FACT SHEET/STATEMENT OF BASIS
FOR APPROVAL OF
CORRECTIVE ACTION COMPLETE
WITHOUT CONTROLS FOR
EIGHTEEN SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN

RCRA PERMIT NO. NM6572124422

HOLLOMAN AIR FORCE BASE
NEW MEXICO

October 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
AFB	Air Force Base
amsl	Above mean sea level
AOC	Area of Concern
AS	Air Sparging
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
BHUST	Base Hospital Underground Storage Tank
BN/AE	Base, neutral, and acid extractable
BRA	Baseline risk assessment
BTEX	Benzene, toluene, Ethylbenzene, and Total Xylenes
CA	Corrective Action
CAC	Corrective Action Complete Without Controls
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CES/CEV	Civil Engineering Squadron/Combat Engineer Vehicle
COPC	Chemical of Potential Concern
CRDL	Contract required detection limit
CSM	Conceptual Site Model
cy	Cubic yards
DPT	Direct Push Technology
DRO	Diesel-range organic
EM	Exposure Model
EPA	United States Environmental Protection Agency
ERP	Environmental Restoration Program
°F	Degrees Fahrenheit
ft	Feet or foot
FWENC	Foster-Wheeler Environmental Corporation
FS/SOB	Fact Sheet/Statement of Basis
GRO	Gasoline-range organic
HAFB	Holloman Air Force Base
HGL	HydroGeoLogic, Inc.
HHRA	Human Health Risk Assessment
HSWA	Hazardous and Solid Waste Amendments
HVAC	Heating, ventilation and air conditioning

IDL	Instrument Detection Limit
IRP	Installation Restoration Program
J&E	Johnson and Ettinger
JP-4	Jet Fuel (Formula 4)
LTM	Long term monitoring
MCL	Maximum contaminant level
µg/m^3	Micrograms per cubic meter
µg/g	Micrograms per gram
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
MOBSS	Mobility Support Squadron
MTBE	Methyl Tertiary Butyl Ether
NAPL	Non-aqueous phase liquid
ND	Non-detect or Not Detected
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMGWQ	New Mexico Groundwater Quality
NMRBDM	New Mexico Risk Based Decision Making
NMWQCC	New Mexico Water Quality Control Commission
NOD	Notice of deficiency
PA	Preliminary Assessment
PCB	Polychlorinated Biphenyl
pCi/g	PicoCuries per gram
PCS	Petroleum-contaminated soil
PID	Photoionization detector
POL	Petroleum, Oil and Lubricants
PRG	Preliminary Remediation Goals
Radian	Radian Corporation, Inc.
RBSL	Risk-based screening level
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROEs	Routes of exposure
SI	Site Investigation

SOB	Statement of Basis
SSL	Soil Screening Level
SSTLs	Site-specific Target Levels
SVE	Soil vapor extraction
SVOC	Semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
T&D	Transportation and disposal
TCE	Trichloroethene
TDS	Total dissolved solids
TOC	Total organic carbon
TOX	Total organic halide
TPH	Total petroleum hydrocarbon
TPHCWG	Total Petroleum Hydrocarbon Working Group
TRPH	Total recoverable petroleum hydrocarbons
USEPA	United States Environmental Protection Agency
UST	Underground storage tank
UTL	Upper Tolerance Limit
VCM	Voluntary Corrective Measures
VOC	volatile organic compound
yd^3	cubic yard(s)

FACT SHEET/STATEMENT OF BASIS FOR APPROVAL OF CORRECTIVE ACTION COMPLETE WITHOUT CONTROLS FOR EIGHTEEN SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN RCRA PERMIT NO. NM6572124422 HOLLOMAN AIR FORCE BASE NEW MEXICO

INTRODUCTION

Under authority of the New Mexico Hazardous Waste Act (Section 74-4-1 et seq., NMSA 1978, as amended, 1992) and the New Mexico Hazardous Waste Management Regulations (20.4.1 NMAC), the New Mexico Environment Department (NMED) can approve or deny hazardous waste permits, closure plans, permit modifications, and amendments.

Two Class 3 Permit Modification Requests (PMRs) were submitted to NMED on June 23, 2008 and July 2, 2008 to modify the U.S. Air Force's/Holloman Air Force Base's (the Permittee's) Hazardous Waste Facility Resource Conservation and Recovery Act (RCRA) Permit No. NM6572124422 (the Permit) pursuant to 20.4.1.900 NMAC (incorporating 40 CFR §270.42[c]). If approved, the permit modification requests would grant Corrective Action Complete Without Controls (hereafter CAC) status for nine (9) Solid Waste Management Units (SWMUs) and nine (9) Areas of Concern (AOCs), and modify Part 4 of the Permit to move these SWMUs and AOCs from the Permit's Appendix 4-A Table A (SWMUs Requiring Corrective Action) to Appendix 4-A Table B (SWMUs/AOCs Not Requiring Corrective Action). Proposed changes to Tables A and B of Appendix 4-A are shown in tables provided in Appendix B of this Fact Sheet/Statement of Basis (FS/SOB). It should be noted that this status was formerly referred to as "no further action" (NFA) status. However, on February 25, 2003, the United States Environmental Protection Agency (EPA) issued Final Guidance on Completion of Corrective Action Activities at RCRA Facilities (Federal Register, Volume 68, Number 37). It provides guidance on procedures for EPA and authorized states when making completion determinations and includes guidance on sites which do or do not require controls such as land use controls, engineering or other institutional controls. Accordingly, a new Appendix 4-A, Table C (SWMUs/AOCs with Corrective Action Complete with Controls) has been added. This was done so that the FS/SOB will be consistent with EPA Guidance and the definitions found in NMAC 20.4.2.7 (*Hazardous Waste Permit and Corrective Action Fees*). This FS/SOB has been compiled from the two separate PMRs which, in some cases, has resulted in figure numbers not being sequential as they were scanned from the original documents and could not be edited. These figures were culled from the various investigation reports referenced in this FS/SOB.

Investigation and remediation of SWMUs/AOCs at Holloman Air Force Base (HAFB) is conducted under both the Air Force Environmental Restoration Program (ERP) and RCRA Corrective Action Program. The sites addressed herein have been under investigation since the early 1990s. Based on the information collected, NMED has concurred that the sites qualify for CAC since the available data for the sites indicates that contaminants pose an acceptable level of risk under current and projected future land use. Therefore, NMED intends, pending public input, to approve the permit modification requests.

The following sites, with SWMU/AOC designations and corresponding ERP Site designations are the subject of this proposed permit modification:

SWMU/AOC No.	SWMU Title	ERP Site No.
SWMU 39	Building 1092 Oil/Water Separator	FT-31
SWMU 105	Golf Course Landfill	LF-19
SWMU 108	MOBSS Landfill Disposal Trench	LF-23
SWMU 115	West Area Landfill #1 PCB Disposal Area	LF-22
SWMU 116	West Area Landfill #2	LF-21
SWMU 127	Building 1092 Waste Oil Tank	FT-31
SWMU 130	Taxiway 4, JP-4 Underground Waste Tank	SS-46
SWMU 135	Building 1092 Oil/Water Sep Drainage Pit	FT-31
SWMU 170	Fire Department Training Area 1	FT-31
AOC-2	Sewage Drainage Pit NE of Building 864	AOC-2
AOC-F	Asphalt Tank Spill Area	SS-68
AOC N	Building 137 Military Gas Tank Leak	SS-48
AOC P	Building 301 Fuel Tank Leaks	OT-44
AOC-R	JP-4 Fuel Line Spill Site	SS-06
AOC-S	Leaking Underground Storage Tank	BHUST
AOC-V	Officer's Club	SS-57
AOC-PRI-2	PRI Building 1264 Solvent Burn Area	OT-35
AOC-PRI-5	PRI Building 1264 Solvent Burn Area	OT-35

A. FACILITY DESCRIPTION

HAFB is located in south central New Mexico, in the north-central part of Otero County, approximately 75 miles north-northeast of El Paso, Texas. HAFB has a population of approximately 6,000 and occupies approximately 59,830 acres in the northeast quarter of Section 1, Township 17 South, Range 8 East. The U.S. Army's White Sands Missile Range testing facilities and White Sands National Monument occupy additional land extending north and west from the base. Private and publicly-owned lands border the remainder of HAFB. The major highway servicing HAFB is Highway 70, which runs southwest from the town of Alamogordo and separates HAFB from publicly-owned lands to the south. Alamogordo, which has a population of approximately 35,000, is located approximately 7 miles east of the base.

HAFB was first established in 1942 as Alamogordo Army Air Field (AAF). From 1942 through 1945, Alamogordo AAF served as the training grounds for over 20 different flight groups, flying primarily B-17s, B-24s, and B-29s. After World War II, most operations had ceased at the base. In 1947, Air Material Command announced the air field would be its primary site for the testing and development of un-manned aircraft, guided missiles, and other research programs. On January 13, 1948, the Alamogordo installation was renamed Holloman Air Force Base, in honor of the late Col. George V. Holloman; a pioneer in guided missile research. In 1968, the 49th Tactical Fighter Wing arrived at HAFB and has remained since. Today, HAFB also serves as a training location for the German Air Force's Tactical Training Center.

The Permittee is located at the following address: Department of the Air Force, Headquarters, 49th Fighter Wing (ACC), Holloman Air Force Base, New Mexico, 88330.

B. HISTORY OF INVESTIGATION

Investigation and remediation of SWMUs and AOCs at HAFB is conducted under both the Air Force ERP and the RCRA Corrective Action Program. The ERP, formerly called the Installation Restoration Program (IRP), was initiated in 1983 and the RCRA Facility Assessment (RFA) was conducted in 1987. A Hazardous and Solid Waste Amendments (HSWA) permit was issued to HAFB by the United States Environmental Protection Agency (EPA) in 1991 and became effective on September 25, 1991. It was reissued by the NMED on February 24, 2004. In January 1996, NMED received authorization from the EPA for corrective action under the HSWA and became the administrative authority for this action. The HSWA portion of the RCRA permit identified sites at the base requiring a Remedial Investigation (RI)/RCRA Facility Investigation (RFI). RFI activities were conducted in two phases. The Phase I RFI was conducted between 1987 and 1992; Phase II of the RFI was conducted between 1992 and 1995. A total of 236 potential SWMUs and 29 AOCs were investigated. Additionally, five remote sites such as radar sites, well fields, and reservoirs were investigated under the RFI. A total of 265 sites were identified and investigated during this process. At the completion of the RFI and RFA processes and through the use of decision documents, 119 SWMUs and AOCs remained on the RCRA permit.

In 1999, the Permittee submitted a request to remove 104 SWMUs and AOCs from the permit. In February 2000, NMED determined that 69 of the 104 SWMUs/AOCs were considered appropriate for removal. A detailed document describing conditions at these sites and the basis for removal was submitted to NMED in October 2000. In February 2001, NMED granted a Class III Permit Modification to remove 69 sites from the Permit. On November 29, 2005, an additional seven sites—six SWMUs and one AOC—were approved for CAC status and re-located from the Permit's Appendix 4-A Table A (SWMUs Requiring Corrective Action) to Appendix 4-A Table B (SWMUs/AOCs Not Requiring Corrective Action).

Section H below briefly describes the location, history, evaluation of relevant information, and the basis for determination for each SWMU/AOC proposed for CAC. More detailed descriptions of the particulars for each SWMU/AOC can be found in the accompanying references constituting the Administrative Record.

This FS/SOB describes the 9 SWMUs and 9 AOCs for which NMED concurred that CAC was appropriate. In summary, if NMED approves the Permittee's request for a permit modification, these 18 sites will be removed from the Permit's Appendix 4-A Table A to Appendix 4-A Table B. In addition, at the Permittee's request, sixteen (16) previously unidentified potential sites will be added as AOCs to Table A.

C. ADMINISTRATIVE RECORD

The Administrative Record for this proposed action consists of the Class 3 Permit Modification Request, this FS/SOB, the Public Notice, the Draft Permit consisting of revised Tables 4-A and

4-B, and the referenced supporting documentation for each site. References for this FS/SOB are listed in each site-specific section in Section H, below. The complete Administrative Record may be reviewed at the following location during the public comment period:

NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone: (505) 476-6000
Monday-Friday: 8:00 am – 5:00 pm

The Permit Modification Request, the FS/SOB, the Public Notice, and the draft Permit may also be reviewed at the following locations during the public comment period:

NMED-District 1 Albuquerque Office
5500 San Antonio NE
Albuquerque, New Mexico 87109
(505) 222-9500
Monday - Friday from 8:00 am to 4:00 pm

Alamogordo Public Library
920 Oregon Avenue
Alamogordo, New Mexico 88330
(575) 439-4140
Monday – Thursday, 10:00 am to 8:00 pm,
Friday 10:00 am to 5:00 pm and
Saturday 11:00 am to 5:00 pm

D. PUBLIC PARTICIPATION

The Permittee issued public notices on June 20, 2008 and July 2, 2008 to announce the beginning of a 60-day comment period on the PMR, which continued until August 19 and September 2, 2008, 5:00 pm. Persons who wished to comment on this action or request a public hearing had an opportunity to submit written and/or electronic mail (e-mail) comment(s) during this period. Additionally, public meetings were held on June 16, 2008 and July 8, 2008 in Alamogordo in accordance with NMAC 20.4.1.901 as part of the 60-day public comment period on the PMR required by the regulations at 40 CFR §270.42(c)(5). There were no attendees at the public meeting and no comments were received during the 60-day comment period.

NMED issued a public notice on **October 29, 2012** to announce the beginning of a 45-day comment period that will end at **5:00 p.m. MST, December 28, 2012**. Any person who wishes to comment on this action or request a public hearing should submit written or electronic mail (e-mail) comment(s) with the commenter's name and address to the address below. Only comments and/or requests received on or before **5:00 p.m. MST, December 28, 2012** will be considered.

John E. Kieling, Chief
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Or via e-mail: john.kieling@state.nm.us
Ref: Holloman AFB – 18 Corrective Action Complete

Written comments must be based on the administrative record. Documents in the administrative record need not be re-submitted if expressly referenced by the commenter. Requests for a public hearing shall provide: (1) a clear and concise factual statement of the nature and scope of the interest of the person requesting the hearing; (2) the name and address of all persons whom the requestor represents; (3) a statement of any objections to the proposed action, including specific references; and (4) a statement of the issues which such persons propose to raise for consideration at the hearing. Written comment and requests for Public Hearing must be filed with Mr. John Kieling on or before **5:00 p.m. MST, December 28, 2012**. The NMED will provide a thirty (30) day notice of a public hearing, if scheduled.

E. NEXT STEPS

The NMED will ensure that the approved draft Permit is consistent with the New Mexico Hazardous Waste Management Regulations. All written comments submitted on the draft Permit will become part of the administrative record, will be considered in formulating a final decision, and may cause the draft Permit to be modified. NMED will respond in writing to all significant public comment. The response will specify which provisions, if any, of the draft Permit have been changed in the final Permit decision, and the reasons for the change. This response will also be posted on the NMED website in addition to notifying all persons providing written comments.

The NMED will notify KAFB, each person on the facility mailing list, and each person who made a public comment of the final decision. The final decision will become effective 30 days after service of the decision unless a later date is specified or a review is requested under the New Mexico Hazardous Waste Management Regulations, 20.4.1.900 NMAC.

F. NMED CONTACT PERSON FOR ADDITIONAL INFORMATION

For additional information from the NMED, contact one of the following individuals:

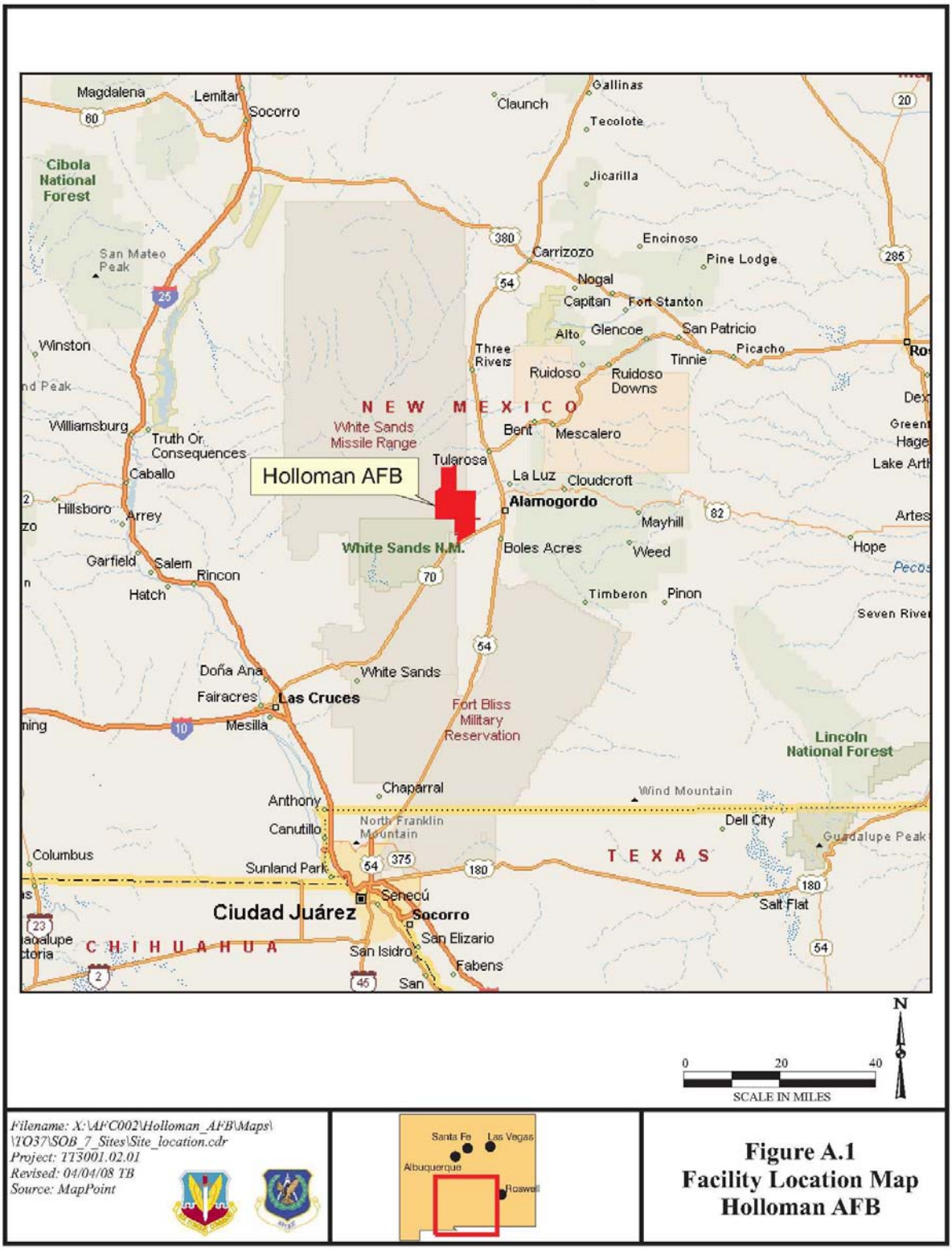
John E. Kieling, Chief
NMED – Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
E-mail: john.kieling@state.nm.us
Telephone: (505) 476-6035
Fax: (505) 476-6030

David Strasser, Environmental Specialist
NMED – Hazardous Waste Bureau
5500 San Antonio Dr. NE
Albuquerque, NM 87109
E-mail: david.strasser@state.nm.us
Telephone: (505) 222-9526
Fax: (505) 222-9510

G. HAFB CONTACT PERSON FOR ADDITIONAL INFORMATION

The Permittee's primary contact for the action is:
Mr. David Scruggs, Chief
Environmental Flight
49 CES/CEVR
550 Tabosa Avenue
Holloman AFB, NM 88330-8458.
Telephone: (575) 572-5395

Figure A1 Facility Location Map, Holloman AFB



Filename: X:\AFC002\Holloman_AFB\Maps
\TO37\SOB_7_Sites\Site_location.cdr
Project: 173001.02.01
Revised: 04/04/08 TB
Source: MapPoint

Figure A.1
Facility Location Map
Holloman AFB

Figure A2 Seven SWMU/AOC Location Map

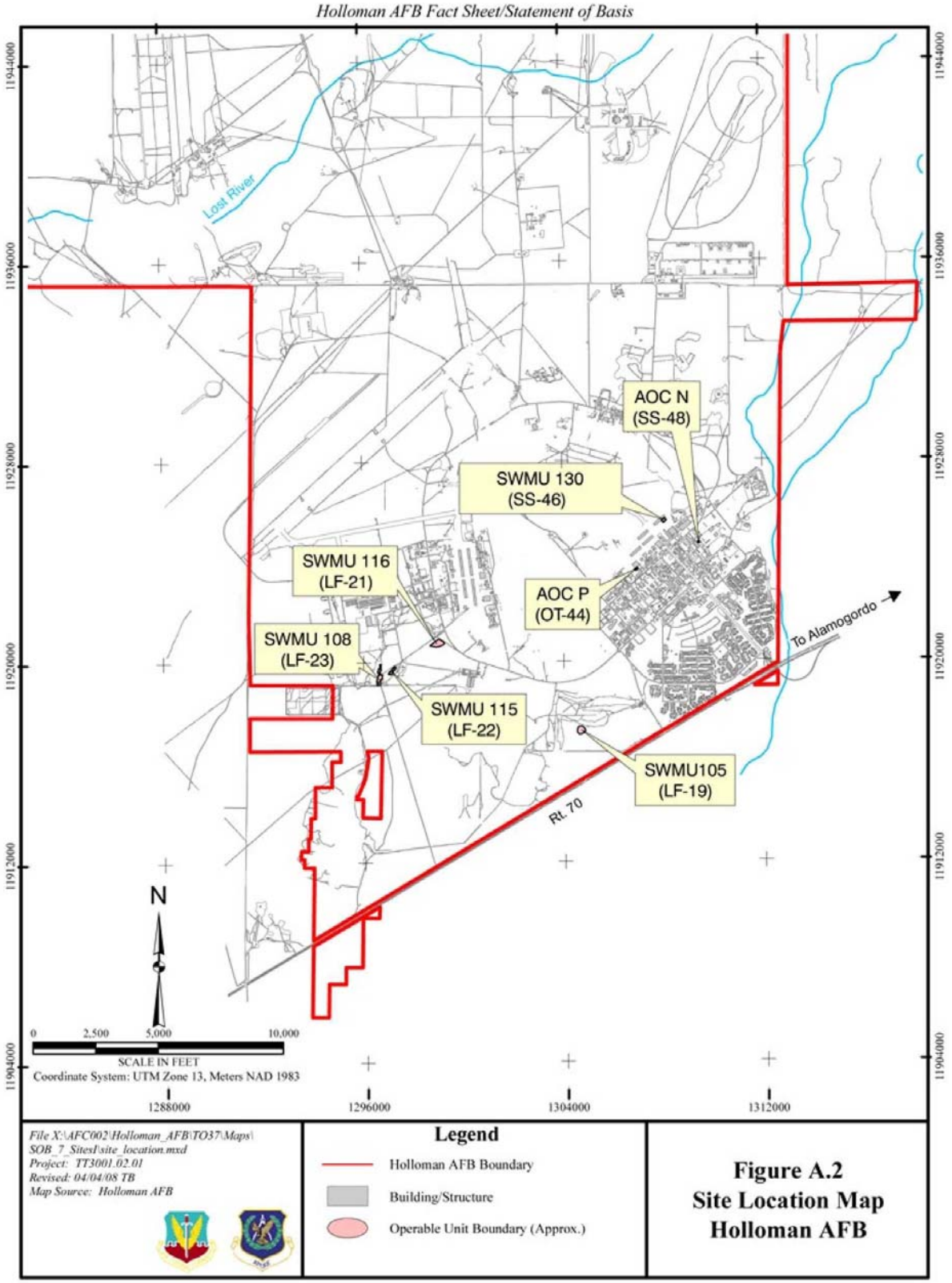
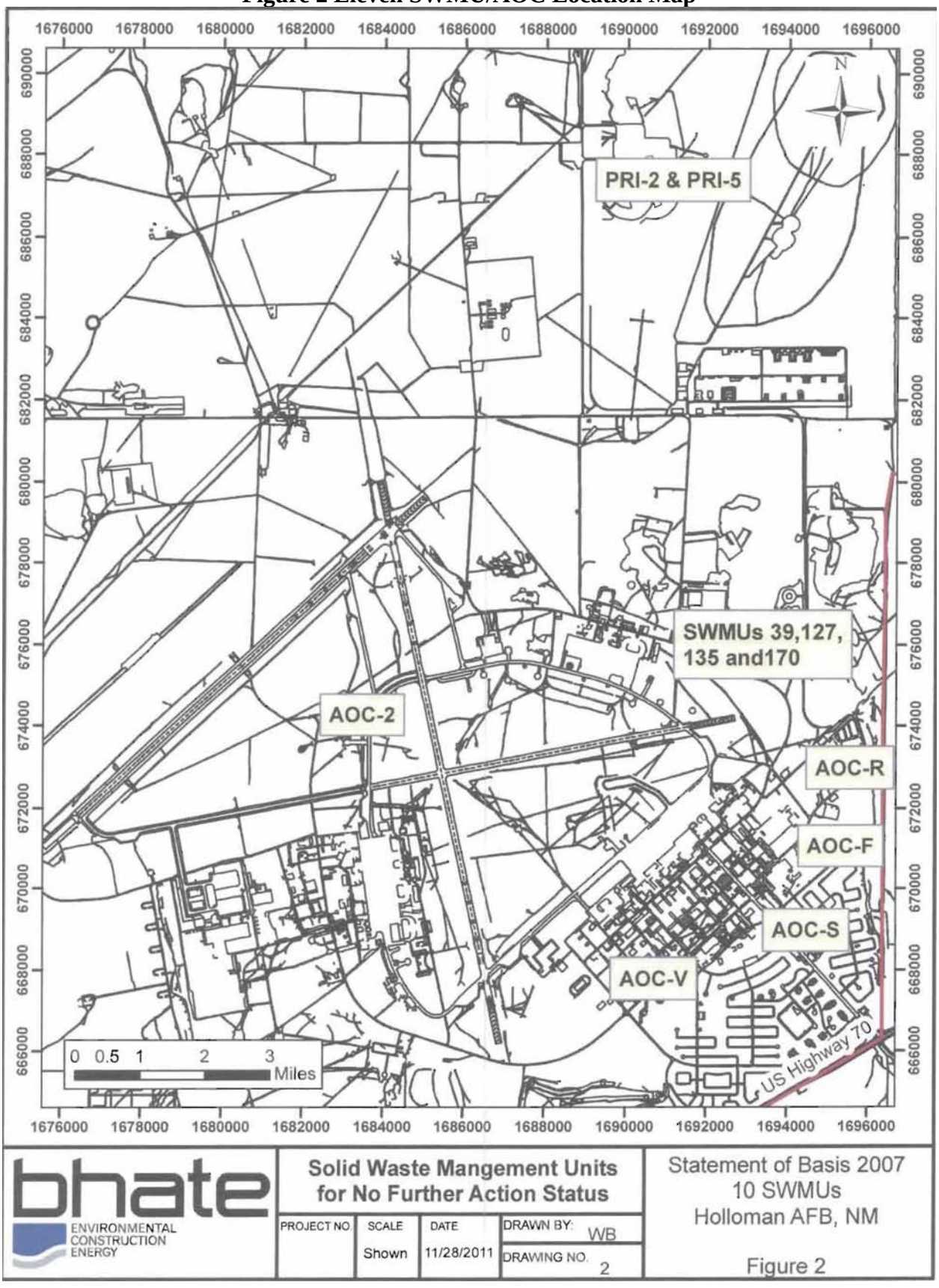


Figure 2 Eleven SWMU/AOC Location Map



H. DESCRIPTION OF SWMUS AND AOCS PROPOSED FOR CAC

H.1 LF-19 (SWMU 105), GOLF COURSE LANDFILL

H.1.1 Location/Unit Description

LF-19, the Golf Course Landfill, is located due south of Fairway 7 of the Holloman AFB golf course and approximately 800 feet north of the southern Base boundary. The location of LF-19 with respect to the surrounding facility is shown on **Figure A2**. A site layout of LF-19 is provided as **Figure H1.1**.

LF-19 is approximately two acres in size and encompasses two disposal units (herein designated as the "northern" and "southern" disposal units). The two disposal units are separated by a narrow, shallow, man-made drainage ditch that trends northeast to southwest. Both disposal units are unpaved, primarily undeveloped, and partially vegetated. The largest portion of LF-19 is comprised of the northern disposal unit, which lies immediately south of the golf course. This unit is bounded to the north and northeast by the asphalt-paved golf cart path; to the east by a fenced-in cactus garden, a small salt cedar grove, and an aggregate (i.e., sand) stockpile; to the south by the shallow, man-made drainage ditch; and to the west by undeveloped, moderately vegetated land. The majority of the northern disposal unit is open, unpaved, and primarily clear of vegetation. Vegetation consisting of salt cedars, shrubs, and grasses is located primarily along the periphery of the northern disposal unit. The golf course historically and currently uses the northern disposal unit for the exterior storage of golf course materials and supplies. At the time of the supplemental RFI field investigation, sand and mulch piles, slashed vegetation, and grass clippings were observed. Minor amounts of concrete rubble were present in the southwestern portion of the disposal area, while scrap metal and degraded metallic corrugated piping was present southeast of the unit. The slashed vegetation and grass clippings were present in the southern portion of the disposal unit. The southern disposal unit is located immediately south of the northern disposal unit, across the narrow, shallow, man-made drainage ditch. This disposal unit is characterized primarily by a long, linear, east-west trending mound ranging approximately 2 feet above the surrounding topography, approximately 150 feet south of the man-made drainage ditch. The area between the mound and the drainage ditch is relatively flat, moderately vegetated with shrubs, and criss-crossed by several unpaved service roads. Sporadic amounts of scrap metal were observed on the surface of the mound. North of the mound, the ground was also sporadically littered with scrap metal. To the south of the debris mound, little to no debris was observed.

H.1.2 History

LF-19 was used between 1968 and 1978 as a disposal site for golf course grass clippings; however, the RFA indicated that unused rodenticides may have been disposed at the landfill. No other information has supported the potential disposal of unused rodenticides at LF-19.

The current and anticipated future land use is open space.

H.1.3 Evaluation of Relevant Information

In 1992, a RFI consisting of installing and sampling three groundwater monitoring wells (MW19-01 through MW19-03) was conducted (Radian Corporation, Inc. [Radian], 1994). The

locations of the wells in relation to the site are shown on **Figure H1.1**. The collected groundwater samples were analyzed for volatile organic compounds (VOCs), organochlorine pesticides, organophosphorus pesticides, polychlorinated biphenyls (PCBs), chlorinated herbicides, total metals, anions, and total dissolved solids (TDS). Table H1.1 presents the RI analytical results screened against the EPA Maximum Contaminant Levels (MCLs) and New Mexico Groundwater Quality (NMGWQ) standards. None of the analytes were detected above background concentrations and EPA MCLs. Cadmium and chloride were the only analytes detected at concentrations exceeding background and NMGWQ standards. No organochlorine pesticides, organophosphorus pesticides, PCBs, or chlorinated herbicides were detected in the groundwater samples and no site-related VOCs were detected. Methylene chloride was detected but was considered a remnant of laboratory blank contamination. Based on the analytical results, the RFI concluded that wastes, if present at LF-19, had not impacted the underlying groundwater and that the site did not present an unacceptable risk even under worst-case exposure conditions.

Based on the results of the RI, Holloman AFB submitted a Decision Document (Radian, 1995) concluding a no-action remedy was appropriate for LF-19. As part of the no-action remedy, surface debris would be removed, a plat of survey would be produced, and groundwater long term monitoring (LTM) would be conducted at the site at the request of NMED and EPA. LTM activities would consist of the biennial collection and analysis of groundwater samples from the three onsite wells for 10 years to ensure that any potential future release from the site would be detected. The collected groundwater samples were to be analyzed for VOCs, organochlorine pesticides, organophosphorus pesticides, chlorinated herbicides, and metals. NMED concurred with and signed the Decision Document.

LTM activities were initiated in 1995. Over the course of the program, the required target analyte list (TAL) for metals was reduced due to lack of analyte detections. By 2003, the required TAL had been reduced to barium, iron, and manganese. With the exception of lead in the first round of sampling, no constituents in the downgradient wells were detected above background concentrations and NMGWQ standards. The TDS concentrations of the groundwater beneath LF-19 exceed 10,000 milligrams per liter (mg/L); indicating that the water is not a potable or agricultural source. The 2003 LTM event marked the fifth biennial sampling event for LF-19. Consequently, within the 2003 LTM report, cessation of LTM and site closeout was recommended [Bhate Environmental Associates (Bhate), 2003]. The groundwater analytical results obtained during 10 years of LTM monitoring and associated EPA MCLs and NMGWQ standards are presented on Table H1.2.

NMED informed Holloman AFB that LTM could be suspended, but that a CAC determination for LF-19 would be considered after additional characterization was performed at the site. Additional characterization activities consisted of a geophysical survey (terrain conductivity and in-phase geophysical survey) and site trenches were conducted in the fall 2005 and spring 2006. The non-invasive geophysical survey conducted on the site and surrounding area confirmed the absence of subsurface metallic anomalies. Magnetic surveying identified a few discrete magnetic anomalies associated with areas containing metallic or magnetically susceptible surface debris. Terrain conductivity results did not suggest the presence of a landfill.

On May 22, 2006, four trenches (designated as HGLTR19-01 through HGLTR19-04) and two test pits (designated as HGLTP19-01 through HGLTP19-02) were completed at LF-19. The

trenches were completed within both lobes of the landfill and targeted identified geophysical anomalies and areas of visual interest. The locations of the trenches are depicted on **Figure H1.1**. During propagation of trench HGLTR19-01, small bluish crystals were observed around several corroded copper pipe fragments. NMED visually inspected the LF-19 trenches on May 22, 2006, during which NMED was notified of the bluish crystals (Strasser, 2006). After inspecting the trench, NMED approved the collection of two soil samples, one from the area containing the bluish crystals and one from the soil immediately beneath it. The soil samples were analyzed for organochlorine pesticides, organophosphorous pesticides, herbicides, and TAL metals. The location of the two soil samples is depicted on **Figure H1.1**.

No organochlorine pesticides or herbicides were detected in the two soil samples. Several organophosphorous pesticides were detected in both soil samples with concentrations typically higher in the near surface soil sample (HGLTR19-01-0102). None of the organophosphorous pesticides concentrations detected in the soil samples exceeded NMED soil screening criteria. Elevated copper, aluminum, chromium, and manganese concentrations were detected in HGLTR19-01-0102, the soil sample containing the bluish crystals. The reported copper concentration exceeded the NMED residential soil screening level (SSL). None of the metals detected in sample HGLTR19-01-0203, collected within one foot below sample HGLTR19-01-0102, were detected at concentrations above NMED SSLs. The presence of the bluish crystals only immediately around the copper pipe fragments, the elevated copper concentrations in shallow soil sample HGLTR19-01-0102, and the lack of elevated metal concentrations in the deeper soil sample (HGLTR19-01-0203) supported the conclusion that the observed bluish crystals are a copper salt formed from the corrosion of copper pipe fragments. The soil analytical results are summarized on **Table H1.3**.

Based on the analytical results, a CAC determination was made and the transfer of LF-19 from Appendix 4-A Table A to Appendix 4-A Table B was requested within the RFI report [HydroGeoLogic, Inc. (HGL), 2007]. On May 1, 2007, NMED approved the RFI report (NMED, 2007). A copy of the NMED approval letter is provided as **Figure H1.2**.

H.1.4 Basis for Determination

NMED concurred with the RFI conclusion that SWMU 105 (LF-19) is suitable for a CAC determination since no release to the environment has occurred or is likely to occur in the future from the SWMU/AOC.

H.1.5 References

Bhate Environmental Associates, Inc. (Bhate), 2003. Final 2003 Long-Term Groundwater Monitoring Report, Holloman AFB, New Mexico. September.

HydroGeoLogic, Inc. (HGL), 2007. Supplemental RCRA Facility Investigation, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWMU 115), and LF-23 (SWMU 108), Holloman Air Force Base, Alamogordo, New Mexico. February.

New Mexico Environment Department (NMED), 2007. Approval of the Supplemental RCRA Facility Investigation Report, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWMU 115), and LF-23 (SWMU 108), February 2007, Holloman Air Force Base, EPA ID#NM6572124422, HWB-HAFB-07-003. May 1.

Radian Corporation (Radian), 1992. RI, Report, Volume II of III, Appendices A, B, C, and D, Investigation, Study and Recommendation for 29 Waste Sites.

Radian, 1993. Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites, Holloman Air Force Base, New Mexico.

Radian, 1994. Draft Final Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Volume 1, Holloman AFB, New Mexico. October.

Radian, 1995. Decision Documents, Multiple Sites.

Strasser, D. 2006. Personnel communication between Mr. Dave Strasser of NMED and Mr. Brett Brodersen of HGL while conducting an onsite inspection of the LF-19 trenches. The discussion was in regard to the collection of soil samples from trench HGLTR19-01 and associated NMED required analyses. May 22.

Table H1.1
Remedial Investigation Groundwater Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Analyses	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-19-01 (upgradient) 10/26/91	MW-19-02 10/26/91	MW-19-03 10/26/91
Inorganic Results (mg/L)							
EPA 160.1- Total Dissolved Solids	43,600	--	1,000	10	*17,000*	*21,000*	*42,000*
EPA 300.0- Chloride	19,600	--	250	26	*7,200*	*8,200*	***20,000***
EPA 300.0- Sulfate	7,470	--	600	5.0	*3,400*	*4,600*	*7,100*
EPA 340.2- Fluoride	4.7	4	1.6	0.10	*1.7*	*3.2*	*1.8*
EPA 353.1- Nitrate-Nitrite	98	--	--	0.022	1.2	8.6	5.7
EPA 365.2- Total Phosphorous	0.75	--	--	0.020	0.26	0.5	0.18
SW6010- Metals (µg/L)							
Antimony	89.6	6	--	100	*140*	***140***	*100*
Cadmium	8.3	5	10	5	*6.3*	*5.4*	***11***
Chromium	234	100	50	10	12	17	ND
Nickel	43.6	--	200^	20	32	33	29
Zinc	253.4	--	10,000	20	33	41	< 0.020
SW7421- Lead (µg/L)	19.9	15	50	3	< 0.0030		***21***
Organic Results							
SW8240 - Volatile Organics (µg/L)							
Methylene Chloride	--	--	100	5.0	3.8 J	< 5.0	22

Notes:
Table presents only constituents detected in ground water at this site.
EPA = United States Environmental Protection Agency MCL = Maximum Contaminant Level
NMGWQ = New Mexico Groundwater Quality mg/L = milligrams per liter
µg/L = micrograms per liter -- = No value or standard was found
J = Detected below the detection limit.

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels
^ NMGWQ Standard for Irrigation Use

[1] Source for Inorganics Values is: Radian (1992). Source for Metals is Radian (1993).

Table H1.2
Long Term Groundwater Monitoring Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Well Number				MW-19-01[4]				
Sampling Data	**Background^**	**EPA MCL (µg/L)**	**NMGWQ Standard (µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
1,2,3- Trichlorobenzene[6]	--	--	--	NA	ND	NA	NA	NA
1,2,4- Trichlorobenzene[6]	--	70	--	NA	ND	NA	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA
Barium	85.2	2000	1000	ND	19	14.5 B (J)	11.3	7.18 J
Cadmium	7.4	5	10	ND	ND	.03 B	NA	NA
Iron	--	--	1000	ND	ND	< 21	89.3	< 200
Lead	5.6	15	50	***54***	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	*230*	*284 (J)*	*597 (J)*	*514*
Mercury	0.03	2	2	ND	ND	< 0.2	< 0.5	NA
Selenium	85.3	50	50	ND	ND	2.9 B (J)	NA	NA
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA

Table H1.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-19-02				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
1,2,3- Trichlorobenzene[6]	--	--	--	NA	1.7 J	NA	NA	NA
1,2,4- Trichlorobenzene[6]	--	70	--	NA	0.9 J	NA	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	3.9 B (J)	NA	NA
Barium	85.2	2000	1000	ND	ND	21.6 B (J)	15.2	11.9
Cadmium	7.4	5	10	ND	ND	0.5 B	NA	NA
Iron	--	--	1000	ND	ND	132	< 1000	146 J
Lead	5.6	15	50	***540***	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	*246 (J)*	77.5 (J)	79.6
Mercury	0.03	2	2	ND	ND	0.56 (J)	< 0.5	NA
Selenium	85.3	50	50	ND	ND	2.7 B (J)	NA	NA
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA

Table H1.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-19-03				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
1,2,3- Trichlorobenzene[6]	--	--	--	NA	ND	NA	NA	NA
1,2,4- Trichlorobenzene[6]	--	70	--	NA	ND	NA	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA
Barium	85.2	2000	1000	ND	ND	17.8 B (J)	18.8 B	10.6 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	< 110	***< 10,000***	< 200
Lead	5.6	15	50	***420***	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	1.1 B (J)	1.5 B (J)	< 100
Mercury	0.03	2	2	ND	ND	< 0.2	< 0.5	NA
Selenium	85.3	50	50	ND	ND	4.1 B (J)	NA	NA
Silver	6.7	--	50	ND	ND	1.3 B (J)	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Chlorinated Herbicides[4] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA

Table H1.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
Laboratory qualifiers--
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
assigned as a result of internal laboratory data assessment procedures
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
B - Value less than CRDL but greater than or equal to IDL
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to 1999 using EPA Method 8081A.
J - estimated value; less than CRDL but greater than or equal to IDL
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
[4] Upgradient monitoring well
EPA Qualifiers--assigned as a result of independent data validation
CRDL = Contract Required Detection Limit
(J) - Estimated value
IDL = Instrument Detection Limit
(UJ) - Estimated value blow the reporting limit
NA = not analyzed
(U) Compound was analyzed for but not detected.
ND = not detected at or above method reporting limit
2003 Validation Qualifiers
VOC = volatile organic compound
J - Estimated value detected less than the CRDL but greater than the reporting limit.
µg/L = micrograms per liter
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
-- = No value or standard was found
UJ - Estimated as a non-detect at the detection limit.
SWMU = solid waste management unit
AFB = Air Force Base
NM = New Mexico
EPA = United States Environmental Protection Agency
NMGWQ = New Mexico Groundwater Quality
Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels
^ Radian (1993)

Table H1.3
Soil Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Analyte	NMED Soil Screening Levels, June 2006 Revision 4.0 Table A-1 Residential Soil	Indust/Occup Soil	Const Worker Soil	HGLTR19-01-0102 1-2' 5/22/2006		HGLTR19-01-0203 2-3' 5/22/2006	
Chlorinated Herbicides (µg/kg)				ND		ND	
Organophosphorous Pesticides (µg/kg)				ND		ND	
Organochlorine Pesticides (µg/kg)							
alpha-Chlordane	16,200[(1)]	71,900[(1)]	130,000[(1)]	119		2.90	
gamma-Chlordane	16,200[(1)]	71,900[(1)]	130,000[(1)]	144		2.00	
p,p-DDE	17,200	78,100	570,000	51.6		--	
p,p-DDT	17,200	78,100	138,000	7.00		1.90	
Endosulfan I	367,000[(2)]	4,100,000[(2)]	1,400,000[(2)]	93.2		--	
Endosulfan sulfate	367,000[(2)]	4,100,000[(2)]	1,400,000[(2)]	6.10		--	
Endrin aldehyde	18,300[(3)]	205,000[(3)]	69,900[(3)]	105		1.00	
Metals (mg/kg)							
Aluminum	77,800	100,000	**14,400**	**58,300**		1,200	
Antimony	31.3	454	124	3.64	J	--	
Arsenic	3.9	17.7	85.2	3.17		1.88	
Barium	15,600	100,000	60,200	16.4		17.4	
Calcium	NA	NA	NA	28,700		156,000	
Chromium	234[(4)]	3,400[(4)]	**26.1**[(4)]	**78.6**		0.976	J
Cobalt	1,520	20,500	61.0	3.47		0.695	J
Copper	**3,130**	45,400	12,400	**7,870**		20	
Iron	23,500	100,000	92,900	4,060		1,240	
Lead	400	800	800	367		7.37	
Magnesium	NA	NA	NA	8,640		2,250	
Manganese	3,590	48,400	**150**	**480**		17.5	
Nickel	1,560	22,700	6,190	310		1.21	J

Table H1.3 (continued)
Soil Analytical Results
LF-19 (SWMU 105)
Holloman AFB, New Mexico

Analyte	NMED Soil Screening Levels, June 2006 Revision 4.0 Table A-1			HGLTR19-01-0102 1-2'		HGLTR19-01-0203 2-3'	
	Residential Soil	Indust/Occup Soil	Const Worker Soil	5/22/2006		5/22/2006	
Potassium	NA	NA	NA	1,240		619	
Silver	391	5,680	1,550	4.26		--	
Sodium	NA	NA	NA	9,280		3,020	
Vanadium	78.2	1,140	310	15.4		2.19	J
Zinc	23,500	100,000	92,900	2,040		5.16	

Notes:
(1) Chlordane NMED SSL value used as surrogate for alpha-chlordane and gamma-chlordane
(2) Endosulfan NMED SSL value used as surrogate for endosulfan I and endosulfan sulfate
(3) Endrin NMED SSL value used as a surrogate for endrin aldehyde
(4) Hexavalent chromium NMED SSL value used as a surrogate for chromium

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NMED = New Mexico Environment Department
SSL = soil screening level

Gray shaded and b**olded** analyte concentrations indicate analyte concentrations above one or more screening criteria values
Bolded screening criteria values are those values exceeded by an analyte concentration

Figure H1.1 LF-19 (SWMU 105) Site Layout, Holloman AFB

Holloman AFB Fact Sheet/Statement of Basis

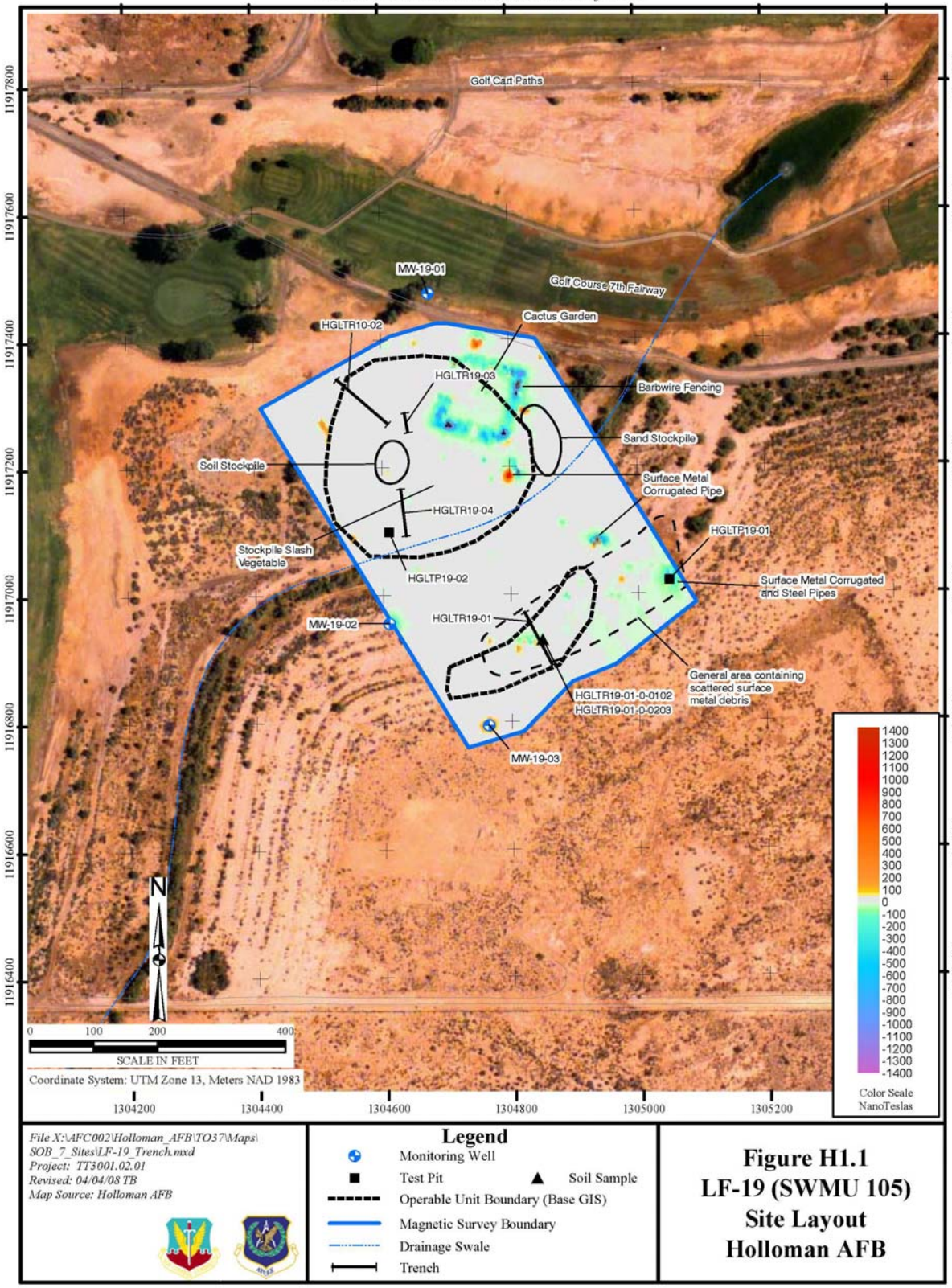
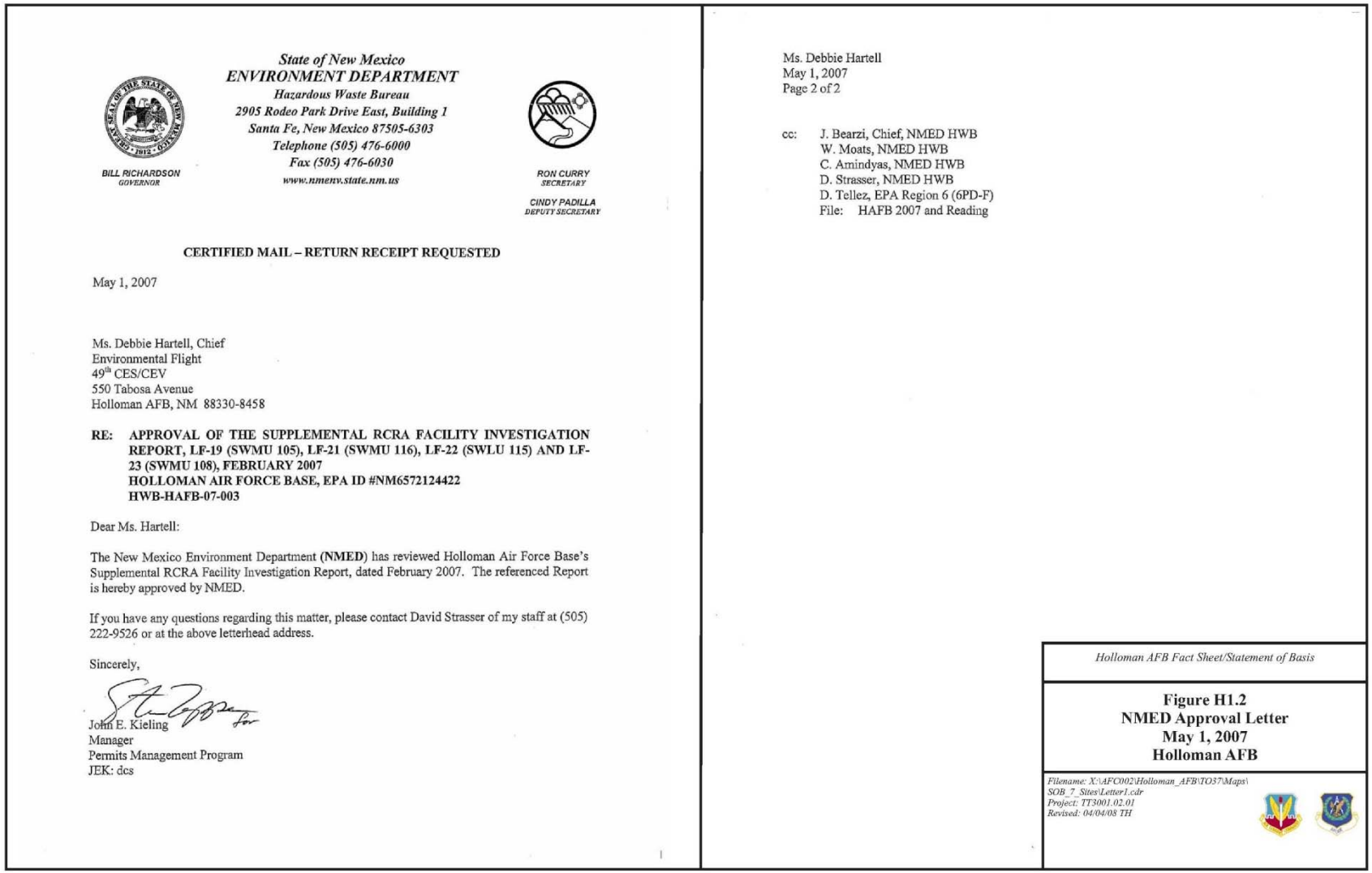


Figure H1.2 NMED Approval Letter, May 1, 2007



State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 476-6000
Fax (505) 476-6030
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CINDY PADILLA
DEPUTY SECRETARY

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

May 1, 2007

Ms. Debbie Hartell, Chief
Environmental Flight
49th CES/CEV
550 Tabosa Avenue
Holloman AFB, NM 88330-8458

RE: APPROVAL OF THE SUPPLEMENTAL RCRA FACILITY INVESTIGATION REPORT, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWLU 115) AND LF-23 (SWMU 108), FEBRUARY 2007
HOLLOMAN AIR FORCE BASE, EPA ID #NM6572124422
HWB-HAFB-07-003

Dear Ms. Hartell:

The New Mexico Environment Department **(NMED)** has reviewed Holloman Air Force Base's Supplemental RCRA Facility Investigation Report, dated February 2007. The referenced Report is hereby approved by NMED.

If you have any questions regarding this matter, please contact David Strasser of my staff at (505) 222-9526 or at the above letterhead address.

Sincerely,

John E. Kieling
Manager
Permits Management Program
JEK: dcs

Ms. Debbie Hartell
May 1, 2007
Page 2 of 2

cc: J. Bearzi, Chief, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Tellez, EPA Region 6 (6PD-F)
File: HAFB 2007 and Reading

Holloman AFB Fact Sheet/Statement of Basis

Figure H1.2
NMED Approval Letter
May 1, 2007
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO37\Maps\SOB_7_Sites\Letter1.cdr
Project: TT3001.02.01
Revised: 04/04/08 TH

H.2 LF-21 (SWMU 116), WEST AREA LANDFILL NO. 2

H.2.1 Location/Unit Description

LF-21, the West Area Landfill No. 2, is located east of the Solar Observatory (Building 910), in the southwestern corner of the intersection of Observatory Road and Forty-Niner Avenue. The location of LF-21 with respect to the surrounding facility is shown on **Figure A.2**. A site layout of LF-21 is provided as **Figure H2.1**. LF-21 is an undeveloped, slightly-to-moderately vegetated parcel of land approximately three acres in size. The site is unpaved, and vegetation, consisting primarily of salt cedars and shrubs, is present in shallow depressions and around/within small debris mounds. The thickest concentration of vegetation is present along the northern and eastern site boundaries. The site is bounded to the northwest by Observatory Road, to the northeast by Forty-Niner Avenue, and to the southwest and southeast by undeveloped land. Access to LF-21 is unrestricted. A large, green-painted, metallic storage box and several fox holes constructed of sand bags are present in the western portion of LF-21. The presence of the storage box and the fox holes indicates that LF-21 has been used and possibly continues to be used for military training exercises. Although the north-central portion of the unit is clear of vegetation, no defined service roads (paved or unpaved) have been observed at the site. Debris consisting of a mixture of concrete and asphalt rubble, terra cotta pipe fragments, metal piping, green and white colored PVC pipes, a wood door, metal cables, and rebar is present on the surface in discrete piles located throughout LF-21. The debris occurs primarily in distinct mounds that are typically less than one foot above the grade of the surrounding topography.

H.2.2 History

LF-21 was reportedly used to dispose of paper bags, food, cans, boxes, boards, and tree limbs from the early 1970s to 1977. According to one interviewee during the records search, some 55-gallon drums were also observed during the active period of disposal. Disposal at this site ceased after the site was identified as an unapproved landfill.

The current and anticipated future land use is industrial.

H.2.3 Evaluation of Relevant Information

In 1992, a RI consisting of installing and sampling four groundwater monitoring wells (MW21-01 through MW21-04) was conducted at LF-21 (Radian, 1994). The monitoring wells were installed up-slope (MW21-01) and down-slope (MW21-02 through MW21-04) of the former landfill (**Figure H2.1**). The groundwater samples were analyzed for VOCs, organochlorine pesticides, organophosphorus pesticides, PCBs, chlorinated herbicides, total metals, anions, and TDS. **Table H2.1** presents the RI groundwater analytical results screened against EPA MCLs and NMGWQ standards. No organochlorine pesticides, organophosphorus pesticides, PCBs, or chlorinated herbicides were detected in the groundwater samples. Several VOCs were detected; however, all of the VOCs were detected at concentrations below screening criteria. Cadmium was the only analyte detected hydraulically downgradient of the site at a concentration [24 micrograms per liter (µg/L) in MW21-02] that exceeded both the background concentration and the NMGWQ standard of 10 µg/L.

Based on the results of the RI, Holloman AFB submitted a Decision Document (Radian, 1995) concluding a CAC determination was appropriate for LF-21. As part of the CAC determination, surface debris would be removed, a plat of survey would be produced, and groundwater LTM would be conducted at the site at the request of NMED and EPA. LTM activities would consist of the biennial collection and analysis of groundwater samples from the three onsite wells for 10 years to ensure that any potential future release from the site would be detected. NMED concurred with and signed the Decision Document.

LTM activities were initiated in 1995. The results of the LTM sampling events are summarized on **Table H2.2**. Over the course of the program, the required analyte list was reduced until, by 2003, the required analyte list included only barium, iron, and manganese. With the exception of iron in MW21-04 (September 2001) and manganese in MW21-02 (December 2005), no constituents in the downgradient wells were detected above background concentrations and NMGWQ standards. TDS concentrations ranged from 11,300 to 36,700 mg/L and exceeded the NMGWQ standard (1,000 mg/L) at each of the four wells sampled. In accordance with the Decision Document and given the lack of analytes above screening criteria, cessation of LTM activities and site closeout was recommended (Bhate, 2003).

NMED informed Holloman AFB that additional characterization of the landfill would be required before CAC status would be considered and that LTM could not be suspended due to the presence of trichloroethene (TCE) in MW21-01, the upgradient monitoring well. LTM activities were therefore conducted in 2005. The required analyte list for the 2005 LTM event was increased to include VOCs, TAL metals, pesticides, herbicides, and TDS. The results of the sampling event were consistent with previous events except for an elevated manganese concentration within MW21-02 exceeding the NMGWQ standard (200 µg/L). The TDS concentrations of the groundwater beneath LF-21 exceed 10,000 mg/L, indicating that the water is not a potable or agricultural source. Based on the results of the 2005 LTM event and pending the results of additional characterization activities being conducted, the cessation of LTM activities was recommended (Bhate, 2006).

Additional characterization activities, consisting of a geophysical survey and site trenching, were conducted in 2005 and 2006. The geophysical survey included both a terrain conductivity and magnetic in-phase survey. Terrain conductivity results did not imply the presence of a landfill. The magnetic in-phase survey identified a few discrete magnetic anomalies associated with areas containing metallic or magnetically susceptible debris in the surface soils and confirmed the absence of subsurface metallic anomalies. On May 18 and 19, 2006, three trenches (designated as HGLTR21-01 through HGLTR21-03) and four test pits (designated as HGLTP21-01 through HGLTP21-04) were completed at LF-21 (**Figure H2.1**) to investigate the identified anomalies. The trenches/test pits were completed to maximum depths ranging from 4 to 6 feet below ground surface (bgs) and ranged from 50 feet (HGLTR21-01) to 114 feet in length (HGLTR21-03). During a visual inspection of the sites proposed for trenching, construction debris (i.e., concrete and asphalt rubble, scrap metal, plastic piping, and a wooden door) was observed scattered across the surface of all three areas to be trenched. No hazardous materials, contaminated soils, unusual solids or fluids, or hazardous material storage containers were observed during LF-21 trenching activities based on visual inspection and photoionization detector field screening results. Consequently, no soil samples were collected for laboratory analysis.

Based on the findings of the additional characterization, the RFI recommended CAC and the transfer of LF-21 from Appendix 4-A Table A to Appendix 4-A Table B of the RCRA permit. On May 1, 2007, NMED approved the RFI report (NMED, 2007). A copy of the approval letter is provided as **Figure H1.2**.

H.2.4 Basis for Determination

NMED concurred with the RFI conclusion that SWMU 116 (LF-21) is suitable for CAC approval since the SWMU/AOC has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.2.5 References

Bhate Environmental Associates, Inc. (Bhate), 2003. Final 2003 Long-Term Groundwater Monitoring Report, Holloman AFB, New Mexico. September.

Bhate, 2006. Final 2005 Long-Term Groundwater Monitoring Report, Holloman AFB, New Mexico. May.

New Mexico Environment Department (NMED), 2007. Approval of the Supplemental RCRA Facility Investigation Report, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWMU 115), and LF-23 (SWMU 108), February 2007, Holloman Air Force Base, EPA ID#NM6572124422, HWB-HAFB-07-003. May 1.

Radian Corporation (Radian), 1992. RI, Report, Volume II of III, Appendices A, B, C, and D, Investigation, Study and Recommendation for 29 Waste Sites.

Radian, 1993. Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites, Holloman Air Force Base, New Mexico.

Radian, 1994. Draft Final Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Volume 1, Holloman AFB, New Mexico. October.

Radian, 1995. Decision Documents, Multiple Sites.

Table H2.1
Remedial Investigation Groundwater Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Analyses	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-21-01 (upgradient) 10/25/91	MW-21-02 10/25/91	MW-21-03 10/25-91	MW-21-04 10/25/91
Inorganic Results (mg/L)								
EPA 160.1- Total Dissolved Solids	43,600	--	1,000	10	*12,000*	*26,000*	*27,000*	*27,000*
EPA 300.0- Chloride	19,600	--	250	26	*1,900*	*4,700*	*7,400*	*2,500*
EPA 300.0- Sulfate	7,470	--	600	5.0	*3,000*	*2,500*	*2,600*	*2,400*
EPA 340.2- Fluoride	4.7	4	1.6	0.10	*2.8*	*1.7*	*1.5*	*1.6*
EPA 353.1- Nitrate-Nitrite	98	--	--	0.22	18	18	14	10
EPA 365.2- Total Phosphorous	0.75	--	--	0.020	0.13	0.24	0.15	0.2
SW6010- Metals (µg/L)								
Arsenic	72.3	10	100	8	***110***	*<8*	*<8*	*<8*
Cadmium	8.3	5	10	20	*<20*	***24***	*<20*	*<20*
Lead	19.9	15	50	6	<6	6.8	7.2	13
Organic Results								
SW8240 - Volatile Organics (µg/L)								
Benzene	--	5	10	5	<5.0	<5.0	1.4 J	<5.0
Ethylbenzene	--	700	750	5	<5.0	<5.0	1.5 J	<5.0
Methylene chloride	--	--	100	5	4.2 JB	11 B	3.7 JB	1.7 JB
Styrene	--	100	--	5	<5.0	<5.0	2.4 J	<5.0
Toluene	--	1,000	750	5	<5.0	<5.0	4.4 J	<5.0
Xylenes	--	10,000	620	5.0	<5.0	<5.0	2.9 J	<5.0

Notes:
Table presents only constituents detected in ground water at this site.

EPA = United States Environmental Protection Agency MCL = Maximum Contaminant Level NMGWQ = New Mexico Groundwater Quality
SWMU = solid waste management unit AFB = Air Force Base NM = New Mexico
mg/L = milligrams per liter µg/L = micrograms per liter -- = No value or standard was found
J = Positive detected below the detection limit. B = Positive detection considered a result of laboratory blank contamination
JB = Positive detection below the method detection limit and considered a result of laboratory blank contamination

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels
^ NMGWQ Standard for Irrigation Use
[1] Source for Inorganics Values is: Radian (1992). Source for Metals is Radian (1993).

Table H2.2
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-01[4]					
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**	**Dec-05**
VOCs[1] (µg/L)									
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	0.53(J)
Methylene chloride	--	--	100	ND	5.1 UB	< 3	NA	NA	ND
Trichloroethylene	--	5	100	ND	*5.4*	*11*	*13*	*15*	*13.3*
Metals[2] (µg/L)									
Arsenic	35.4	10	100	ND	ND	*16.2 B (J)*	*11.8 (J)*	*21.2*	*11.0*
Barium	85.2	2,000	1,000	ND	17	18.6 B (J)	NA	15.7	17.7(J)
Cadmium	7.4	5	10	ND	ND	< .03	NA	NA	ND
Calcium	--	--	--	NA	NA	NA	NA	NA	838,000
Chromium	7.2	100	50	ND	ND	9.3 B (J)	< 20	NA	ND
Cobalt	10.9	--	50	NA	NA	NA	NA	NA	1.0(J)
Iron	--	--	1,000	ND	ND	< 21	< 1,000	< 200	ND
Magnesium	--	--	--	NA	NA	NA	NA	NA	718,000
Manganese	--	--	200	ND	ND	21.1 B (J)	139 (J)	12.3	8.0(J)
Nickel	14.5	--	200	NA	NA	NA	NA	NA	ND
Potassium	--	--	--	NA	NA	NA	NA	NA	62,000
Selenium	85.3	50	50	ND	ND	6.2 B (J)	NA	< 10	ND
Sodium	--	--	--	NA	NA	NA	NA	NA	1,740,000
Thallium	90.4	2	--	NA	NA	NA	NA	NA	*7.1(J)*
Vanadium	222.4	--	--	NA	NA	NA	NA	NA	51.4
Zinc	29.7	--	10,000	NA	NA	NA	NA	NA	11.6(J)
Organochlorine Pesticides[3] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-01[4]					
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**	**Dec-05**
Chlorinated Herbicides[4] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Filterable Residue (mg/L)									
Total Dissolved Solids	--	--	1,000	NA	NA	NA	NA	NA	*11,300*

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-02					
Sampling Data	Background^	(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
VOCs[1] (µg/L)									
Acetone	--	--	--	ND	ND	ND	ND	ND	5.5(J)
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	ND
Methylene chloride	--	--	100	ND	5 UB	< 3	NA	NA	ND
Trichloroethylene	--	5	100	ND	ND	< 3	< 5	< 1	ND
Metals[2] (µg/L)									
Arsenic	35.4	10	100	ND	ND	*13.0 B (J)*	7.2 B (J)	< 100	*14.8*
Barium	85.2	2,000	1,000	ND	40	32.1 B (J)	NA	19.5 J	41.69(J)
Cadmium	7.4	5	10	ND	ND	0.3 B	NA	NA	0.75(J)
Calcium	--	--	--	NA	NA	NA	NA	NA	1,780,000
Chromium	7.2	100	50	ND	ND	< 0.6	< 20	NA	ND
Cobalt	10.9	--	50	NA	NA	NA	NA	NA	5.8(J)
Iron	--	--	1,000	ND	ND	< 21	< 1,000	< 200	ND
Magnesium	--	--	--	NA	NA	NA	NA	NA	2,010,000
Manganese	--	--	200	ND	ND	0.6 B (J)	< 10 (UJ)	< 100	***789***
Nickel	14.5	--	200	NA	NA	NA	NA	NA	1.8(J)
Potassium	--	--	--	NA	NA	NA	NA	NA	151,000
Selenium	85.3	50	50	ND	ND	11.3 B (J)	NA	< 100	ND
Sodium	--	--	--	NA	NA	NA	NA	NA	5,080,000
Thallium	90.4	2	--	NA	NA	NA	NA	NA	*10.8*
Vanadium	222.4	--	--	NA	NA	NA	NA	NA	24.7(J)
Zinc	29.7	--	10,000	NA	NA	NA	NA	NA	3.4(J)

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-02					
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**	**Dec-05**
Organochlorine Pesticides[3] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Chlorinated Herbicides[4] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Filterable Residue (mg/L)									
Total Dissolved Solids	--	--	1,000	NA	NA	NA	NA	NA	*29,700*

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-03					
Sampling Data	Background^	(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
VOCs[1] (µg/L)									
Acetone	--	--	--	ND	ND	ND	ND	NA	ND
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	ND
Methylene chloride	--	--	100	ND	5.4 UB	< 3	NA	NA	ND
Trichloroethylene	--	5	100	ND	ND	< 3	< 5	< 1	ND
Metals[2] (µg/L)									
Arsenic	35.4	10	100	ND	ND	*11.6 B (J)*	*12 (J)*	*16.1*	*12.4*
Barium	85.2	2,000	1,000	ND	36	36.1 B (J)	NA	26.8	33.2(J)
Cadmium	7.4	5	10	ND	ND	0.6 B	NA	NA	ND
Calcium	--	--	--	NA	NA	NA	NA	NA	2,010,000
Chromium	7.2	100	50	ND	ND	< 0.6	< 20	NA	ND
Cobalt	10.9	--	50	NA	NA	NA	NA	NA	1.1(J)
Iron	--	--	1,000	ND	ND	< 21	< 1,000	67.4 J	ND
Magnesium	--	--	--	NA	NA	NA	NA	NA	2,190,000
Manganese	--	--	200	ND	50	34.8 (J)	42.1 (J)	19.2	12.0(J)
Nickel	14.5	--	200	NA	NA	NA	NA	NA	ND
Potassium	--	--	--	NA	NA	NA	NA	NA	149,000
Selenium	85.3	50	50	ND	ND	12.4 B (J)	NA	13.4 J	ND
Sodium	--	--	--	NA	NA	NA	NA	NA	5,300,000
Thallium	90.4	2	--	NA	NA	NA	NA	NA	*7.4(J)*
Vanadium	222.4	--	--	NA	NA	NA	NA	NA	47.2(J)
Zinc	29.7	--	10,000	NA	NA	NA	NA	NA	2.2(J)

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-03					
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**	**Dec-05**
Organochlorine Pesticides[3] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Chlorinated Herbicides[4] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Filterable Residue (mg/L)									
Total Dissolved Solids	--	--	1,000	NA	NA	NA	NA	NA	*24,200*

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-04					
Sampling Data	Background^	(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
VOCs[1] (µg/L)									
Acetone	--	--	--	ND	ND	ND	ND	NA	5.1(J)
Chloroform	--	--	100	ND	ND	ND	ND	NA	ND
cis-1,2-dichloroethene	--	70	--	ND	ND	ND	ND	NA	ND
Methylene chloride	--	--	100	ND	4.7 UB	< 3	NA	NA	ND
Trichloroethylene	--	5	100	ND	ND	< 3	< 5	< 1	ND
Metals[2] (µg/L)									
Arsenic	35.4	10	100	ND	ND	4.6 B (J)	6.7 B (J)	*11.8*	ND
Barium	85.2	2,000	1,000	ND	38	37.1 B (J)	NA	24.7	36.2(J)
Cadmium	7.4	5	10	ND	ND	0.7 B	NA	NA	0.77(J)
Calcium	--	--	--	NA	NA	NA	NA	NA	2,310,000
Chromium	7.2	100	50	ND	ND	< 0.6	< 200	NA	ND
Cobalt	10.9	--	50	NA	NA	NA	NA	NA	3.9(J)
Iron	--	--	1,000	ND	600	936	***3440 B***	89.2 J	ND
Magnesium	--	--	--	NA	NA	NA	NA	NA	2,500,000
Manganese	--	--	200	ND	ND	78.5 (J)	62.5 (J)	18.6	141
Nickel	14.5	--	200	NA	NA	NA	NA	NA	ND
Potassium	--	--	--	NA	NA	NA	NA	NA	148,000
Selenium	85.3	50	50	ND	ND	11.5 B (J)	NA	12.6 J	ND
Sodium		--	--	NA	NA	NA	NA	NA	6,220,000
Thallium	90.4	2	--	NA	NA	NA	NA	NA	*6.2(J)*
Vanadium	222.4	--	--	NA	NA	NA	NA	NA	22.1(J)
Zinc	29.7	--	10,000	NA	NA	NA	NA	NA	4.1(J)

Table H2.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-21 (SWMU 116)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-21-04					
Sampling Data	Background^	(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
Organochlorine Pesticides[3] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Chlorinated Herbicides[4] (µg/L)									
all	--	--	--	ND	ND	NA	NA	NA	ND
Filterable Residue (mg/L)									
Total Dissolved Solids	--	--	1,000	NA	NA	NA	NA	NA	*36,700*

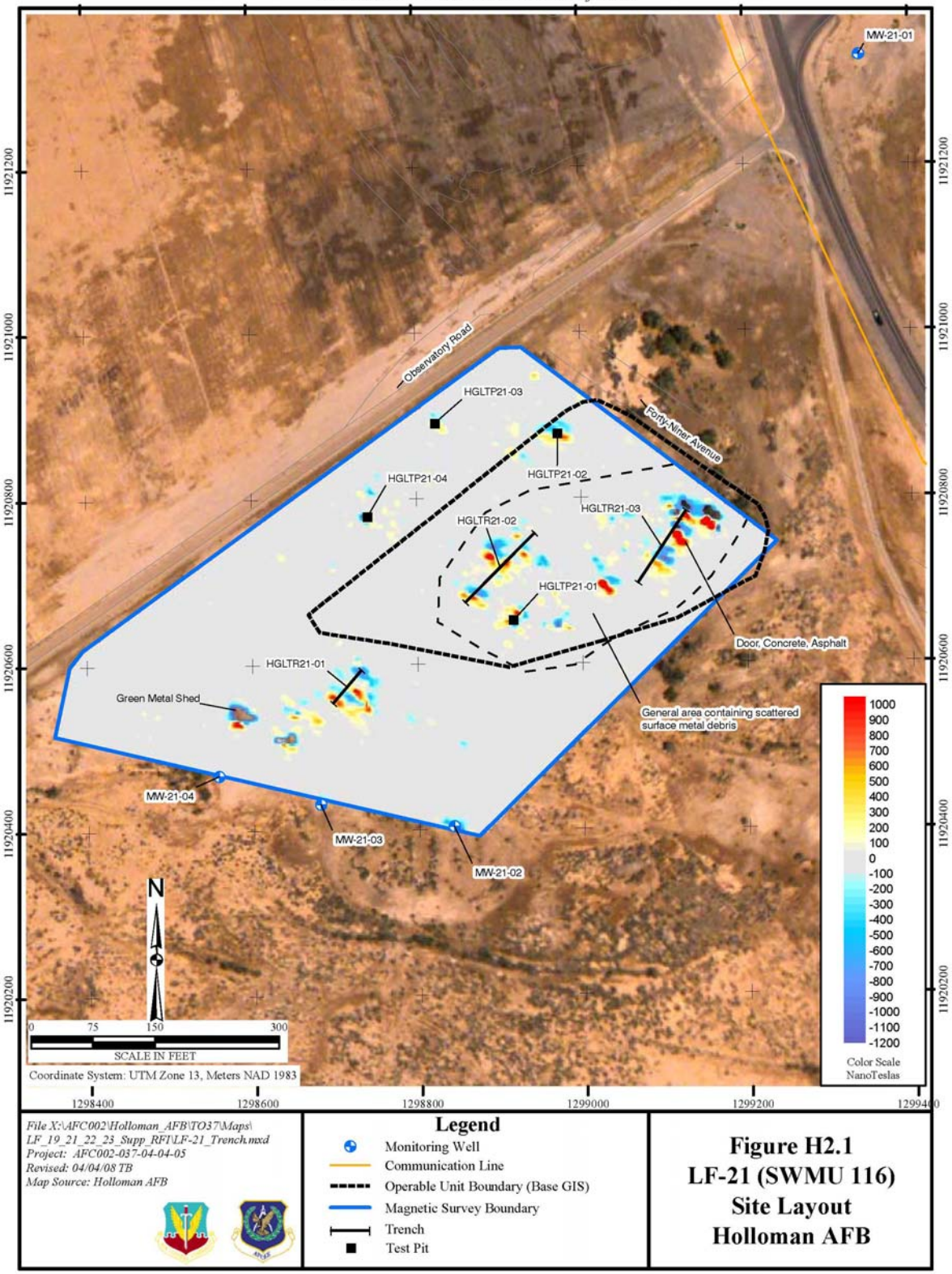
Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to 1999 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
CRDL = Contract Required Detection Limit
IDL = Instrument Detection Limit
NA = not analyzed
ND = not detected at or above method reporting limit
-- no value or standard was found
VOC = volatile organic compound
µg/L = micrograms per liter
EPA = U.S. Environmental Protection Agency
SWMU = solid waste management unit
AFB = Air Force Base
NM = New Mexico
MCL = Maximum Contaminant Level
NMGWQ = New Mexico Groundwater Quality

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels

^ Radian (1993)

Figure H2.1 LF-21 (SWMU 116) Site Layout, Holloman AFB



H.3 LF-22 (SWMU 115), WEST AREA LANDFILL NO. 1

H.3.1 Location/Unit Description

LF-22, West Area Landfill No. 1, is located in an arroyo west of the Solar Observatory (Building 910) and Observatory Road. The location of LF-22 with respect to the surrounding facility is shown on **Figure A2**. A site layout of LF-22 is provided as **Figure H3.1**. LF-22 is an undeveloped, moderately vegetated, rectangular-shaped portion of land approximately three acres in size surrounding a former arroyo. The site trends in a northeast-southwest direction and is bordered to the east and southeast by an unpaved segment of Observatory Road and to the south, southwest, northwest, and north by undeveloped land. Vegetation consists of salt cedars, shrubs, cactus, and grasses. The salt cedars are located primarily within and immediately around the former arroyo. Access to LF-22 is unrestricted; however, the site is located in a secluded portion of the base. Debris consisting almost exclusively of concrete rubble is present within the former arroyo. Several former metal sign posts and a few metal pipes are also present.

H.3.2 History

LF-22 was active between 1974 and 1978. The site was reportedly used to dispose of plastic sheeting, boxes, and empty cans. Disposal operations ceased after the site was identified as an unapproved landfill. During a records search, one interviewee indicated that some 55-gallon drums were observed during the active period of disposal.

The current and anticipated future land use is industrial.

H.3.3 Evaluation of Relevant Information

In 1992, a RI, consisting of installing and sampling four groundwater monitoring wells (MW22-01 through MW22-04) was conducted (Radian, 1994). The locations of the monitoring wells are depicted on **Figure H3.1**. The groundwater samples were analyzed for VOCs, organochlorine pesticides, organophosphorus pesticides, PCBs, chlorinated herbicides, total metals, anions, and TDS. The results of the RI groundwater investigation are presented on **Table H3.1**. Only cadmium (11 µg/L in MW22-02) was detected at a concentration above background and NMWQCC standard of 10 µg/L. Pesticides 4,4'-DDE and alpha-BHC were detected at low concentrations in downgradient monitoring well MW22-04. Several halogenated VOCs were detected at estimated low levels in the upgradient well MW22-01 and several non-halogenated VOCs were present at estimated low levels in MW22-02. A risk characterization of LF-22, conducted as part of the RI, concluded that LF-22 did not present an unacceptable risk even under worst-case exposure conditions.

Based on the RI results, Holloman AFB submitted a Decision Document (Radian, 1995) concluding CAC was appropriate for LF-22. As part of the CAC determination, surface debris would be removed, a plat of survey would be produced, and LTM would be conducted at the site at the request of NMED and EPA. LTM activities would consist of the biennial collection and analysis of groundwater samples from the three onsite wells for 10 years to ensure that any potential future release from the site would be detected. NMED concurred with and signed the Decision Document.

LTM activities were initiated in 1995. A summary of the groundwater positive detections since LTM was initiated in 1995 is provided as **Table H3.2**. Modification of the required analyte list was conducted over the course of the LTM program due to lack of analyte detections. After the 1999 LTM event, NMED approved the cessation of monitoring for PCBs, pesticides, and herbicides. Subsequent analyte reductions reduced the required analyte list to include only arsenic, barium, iron, manganese, and selenium. No constituents in the downgradient wells have been detected above upgradient concentrations and NMGWQ standards over the course of the LTM program. The TDS concentrations of the groundwater beneath LF-22 exceed 10,000 mg/L, indicating that the water is not a potable or agricultural source.

Holloman AFB submitted a Statement of Basis to NMED requesting CAC status and a permit modification for the site. NMED agreed that LTM could be suspended; however, CAC status for LF-22 would be considered after additional characterization was performed at the site. A supplemental RFI consisting of a geophysical survey and site trenching was conducted at LF-22 in the fall 2005 and spring 2006. The geophysical survey consisted of a terrain conductivity and magnetic in-phase survey. The survey identified one conductivity anomaly and multiple magnetic anomalies. The results of the geophysical survey are depicted on **Figure H3.1**. The conductivity anomaly and most of the magnetic anomalies were associated with a concrete rubble pile located within a former drainage swale.

On May 18, 2006, three trenches (designated as HGLTR22-01 through HGLTR22-03) were completed at LF-22, bisecting the concrete rubble pile. Site trenching activities determined that the debris consisted almost exclusively of concrete rubble. Metallic and magnetically susceptible debris included rebar within the concrete and metal sign posts. No containers, buckets, or drums used for the storage or disposal of hazardous materials were observed in the LF-22. In addition, no soil staining, unusual solids or fluids, or petroleum odors were observed or detected in the soils comprising and underlying the LF-22 landfill. Beneath the fill material, undisturbed reddish brown to light beige, moderately soft, damp to moist, silty sand containing calcite crystals was observed. There was no visual or field screening evidence that the unit had been impacted from hazardous material disposal activities. Consequently, no soil samples were collected for laboratory analysis.

Based on the findings of the additional characterization, the RFI recommended a CAC determination and the transfer of LF-22 from Appendix 4-A Table A to Appendix 4-A Table B of the RCRA permit. On May 1, 2007, NMED approved the RFI report (NMED, 2007). A copy of the approval letter is provided as **Figure H1.2**.

H.3.4 Basis for Determination

NMED concurred with the RFI conclusion that SWMU 115 (LF-22) is suitable for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.3.5 References

New Mexico Environment Department (NMED), 2007. Approval of the Supplemental RCRA Facility Investigation Report, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWMU 115), and LF-23 (SWMU 108), February 2007, Holloman Air Force Base, EPA ID#NM6572124422, HWB-HAFB-07-003. May 1.

Radian Corporation (Radian), 1992. RI, Report, Volume II of III, Appendices A, B, C, and D, Investigation, Study and Recommendation for 29 Waste Sites.

Radian, 1993. Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites, Holloman Air Force Base, New Mexico.

Radian, 1994. Draft Final Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Volume 1, Holloman AFB, New Mexico. October.

Radian, 1995. Decision Documents, Multiple Sites.

Table H3.1
Remedial Investigation Groundwater Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Location:	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-22-01 (upgradient) 10/27/91	MW-22-02 10/27/91	MW-22-03 10/26/91	MW-22-04 10/26/91
Analyses								
EPA 160.1- Total Dissolved Solids (mg/L)	43,600	--	1,000	10	*18,000*	*27,000*	*18,000*	*10,000*
EPA 300.0- Chloride (mg/L)	19,600	--	250	26	*6,200*	*11,000*	*8,200*	*3,900*
EPA 300.0- Sulfate (mg/L)	7,470	--	600	5.0	*3,500*	*3,300*	*2,800*	*2,900*
EPA 340.2- Fluoride (mg/L)	4.7	4	1.6	0.10	*2.4*	*1.9*	*2.5*	*3*
EPA 353.1- Nitrate-Nitrite (mg/L)	98	--	--	0.11	4.3	7.7	7.1	4.3
EPA 365.2- Total Phosphorous (mg/L)	0.75	--	--	0.0020	0.057	0.13	0.22	0.18
SW6010- Metals (µg/L)								
Cadmium	8.3	5	10	5	*7.7*	***11***	< 5	< 5
Chromium	234	100	10	10	< 10	< 10	< 10	*13*
Nickel	43.6	--	200^	20	23	44	ND	29
Zinc	253.4	--	10,000	20	< 20	< 20	< 20	28
SW7421- Lead (µg/L)	19.9	15	50	3	< 3	< 3	7.9	4.9
SW8080 - Organochlorine Pesticides and PCBs (µg/L)								
4,4'- DDE	--	--	--	0.0094	< 0.0094	< 0.0094	< 0.0094	0.010 C
alpha - BHC	--	--	--	0.0094	< 0.0094	< 0.0094	< 0.0094	0.015 C
SW8240 - Volatile Organics (µg/L)								
1,1,2,2- Tetrachloroethane	--	--	10	5.0	0.098 J	< 5.0	< 5.0	< 5.0
1,1- Dichloroethane	--	--	25	5.0	1.9 J	< 5.0	< 5.0	< 5.0
Acetone	--	--	--	100	< 100	16 J	< 100	< 100
Benzene	--	5	10	5.0	< 5.0	0.14 J	< 5.0	< 5.0
Carbon disulfide	--	--	--	5.0	4.4 J	< 5.0	< 5.0	< 5.0
Chlorobenzene	--	100	--	5.0	< 5.0	0.33 J	< 5.0	< 5.0
Methylene chloride	--	--	100	5.0	0.76 JB	10 B	3.9 J	26 B
Tetrachloroethene	--	5	20	5.0	1.5 J	< 5.0	< 5.0	< 5.0
Toluene	--	1,000	750	5.0	< 5.0	0.23 J	< 5.0	< 5.0
Trichloroethene	--	5	100	5.0	1.2 J	< 5.0	< 5.0	< 5.0

Table H3.1 (continued)
Remedial Investigation Groundwater Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Notes:
Table presents only constituents detected in groundwater at this site.
C = Presence and quantitation of analyte confirmed by second column analysis.
J = Detected below the detection limit.
B = Analyte detected in laboratory blank analysis, no blank subtraction performed.
ND = Not Detected, at the reported detection limit.
-- No value or standard was found
SWMU = solid waste management unit
AFB = Air Force Base
NM = New Mexico
mg/L = milligrams per liter
µg/L = micrograms per liter
EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
NMGWQ = New Mexico Groundwater Quality
< = less than
^ NMGWQ Ground Water Standard for Irrigation Use

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Ground Water Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels

[1] Source for metals background values: Radian (1993). Source for all other background values: Radian (1992)

Table H3.2
Long Term Groundwater Monitoring Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-22-01[4]				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Chloroform	--	--	100	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	4.1 UB	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	2.6 J	< 3	NA	NA
Trichlorethylene	--	5	100	ND	1.7 J	1 J	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	*11.8 B (J)*	*11.5 (J)*	*23.7*
Barium	85.2	2000	1000	ND	27	23.6 B (J)	20.7	14.2
Chromium	7.2	100	50	ND	ND	< 0.6	NA	NA
Iron	--	--	1000	ND	ND	< 21	< 1000	< 200
Lead	5.6	15	50	ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	54	8.9 B (J)	65.7
Selenium	85.3	50	50	ND	ND	4.1 B (J)	< 10 (UJ)	<10
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
2,4-D	--	--	--	ND	ND	< 0.08	NA	NA
MCPP	--	--	--	ND	ND	34 P (J)	< 0.5	NA
Picloram	--	500	--	ND	ND	0.046 P (J)	< 0.5	NA

Table H3.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-22-02				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Chloroform	--	--	100	ND	ND	1 J	NA	NA
Methylene chloride	--	--	100	ND	ND	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	ND	< 3	NA	NA
Trichlorethylene	--	5	100	ND	ND	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	*12 B (J)*	6.8 B (J)	*16.1*
Barium	85.2	2000	1000	ND	29	29.5 B (J)	17.6	19.8
Chromium	7.2	100	50	ND	ND	< 0.6	NA	NA
Iron	--	--	1000	ND	ND	< 21	< 1000	123 J
Lead	5.6	15	50	ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	0.7 B	< 10 (UJ)	< 10
Selenium	85.3	50	50	ND	ND	13.7 B (J)	3.3 B (J)	17.2
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Polychlorinated Biphenyls (µg/L)								
all	--	--	--	ND	ND	NA	NA	NA
Chlorinated Herbicides[5] (µg/L)								
2,4-D	--	--	--	ND	ND	< 0.8	NA	NA
MCPP	--	--	--	ND	ND	< 20	NA	NA
Picloram	--	500	--	ND	ND	< 0.04	NA	NA

Table H3.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMED	MW-22-03				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Chloroform	--	--	100	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	ND	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	ND	< 3	NA	NA
TCE	--	5	100	ND	ND	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	6.4 B (J)	8.8 B (J)	*14.2*
Barium	85.2	2000	1000	ND	27	30.2 B (J)	47.8 B	17.5
Chromium	7.2	100	50	ND	ND	< 0.6	NA	NA
Iron	--	--	1000	ND	ND	< 21	***< 10,000***	33.8 J
Lead	5.6	15		ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	ND	38.7	44.4 (J)	39.8
Selenium	85.3	50	50	ND	ND	17.2 B (J)	10.2 (J)	12.3
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
2,4-D	--	--	--	ND	ND	< 0.08	NA	NA
MCPP	--	--	--	ND	ND	< 20	NA	NA
Picloram	--	500	--	ND	ND	< 0.04	NA	NA

Table H3.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMED	MW-22-04				
Sampling Data	Background^	(µg/L)	(µg/L)	Aug-95	Sep-97	Sep-99	Sep-01	Apr-03
VOCs[1] (µg/L)								
Chloroform	--	--	100	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	ND	< 3	NA	NA
Tetrachloroethylene	--	5	20	ND	ND	< 3	NA	NA
TCE	--	5	100	ND	ND	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	5.3 B (J)	5.2 B (J)	*18.6*
Barium	85.2	2000	1000	ND	10	16.8 B (J)	16.1	12.7
Chromium	7.2	100	50	ND	ND	1.6 B	NA	NA
Iron	--	--	1000	ND	86	51.2 B	< 1000	123 J
Lead	5.6	15		ND	ND	< 1.5	< 10 (UJ)	NA
Manganese	--	--	200	ND	29	52.1	38.6 (J)	62.2
Selenium	85.3	50	50	ND	ND	4.6 B (J)	< 10 (UJ)	< 10
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
2,4-D	--	--	--	ND	ND	0.51 P (J)	NA	NA
MCPP	--	--	--	ND	ND	< 20	NA	NA
Picloram	--	500	--	ND	ND	< 0.04	NA	NA

Table H3.2 (continued)
Long Term Groundwater Monitoring Analytical Results
LF-22 (SWMU 115)
Holloman AFB, New Mexico

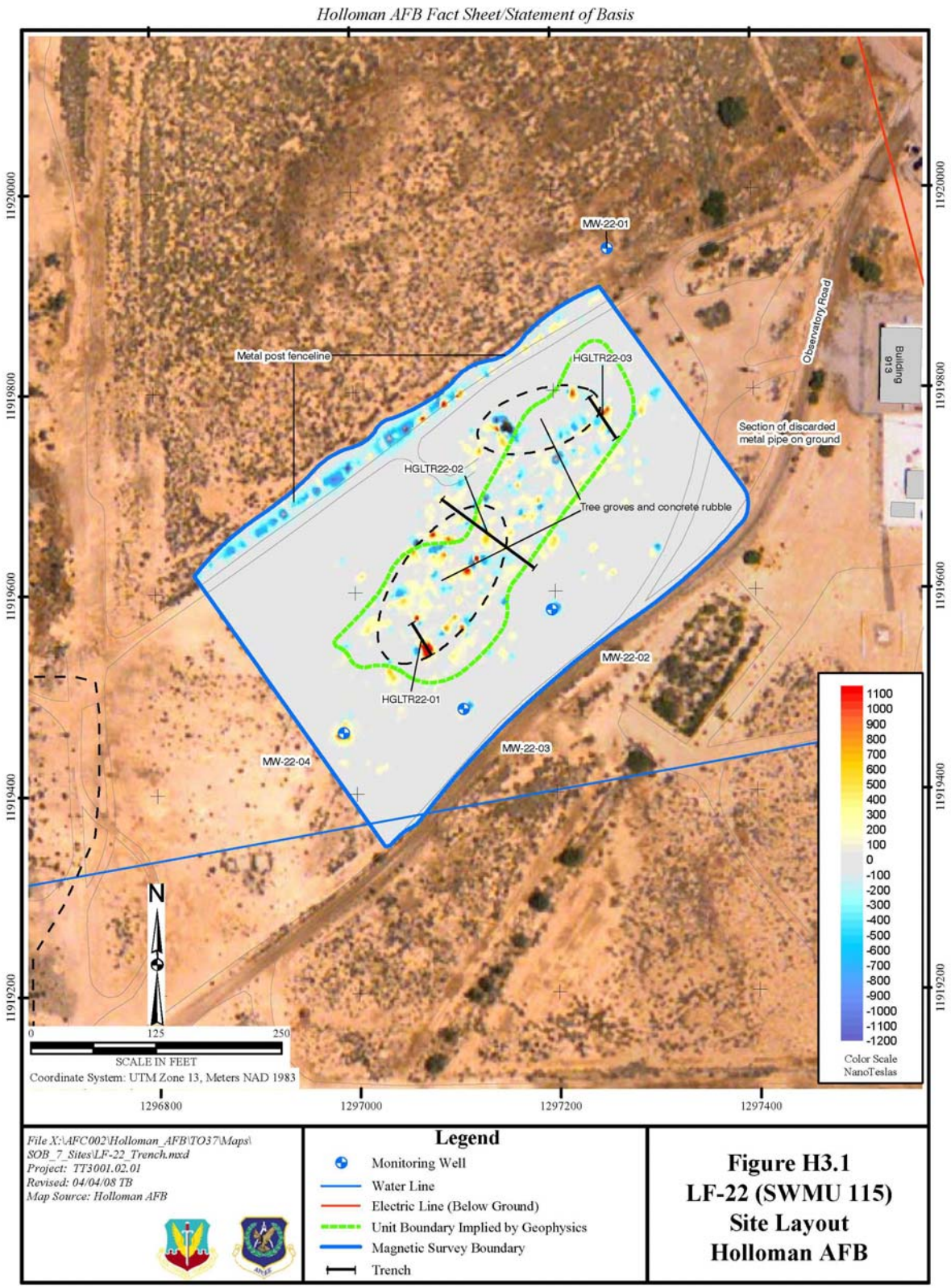
Notes:
[1] Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
[2] Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[3] Unless otherwise reported, no organochlorine pesticides were detected prior to 1999 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
[4] Upgradient monitoring well
CRDL = Contract Required Detection Limit
IDL = Instrument Detection Limit
NA = not analyzed
ND = not detected at or above method reporting limit
VOC = volatile organic compound
µg/L = micrograms per liter
-- = No value or standard was found
SWMU = solid waste management unit
AFB = Air Force Base
NM = New Mexico
EPA = United States Environmental Protection Agency
NMGWQ = New Mexico Groundwater Quality

Laboratory qualifiers--
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels

[^] Radian (1993)

Figure H3.1 LF-22 (SWMU 115) Site Layout, Holloman AFB



H.4 LF-23 (SWMU 108), MOBILITY SUPPORT SQUADRON (MOBSS) LANDFILL

H.4.1 Location/Unit Description

LF-23, the MOBSS Landfill, is located southwest of the Solar Observatory (Building 910), west of Observatory Road, and approximately 350 feet southwest of LF-22. The location of LF-23 with respect to the surrounding facility is shown on **Figure A2**. A site layout of LF-23 is provided as **Figure H4.1**. LF-23 is an undeveloped, rectangular-shaped parcel of land, trending in a north-south orientation, approximately three acres in size. The site is moderately vegetated with shrubs, salt cedars (in the southwestern corner), and cactus. Construction debris consisting of predominantly concrete and asphalt rubble, as well as metal sign posts, and metal cables, were observed throughout LF-23, but primarily in the southern portion of the unit. Several fox holes constructed of sand bag and barbed wire fencing are present in the southern portion of LF-23. The presence of the fox holes indicates the use of LF-23 for military training exercises. Numerous unpaved service roads lie adjacent to and cross LF-23 along the eastern and southern site boundaries and through the central portion of LF-23.

H.4.2 History

LF-23 received waste disposal items from 1976 to 1979. The site was reportedly used for the disposal of plastic sheeting, boxes, and empty cans. Disposal operations ceased after the site was identified as an unapproved landfill. During a records search, one interviewee indicated that cans of diazinon, dibromochloromethane, and 55-gallon drums of unknown contents were reportedly observed at the site.

The current and anticipated future land use is industrial.

H.4.3 Evaluation of Relevant Information

In 1992, a RI (Radian, 1994), consisting of the installation and sampling of four groundwater monitoring wells (MW23-01 through MW23-04) was conducted at LF-23 (SWMU 108) (**Figure H4.1**). The collected groundwater samples were analyzed for VOCs, organochlorine pesticides, organophosphorus pesticides, PCBs, chlorinated herbicides, total metals, anions, and TDS. RI groundwater analytical results are presented in Table **H4.1**. No site-related VOCs and no organophosphorus pesticides, chlorinated herbicides, or PCBs were detected in the groundwater. Organochlorine pesticide delta-BHC was detected at low levels in MW23-02 and MW23-04. Since these two wells are located in a borrow pit that fills with runoff water from the Base during rainfall events, the RI suggested that the presence of delta-BHC may be attributable to runoff, given the lack of other detected constituents. The RI concluded that the MOBSS Landfill had little impact on the local groundwater, and a risk characterization of the site concluded that LF-23 did not present an unacceptable risk even under worst-case exposure conditions.

Based on the results of the RI, Holloman AFB submitted a Decision Document (Radian, 1994) concluding that a CAC determination was appropriate for LF-23. As part of the CAC determination, surface debris would be removed, a plat of survey would be produced, and LTM would be conducted at the site at the request of NMED and EPA. LTM activities would consist of the biennial collection and analysis of groundwater samples from the three onsite wells for 10

years to ensure that any potential future release from the site would be detected. NMED concurred with and signed the Decision Document.

LTM activities were initiated in 1995. Over the course of the LTM program, the TAL was reduced until in 2003 the analyte list consisted only of barium, iron, manganese, and selenium. Since 1995, no chemical of potential concern (COPC) has been detected at concentrations exceeding background and NMGWQ standards. A summary of the groundwater positive detections since LTM began is provided as **Table H4.2**. The TDS concentration of the groundwater beneath LF-23 exceeds 10,000 mg/L, indicating that the water is not a potable or agricultural source. Based on the analytical results, Holloman AFB submitted a Statement of Basis to NMED, after the 2003 LTM event, requesting CAC status and a permit modification for the site. NMED agreed to suspend LTM, but stated that a CAC determination for LF-23 would be considered after additional characterization was performed at the site.

In the fall 2005 and spring 2006, a supplemental RFI was conducted to provide the additional characterization data needed by NMED. The supplemental RFI included a geophysical survey (terrain conductivity and in-phase magnetic survey) and site trenching. The geophysical surveying identified one conductivity anomaly and multiple magnetic anomalies. The conductivity anomaly and most of the magnetic anomalies were associated with concrete rubble pile located along the eastern edge of an arroyo. The in-phase magnetic survey results are presented on **Figure H4.1**.

On May 17 and 18, 2006, four trenches (designated as HGLTR23-01 through HGLTR21-04) were completed at LF-23 to investigate the geophysical anomalies. The locations of the trenches are presented on **Figure H4.1**. Fill material, consisting primarily of construction debris, was observed in all four trenches. The fill material ranged in thickness from 1 foot (HGLTR23-04) to 4.5 feet (HGLTR23-02). Debris encountered included concrete rubble (including a concrete utility box and drainage culvert), former communication line, asphalt, wiring, cording, a tarpaulin, metal piping, metal sign posts, metal railing, rubber bands, and a partially crushed 5-gallon water can. Visual evidence and field screening results did not indicate the presence or release of hazardous materials. No canisters, buckets, or drums potentially used to store or dispose hazardous materials were encountered in the landfill. Beneath the fill material, undisturbed soils composed primarily of moderately loose, light brown to reddish brown, silty sand was encountered to the maximum excavated trench depth. No soil staining, unusual solids or fluids, or petroleum odors were encountered in the soils comprising and underlying the LF-23 landfill. Consequently, no soil samples were collected for laboratory analysis.

Based on the findings of the additional characterization, the RFI recommended CAC status and the transfer of LF-21 from Appendix 4.A Table A to Appendix 4.A Table B of the RCRA permit. On May 1, 2007, NMED approved the RFI report (NMED, 2007). A copy of the approval letter is provided as **Figure H1.2**.

H.4.4 Basis for Determination

NMED concurred with the RFI conclusion that SWMU 108 (LF-23) is suitable for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable

state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.4.5 References

New Mexico Environment Department (NMED), 2007. Approval of the Supplemental RCRA Facility Investigation Report, LF-19 (SWMU 105), LF-21 (SWMU 116), LF-22 (SWMU 115), and LF-23 (SWMU 108), February 2007, Holloman Air Force Base, EPA ID#NM6572124422, HWB-HAFB-07-003. May 1.

Radian Corporation (Radian), 1992. RI, Report, Volume II of III, Appendices A, B, C, and D, Investigation, Study and Recommendation for 29 Waste Sites.

Radian, 1993. Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites, Holloman Air Force Base, New Mexico.

Radian, 1994. Decision Documents, Investigation, Study, and Recommendation for 29 Waste Sites, Holloman AFB, New Mexico. September.

Radian, 1994b. Draft Final Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units, Volume 1, Holloman AFB, New Mexico. October.

Table H4.1
Remedial Investigation Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

Location	Background[1]	EPA MCL	NMGWQ Standard	Detection Limit	MW-23-01 (upgradient) 10/23/91	MW-23-02 10/23/91	MW-23-03 10/23/91	MW-23-04 10/23/91
Analyses								
Inorganic Results								
EPA 160.1- Total Dissolved Solids (mg/L)	43,600	--	1,000	(10)	*37,000*	*40,000*	*31,000*	*23,000*
EPA 300.0- Chloride (mg/L)	19,600	--	250	(26)	*13,000*	***20,000***	*16,000*	*11,000*
EPA 300.0- Sulfate (mg/L)	7,470	--	600	(10)	*5,900*	*5,800*	*4,600*	*3,700*
EPA 340.2- Fluoride (mg/L)	4.7	4	1.6	(0.10)	1.5	1.0	1.1	1.4
EPA 353.1- Nitrate-Nitrite (mg/L)	98	--	--	(0.022)	0.74	13	9.8	13
EPA 365.2- Total Phosphorous (mg/L)	0.75	--	--	(0.020)	0.091	0.73	0.16	0.16
SW6010- Metals (µg/L)								
Cadmium	8.3	5	10	(5)	< 5	*5.9*	< 5	< 5
Chromium	234	100	10	(10)	< 10	10	< 10	< 10
Copper	38.6	--	1,000	(20)	< 20	31	< 20	< 20
Nickel	43.6	--	200^	(20)	< 20	36	22	< 20
SW7421- Lead (µg/L)	19.9	15	50	(6)	< 6	15	< 6	< 6
Organic Results								
SW8080 - Organochlorine Pesticides and PCBs (µg/L)								
delta - BHC	--	--	--	(0.0095)	< 0.0095	0.17 X	< 0.0095	0.014 X
SW8240 - Volatile Organics (µg/L)								
Methylene Chloride	--	--	100	(5)	< 5.0	9.6	4.6 J	9.3

Notes:
Table presents only constituents detected in ground water at this site.
X = SW8080-- Presence of analyte confirmed by second column analysis, but quantitation was not confirmed. J = Detected below the detection limit.
SWMU = solid waste management unit
NM = New Mexico
µg/L = micrograms per liter
MCL = Maximum Contaminant Level
-- = No value or standard was found
AFB = Air Force Base
mg/L = milligrams per liter
EPA = United States Environmental Protection Agency
NMGWQ = New Mexico Groundwater Quality
^ NMGWQ Standard for Irrigation Use

Results in **BOLD** and *italics* exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in *italics* exceed EPA or NMGWQ standards but are below background and/or upgradient levels

[1] Source for metals background values: Radian (1993). Source for all other background values: Radian (1992)

Table H4.2
Long Term Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-23-01[6]				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Acetone	--	--	--	ND	ND	1 J	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	20	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	7.9 B (J)	NA	NA
Barium	85.2	2000	1000	ND	ND	21.5 B (J)	22.9	< 10
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	646	*< 10,000*	*< 2000*
Manganese	--	--	200	ND	ND	*348*	*223 (J)*	13.6 J
Selenium	85.3	50	50	ND	ND	16.4 B (J)	9.5 B (J)	44 J
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)								
all	--	0.5	1	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
4-Nitrophenol	--	--	--	ND	ND	0.085 P (J)	< 0.5	NA

Table H4.2 (continued)
Long Term Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-23-02				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Acetone	--	--	--	ND	ND	< 5	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	ND	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	6.2 B (J)	NA	NA
Barium	85.2	2000	1000	ND	21	29.1 B (J)	32.3 B	10.1 J
Cadmium	7.4	5	10	ND	ND	0.7 B	NA	NA
Iron	--	--	1000	ND	ND	< 110	*< 10000*	*< 2000*
Manganese	--	--	200	ND	ND	12.6 B	9.9 B (J)	< 100
Selenium	85.3	50	50	ND	13	*57.4 B (J)*	24.2 (J)	***< 100***
Silver	6.7	--	50	ND	ND	5.2 B (J)	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)								
all	--	0.5	1	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
4-Nitrophenol	--	--	--	ND	ND	< 0.08	NA	NA

Table H4.2 (continued)
Long Term Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

Well Number		EPA MCL	NMGWQ Standard	MW-23-03				
Sampling Data	**Background^**	**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Acetone	--	--	--	ND	ND	< 5	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	18 UB	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	< 3	NA	NA
Barium	85.2	2000	1000	ND	20	25.3 B (J)	35.0 B	15 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	< 110	*< 10,000*	*< 2000*
Manganese	--	--	200	ND	ND	80.3	13.9 (J)	43.6 J
Selenium	85.3	50	50	ND	11 JS	42.7 B (J)	13.6 (J)	***96.9***
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)								
all	--	0.5	1	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
4-Nitrophenol	--	--	--	ND	ND	< 0.08	NA	NA

Table H4.2 (continued)
Long Term Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

Well Number	Background^	EPA MCL	NMGWQ Standard	MW-23-04				
Sampling Data		**(µg/L)**	**(µg/L)**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Apr-03**
VOCs[1] (µg/L)								
Acetone	--	--	--	ND	ND	1 J	NA	NA
Bromoform	--	--	--	ND	ND	< 3	NA	NA
Methylene chloride	--	--	100	ND	ND	< 3	NA	NA
Metals[2] (µg/L)								
Arsenic	35.4	10	100	ND	ND	3.8 B (J)	< 10	NA
Barium	85.2	2000	1000	ND	ND	33.3 B (J)	41.1 B	10.6 J
Cadmium	7.4	5	10	ND	ND	< 0.3	NA	NA
Iron	--	--	1000	ND	ND	91.1 B	*< 10000*	*< 2000*
Manganese	--	--	200	ND	ND	98.5	55.4 (J)	< 100
Selenium	85.3	50	50	ND	ND	13.0 B (J)	6.9 B (J)	***< 100***
Silver	6.7	--	50	ND	ND	< 0.5	NA	NA
Organochlorine Pesticides[3] (µg/L)								
all	--	--	--	ND	ND	ND	NA	NA
Polychlorinated Biphenyls[4] (µg/L)								
all	--	0.5	1	ND	ND	ND	NA	NA
Chlorinated Herbicides[5] (µg/L)								
4-Nitrophenol	--	--	--	ND	ND	< 0.08	NA	NA

Table H4.2 (continued)
Long Term Groundwater Analytical Results
LF-23 (SWMU 108)
Holloman AFB, New Mexico

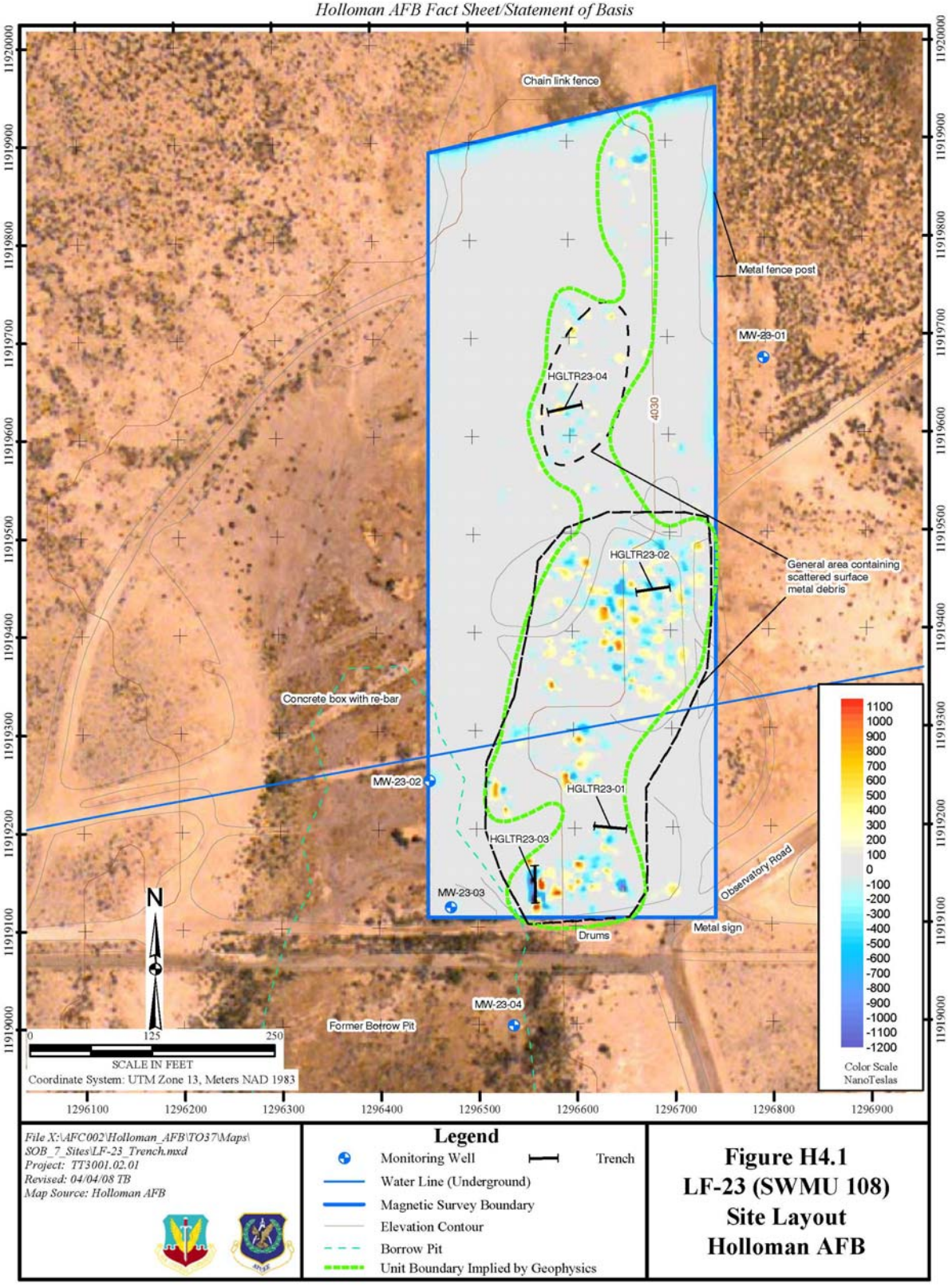
Notes:
1 Unless otherwise reported, no VOCs were detected prior to 2001 using EPA Method 8260B.
(EPA Method 8260A was used to analyze for VOCs in the 1995 and 1997 programs.)
2 Unless otherwise reported, no metals were detected using EPA Methods 6010B Trace & 7470A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
3 Unless otherwise reported, no organochlorine pesticides were detected prior to 1999 using EPA Method 8081A.
(EPA Method 8080A was used to analyze for organochlorine pesticides in the 1995 and 1997 programs.)
6 Upgradient monitoring well
CRDL = Contract Required Detection Limit
IDL = Instrument Detection Limit
NA = not analyzed
ND = not detected at or above method reporting limit
VOC = volatile organic compound
µg/L = micrograms per liter
-- = No value or standard found
EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
NMGWQ = New Mexico Groundwater Quality
AFB = Air Force Base
NM = New Mexico
SWMU = solid waste management unit

Laboratory qualifiers—
assigned as a result of internal laboratory data assessment procedures
B - Value less than CRDL but greater than or equal to IDL
J - estimated value; less than CRDL but greater than or equal to IDL
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank
EPA Qualifiers--assigned as a result of independent data validation
(J) - Estimated value
(UJ) - Estimated value blow the reporting limit
(U) Compound was analyzed for but not detected.
2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ - Estimated as a non-detect at the detection limit.

Results in BOLD and italics exceed EPA Primary Drinking Water MCLs and are greater than the background and upgradient values
Results shaded in BOLD and italics exceed NMGWQ Standards for Human Health and are greater than the background and upgradient values
Results in italics exceed EPA or NMGWQ standards but are below background and/or upgradient levels

^ Radian (1993)

Figure H4.1 LF-23 (SWMU 108) Site Layout, Holloman AFB



H.5 OT-44 (AOC-P), BUILDING 301 FUEL TANK LEAKS

H.5.1 Location/Unit Description

OT-44 (AOC-P, formerly designated as Site 50) encompassed a hydrocarbon plume formerly present on the groundwater immediately south of Building 301, an aircraft maintenance hangar adjacent to the Holloman AFB main taxiway. The location of OT-44 (AOC-P) with respect to the surrounding facility is shown on **Figure A2**. The buildings around Site OT-44 serve as an aircraft maintenance hangar (Building 301), a fuel barn (Building 315), and a training facility (Building 302). OT-44 is located within an asphalt-paved area lying between Building 301 and a cinder block wall. A site layout of OT-44 is included as **Figure H5.1**.

H.5.2 History

OT-44 was initially identified after free phase hydrocarbons were observed on the water table during exploratory trenching activities for installation of a sewer line. The source of the hydrocarbons was not determined at that time; however, the source was since identified as a leak within a 25,000-gallon diesel underground storage tank (UST) pipeline. After the piping failed a tank tightness test in 1990, the UST was closed and removed in February 1991. The UST was recorded as being in good condition with no corrosion pits, holes, or leaks noted during the removal process. In March 1997, approximately 60 tons (44.4 cubic yards [yd^3]) of total petroleum hydrocarbon (TPH) contaminated soil was removed from OT-44. Excavation activities continued vertically to the top of the water table, located at approximately 5.5 feet bgs during excavation activities. The excavation was then backfilled and resurfaced to grade with asphalt.

The current and anticipated future land use is industrial.

H.5.3 Evaluation of Relevant Information

OT-44 was designated as an area of concern after petroleum hydrocarbons were observed on the groundwater during the installation of a utility line immediately south of Building 301. Upon identification, an IRP Phase II, Stage I Confirmation/Quantification study (Dames and Moore, 1987) was conducted. The study included the installation of an 8-inch monitoring well (designated 50W1) and the completion of one soil boring (designated 50B1). Based on oil and grease detections found during the IRP Phase II, Stage I Confirmation/Quantification study (provided on **Tables H5.1 [soil] and H5.2 [groundwater]**), a two stage Phase II RI was initiated. Stage 1 of the Phase II RI included installing and sampling (soil and groundwater) four soil borings (designated B1 through B4), which were converted into groundwater monitoring wells (MW1 through MW4) (Walk Haydel, 1988). In addition, a small boring survey consisting of completing 20 small-diameter borings (designated as P1 through P15) on a 10 foot by 10 foot grid across a 20 square foot area located south of Building 301. The investigated area was believed to house a 15,000-gallon heating oil UST; however, the small boring survey failed to locate the UST. Consequently, one additional boring (designated B5) was installed near a newer fiberglass diesel UST. Soil samples obtained from 12.5, 15, and 17.5 feet bgs, were collected from B5 based on field screening results and submitted for total recoverable petroleum hydrocarbon (TRPH). Only the 5 foot bgs soil sample obtained from boring B2 contained contaminants above screening levels (TRPH at 7,946 mg/kg, exceeding the 1,000 mg/kg Base TPH Action Level). TRPHs were

detected solely within MW2 and were detected at a concentration of 17 mg/L. Results of this investigation are provided on **Tables H5.3 (soil) and H5.4 (groundwater)**.

The Stage I RI did not identify the source of the petroleum contamination; therefore, during the Stage 2 portion of the RI, five additional soil borings (P16 through P20) were completed to locate the 15,000-gallon heating oil UST. In addition, a background monitoring well (MW6) was installed and one round of groundwater sampling was conducted. Borings P16 through P20 were completed in an area between Building 301 and the previous 15 soil borings as shown on **Figure H5.1**. None of the five soil borings located the heating oil UST. Based on the data collected, soil contamination was identified to a depth of 10 feet bgs immediately south of Building 301. Contaminants present included TRPH, fuel-related VOCs, and solvents. Results of this investigation are provided on **Tables H5.3 (soil) and H5.4 (groundwater)**. Groundwater was determined to flow from the northeast to the southwest. As part of the RI, a Baseline Risk Assessment (BRA) was conducted, from which it was determined that OT-44 posed no significant risk to human health or the environment (Walk Haydel, 1989a). Consequently, the RI recommended NFA (Walk Haydel, 1989b) and, based on that recommendation, a Decision Document requesting NFA status for OT-44 was submitted to NMED (Walk Haydel, 1990).

In 1990, the 25,000-gallon diesel UST (UST 5RM 301) located in the immediate vicinity of OT-44 failed a tank tightness test. The approximate location of the diesel UST and its fuel line are shown on **Figure H5.1**. Three vapor detection points were installed adjacent to an underground pipe running north from the UST into Building 301. A small intermittent leak was detected. The UST was closed in February 2001. During the closure process, the UST was excavated from the subsurface and visually inspected. The UST was determined to be in good condition with no corrosion pits, holes, or leaks noted.

After reviewing the Decision Document, NMED required additional investigation of OT-44 to confirm that TRPH concentrations in soil did not exceed the base TPH action level of 1,000 mg/kg, and as a result, a Phase II RFI was conducted in 1994. The Phase II RFI consisted of completing six soil borings (i.e., 44-B07 through 44-B12) at OT-44 (Foster Wheeler, 1995). Soil samples were collected from 1 to 3 feet bgs and 3 to 5 feet bgs from 44-B08 through 44-B12 and from 0.5 to 2.5 feet bgs, 2.5 to 4.5 feet bgs, and 4.5 to 6.5 feet bgs in boring 44-B0-7 and were submitted for TRPH analysis using EPA Method 418.1. Stained soils were encountered in boring 44-B07 and slightly stained soils were encountered in boring 44-B11. Results of the 1994 Phase II RFI are included as Table H5.5. TRPH were detected in five (44-B07 and 44-B09 through 44-B12) of the six soil borings; but with the exception of 44-B07, were below 500 mg/kg. TRPH concentrations in boring 44-B07 at 0.5 to 2.5 and 2.5 to 4.5 feet bgs were 17,100 mg/kg and 30,700 mg/kg, respectively. TRPH was not detected in the 4.5 to 6.5 foot bgs soil sample in boring 44-B07. The Phase II RFI recommended conditional NFA with NFA status requiring remediation of the TRPH-contaminated soils to the Base-specific cleanup level of 1,000 mg/kg. A Class 3 permit modification request was submitted to EPA Region VI recommending site closure.

In February 1996, additional characterization was performed to further delineate contaminated soil in excess of 1,000 mg/kg (Groundwater Technology, 1996). Three soil borings (OT44-DP1 through OT44-DP3) were completed, characterized, and sampled. Two soil samples per boring, based on field screening results, were collected and analyzed for gasoline-range organics (GRO); diesel-range organics (DRO); TRPH; and benzene, toluene, ethylbenzene, and total xylenes

(BTEX). **Table H5.6** summarizes the analytical results of the additional characterization samples. None of the analyzed compounds were detected in boring OT44-DP1. GRO, DRO, and TRPH were detected in borings OT44-DP2 and OT44-DP3, while ethylbenzene and total xylenes were detected solely within boring OT44-DP2. Boring OT44-DP3 was completed in the vicinity of the former UST pipe leak. The highest GRO, DRO, and TRPH concentrations detected in boring OT44-DP3 were detected in the 2- to 4-foot soil interval. TPH concentrations dropped significantly in the 4- to 5-foot soil interval sample. Within boring OT44-DP2, maximum concentrations of the detected analytes were reported in the 5- to 6-foot soil interval. DRO and TRPH concentrations in borings OT44-DP2 and OT44-DP3 exceeded the Holloman AFB TPH action level of 1,000 mg/kg.

Based on the presence of TPH concentrations above 1,000 mg/kg, approximately 60 tons (44.4 yd^3) of TPH-impacted soils were excavated from OT-44 and disposed offsite in March 1997 (Foster Wheeler, 1997). Excavation activities were conducted in an area where vadose soils contained TPH concentrations above the Holloman AFB TPH action level of 1,000 mg/kg based on previous soil sampling activities. The excavated area corresponds to a small hole previously identified in the 25,000-gallon diesel UST product line. TPH-impacted soils were excavated to the top of the water table, estimated to be approximately 5 feet bgs. Three verification soil samples were obtained after excavation of the TPH-impacted soils and analyzed for TRPH. The location of the verification soil samples used in determining the extent of excavation activities and their associated TRPH analytical results are depicted on **Figure H5.1**. The results of the verification samples are also summarized on **Table H5.7**, which shows that none of the verification soil samples contained TRPH concentrations at or exceeding 1,000 mg/kg.

Biennial LTM of the groundwater was initiated at OT-44 in 1995 and conducted through 2001. Based on historic groundwater analytical results, groundwater samples collected during the LTM events were analyzed solely for VOCs. VOCs detected in the OT-44 groundwater included benzene, sec-butylbenzene, carbon disulfide, chloroform, methylene chloride, toluene, and TCE. The majority of the VOCs were detected in MW2 during the 1997 LTM event. With the exception of carbon disulfide and TCE, all of the VOCs were detected solely during the 1997 LTM event. Carbon disulfide was detected in MW2 in 1995 and 1999 while TCE was detected in MW2 only during the 1999 LTM event. TCE was detected at 1 µg/L. The 1997 LTM event was conducted in September 1997 after TPH excavation activities (i.e., March 1997) had been completed. The presence of the VOCs in groundwater samples retrieved from the downgradient wells was most likely attributable to the agitation of the groundwater system that occurred during excavation activities. None of the historically detected VOCs were detected during the 2001 LTM event. Cessation of OT-44 LTM activities was recommended in the 2001 LTM report (Foster Wheeler, 2002) and NMED concurred. The results of groundwater LTM activities are summarized on **Table H5.8**.

In January 2007, a request for a CAC determination and a report (HGL, 2007) was submitted to NMED presenting in detail the results of the various investigations conducted at OT-44, and requested CAC status. In a June 26, 2007, Notice of Deficiency (NOD) letter, NMED required minor revisions to the technical memorandum but concurred with the CAC recommendation (NMED, 2007). A copy of the NOD letter is included as **Figure H5.2**.

H.5.4 Basis for Determination

NMED concurred with the request for a CAC determination and the report conclusion that AOC-P (OT-44) is suitable for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.5.5 References

Dames and Moore, 1987. Installation Restoration Program Phase II – Confirmation/Quantification Stage 1 Report (April 1984 to March 1985), Holloman Air Force Base, New Mexico. March 6.

Foster Wheeler Environmental Corp. (Foster Wheeler), 1995. Draft Final Phase II RCRA Facility Investigation Report, Table 1 Solid Waste Management Units, Volume 1. June.

Foster Wheeler, 1997. Final Closure Report Addendum for Phase II Remediation of POL Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals. December.

Foster Wheeler, 2002. Final 2001 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico. July.

Groundwater Technology Government Services (Groundwater Technology), 1996. Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123, and OT-44, Holloman Air Force Base, New Mexico. February 29.

HydroGeoLogic, Inc. (HGL), 2007. Request for No Further Action, OT-44 (AOC P), Holloman Air Force Base, New Mexico. January.

New Mexico Environment Department (NMED), 2007. Notice of Deficiency, Request for No Further Action, OT-44 (AOC-P), January 2007, Holloman Air Force Base, EPA ID#NM6572124422, HWB-HAFB-07-004. June 26.

Walk, Haydel and Associates, Inc. (Walk Haydel), 1988. Stage 1 Drilling and Sampling Technical Report. June.

Walk Haydel, 1989a. Installation Restoration Program Remedial Investigation, Final Baseline Risk Assessment. December.

Walk Haydel, 1989b. Installation Restoration Program Remedial Investigation Final Remedial Investigation Report, Holloman Air Force Base, New Mexico, Volume I. December.

Walk Haydel, 1990. Installation Restoration Program, Holloman Air Force Base, New Mexico, Decision Documents, Site LF-01 (Old Site 1) – Main Base Landfill; Site LF-10 (Old Site 10) – Old Main Base Landfill; Site SD-25 (Old Site 25) – Drainage Lagoon; Site FT-31 (Old Site 31) – Fire Department Training Area; Site OT-44 (Old Site 50) – Building 301, Aircraft Maintenance

Hangar; Site SS-46 (Old Site 53) – JP4 Underground Waste Tank; and Site SS-48 (Old Site 55) – Military Gas Station. November.

Table H5.1
Soil Analytical Results
IRP Phase II Stage I Confirmation/Quantification Study
OT-44 (AOC P)
Holloman AFB, New Mexico

		Boring 50B1 (9/25/84)			Boring 50W1 (9/27/84)	
Parameter	**unit**	**5-6.5 (feet)**	**7.5-9 (feet)**	**10-11.5 (feet)**	**5-6.5 (feet)**	**7.5-9 (feet)**
Arsenic	mg/kg	--	--	--	--	--
Cadmium	mg/kg	--	--	--	--	--
Nickel	mg/kg	--	--	--	--	--
Lead	mg/kg	--	--	--	--	--
Silver	mg/kg	--	--	--	--	--
Chromium (hexavalent)	mg/kg	--	--	--	--	--
Oil and grease	mg/kg	160	3,700	1,143	1,192	4,265
TOC	mg/kg	--	--	--	--	--
TOX	mg/kg	<5	<5	<5	<5	<5
Phenolics	mg/kg	17	<1	<1	<1	<1

Notes:
mg/kg = milligrams per kilogram
-- = Not Detected
TOC = Total Organic Carbon
TOX = Total Organic Halides

Table H5.2
Groundwater Analytical Results
IRP Phase II, Stage 1 - Confirmation/Quantification Study
OT-44 (AOC P)
Holloman AFB, New Mexico

Parameter	Unit	50W1 (10/2/84)	
		Result	DL
Arsenic	µg/L	<	10
Cadmium	µg/L	<	10
Nickel	µg/L	<	10
Lead	µg/L	<	10
Silver	µg/L	<	10
Chromium (hexavalent)	µg/L	<	4
Oil and grease	µg/L	140,000	600
TOC	µg/L	95,000	1,000
TOX	µg/L	120	10
Phenolics	µg/L	<	10

Notes:
µg/L = micrograms per liter
< = Not detected above the detection limit
DL = Detection Limit
TOC = Total Organic Carbon
TOX = Total Organic Halides

Table H5.3
Soil Analytical Results
Phase II Remedial Investigation
OT-44 (AOC P)
Holloman AFB, New Mexico

Location		Industrial/ Occupational		B1 (3/28/88)			B2 (3/28/88)			B3 (4/1/88)		
Depth (feet)	**Residential**	**(µg/kg)**	**Construction**	**2.5**	**5**	**10**	**2.5**	**5**	**10**	**2.5**	**5**	**10**
VOCs (µg/kg)												
Benzene	27,000	73,600	157,000	--*	9	--	--	--	--	--	--	--
Chlorobenzene	176,000	242,000	242,000	--	--	--	--	40	--	--	--	--
Ethylbenzene	10,600,000	25,400,000	571,000,000	--	--	--	--	33	--	--	--	--
Styrene	419,000	419,000	419,000	--	5	--	--	--	--	--	--	--
Tetrachloroethene	9,830	24,600	97,600	--	39	5*	--	9	--	--	--	--
Toluene	248,000	248,000	248,000	--	6	--	--	9	--	--	--	--
Trichlorofluoromethane	528,000	959,000	959,000	--	374	83	--	39	103	--	--	--
BN/AE (µg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRPH (mg/kg)	1,000	NA	NA	526	--	--	--	**7,946**	--	--	--	--

Location		Industrial/ Occupational		B4 (3/29/88)			B5 (3/29/88)			B6 (1/23/88)		
Depth (feet)	**Residential**	**(µg/kg)**	**Construction**	**5**	**7.5**	**10**	**12.5**	**15**	**17.5**	**2.5**	**5**	**20**
VOCs (µg/kg)												
Benzene	27,000	73,600	157,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
Chlorobenzene	176,000	242,000	242,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
Ethylbenzene	10,600,000	25,400,000	571,000,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
Styrene	419,000	419,000	419,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
Tetrachloroethene	9,830	24,600	97,600	--	--	--	NA	NA	NA	(--)	(--)	(--)
Toluene	248,000	248,000	248,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
Trichlorofluoromethane	528,000	959,000	959,000	--	--	--	NA	NA	NA	(--)	(--)	(--)
BN/AE (µg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA	(--)	(--)*	(--)
TRPH (mg/kg)	1,000	NA	NA	--	--	--	--	--	--	(24)	(25)	(--)

Notes:
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
-- = not detected
( ) = Stage II Data
* = Corps of Engineers lab data
BN/AE = base neutrals/acid extractables
TRPH = total recoverable petroleum hydrocarbon
VOC = volatile organic compound
NA = not analyzed
Results in **BOLD** exceeded the Base-specific TRPH limit of 1,000 mg/kg

Table H5.4
Groundwater Analytical Results
Phase II Remedial Investigation
OT-44 (AOC P)
Holloman AFB, New Mexico

	NMGWQ Standards	EPA MCL	Monitoring Well									
			STAGE I				STAGE II					
			MW 1	MW 2	MW 3	MW 4	MW 1	MW 2	MW 3	MW 4	MW 6	MW 6-D[(1)]
Volatiles (ug/L)												
Date Collected:			3/28/88	NC	NC	NC	1/29/89	1/29/89	NC	NC	1/29/89	1/29/89
1,1,1-Trichloroethane	60	200	22*	NA	NA	NA	(--)	(--)	NA	NA	(--)	(--)
Trichloroethene	100	5	*75**	NA	NA	NA	*(16)*	*(9)*	NA	NA	(--)	(--)
I,I-Dichloroethane	25	--	7*	NA	NA	NA	(--)	(--)	NA	NA	(--)	(--)
I,I-Dichloroethylene	5	7	2*	NA	NA	NA	(--)	(--)	NA	NA	(--)	(--)
I,2-trans-Dichloroethylene	--	100	5*	NA	NA	NA	(--)	(--)	NA	NA	(--)	(--)
Acid/Base/Neutral Extractables (ug/L)												
Date Collected:			4/8/88	4/8/88	4/8/88	4/8/88	NC	NC	NC	NC	1/29/89	1/29/89
2,4-Dinitrotoluene	--	--	--	--	--	--	NA	NA	NA	NA	(58)	(56)
Total Recoverable Petroleum Hydrocarbons (TRPH) (mg/L)												
Date Collected:			4/8/88	4/8/88	4/8/88	4/8/88	1/29/89	1/29/89	NC	NC	1/29/89	1/29/89
TRPH	--	--	--	17	--	--	(--)	(9)	NA	NA	(2)	(2)

Notes:
(1) Duplicate of MW-6
NMGWQ = New Mexico Groundwater Quality
EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
ug/L = micrograms per liter
mg/L = milligrams per liter
-- = Not detected
( ) = Stage II data
D = Field duplicate
* = Corps of Engineers lab data
NA = Not analyzed
NC = Not collected
Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and EPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed EPA MCLs

Table H5.5
Soil Analytical Results
Phase II RCRA Facility Investigation
OT-44 (AOC P)
Holloman AFB, New Mexico

Location ID	Depth (feet)	TRPH	
		Result (mg/kg)	DL
44-B07 (11/16/94)	0.5-2.5	**17,100**	565
	2.5-4.5	**30,700**	791
	4.5-6.5	<	29
44-B08 (11/16/94)	1-3	<	29
	3-5	<	29
44-B09 (11/16/94)	1-3	<	29
	3-5	145	29
44-B10 (11/16/94)	1-3	<	31
	3-5	264	28
44-B11 (11/16/94)	1-3	156	26
	3-5	404	25
44-B12 (11/16/94)	1-3	70	26
	3-5	169	29

Notes:
µg/kg = micrograms per kilogram
ft = feet
< = Not detected at or above the detection limit
DL = Detection limit
TRPH = total recoverable petroleum hydrocarbons
Results in **BOLD** exceed the Base-specific TPH action level of 1,000 mg/kg.

Table H5.6
Soil Analytical Results
Additional Soil Characterization Activities
OT-44 (AOC P)
Holloman AFB, New Mexico

Parameter	Units	OT-44-DP1 (2/1/96)		OT44-DP2 (2/1/96)		OT44-DP3 (2/1/96)	
		2-3	4-5	5-6	6-8	4-5	2-4
GRO	mg/kg	--	--	490	413	3 J	42
DRO	mg/kg	--	--	11,000	11,000	32	8,200
TRPH	mg/kg	--	--	**19,100**	**12,600**	74	**12,500**
Benzene	µg/kg	--	--	--	--	--	--
Toluene	µg/kg	--	--	--	--	--	--
Ethylbenzene	µg/kg	--	--	1,360	790	--	--
Xylene	µg/kg	--	--	810	550 J	--	--

Notes:
-- = not detected
J = estimated value less than sample quantitation limit
GRO = gasoline-range total petroleum hydrocarbons
DRO = diesel-range total petroleum hydrocarbons
TRPH = total recoverable petroleum hydrocarbons
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram

Values in **BOLD** indicate TRPH concentrations exceeding Base-specific TPH action level of 1,000 mg/kg

Table H5.7
Soil Analytical Results
Excavation Closure Verification Sampling
OT-44 (AOC P)
Holloman AFB, New Mexico

Sample ID	OT44-01-03	OT44-01-03^	OT44-02-03	OT44-020-03^	OT44-03-03	OT44-030-03^	OT44-04-03	OT44-040-03^
Date Sampled	3/17/1997	3/17/1997	3/17/1997	3/17/1997	3/17/1997	3/17/1997	3/17/1997	3/17/1997
TRPH - 418 1 (mg/kg)	260	520	46	49	<20	27	32	25
RPD (%)		67%		6.30%		30%		25%

Notes:
< = Constituent not detected above laboratory quantitation limit
( ) = EPA Region VI risk-based criteria for industrial land use
NA = Not analyzed
ND = Not detected
NP = not present
[1] = Risk-based value above detected saturation point, value shown is residential land use risk-based concentration
RPD = Relative Percent Difference
^ = Duplicate sample; acceptance limit is 50%

Table H5.8
Groundwater Analytical Results
Biennial Groundwater Long Term Monitoring (1995 - 2001)
OT-44 (AOC P)
Holloman AFB, New Mexico

			S50-MW1				S50-MW2			
Sampling Date	**NMGWQ Standards**	**EPA MCL**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**
VOCs (µg/L)										
Benzene	10	5	NS	--	--	--	--	1.2	--	--
sec-Butylbenzene	NP	NP	NS	--	NA	--	--	1.9 J	NA	--
Carbon disulfide	NP	NP	NS	--	--	--	11	2.6 J	5	--
Chloroform	100	NP	NS	0.76 J	--	--	--	--	--	--
Methylene chloride	100	NP	NS	--	--	--	--	7.2 UB	--	--
Toluene	750	1,000	NS	--	--	--	--	1.4	--	--
Trichloroethylene	100	5	NS	--	--	--	ND	ND	1 J	--

			S50-MW3				S50-MW6(1)			
Sampling Date	**NMGWQ Standards**	**EPA MCL**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**	**Aug-95**	**Sep-97**	**Sep-99**	**Sep-01**
VOCs[1] (µg/L)										
Benzene	10	5	NS	--	--	--	--	--	--	--
sec-Butylbenzene	NP	NP	NS	--	NA	--	--	--	NA	--
Carbon disulfide	NP	NP	NS	--	--	--	--	1.8 J	--	--
Chloroform	100	NP	NS	--	--	--	--	--	--	--
Methylene chloride	100	NP	NS	7.6 UB	--	--	--	7.1 UB	--	--
Toluene	750	1,000	NS	--	--	--	--	--	--	--
Trichloroethylene	100	5	NS	--	--	--	--	--	--	--

Notes:
(1) Upgradient monitoring well
-- = not detected
NS = not sampled
NA = not analyzed
NP = not provided
VOC = volatile organic compound
µg/L = micrograms per liter
NMGWQ = New Mexico Groundwater Quality
EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level

Laboratory Qualifiers - assigned as a result of laboratory data assessment procedures
J = Estimated value, less than CRDL but greater than or equal to IDL
UB = Qualifies as nondetect due to presence of analyte in associated laboratory blank

Figure H5.1 OT-44 (AOC P) Site Layout, Holloman AFB

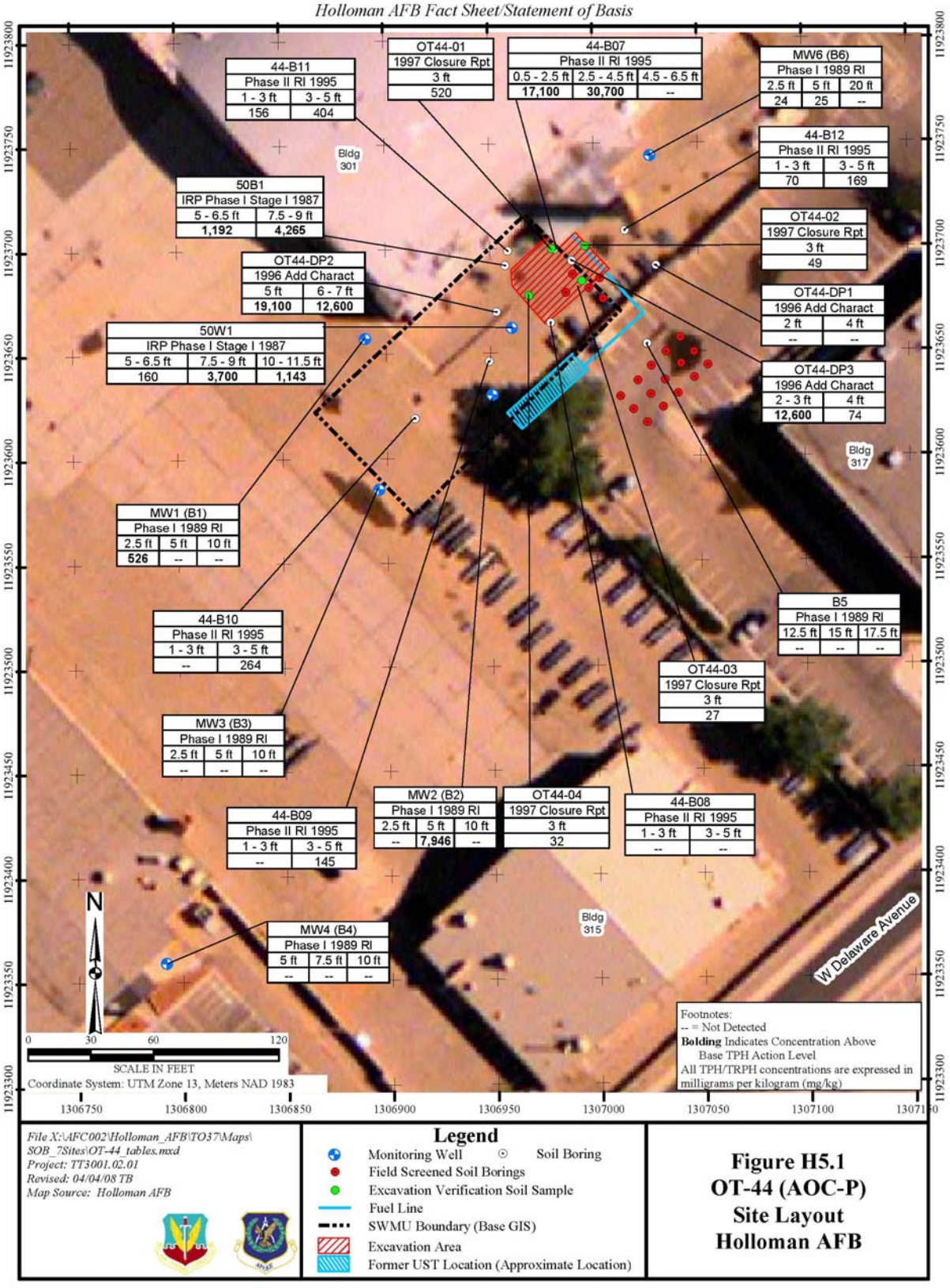
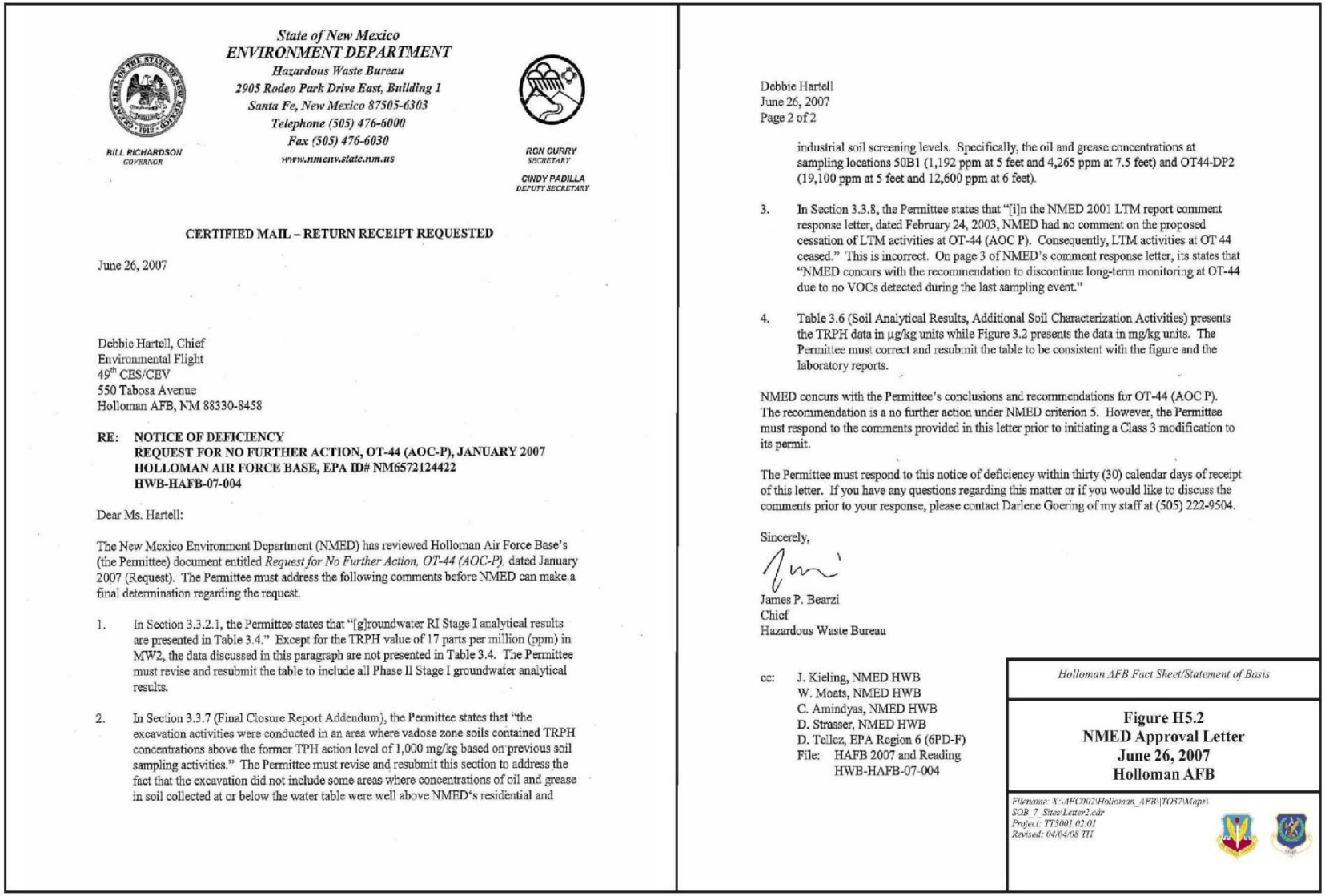


Figure H5.2 NMED Approval Letter, June 26, 2007



State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 476-6000
Fax (505) 476-6030
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CINDY PADILLA
DEPUTY SECRETARY

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

June 26, 2007

Debbie Hartell, Chief
Environmental Flight
49th CES/CEV
550 Tabosa Avenue
Holloman AFB, NM 88330-8458

RE: NOTICE OF DEFICIENCY
REQUEST FOR NO FURTHER ACTION, OT-44 (AOC-P), JANUARY 2007
HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422
HWB-HAFB-07-004

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed Holloman Air Force Base's (the Permittee) document entitled *Request for No Further Action, OT-44 (AOC-P)*, dated January 2007 (Request). The Permittee must address the following comments before NMED can make a final determination regarding the request.

1. In Section 3.3.2.1, the Permittee states that "[g]roundwater RI Stage I analytical results are presented in Table 3.4." Except for the TRPH value of 17 parts per million (ppm) in MW2, the data discussed in this paragraph are not presented in Table 3.4. The Permittee must revise and resubmit the table to include all Phase II Stage I groundwater analytical results.

2. In Section 3.3.7 (Final Closure Report Addendum), the Permittee states that "the excavation activities were conducted in an area where vadose zone soils contained TRPH concentrations above the former TPH action level of 1,000 mg/kg based on previous soil sampling activities." The Permittee must revise and resubmit this section to address the fact that the excavation did not include some areas where concentrations of oil and grease in soil collected at or below the water table were well above NMED's residential and

Debbie Hartell
June 26, 2007
Page 2 of 2

industrial soil screening levels. Specifically, the oil and grease concentrations at sampling locations 50B1 (1,192 ppm at 5 feet and 4,265 ppm at 7.5 feet) and OT44-DP2 (19,100 ppm at 5 feet and 12,600 ppm at 6 feet).

3. In Section 3.3.8, the Permittee states that "[i]n the NMED 2001 LTM report comment response letter, dated February 24, 2003, NMED had no comment on the proposed cessation of LTM activities at OT-44 (AOC P). Consequently, LTM activities at OT 44 ceased." This is incorrect. On page 3 of NMED's comment response letter, its states that "NMED concurs with the recommendation to discontinue long-term monitoring at OT-44 due to no VOCs detected during the last sampling event."

4. Table 3.6 (Soil Analytical Results, Additional Soil Characterization Activities) presents the TRPH data in µg/kg units while Figure 3.2 presents the data in mg/kg units. The Permittee must correct and resubmit the table to be consistent with the figure and the laboratory reports.

NMED concurs with the Permittee's conclusions and recommendations for OT-44 (AOC P). The recommendation is a no further action under NMED criterion 5. However, the Permittee must respond to the comments provided in this letter prior to initiating a Class 3 modification to its permit.

The Permittee must respond to this notice of deficiency within thirty (30) calendar days of receipt of this letter. If you have any questions regarding this matter or if you would like to discuss the comments prior to your response, please contact Darlene Goering of my staff at (505) 222-9504.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

cc: J. Kieling, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Tellez, EPA Region 6 (6PD-F)
File: HAFB 2007 and Reading
HWB-HAFB-07-004

Holloman AFB Fact Sheet/Statement of Basis

Figure H5.2
NMED Approval Letter
June 26, 2007
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO37\Maps\SOB_7_Sites\Letter2.cdr
Project: TT3001.02.01
Revised: 04/04/08 TH

H.6 SS-46 (SWMU 130), TAXIWAY 4, TANK 28, JP-4 UNDERGROUND WASTE TANK

H.6.1 Location/Unit Description

SS-46 (SWMU 130), formerly designated as Site 53, was located on the southeast side of the main taxi access, bounded between the Main Taxiway, Taxiway No. 4, and Taxiway No. 5. Building 285, a German Air Force hangar, was constructed over SS-46 in the mid-1990s. The location of SS-46 in relation to the surrounding facility is shown on **Figure A2**. A site layout of SS-46 is presented as **Figure H6.1**.

H.6.2 History

The 1983 IRP Phase I records search of Holloman AFB identified Tank 28 (SWMU 130) as an active waste JP4 fuel UST in use since the mid-1960s (CH2M Hill, 1983). According to the records search, the waste fuel was stored until a sufficient quantity had been accumulated and sold by the Defense Property Disposal Office (CH2M Hill, 1983). No environmental issues associated with Tank 28 were identified in the report. In 1988, a RFA identified SWMU 130 as an active UST used to store contaminated JP-4 fuel. The UST was reportedly in operation from 1968 to at least 1988. During the RFA Visual Site Inspection, no impacts to the site surface soils or surrounding soils were documented; however, three monitoring wells were noted in the vicinity of SS-46. Based on the presence of the monitoring wells, the RFA concluded that a release from UST Tank 28 (SWMU 130) had occurred (A.T. Kearney, 1989). No information on these wells, the ultimate disposition of the monitoring wells, or on the assumed release was provided in the RFA.

In 1989, a RI was conducted at the site (Walk Haydel, 1989a) because of a suspected release and incomplete facility records verifying or disproving the former release. During advancement of the monitoring well boreholes, soil samples were collected from 2.5 feet bgs, 5 feet bgs, and 14 feet bgs, equating to 2 feet below the bottom of the UST, and analyzed for VOCs, base, neutral, acid extractables (BN/AEs), TRPH, and lead. All detected concentrations were below NMED SSLs. The 1989 RI soil analytical results are presented on **Table H6.1**.

A groundwater sample was collected from the completed wells and analyzed for VOCs, BN/AE, TRPH, and lead (Walk Haydel, 1989a). During Stage II of the RI, an additional monitoring well (MW4) was installed and all four monitoring wells were re-sampled. The groundwater sample obtained from MW1 was analyzed for VOCs, BN/AEs, and lead, while the groundwater samples collected from MW2, MW3, and MW4 were analyzed for VOCs and lead. The groundwater analytical results for the 1989 RI are presented on **Table H6.2**. No VOCs were detected in the groundwater samples obtained from the four monitoring wells. Four phthalates were detected in MW1; however, all but one was detected below standards. Bis(2-ethylhexyl)phthalate was detected in well MW1 at concentrations exceeding the federal MCL value of 6 µg/L for the phthalate; since bis(2-ethylhexyl)phthalate is a common laboratory contaminant, its presence in the MW1 groundwater sample is suspect. TRPH was detected in only one well (MW3) and was detected at a low concentration (4 mg/L). During the Stage I sampling event, lead was detected in wells MW1, MW2, and MW3, with concentrations in MW3 exceeding NMGWQ standards and federal MCLs. During the Stage II sampling event, lead was detected only in well MW1 and at concentrations below NMWQCC standards but slightly exceeding the federal action level for

lead of 15 µg/L. An elevated lead detection limit of 50 µg/L occurred during the Stage II sampling event due to matrix interference.

A Baseline Risk Assessment (BRA) was conducted using the data collected during the RI, and no significant risk to human or environmental receptors was determined to be present (Walk Haydel, 1989b). Actions recommended included removal of the tank from service until a leak test could be performed, but, based on the data collected; no further investigative work or feasibility studies were recommended. The tank was taken out of service in 1989. A Decision Document (Walk Haydel, 1990) was signed by the installation commander in September 1991. The NMED agreed to sign the Decision Document if periodic groundwater monitoring was initiated.

In the mid-1990s, Building 285, a German Air Force hangar was constructed over SS-46, resulting in the removal of the four IRP RI groundwater monitoring wells. The UST was also removed. UST closure activities were documented with a 49 CES/CEV memorandum (49 CES/CEV, 1995). On November 18, 1994, a 9,500-gallon capacity UST, formerly containing JP4, was removed. During the removal process, a small hole was discovered in the bottom of the tank and contaminated soil and groundwater was observed immediately around the UST. The impacted soils were immediately removed from the subsurface during the UST closure process and soil verification samples were collected from the UST excavation sidewalls. The collected soils were analyzed for TPH, BTEX, methyl tertiary butyl ether (MTBE), and product fingerprinting. No free phase hydrocarbons or severely contaminated soils were encountered; however, verification soil samples identified TPH concentrations above the Base TPH Action Limit of 1,000 mg/kg along the western and southern sidewalls. The UST excavation was extended to the west and south until verification samples contained TPH concentrations below 1,000 mg/kg. Approximately 1,721 tons (1,380 yd^3) of contaminated soil was removed from the UST excavation. The results of the verification sampling event are summarized on **Table H6.3**. Upon completion of excavation activities, the excavation was backfilled with clean soil. In addition to the soil samples, a groundwater sample was also collected from the UST excavation and was analyzed only for TPH. TPH was detected in the pit water at 7 mg/L, which exceeded the NMED tap water screening level of 1.72 mg/L (**Table H6.3**).

The current and anticipated future land use is industrial.

H.6.3 Evaluation of Relevant Information

In August 1997, three new groundwater monitoring wells (designated as MW-46-01 through MW-46-03) were installed at SS-46. Biennial groundwater LTM activities were initiated in late 1997. A summary of the LTM data obtained from the Bhate 2006 LTM report is provided as **Tables H6.4 and H6.5**. Over the course of the LTM program, the TAL was reduced and in 2005 consisted only of bromodichloromethane, chloroform, and methylene chloride. Benzene was removed from the SS-46 COPC list after the 2001 LTM event. Groundwater samples were collected from the three wells and analyzed for VOCs and total and dissolved lead analysis. The 2005 LTM event represented the fifth biennial sampling event. During the 2005 LTM event, no target analytes were detected above contract required detection limits (CRDLs). Based on the analytical results, cessation of LTM and assignment of CAC were recommended (Bhate, 2006).

NMED agreed with the recommendation in an October 4, 2006, comment letter (NMED, 2006) provided as **Figure H6.2**.

H.6.4 Basis for Determination

NMED concurred with the 2005 LTM report conclusion that SWMU 130 (SS-46) is suitable for CAC since the SWMU and AOC have been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.6.5 References

49 CES/CEV, 1995. Report on On Site Investigation of Underground Storage Tank at TW 3/4 at Holloman AFB. January 27.

A.T. Kearney, Inc, and DPRA Incorporated, September 1988. RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report, Holloman AFB.

Bhate Environmental Associates, Inc., 2006. 2005 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico. March.

CH2M Hill, 1983. Installation Restoration Program Records Search for Holloman AFB. August.

New Mexico Environment Department (NMED), 2006. Comment letter on the Final 2005 Long-Term Groundwater Monitoring Report, Holloman Air Force base, New Mexico, May 2006, EPA ID#NM6572124422, HWB-HAFB-06-003. October 4.

Walk Haydel & Associates, Inc. (Walk, Haydel), 1989a. Final Installation Restoration Program, Remedial Investigation Report, Holloman AFB. December.

Walk Haydel, 1989b. Final Installation Restoration Program, Baseline Risk Assessment Report, Holloman AFB, New Mexico. December.

Walk Haydel, 1990. Installation Restoration Program, Holloman Air Force Base, New Mexico, Decision Documents, Site LF-01 (Old Site 1) – Main Base Landfill; Site LF-10 (Old Site 10) – Old Main Base Landfill; Site SD-25 (Old Site 25) – Drainage Lagoon; Site FT-31 (Old Site 31) – Fire Department Training Area; Site OT-44 (Old Site 50) – Building 301, Aircraft Maintenance Hangar; Site SS-46 (Old Site 53) – JP4 Underground Waste Tank; and Site SS-48 (Old Site 55) – Military Gas Station. November 30.

Table H6.1
1989 IRP RI Soil Analytical Results
SS-46 (SWMU 130)
Holloman AFB, New Mexico

Analyses	NMED Soil Screening Levels[1]			Boring								
	Residential	Industrial/ Occupational	Construction Worker	B1 (3/25/88)			B2 (3/25/88)			B3 (3/24/88)		
			Depth:	2.5 ft	5 ft	14 ft	2.5 ft	5 ft	14 ft	2.5 ft	5 ft	14 ft
Benzene (µg/kg)	10,300	25,800	174,000	--**	--*	--	6*	--*	6*	5	5	8
Chlorobenzene (µg/kg)	194,000	245,000	245,000	NA	--	NA	NA	--	NA	NA	2	NA
Toluene (µg/kg)	252,000	252,000	252,000	NA	NA	--	NA	NA	5	NA	NA	--
BN/AE (µg/kg)	NA	NA	NA	--	--	--	--	--	--	--	--	--
TRPH (mg/kg)	1,000	1,000	1,000	--	--	--	--	--	--	--	32	--
Lead (µg/kg)	400,000	800,000	800,000	400	900	900	1,100	1,000	900	--	--	--

Notes:
(1) NMED Soil Screening Levels, June 2006, Revision 4.0
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
ft = feet
NA = not analyzed/not applicable
-- = not detected
* = sample analyses outside QC limits - one surrogate out-of-range
** = Corps of Engineers lab data
TRPH = total recoverable petroleum hydrocarbons
BN/AE = base, neutral, acid extractables
IRP = Installation Restoration Program
RI = remedial investigation

Table H6.2
1989 IRP RI Groundwater Analytical Results
SS-46 (SWMU 130)
Holloman AFB, New Mexico

	NMGWQ Standard[1]	EPA MCL	Monitoring Well				
			MW1	**MW1-D**	**MW2**	**MW3**	**MW4**
Volatiles (µg/L)							
		Date Collected:	1/27/89	1/27/89	1/27/89	1/29/89	2/1/89
Volatiles	NA	NA	(--)	(--)	(--)	(--)	(--)
Base/Neutral/Acid Extractables (µg/L)							
		Date Collected:	4/8/88	4/8/88	4/7/88	4/7/88	NC
Bis(2-ethylhexyl)phthalate	--	6	*32*	*118*	--	--	NA
Butylbenzylphthalate	--	--	16	136	--	--	NA
Di-n-butylphthalate	--	--	142	672	--	--	NA
Dimethylphthalate	--	--	--	56	--	--	NA
Total Recoverable Petroleum Hydrocarbons **(mg/L)**							
		Date Collected:	4/8/88	4/8/88	4/7/88	4/7/88	NC
TRPH	--	--	--	NA	--	4	NA
Lead (µg/L)							
		Date Collected:	4/8/88, 1/27/89	4/8/88, 1/27/89	4/7/88, 1/29/89	4/7/88, 1/29/89	NC, 2/1/89
Lead	50	15[2]	4.5 *(16)*	3.1 *(19)*	2.5 (--)	***341*** (--)*	NA (--)*
Tentatively Identified Compounds (µg/L)							
		Date Collected:	1/27/89	1/27/89	1/29/89	1/29/89	2/1/89
3-methylpentane	--	--	(24)	(--)	(--)	(--)	(--)

Notes:
(1) NMAC 20.6.2.3103
(2) Action Level
µg/L = micrograms per liter
mg/L = milligrams per liter
NMGWQ = New Mexico Groundwater Quality
EPA = United States Environmental Protection Agency
MCL = maximum contaminant level
TRPH = total recoverable petroleum hydrocarbons
NA = not analyzed/not applicable
D = field duplicate
( ) = stage II data
-- = not detected
* = Elevated detection limit (50 ug/L) due to matrix interference
NMAC = New Mexico Administrative Code
Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and EPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed EPA Primary Drinking Water MCLs

Table H6.3
Excavation Verification Sample Analytical Results (November 1994)
SS-46 (SWMU 130)
Holloman AFB, New Mexico

Sample ID		Location[3]	TPH Concentration	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Fingerprinting
SOIL (mg/kg)									
NMED Soil Screening Levels - Residential[1]			1,000	10.3	252	128	82	388	NA
NMED Soil Screening Levels - Industrial/Occupational[1]			1,000	25.8	252	128	82	984	NA
NMED Soil Screening Levels - Construction Worker[1]			1,000	174	252	128	82	19,600	NA
	N	6,740	33	--	--	0.033	0.070	NA	NP
	S	9,340	<20	--	--	--	0.13	NA	NP
	1	North Wall of Pit	32	--	--	--	--	--	Diesel (C11-C28)
	2	East Side of Pit	500	--	--	--	--	--	Diesel (C9-C30)
	3	South Side of Pit	**>1,000[2]**	NP	NP	NP	NP	NP	NP
	4	West Side of Pit	**>1,000[2]**	NP	NP	NP	NP	NP	NP
	5	South Side of Pit	590	--	--	0.63	0.30	NA	NP
	6	West Side of Pit	<20	--	--	--	--	NA	NP
	7	South Side of Pit	97	--	--	--	--	NA	NP
	8	West Side of Pit	<5	--	--	--	--	--	--
	9	Northeast Side of Pit	<5	--	--	--	--	--	--
	S/W Tank Hole	South End by Tank Hole	**9,000**	9	64	48	**110**	NA	NP
GROUNDWATER (mg/L)									
NMED Soil Screening Levels - Tap Water[1]			1.72[4]	0.00349	2.27	1.34	0.203	0.0614	NA
	Groundwater	Excavation	**7**	NP	NP	NP	NP	NA	NP

Notes:
(1) NMED Soil Screening Levels, June 2006, Revision 4.0.
(2) Analytical data not provided but concentration exceeded NMED-approved TPH action level of 1,000 mg/kg
(3) Samples collected either at 3 of 7 feet bgs
(4) Diesel #2 TPH Screening Guideline for Potable Water

mg/kg = milligrams per kilogram
mg/L = milligrams per liter
TPH = total petroleum hydrocarbons
MTBE = methyl tertiary butyl ether
-- = not detected
NA = not analyzed/not applicable
NP = not provided
UST = underground storage tank
NMED = New Mexico Environment Department

Bolded analyte concentration indicates concentration above one or more screening criteria.
Shaded Sample IDs and associated locations indicate sample locations where additional excavation of the UST pit was conducted.

Table H6.4
Groundwater LTM Analytical Results
SS-46 (SWMU 130)
Holloman AFB, New Mexico

Well Number	NMGWQ	EPA	MW-46-01					MW-46-02				
Sampling Date	Standard[1]	MCL	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
VOCs[2] (µg/L)												
Benzene	10	5	--	--	--	NA	--	--	--	--	NA	NA
Bromodichloromethane	NA	NA	--	--	5.4	1.7	--	--	--	5.4	--	--
Chloroform	100	NA	--	--	7.4	4.7	0.99 J	--	--	2.9 J	0.22 (J)	--
Methylene chloride	100	NA	--	--	1.2 J	--	--	--	--	--	--	--

Well Number	NMGWQ	EPA	MW-46-03[3]				
Sampling Date	Standard[1]	MCL	Sep-97	Sep-99	Sep-01	Apr-03	Dec-05
VOCs[2] (µg/L)							
Benzene	10	5	--	--	--	NA	0.52 J
Bromodichloromethane	NA	NA	--	--	--	--	--
Chloroform	100	NA	--	--	--	0.37 (J)	--
Methylene chloride	100	NA	--	--	--	--	--

Notes:
(1) NMAC 20.6.2.3103
(2) Unless otherwise reported, no VOCs were detected using EPA Method 8260B.
(3) Upgradient monitoring well
µg/L = micrograms per liter
NMGWQ = New Mexico Groundwater Quality
EPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
VOC = volatile organic compound
Qual = Qualifier
CRDL = Contract Required Detection Limit
IDL = Instrument Detection Limit
-- = not detected at or above method reporting limit
NA = not analyzed/not applicable
VOCs = volatile organic compounds
µg/L = micrograms per liter
(J) = Estimated value based on QC criteria
J = Estimated value detected less than the CRDL but greater than the reporting limit.
U = Compound was analyzed for but not detected. Analyte result was below the CRDL.
UJ = Estimated as non-detect at the detection limit.

Table H6.5
TDS Summary Results
SS-46 (SWMU 130)
Holloman AFB, New Mexico

Well ID	TDS (mg/L)			
	Second Quarter (June) 2002	Third Quarter (September) 2002	Second Quarter (March) FY2003	Dec-05
MW-46-01	6,740	7,580	6,960	8,380
MW-46-02	9,340	8,260	7,710	8,000
MW-46-03	7,760	7,440	7,380	6,390

Notes:
TDS = total dissolved solids
mg/L = milligrams per liter

Figure H6.1 SS-46 (SWMU 130) Site Layout, Holloman AFB

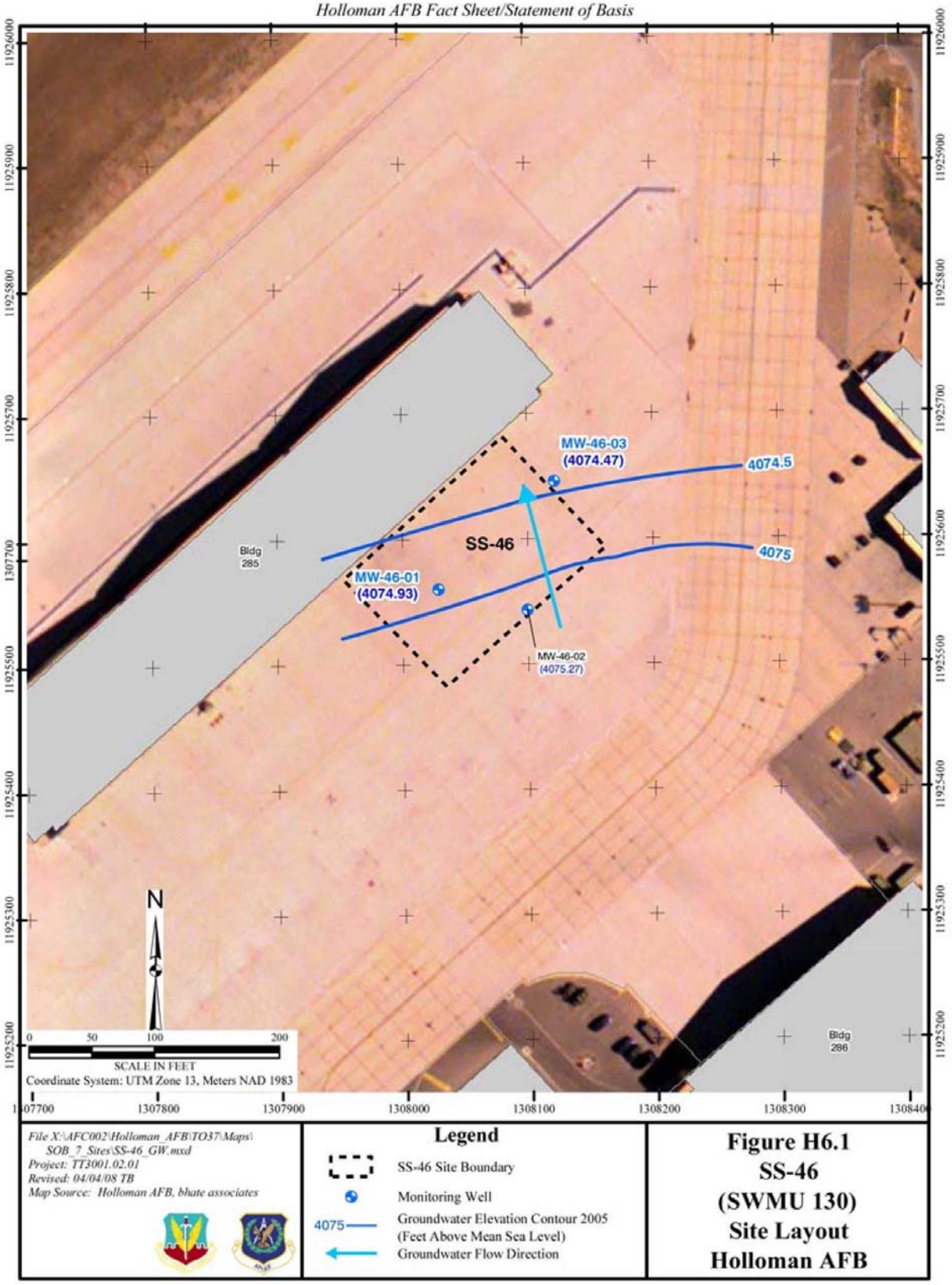
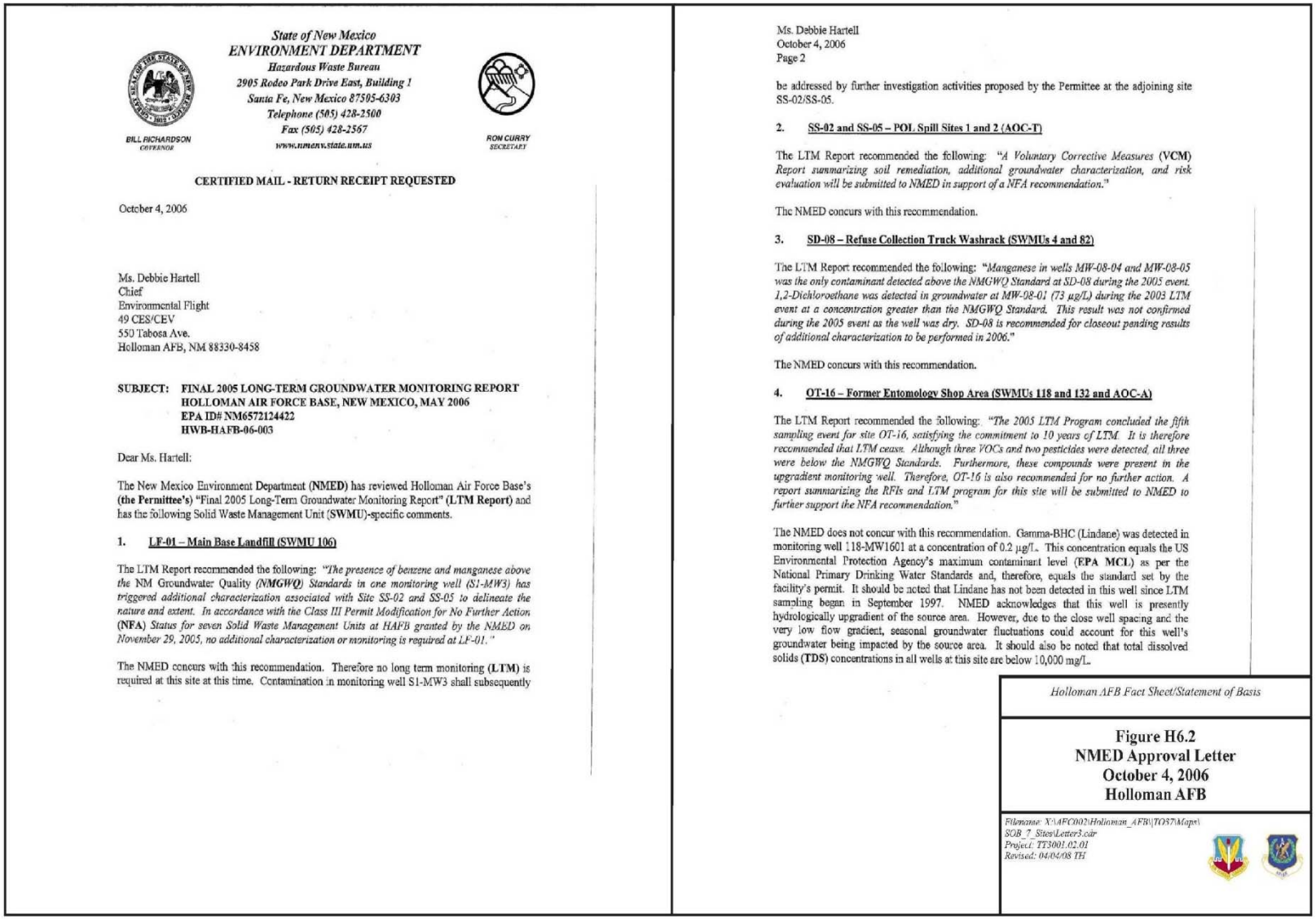


Figure H6.2 NMED Approval Letter, October 4, 2006
(Page 1 of 3)



State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 428-2567
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 4, 2006

Ms. Debbie Hartell
Chief
Environmental Flight
49 CES/CEV
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

SUBJECT: FINAL 2005 LONG-TERM GROUNDWATER MONITORING REPORT
HOLLOMAN AIR FORCE BASE, NEW MEXICO, MAY 2006
EPA ID# NM6572124422
HWB-HAFB-06-003

Dear Ms. Hartell:

The New Mexico Environment Department **(NMED)** has reviewed Holloman Air Force Base's **(the Permittee's)** "Final 2005 Long-Term Groundwater Monitoring Report" **(LTM Report)** and has the following Solid Waste Management Unit (SWMU)-specific comments.

1. **LF-01 – Main Base Landfill (SWMU 106)**

The LTM Report recommended the following: *"The presence of benzene and manganese above the* NM Groundwater Quality *(NMGWQ) Standards in one monitoring well (S1-MW3) has triggered additional characterization associated with Site SS-02 and SS-05 to delineate the nature and extent. In accordance with the Class III Permit Modification for No Further Action* **(NFA)** *Status for seven Solid Waste Management Units at HAFB granted by the NMED on November 29, 2005, no additional characterization or monitoring is required at LF-01."*

The NMED concurs with this recommendation. Therefore no long term monitoring **(LTM)** is required at this site at this time. Contamination in monitoring well S1-MW3 shall subsequently

be addressed by further investigation activities proposed by the Permittee at the adjoining site SS-02/SS-05.

2. **SS-02 and SS-05 – POL Spill Sites 1 and 2 (AOC-T)**

The LTM Report recommended the following: *"A Voluntary Corrective Measures* **(VCM)** *Report summarizing soil remediation, additional groundwater characterization, and risk evaluation will be submitted to NMED in support of a NFA recommendation."*

The NMED concurs with this recommendation.

3. **SD-08 – Refuse Collection Truck Washrack (SWMUs 4 and 82)**

The LTM Report recommended the following: *"Manganese in wells MW-08-04 and MW-08-05 was the only contaminant detected above the NMGWQ Standard at SD-08 during the 2005 event. 1,2-Dichloroethane was detected in groundwater at MW-08-01 (73 µg/L) during the 2003 LTM event at a concentration greater than the NMGWQ Standard. This result was not confirmed during the 2005 event as the well was dry. SD-08 is recommended for closeout pending results of additional characterization to be performed in 2006."*

The NMED concurs with this recommendation.

4. **OT-16 – Former Entomology Shop Area (SWMUs 118 and 132 and AOC-A)**

The LTM Report recommended the following: *"The 2005 LTM Program concluded the fifth sampling event for site OT-16, satisfying the commitment to 10 years of LTM. It is therefore recommended that LTM cease. Although three VOCs and two pesticides were detected, all three were below the NMGWQ Standards. Furthermore, these compounds were present in the upgradient monitoring well. Therefore, OT-16 is also recommended for no further action. A report summarizing the RFIs and LTM program for this site will be submitted to NMED to further support the NFA recommendation."*

The NMED does not concur with this recommendation. Gamma-BHC (Lindane) was detected in monitoring well 118-MW1601 at a concentration of 0.2 µg/L. This concentration equals the US Environmental Protection Agency's maximum contaminant level **(EPA MCL)** as per the National Primary Drinking Water Standards and, therefore, equals the standard set by the facility's permit. It should be noted that Lindane has not been detected in this well since LTM sampling began in September 1997. NMED acknowledges that this well is presently hydrologically upgradient of the source area. However, due to the close well spacing and the very low flow gradient, seasonal groundwater fluctuations could account for this well's groundwater being impacted by the source area. It should also be noted that total dissolved solids **(TDS)** concentrations in all wells at this site are below 10,000 mg/L.

Holloman AFB Fact Sheet/Statement of Basis

Figure H6.2
NMED Approval Letter
October 4, 2006
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO37\Maps\SOB_7_Sites\Letter3.cdr
Project: TT3001.02.01
Revised: 04/04/08 TH

Figure H6.2 NMED Approval Letter, October 4, 2006
(Page 2 of 3)

Therefore, the Permittee is required to sample groundwater from all wells at this site for pesticides and TDS on a quarterly basis for eight consecutive quarters. The Permittee is required to submit a letter work plan confirming the scheduling of this sampling activity, including the methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status for this site is warranted will be made after the required quarterly sampling.

5. **SS-17 – BX Service Station (AOC-Q)**

The LTM Report recommended the following: *"Contaminated soil removal is underway and will be completed in 2008. Upon conclusion of this removal, a Voluntary Corrective Measures Report summarizing soil remediation, nature and extent of groundwater conditions, and risk evaluation will be submitted to NMED to support further decisions with regard to this site."*

The NMED concurs with this recommendation.

6. **LF-21 – West Area Landfill No. 2 (SWMU 116)**

The LTM Report recommended the following: *"The 2005 LTM Program concluded its sixth sampling event for LF-21, representing over 10 years of LTM, satisfying the Decision Document commitment. Manganese detected in well MW-21-02 was the only contaminant detected above the NMGWQ Standards at LF-21 during the 2005 event. It is recommended that LTM cease. Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments, to support future decisions with regard to LF-21."*

The NMED concurs with this recommendation.

7. **LF-29 – Former Army Landfill (SWMU 104)**

The LTM Report recommended the following: *"This round completes 10 years of LTM at LF-29 and it is recommended that LTM cease. Additional characterization work to support future decisions with regard to LF-29 is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments."*

The NMED concurs with this recommendation.

8. **DP-30 and SD-33 – Grease Trap Disposal Pits (SWMU 113B)**

The LTM Report recommended the following: *"Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments. This characterization includes continued groundwater sampling on a semi-annual basis for VOCs, metals and TDS."*

The NMED concurs with this recommendation.

9. **SS-39 – Missile Fuel Spill Area (SWMUs 165, 177, 179 and 181)**

The LTM Report recommended the following: *"Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments. This characterization includes continued groundwater sampling on a semi-annual basis for VOCs, RCRA metals, perchlorate and TDS."*

The NMED concurs with this recommendation.

10. **SS-46 – JP-4 Spill Site (SWMU 130)**

The LTM Report recommended the following: *"The 2005 LTM Program concluded the fifth sampling event for site SS-46 and 10 years of monitoring. It is recommended that LTM cease. Furthermore, VOCs were not detected above the CRDLs and SS-46 is recommended for No Further Action under NMED Criterion 5."*

The NMED concurs with this recommendation.

11. **SS-48 – Military Gas Station (AOC-N)**

The LTM Report recommended the following: *"The 2005 LTM Program concluded the sixth sampling event for site SS-48 and over 10 years of LTM. Therefore, it is recommended that LTM cease. Although benzene was detected above the NMGWQ Standards in one monitoring well (S55-MW5), SS-48 is recommended for NFA. The TDS concentrations in four of the six wells were above 10,000 mg/L. It is hypothesized that the two wells with TDS concentrations below 10,000 mg/L are artificially low due to the dilution of natural groundwater from leaking water lines and surface irrigation from the domestic water supply. In conclusion, the NMGWQ Standard for TDS does not apply because SS-48 groundwater in its natural state would have TDS concentrations greater than 10,000 mg/L. Therefore, the groundwater is not a potential domestic or agricultural water supply."*

The NMED does not concur with the recommendation that LTM cease and the site be considered for NFA status. Nor does the NMED agree with the conclusion that TDS concentrations in groundwater above 10,000 mg/L necessarily negate application of NM Water Quality Control Commission (NMWQCC) groundwater standards. Evaluation of potential risks from exposure pathways (e.g. vapor inhalation or construction worker exposure) will be deemed necessary for contaminants above NMWQCC Standards, regardless of TDS concentrations. The NMED also does not agree that the NMWQCC Standards do not apply to groundwater with TDS concentrations below 10,000 mg/L where this condition appears *"artificially low due to dilution*

Holloman AFB Fact Sheets/Statement of Basis

Figure H6.2 (Cont.)
NMED Approval Letter
October 4, 2006
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO37\Maps\SOB_7_Sites\Letter3_P3-4.cdr
Project: TT3001.02.01
Revised: 04/04/08 TH

Figure H6.2 NMED Approval Letter, October 4, 2006
(Page 3 of 3)

of natural groundwater". If TDS concentrations are below 10,000 mg/L, the NMWQCC Standards will apply, regardless of hypothetical reasons for the lower concentrations.

The Benzene concentration in well S55-MW5 during this LTM event was 83 µg/L. The NMWQCC Standard is 10 µg/L. Benzene concentrations in this well have been above the NMWQCC Standard since September 1999. The TDS concentrations in this well during the 2005 LTM event were above 10,000 mg/L. In addition, the concentration of Methyl tertbutyl ether (**MTBE**) in well S55-MW5 was 419 µg/L and the MTBE concentration in well S55-MW7 was 161 µg/L. Although there are no NMWQCC Standards or EPA MCLs for MTBE in groundwater, the calculated standard as specified in the facility permit is 131 µg/L and the NM Environmental Improvement Board Standard for groundwater remediation is 100 µg/L (reference 20.5.12.1233 (a)(2) NMAC). These concentrations are exceeded in both wells. The TDS concentrations in these wells during the 2005 LTM event were above 10,000 mg/L. Therefore, the Permittee is required to conduct a risk assessment for volatile organic compounds, particularly Benzene and MTBE, evaluating the vapor inhalation and construction worker exposure pathways in the vicinity of this site. The Permittee is required to submit a letter work plan confirming the scheduling of this evaluation, including methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status or further LTM for this site is warranted will be made after the required risk assessment.

If you have any questions regarding this matter, please contact David Strasser of my staff at (505) 222-9526 or at the above address.

Sincerely,

John E. Kieling
Manager
Permits Management Program

JEK:dcs

cc: J. Bearzi, NMED, HWB
W. Moats, NMED, HWB
C. Amindyas, NMED, HWB
D. Strasser, NMED, HWB
D. Tellez, EPA, Region 6 (6PD-F)
D. Griffin, HAFB
File: HAFB, 2006 and Reading
HWB-HAFB-06-003 (2005 LTM Report)
HWB-HAFB-05-003 (SD-08 RFI WP)
HWB-HAFB-05-004 (SS-02/SS-05 RFI WP)
HWB-HAFB-05-006 (LF-21, LF-29, DP-30/SD-33 and SS-39 RFI WP)

Holloman AFB Fact Sheet/Statement of Basis

Figure H6.2 (Cont.)
NMED Approval Letter
October 4, 2006
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO57\Maps\SGB_7_Sites\Letter3_P5-6.cdr
Project: TT3001.02.01
Revised: 02/28/08 TH

H.7 SS-48 (AOC N) MILITARY GAS STATION TANK

H.7.1 Location/Unit Description

SS-48 is located in the southeastern portion of Holloman AFB off of Ocotillo Avenue between Connecticut Avenue and Colorado Avenue. The location of the site in relation to the surrounding facility is depicted on **Figure A2**. A site layout map is included as **Figure H7.1**. Associated permanent facilities are three 12,000-gallon USTs (Tank Numbers 1, 2, and 3), a pumphouse, and a dispensing island. A vehicle washrack is also located on site. Groundwater occurs approximately 15 feet bgs. The hydraulic gradient is toward the south.

H.7.2 History

In 1986, it was reported that water was found in former Tank No. 2. The water was pumped out; however, water was found in the tank again about a week later. An integrity test confirmed that the tank had a leak and use of the tank was discontinued. One of the base personnel working at the gas station believed that water was leaking into the top of the tank from the adjacent washrack. During a 1989 RI (Walk Haydel, 1989a), seven monitoring wells were installed and soil samples from each monitoring well borehole were collected. Upon completion of the monitoring wells, groundwater samples were collected from all seven monitoring wells. Both the soil and groundwater samples were analyzed for VOCs, TRPH, and lead. No analytes were detected above screening criteria in the soil samples. The groundwater samples contained benzene, toluene, tetrachloroethene, TCE, and lead above screening criteria in two of the seven wells. The soil and groundwater analytical results of the 1989 RI are provided as **Tables H7.1 and H7.2**, respectively.

A BRA was conducted for the site and concluded that the site posed no significant threat to human health or the environment (Walk Haydel, 1989b). A Decision Document (Walk Haydel, 1990) was signed by the Base and NMED in April 1993 to support site close-out of SS-48, and the USTs were subsequently removed in 1993 (USAF, 2003). The decision document stated that Site SS-48 presented no significant public health or environmental risk.

The current and anticipated future land use is industrial.

H.7.3 Evaluation of Relevant Information

Biennial groundwater LTM activities were initiated in 1995 and continued until 2005. LTM sampling consisted of gauging and collecting groundwater samples from six of the seven onsite monitoring wells with one well (S55-MW3) added to the LTM program in 2003 based on a request from Holloman AFB. Groundwater samples in December 2005 were analyzed for VOCs (**Table H7.3**) and TDS (**Table H7.4**) (Bhate, 2006). Historical groundwater LTM analytical results are also included on **Table H7.3**. Eight VOCs were detected above the CRDLs in the six groundwater samples collected from the SS-48 monitoring well network. The most frequently detected VOCs were chloroform, MTBE, and TCE. TCE, the most widely distributed VOC constituent, was detected in five of the wells sampled with concentrations ranging from 1.2 to 25.2 µg/L. The highest concentrations were found in wells upgradient and cross-gradient of the site. All concentrations of TCE were below the NMGWQ standard. Chloroform was detected in four wells (S55-MW-2, S55-MW-3, S55-MW-4, and S55-MW-6) with concentrations ranging

from 1.4 to 4.0 µg/L. These concentrations are also below the NMGWQ standard. MTBE was detected in S55-MW5 and S55-MW7 with concentrations of 419 and 161 µg/L respectively. There is no NMGWQ standard for this compound.

Benzene was detected in monitoring well S55-MW5 with a concentration of 83.0 µg/L. This concentration is greater than the NMGWQ standard (10 µg/L). However, the concentration of benzene detected in 2005 was less than the concentrations of benzene detected in 2003 (100 µg/L) and 2001 (560 µg/L) at S55-MW5, exhibiting a decreasing trend. The detections of 1,2-dichloroethane (1.1 µg/L in S55-MW7) and ethylbenzene (6.8 µg/L in S55-MW5) were both below the NMGWQ standards. In addition, there were low concentrations of sec-butylbenzene (1.4 µg/L) and isopropylbenzene (1.4 µg/L) detected in the sample collected from S55-MW5. There are no NMGWQ standards for these compounds. In general the concentrations of VOCs were lower than the concentrations previously detected at SS-48. This was the first time that monitoring well S55-MW6 had been sampled under the LTM program. TDS concentrations ranged from 6,110 to 12,100 mg/L.

Although benzene was detected above the NMGWQ standards in one well (S55-MW5), cessation of LTM activities and NFA was recommended, since TDS concentrations in wells containing contaminants were above 10,000 mg/L, indicating that the underlying groundwater was not a potential domestic or agricultural water supply. NMED reviewed the 2005 LTM report and responded in an October 4, 2006 comment letter (provided as **Appendix A**), indicating that a risk assessment was required for VOCs (particularly benzene and MTBE) that would evaluate the vapor inhalation and construction work exposure pathways in the vicinity of the site before deciding whether CAC status or further LTM is warranted (NMED, 2006).

Holloman AFB addressed the VOC risk assessment requirement in a Response to Comment letter on November 14, 2006 (provided in **Appendix A**, HGL, 2006). The risk assessment utilized the Tier 1 risk-based screening levels for these receptors and pathways in the New Mexico Risk Based Decision Making (NMRBDM) process set forth in the *New Mexico Underground Storage Tank Bureau Guidelines for Corrective Action, March 13, 2000.* The Tier 1 screening levels are criteria developed using default exposure assumptions presented in the Guidelines. The NMRBDM process directs that contaminant concentrations in applicable media for appropriate receptors be compared to these screening levels. If these levels are exceeded, remediation or proceeding to a site-specific Tier 2 risk evaluation would be the next course of action. NMED may approve CAC status if the site satisfies the requirements of 20 NMAC 5.12.1227. These requirements include but are not limited to:

- Representative concentrations for each medium meet the criteria established in accordance with 20 NMAC 5.12 and the maximum concentration in each medium does not exceed the representative concentration by a factor of 10,
- No nuisance conditions exist at the site,
- Non-aqueous phase liquids (NAPLs) and contaminant-saturated soils have been removed or remediated,
- NMED agrees with the overall Tier 1 evaluation, and

- The overall size of the plume is shrinking, based on concentration trends observed in the monitoring wells.

SS-48 contaminant concentrations were, therefore, compared to the Tier 1 risk-based screening levels (RBSLs) to determine whether further evaluation using a Tier 2 risk assessment was warranted. Initial screening against standards resulted in the requirement to evaluate benzene, ethylbenzene, and MTBE with respect to the RBSLs. Although the site and its surrounding area are defined as commercial in accordance with Section 4.3.1 of the corrective action guidance document, benzene, ethylbenzene, and MTBE were compared to both residential and commercial groundwater indoor inhalation RBSLs, provided in Tables 4-17 and 4-18, respectively, of the guidance document. In addition, concentrations were also compared to the construction worker groundwater outdoor inhalation RBSLs located in Table 4-19 of the corrective action guidance document (NM USTB, 2000). Based on direct comparison, none of the three contaminants have historically been (or currently are) detected at concentrations exceeding these RBSLs. All concentrations were several orders of magnitude below Tier 1 RBSLs. The site also satisfied the other criteria of 20 NMAC 5.12.1227, namely no nuisance conditions exist at the site, there are no NAPL and contaminant saturated soils present, and contaminant concentrations have decreased over time. Based on the evaluation and the satisfaction of the criteria, cessation of LTM and a CAC determination was requested. NMED concurred in a comment letter dated 1 March 2007. A copy of the comment letter is included as Figure H7.2.

H.7.4 Basis for Determination

NMED concurred with the 2005 LTM report and subsequent risk assessment conclusion that AOC N (SS-48) is suitable for CAC since the SWMU and AOC have been characterized or remediated in accordance with current applicable state or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.7.5 References

Bhate Environmental Associates, Inc., 2006. 2005 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico. March.

HydroGeoLogic, Inc. (HGL), 2006. Response to NMED Comments

New Mexico Environment Department (NMED), 2006. Comment letter on the Final 2005 Long-Term Groundwater Monitoring Report, Holloman Air Force base, New Mexico, May 2006, EPA ID#NM6572124422, HWB-HAFB-06-003. October 4.

New Mexico Underground Storage Tank Bureau (NM USTB), 2000. New Mexico Underground Storage Tank Bureau Guidelines for Corrective Action. March.

United States Air Force (USAF), 2003. Management Action Plan, Public Version, Holloman Air Force Base, New Mexico. December.

Walk Haydel and Associates, Inc. (Walk, Haydel), 1989a. Installation Restoration Program Remedial Investigation, Final Baseline Risk Assessment. December.

Walk Haydel, 1989b. Installation Restoration Program Remedial Investigation Final Remedial Investigation Report, Holloman Air Force Base, New Mexico, Volume I. December.

Walk Haydel, 1990. Installation Restoration Program, Holloman Air Force Base, New Mexico, Decision Documents, Site LF-01 (Old Site 1) – Main Base Landfill; Site LF-10 (Old Site 10) – Old Main Base Landfill; Site SD-25 (Old Site 25) – Drainage Lagoon; Site FT-31 (Old Site 31) – Fire Department Training Area; Site OT-44 (Old Site 50) – Building 301, Aircraft Maintenance Hangar; Site SS-46 (Old Site 53) – JP4 Underground Waste Tank; and Site SS-48 (Old Site 55) – Military Gas Station. November.

Table H7.1
Soil Risk Based Screening
SS-48 (AOC-N)
Holloman AFB, New Mexico

Analyte	Risk Based Screening Levels			B1 (4/5/88)						B2 (4/5/88)					
				Sample Depth (feet)						Sample Depth (feet)					
	Residential Indoor Inhalation[1]	Commercial Worker Indoor Inhalation[2]	Soil within Construction Zone[3]	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	20.7	128	167,000	--	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Ethylbenzene (µg/kg)	36,900	402,000	5,980,000	--	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Toluene (µg/kg)	1,880	20,500	6,310,000	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA
Total Xylenes (µg/kg)	2,590	28,200	8,000,000	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA
BN/AE (µg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRPH (mg/kg)	520[4]	520[4]	--	307	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Lead (µg/kg)	N/A	N/A	1,000,000	5	5	NA	NA	3.2	NA	--	0.8	NA	NA	1.3	NA

Analyte	Risk Based Screening Levels			B3 (3/30/88)						B4 (1/18/89)					
				Sample Depth (feet)						Sample Depth (feet)					
	Residential Indoor Inhalation[1]	Commercial Worker Indoor Inhalation[2]	Soil within Construction Zone[3]	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	20.7	128	167,000	*74*	*85***	NA	NA	--	NA	NA	(--)	NA	(--)	NA	(--)
Ethylbenzene (µg/kg)	36,900	402,000	5,980,000	31	134	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
Toluene (µg/kg)	1,880	20,500	6,310,000	8	41	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
Total Xylenes (µg/kg)	2,590	28,200	8,000,000	11	335	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
BN/AE (µg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	(--)	NA	(--)	NA	(--)
TRPH (mg/kg)	520[4]	520[4]	--	--	36	NA	NA	--	NA	NA	(--)	NA	(--)	NA	(12)
Lead (µg/kg)	N/A	N/A	1,000,000	--	2	NA	NA	3.9	NA	NA	(--)	NA	(5)	NA	(3)

Table H7.1 (continued)
Soil Risk Based Screening
SS-48 (AOC-N)
Holloman AFB, New Mexico

Analyte	Risk Based Screening Levels			B5 (1/18/89)						B6 (1/24/89)					
				Sample Depth (feet)						Sample Depth (feet)					
	Residential Indoor Inhalation[(1)]	Commercial Worker Indoor Inhalation[(2)]	Soil within Construction Zone[(3)]	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	20.7	128	167,000	NA	(--)	(--)	NA	NA	(--)	NA	(--)	(--)	NA	NA	(--)
Ethylbenzene (µg/kg)	36,900	402,000	5,980,000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
Toluene (µg/kg)	1,880	20,500	6,310,000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
Total Xylenes (µg/kg)	2,590	28,200	8,000,000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
BN/AE (µg/kg)	--	--	--	NA	NA	(--)	(--)	NA	(--)	NA	(--)#	(--)*	NA	NA	(--)*
TRPH (mg/kg)	520[(4)]	520[(4)]	--	NA	(--)	(15)	NA	NA	(14)	NA	(16)	(--)	NA	NA	(--)
Lead (µg/kg)	N/A	N/A	1,000,000	NA	(--)	(2)	NA	NA	(4)	NA	(1)	(3)	NA	NA	(4)

Analyte	Risk Based Screening Levels			B7 (1/24/89)					
				Sample Depth (feet)					
	Residential Indoor Inhalation[(1)]	Commercial Worker Indoor Inhalation[(2)]	Soil within Construction Zone[(3)]	2.5	5	7.5	10	12.5	20
Volatiles									
Benzene (µg/kg)	20.7	128	167,000	NA	(--)	NA	NA	NA	(--)
Ethylbenzene (µg/kg)	36,900	402,000	5,980,000	NA	NA	NA	NA	NA	(--)
Toluene (µg/kg)	1,880	20,500	6,310,000	NA	NA	NA	NA	NA	(--)
Total Xylenes (µg/kg)	2,590	28,200	8,000,000	NA	NA	NA	NA	NA	(--)
BN/AE (µg/kg)	--	--	--	(--)*	(--)*	NA	NA	NA	(--)*
TRPH (mg/kg)	520[(4)]	520[(4)]	--	(--)	(--)	NA	NA	NA	(--)
Lead (µg/kg)	N/A	N/A	1,000,000	(--)	(1)	NA	NA	NA	(9)

Table H7.1 (continued)
Soil Risk Based Screening
SS-48 (AOC-N)
Holloman AFB, New Mexico

Notes:
^ Soil analytical data summarized from 1989 IRP Remedial Investigation (Walk Haydel, 1989a)
^ Boring locations correspond to monitoring well locations
(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) NMED residential Screening Guideline value for diesel (NMED, 2005)
µg/kg = micrograms per kilogram
RI = Remedial Investigation
NA = Not Analyzed
N/A = not applicable
BN/AE = Base Neutrals/Acid Extractables
TRPH = Total Recoverable Petroleum Hydrocarbons
-- = Not Detected/Not Applicable
( ) = Stage II data
* = Acid extractables not valid due to out-of-range surrogate recoveries
** = Outside QC limits-one surrogate recover out-of-range
# = Corps of Engineers lab data

Italicized values indicate an analyte concentration above residential subsurface soil indoor inhalation risk-based screening level for the respective analyte.

Table H7.2
Phase 1 1998 RI Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Analyses	NMGWQ Standard (µg/L)	EPA MCL (µg/L)	MW1 4/11/88	(MW1) 2/1/89	MW2 4/11/88	(MW2) 2/1/89	MW3 4/11/88	MW3 (Stage II) 1/26/89	MW4 2/2/89	MW5 2/2/89	MW5-D 2/2/89	MW6 2/2/89	MW7 2/2/89
Volatiles (µg/L)													
Acetone	--	--	--	(--)	NA	(--)	(16)	NA	(--)	(--)	NA	(--)*	(--)
Benzene	10	5	--	(--)	NA	(--)	***(15)***	NA	(--)	(--)	NA	(--)	(--)
Tetrachloroethene	20	5	--	*(18)*	NA	(--)	(--)	NA	(--)	(--)	NA	(--)	(--)
Toluene	750	1000	--	(--)	NA	(--)	(6)	NA	(--)	(--)	NA	(--)	(--)
Total Xylenes	620	10000	--	(--)	NA	(--)	**(1300)**	NA	(--)	(--)	NA	(--)	(--)
Trichloroethene	100	5	***17***	(--)	NA	(--)	*(7)*	NA	(--)	(--)	NA	(--)	(--)
BN/AE (µg/L)													
Acenaphthene	--	--	NA	--**	NA	(--)	(14)	NA	(--)	(--)	NA	(--)	(--)
Bis(2-ethylhexyl)phthalate	--	6	NA	--	NA	(--)	(--)	NA	(--)	(--)	NA	(--)	(--)
Fluorene	--	--	NA	--	NA	(--)	(10)	NA	(--)	(--)	NA	(--)	(--)
2-Methylnaphthalene	--	--	NA	--	NA	(--)	(63)	NA	(--)	(--)	NA	(--)	(--)
Naphthalene	--	--	NA	--	NA	(--)	(235)	NA	(--)	(--)	NA	(--)	(--)
Nitrobenzene	--	--	NA	--	NA	(15)	(--)	NA	(--)	(--)	NA	(--)	(--)
Phenanthrene	--	--	NA	--	NA	(--)	(22)	NA	(--)	(--)	NA	(--)	(--)
Total Recoverable Petroleum Hydrocarbons (TRPH) (mg/L)													
TRPH	--	--	--	--	4.3	(--)	--	(3)	(--)	(--)	NA	(--)	(3)
Lead (µg/L)													
Lead	50	15[(1)]	*34.7*	*(46)*	--	(--)	*17.2*	*(18)*	***(63)***	*(42)*	***(65)***	*(16)*	*(46)*
Tentatively Identified Compounds (µg/L)													
2-Butene	--	--								*(34)*	*(30)*		
2-methyoxy-2-methyl propane	--	--								*(95)*	*(86)*		

Notes:
[1]Action Level

µg/L = micrograms per liter
MCL = Maximum Contaminant Level
( ) = Stage II Data
** = Corps of Engineers lab data
NMGWQ = New Mexico Groundwater Quality
TRPH = Total Recoverable Petroleum Hydrocarbon
NA = Not Analyzed
D = Field Duplicate
EPA = United States Environmental Protection Agency
-- = Not detected/Not applicable
* = Outside QC limits -- one surrogate out-of-range

Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and EPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed EPA Primary Drinking Water MCLs

Table H7.3
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well Number	NMGWQ Standard	EPA MCL	S55-MW2[2]											
			Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[1](µg/L)														
Acetone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U	ND	
Benzene	10	5	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Bromodichloromethane	--	--	ND	U	1.3	J	< 3	U	< 5	U	< 1	U	ND	
2 - Butanone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U	ND	
tert-Butylmethyl ether	--	--	ND	U	ND	U	NA		< 5	U	< 1	U	ND	
Carbon disulfide	--	--	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
Chloroform	100	--	ND	U	2.6	J	2	J	< 5	U	1.1		2.8	
cis-1,2-dichloroethene	--	70	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,1-dichloroethene	5	7	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,2-dichloroethane	10	5	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Ethylbenzene	750	700	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Methylene chloride	100	--	ND	U	1.7	UB	< 3	U	< 5	U	< 2	U	ND	
Tetrachloroethene	20	5	ND	U	ND	U	ND	U	ND	U	2.3		ND	
1,1,1-Trichloroethane	60	200	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Trichloroethylene	100	5	*6.6*		ND	U	< 3	U	< 5	U	*24*		*10.4*	
Toluene	750	1,000	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Styrene	--	100	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
o-Xylene	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
m,p-Xylenes	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 10	U	< 2	U	ND	
Freon 113														

Table H7.3 (continued)
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well Number	NMGWQ Standard	EPA MCL	S55-MW3											
			Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[1](µg/L)														
Acetone	--	--	NA		NA		NA		NA		< 10	U	ND	
Benzene	10	5	NA		NA		NA		NA		0.38	(J)	ND	
Bromodichloromethane	--	--	NA		NA		NA		NA		< 1	U	0.57	J
2 - Butanone	--	--	NA		NA		NA		NA		< 10	U	ND	
tert-Butylmethyl ether	--	--	NA		NA		NA		NA		7.7		ND	
Carbon disulfide	--	--	NA		NA		NA		NA		< 1	U	ND	
Chloroform	100	--	NA		NA		NA		NA		1.5		4	
cis-1,2-dichloroethene	--	70	NA		NA		NA		NA		0.21	(J)	ND	
1,1-dichloroethene	5	7	NA		NA		NA		NA		0.41	(J)	ND	
1,2-dichloroethane	10	5	NA		NA		NA		NA		< 1	U	ND	
Ethylbenzene	750	700	NA		NA		NA		NA		1.4		ND	
Methylene chloride	100	--	NA		NA		NA		NA		< 2	U	ND	
Tetrachloroethene	20	5	NA		NA		NA		NA		0.24	(J)	ND	
1,1,1-Trichloroethane	60	200	NA		NA		NA		NA		< 1	U	ND	
Trichloroethylene	100	5	NA		NA		NA		NA		29		*13*	
Toluene	750	1,000	NA		NA		NA		NA		< 1	U	ND	
Styrene	--	100	NA		NA		NA		NA		< 1	U	ND	
o-Xylene	620[3]	10,000[3]	NA		NA		NA		NA		6.2		ND	
m,p-Xylenes	620[3]	10,000[3]	NA		NA		NA		NA		6.6		ND	
Freon 113														

Table H7.3 (continued)
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well Number	NMGWQ Standard	EPA MCL	S55-MW4											
			Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[1](µg/L)														
Acetone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U	ND	
Benzene	10	5	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Bromodichloromethane	--	--	ND	U	2.2	J	< 3	U	< 5	U	< 1	U	ND	
2 - Butanone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U	ND	
tert-Butylmethyl ether	--	--	ND	U	ND	U	NA		< 5	U	< 1	U	ND	
Carbon disulfide	--	--	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
Chloroform	100	--	ND	U	2.4	J	< 3	U	< 5	U	0.64	(J)	1.4	
cis-1,2-dichloroethene	--	70	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,1-dichloroethene	5	7	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,2-dichloroethane	10	5	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Ethylbenzene	750	700	ND	U	0.81	J	< 3	U	< 5	U	< 1	U	ND	
Methylene chloride	100	--	ND	U	1.6	UB	< 3	U	< 5	U	< 2	U	ND	
Tetrachloroethene	20	5	ND	U	ND	U	ND	U	ND	U	0.33	(J)	ND	
1,1,1-Trichloroethane	60	200	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
Trichloroethylene	100	5	ND	U	ND	U	< 3	U	< 5	U	1.1		25.2	
Toluene	750	1,000	ND	U	1.2		< 3	U	< 5	U	< 1	U	ND	
Styrene	--	100	ND	U	ND	U	< 3	U	< 5	U	< 1	U	ND	
o-Xylene	620[3]	10,000[3]	ND	U	0.74	J	< 3	U	< 5	U	< 1	U	ND	
m,p-Xylenes	620[3]	10,000[3]	ND	U	2.1		< 3	U	< 10	U	< 2	U	ND	
Freon 113													0.63	J

Table H7.3 (continued)
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well Number	NMGWQ Standard.	EPA MCL	S55-MW5											
			Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[1](µg/L)														
Acetone	--	--	ND	U	ND	U	4	J	< 50	U	< 10	U	19.4	J
Benzene	10	5	***38***		ND	U	***170***	D	***560***		***100***		***83***	
Bromodichloromethane	--	--	ND	U	ND	U	< 3	U	< 50	U	< 1	U	ND	
2 - Butanone	--	--	ND	U	ND	U	< 5	U	< 50	U	< 10	U	ND	
tert-Butylmethyl ether	--	--	ND	U	350		NA		100		25		419	
Carbon disulfide	--	--	ND	U	ND	U	ND	U	ND	U	1.6		1.9	J
Chloroform	100	--	ND	U	ND	U	< 3	U	< 50	U	1.1		0.6	J
cis-1,2-dichloroethene	--	70	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,1-dichloroethene	5	7	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,2-dichloroethane	10	5	ND	U	ND	U	< 3	U	< 50	U	3.4		ND	
Ethylbenzene	750	700	ND	U	ND	U	***870***	D	19	J	140		6.8	
Methylene chloride	100	--	ND	U	ND	U	< 3	U	< 50	U	< 2	U	ND	
Tetrachloroethene	20	5	ND	U	ND	U	ND	U	ND	U	< 1	U	ND	
1,1,1-Trichloroethane	60	200	ND	U	ND	U	< 3	U	< 50	U	< 1	U	ND	
Trichloroethylene	100	5	ND	U	ND	U	< 3	U	< 50	U	0.84	(J)	1.2	
Toluene	750	1,000	ND	U	ND	U	1	J	< 50	U	8.2		0.66	J
Styrene	--	100	ND	U	ND	U	1	J	< 50	U	< 1	U	ND	
o-Xylene	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 50	U	0.22	(J)	ND	
m,p-Xylenes	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 100	U	6.7		ND	
Freon 113													ND	

Table H7.3 (continued)
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well Number	NMGWQ Standard (µg/L)	EPA MCL (µg/L)	S55-MW7												S55-MW6	
			Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05		Dec-05	
Sampling Date			Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[1](µg/L)																
Acetone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U				
Benzene	10	5	ND	U	ND	U	< 3	U	< 5	U	0.5	(J)				
Bromodichloromethane	--	--	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
2 - Butanone	--	--	ND	U	ND	U	< 5	U	< 5	U	< 10	U				
tert-Butylmethyl ether	--	--	ND	U	ND	U	NA		3	J	280		161			
Carbon disulfide	--	--	ND	U	ND	U	ND	U	ND	U	< 1	U				
Chloroform	100	--	ND	U	ND	U	< 3	U	< 5	U	0.57	(J)	0.94	J	2	
cis-1,2-dichloroethene	--	70	ND	U	ND	U	ND	U	ND	U	< 1	U				
1,1-dichloroethene	5	7	ND	U	ND	U	ND	U	ND	U	< 1	U				
1,2-dichloroethane	10	5	ND	U	0.92	J	< 3	U	< 5	U	1.9		1.1			
Ethylbenzene	750	700	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
Methylene chloride	100	--	ND	U	ND	U	< 3	U	< 5	U	< 2	U				
Tetrachloroethene	20	5	ND	U	ND	U	ND	U	ND	U	< 1	U				
1,1,1-Trichloroethane	60	200	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
Trichloroethylene	100	5	*6.7*		*6.7*		< 3	U	< 5	U	0.38	(J)			9	
Toluene	750	1,000	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
Styrene	--	100	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
o-Xylene	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 5	U	< 1	U				
m,p-Xylenes	620[3]	10,000[3]	ND	U	ND	U	< 3	U	< 10	U	< 2	U				
Freon 113																

Table H7.3 (continued)
LTM Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Notes:
[1]Unless otherwise reported, no VOCs were detected using EPA Method 8260B.
(EPA Method 8260A was used analyze for VOCs in the 1995 and 1997 program.)
[2]Upgradient monitoring well
[3]Total Xylene value presented as surrogate for o-Xylenes and m,p-Xylenes

CRDL = Contract Required Detection Limit
IDL = Instrument Detection Limit
ND = Not Detected at or above method reporting limit
NA = Not Analyzed
VOC = volatile organic compound
µg/L = micrograms per liter
EPA = United States Environmental Protection Agency
NMGWQ = New Mexico Groundwater Quality
MCL = Maximum Contaminant Level
U = non-detect analytical result
J = positive detection; reported value estimated
B = positive detection; reported value considered artifact of laboratory blank contamination
< = less than reported value

Laboratory Qualifiers-- assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers-- assigned as a result of independent data validation
(J)-- Estimated value based on QC criteria
(UJ)-- Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J -- Estimated value detected less than the CRDL but greater than the reporting limit.
U -- The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ -- Estimated as non-detect at the detection limit.

Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and EPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed EPA Primary Drinking Water MCLs

Table H7.4
LTM TDS Groundwater Analytical Results
SS-48 (AOC N)
Holloman AFB, New Mexico

Well ID	Second Quarter (June) 2002 Lab TDS (mg/L)	Third Quarter (September) 2002 Lab TDS (mg/L)	Second Quarter (March) FY2003 Lab TDS (mg/L)	Dec 2005 LTM TDS (mg/L)
S55-MW-2	6,360	6,320	4,890	**11,500**
S55-MW-3	9,380	7,660	8,720	6,110
S55-MW-4	8,380	5,800	5,010	**10,200**
S55-MW-5	**19,700**	**16,400**	**12,600**	**11,700**
S55-MW-6	**10,300**	8,650	5,900	6,340
S55-MW-7	8,740	9,080	10,000	**12,100**

Notes:
TDS = total dissolved solids
mg/L = milligrams per liter
LTM = long term monitoring
Results in **BOLD** exceed the New Mexico TDS Standard of 10,000 mg/L

Figure H7.1 SS-48 (AOC N) Site Layout, Holloman AFB

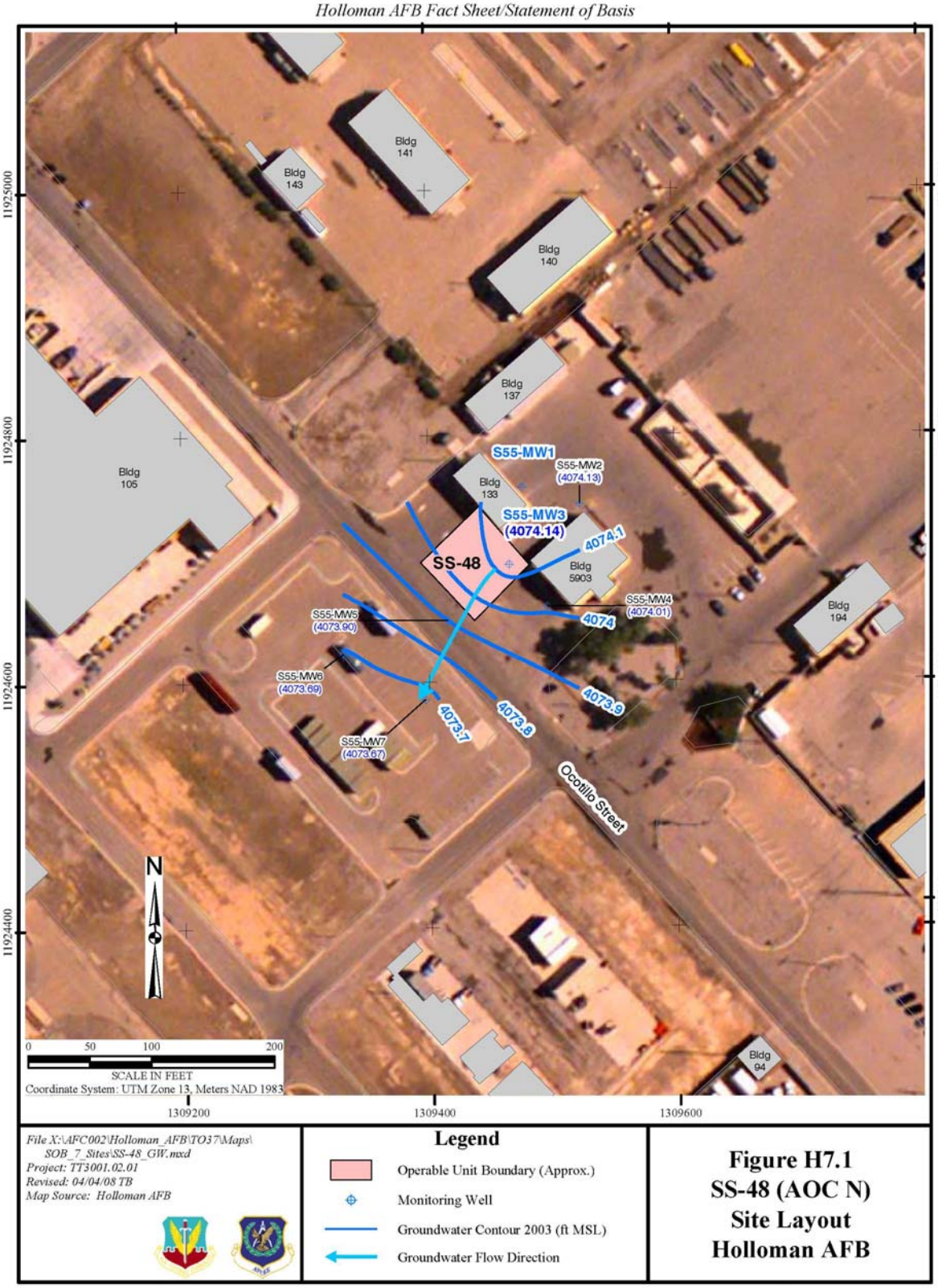
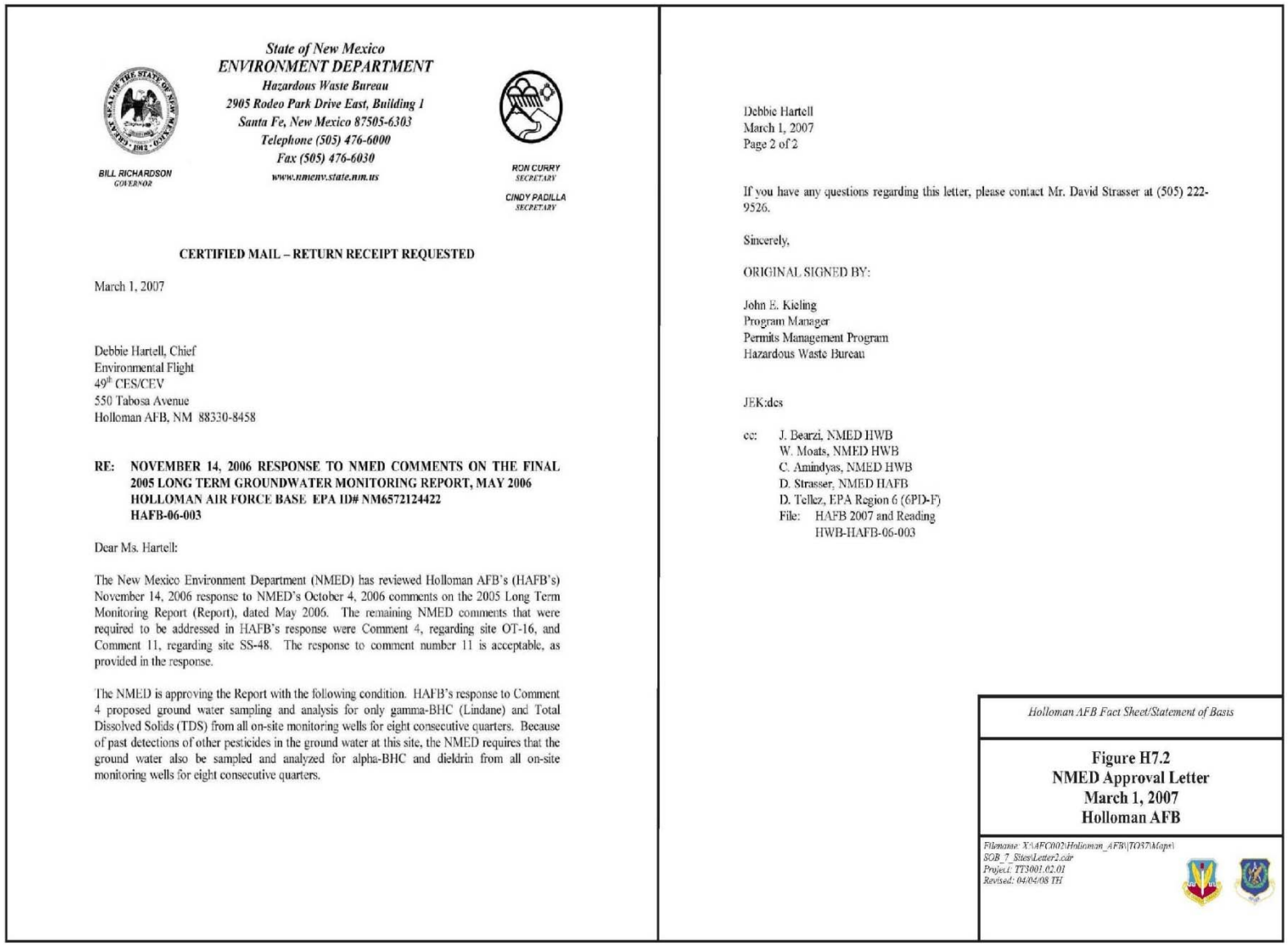


Figure H7.2 NMED Approval Letter, March 1, 2007



State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 476-6000
Fax (505) 476-6030
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CINDY PADILLA
SECRETARY

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

March 1, 2007

Debbie Hartell, Chief
Environmental Flight
49th CES/CEV
550 Tabosa Avenue
Holloman AFB, NM 88330-8458

RE: NOVEMBER 14, 2006 RESPONSE TO NMED COMMENTS ON THE FINAL 2005 LONG TERM GROUNDWATER MONITORING REPORT, MAY 2006 HOLLOMAN AIR FORCE BASE EPA ID# NM6572124422 HAFB-06-003

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed Holloman AFB's (HAFB's) November 14, 2006 response to NMED's October 4, 2006 comments on the 2005 Long Term Monitoring Report (Report), dated May 2006. The remaining NMED comments that were required to be addressed in HAFB's response were Comment 4, regarding site OT-16, and Comment 11, regarding site SS-48. The response to comment number 11 is acceptable, as provided in the response.

The NMED is approving the Report with the following condition. HAFB's response to Comment 4 proposed ground water sampling and analysis for only gamma-BHC (Lindane) and Total Dissolved Solids (TDS) from all on-site monitoring wells for eight consecutive quarters. Because of past detections of other pesticides in the ground water at this site, the NMED requires that the ground water also be sampled and analyzed for alpha-BHC and dieldrin from all on-site monitoring wells for eight consecutive quarters.

If you have any questions regarding this letter, please contact Mr. David Strasser at (505) 222-9526.

Sincerely,

ORIGINAL SIGNED BY:

John E. Kieling
Program Manager
Permits Management Program
Hazardous Waste Bureau

JEK:des

cc: J. Bearzi, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HAFB
D. Tellez, EPA Region 6 (6PD-F)
File: HAFB 2007 and Reading
HWB-HAFB-06-003

Holloman AFB Fact Sheet/Statement of Basis

Figure H7.2
NMED Approval Letter
March 1, 2007
Holloman AFB

Filename: X:\AFC002\Holloman_AFB\TO37\Maps\SOB_7_Sites\Letter2.cdr
Project: TT3001.02.01
Revised: 04/04/08 TH

H.8 SS-68 (AOC-F), ASPHALT TANK SPILL AREA

H.8.1 Location/Unit Description

AOC-F is identified in the ERP as site SS-68, Asphalt Tank Spill Area. The 1988 RFA states that aboveground and belowground tanks were previously removed and were located to the northwest of Building 121. The December 2005 *HAFB Environmental Restoration Program Site Status Summaries Report* places the location as 200 feet northeast of Creosote Avenue. This location coincides with the current piles of asphalt that are gathered from road work across HAFB and recycled. While the exact location is unknown, the most likely location of these tanks (if they ever existed) would have been at the location used to stockpile and recycle asphalt pavement. A detailed layout of this site and its surroundings is provided as **Figures 3 and 4.**

H.8.2 Evaluation of Relevant Information

The records searched to obtain information on AOC-F include:

- Aerial photographs taken in 1984, 1996, and 2004
- The 1988 RFA prepared by A.T. Kearney, Inc. dated September 1988
- Site visit on July 10, 2006
- HAFB Environmental Restoration Program Site Status Summaries Report (December 2005)
- Interview with Mr. Darvin St. John of the HAFB 49th CES/CEV Environmental Flight

Weathered asphalt removed from road improvement projects at HAFB has been crushed and reused since the 1980s. Typically, after it has been removed, the asphalt has been staged in an undeveloped area east of Creosote Avenue and north of the base enlisted personnel housing. Normally the asphalt is staged in piles until it is reused. This has been standard practice since the early 1980s. A tank has not been observed in the aerial photographs of the area taken in 1984, 1996, and 2004. Further, asphalt tanks are typically heated to keep the material warm and flowable for use and that would make underground tanks unlikely for this kind of operation at HAFB.

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SWMU AOC-F (SS-68) and Area Layout -1996 Aerial Photograph

PROJECT NO.	SCALE	DATE	DRAWN BY:
9050360	AS SHOWN	11/20/06	MRM/CM

DRAWING NO: Figure 3

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 3

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SWMU AOC-F (SS-68) and Area Layout -2004 Aerial Photograph

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	08/10/06	MRM/CM

DRAWING NO: Figure 4

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 4

An interview with Mr. Darvin St. John of the 49th CES/CEV, who in the 1990s was responsible for documenting the removal of many USTs at HAFB, did not recall the presence of either a UST or aboveground storage tank (AST) in this area. No ASTs or USTs are identified within this area in base records. Currently, 6 piles of asphalt are located approximately 700 feet south of Building 121. Aerial photographs from years 1996 and 2004 confirm the storage of asphalt in this area but do not confirm the presence of any tanks. No releases of hazardous constituents have been documented related to this site.

H.8.3 Basis for Determination

A CAC determination was requested for AOC-F SS-68, Asphalt Tank Spill Area, because the SWMU/AOC cannot be located, does not exist or is a duplicate SWMU/AOC.

A source of contamination cannot be tied to this location. After contacting personnel familiar with the presence and removal of USTs at HAFB, and searching the records at the HAFB Office of Real Property, there remains no evidence of USTs or ASTs at this site and there is no documentation of releases to the environment. Storage of asphalt for reuse is not considered a hazardous waste practice. If a tank was present at the site during the 1988 RFA, it could have been a portable tank for fueling equipment or some other type of portable unit for processing the asphalt.

H.8.4 References

A.T. Kearny, 1988 *RCRA Facility Assessment Report*, HAFB, New Mexico.

Bhate Environmental Associates, Inc. (Bhate), 2007, *Confirmatory Sampling Work Plan Multiple Sites*, HAFB, New Mexico.

H.9 OT-35 (AOC-PRI-2 & PRI-5), SPENT SOLVENT DISPOSAL AREA

H.9.1 Location/Unit Description

OT-35 (AOC-PRI-2 & PRI-5) consists of the Building 1264 Solvent Burn Area (AOC-PRI-2) and the Building 1264 Solvent Disposal Area (AOC-PRI-5). The two sites are co-located and have been investigated as one unit. The Spent Solvent Disposal Area (OT-35) is located immediately south and within the confines of the new Primate Research Laboratory (Buildings 1264 and 1265) approximately 2 miles north of the Main Base Area (see **Figures 2** [at the beginning of this FS/SOB] **and 5**). The Site topography is relatively flat, and the area is sparsely vegetated.

H.9.2 History

Spent solvents had reportedly been disposed of intermittently on the ground and ignited in an area south of Building 1264 during the 1950s and 1960s. The spent solvents were generated as part of the on-site laboratory operations and consisted of xylenes, methanol, toluene, and acetone. Spent solvents may also have contained small quantities of radioactive tracers (carbon-14, iodine-125, and tritium). Based on interviews and site visits with longtime Primate Research Laboratory employees, three potential solvent disposal areas were identified. The disposal sites include:

- An area of stressed vegetation immediately north of Building 1264 (site AOC-PRI-2) where scintillation cocktails were reportedly disposed of on the ground,
- A slightly vegetated area north of Building 1269 where stained soils were observed,
- An area several hundred yards south of Building 1269 that was identified as the former solvent evaporation area (site AOC-PRI-5) where solvents were set out in evaporation pans for disposal (Radian, 1993).

H.9.3 Evaluation of Relevant Information

A records search for Site OT-35 was conducted by CH_2M Hill in 1982 (CH_2M Hill. August 1983). The records search concluded that the site did not present any significant concern for adverse effects on health or the environment. The site was investigated in December 1992 and February 1993 during a Site Investigation (SI) conducted by Radian Corporation. The field investigations were conducted before construction was completed at the primate research facility.

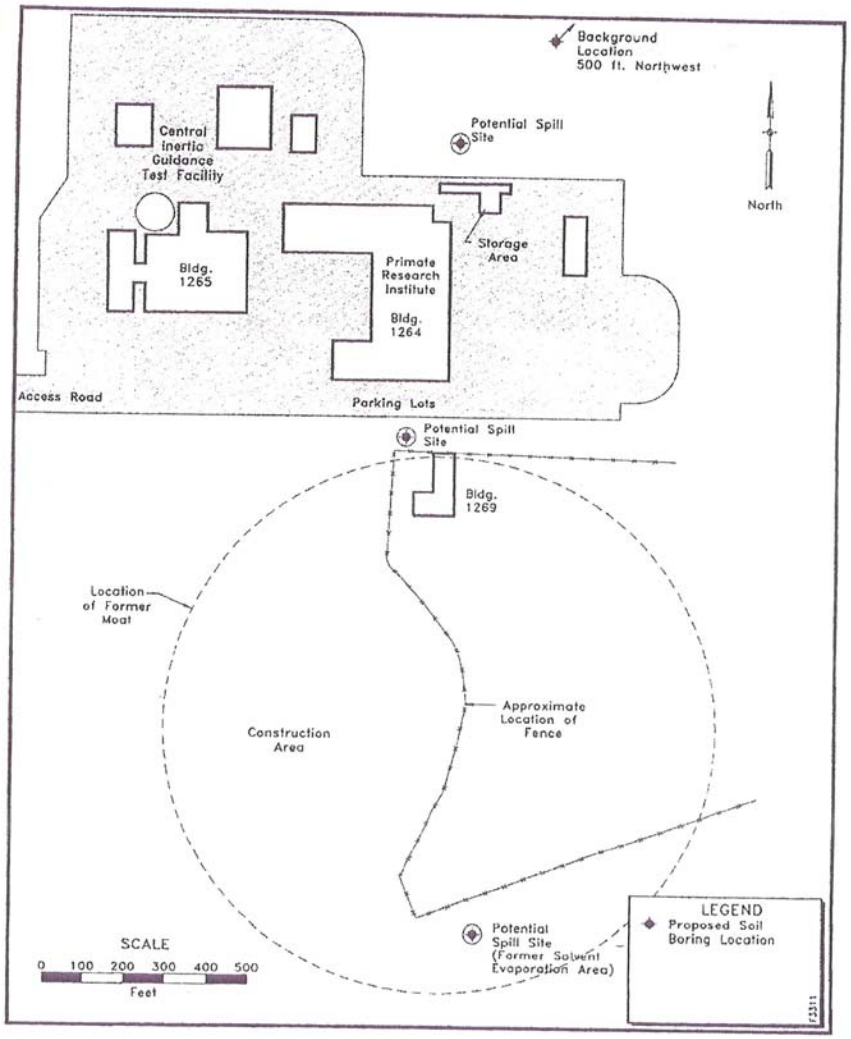
The following Investigation activities have been performed at the OT-35 site (Radian, 1993):

- A passive soil-gas survey using the PETREX sampling technique was conducted at the site using 15 samplers. Five samplers were installed at each of the three potential disposal sites (Radian, 1993).

- One soil boring was drilled into each of the three potential disposal sites (BH-35-01 through BH-35-03). Two subsurface soil samples were collected from each borehole and submitted for chemical analysis: the surface sample (0 to 4.5 ft feet below ground surface [ft bgs]) and a subsurface sample with the most visible contamination or the highest photoionization detector (PID) reading. These soil samples were analyzed for volatile organic compounds (VOCs), gross alpha and beta radioactivity, and gamma radioactivity (Radian 1993).
- One background soil sample (BH-35-04) was collected from 0 to 2 ft bgs approximately 500 ft northeast of the site and was analyzed for alpha, beta, and gamma radioactivity (Radian 1993).

The soil-gas survey identified the presence of chloroform vapors in soil-gas samplers installed in the three disposal areas. It is reported that chloroform was used in the scintillation cocktails. It is also a common laboratory artifact. The soil-gas survey technique used is a qualitative tool (ion counts) that does not report the quantity of vapor in the vadose zone, rather the relative presence of gasses. The soil-gas survey results are presented on **Figures 6, 7, and 8**. The results of the soil-gas survey were used to locate soil borings and sampling locations as illustrated on **Figure 9**.

Table 2 summarizes the analytical results for soil samples collected from the three borings. No VOCs were detected in the soil samples. Review of gross alpha, gross beta, and gamma radiation results for the six soil samples collected during the OT-35 SI indicates that detected radioactivity levels were comparable to background levels found at HAFB. Concentrations of gross alpha and gross beta ranged from not detected (ND) to 21.21 picoCuries per gram (pCi/g) and ND to 19.51 pCi/g, respectively. Using one half of the detection limit for the not detected data, the average concentrations of gross alpha and gross beta for these soil samples is 10.1 pCi/g and 11.3 pCi/g, respectively. These average concentrations are within and below the background ranges for gross alpha (4.6 to 15.4 pCi/g) and gross beta (18.0 to 21.1 pCi/g) detected in the background samples collected during the Preliminary Assessment (PA) conducted at Site RW-42 (Radian, 1993. In addition, the single detection of gamma radiation (0.33 pCi/g) is estimated and is well below the reporting limit (100 pCi/g). Additionally, Iodine-125 and Tritium-3 radioactive tracers historically used at OT-35 have relatively short half-lives. The half-lives of Iodine-125 and Tritium-3 are 60 days and 12.3 years, respectively. As the OT-35 disposal sites have been inactive for over 30 years there has been approximately an eighty percent (80%) degradation (decay) of Tritium-3 and 99% decay of Iodine-125. Although Carbon-14 has a half life of 5,730 years, Carbon-14 has never been considered a carcinogen. Furthermore, these radioactive tracers are not alpha emitters. Iodine-125 emits gamma particles while Carbon-14 and Tritium-3 emit beta particles, therefore the gross alpha levels found at OT-35 are naturally occurring (International Commission on Radiological Protection, 2002).



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

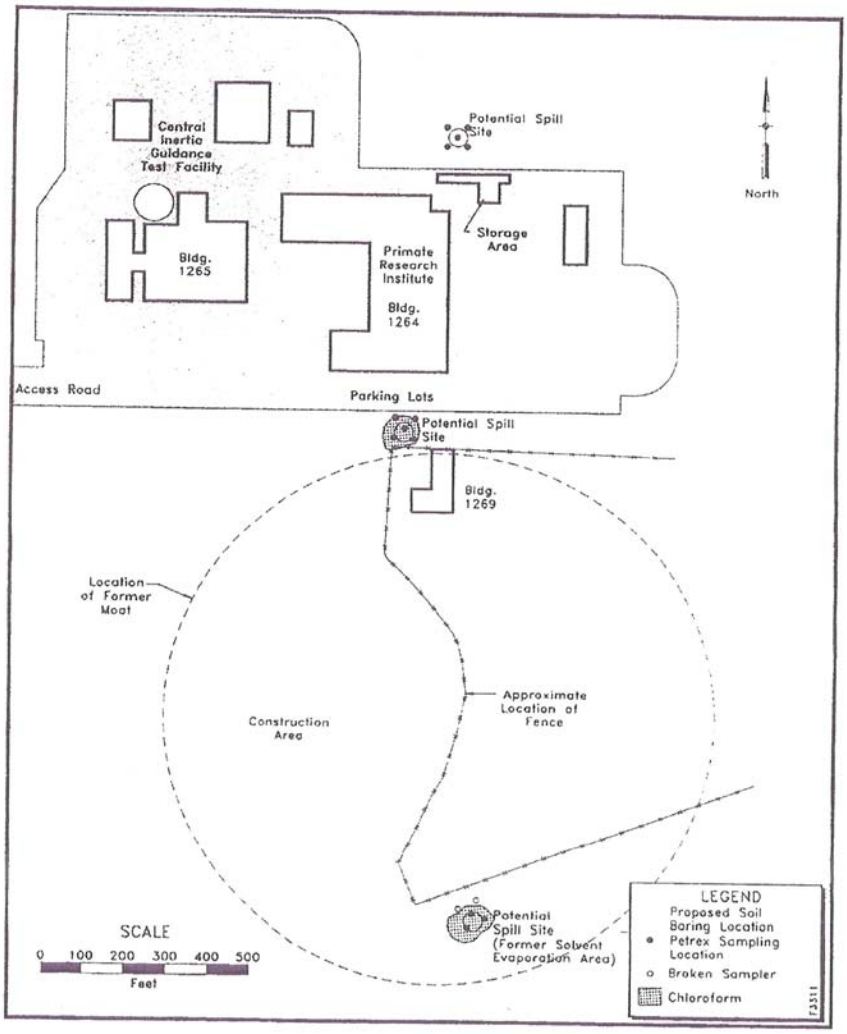
OT-35 Features and Proposed Soil Boring Locations
Source: Radian 1993

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm

DRAWING NO: Figure 5

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 5



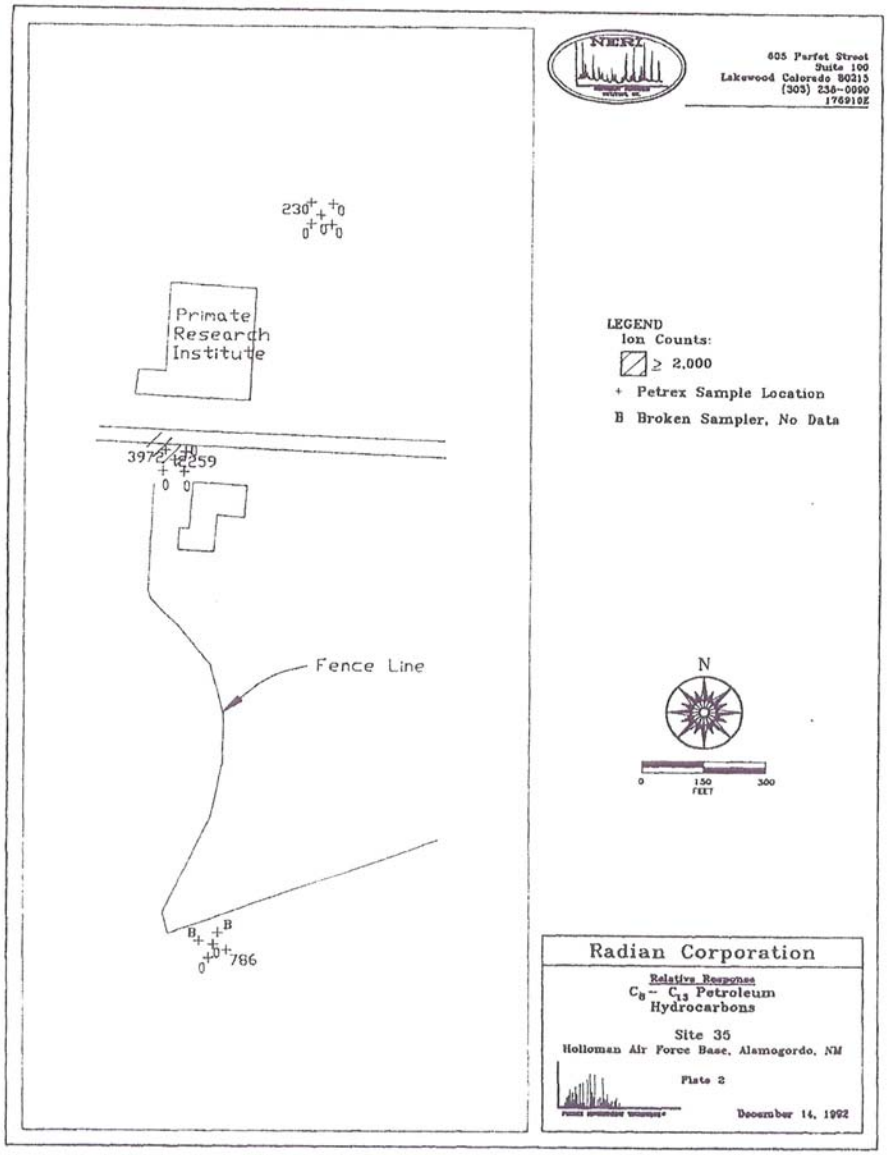
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

OT-35 Passive Soil-Gas Results
Source: Radian 1993

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm
			DRAWING NO: Figure 6

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 6



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

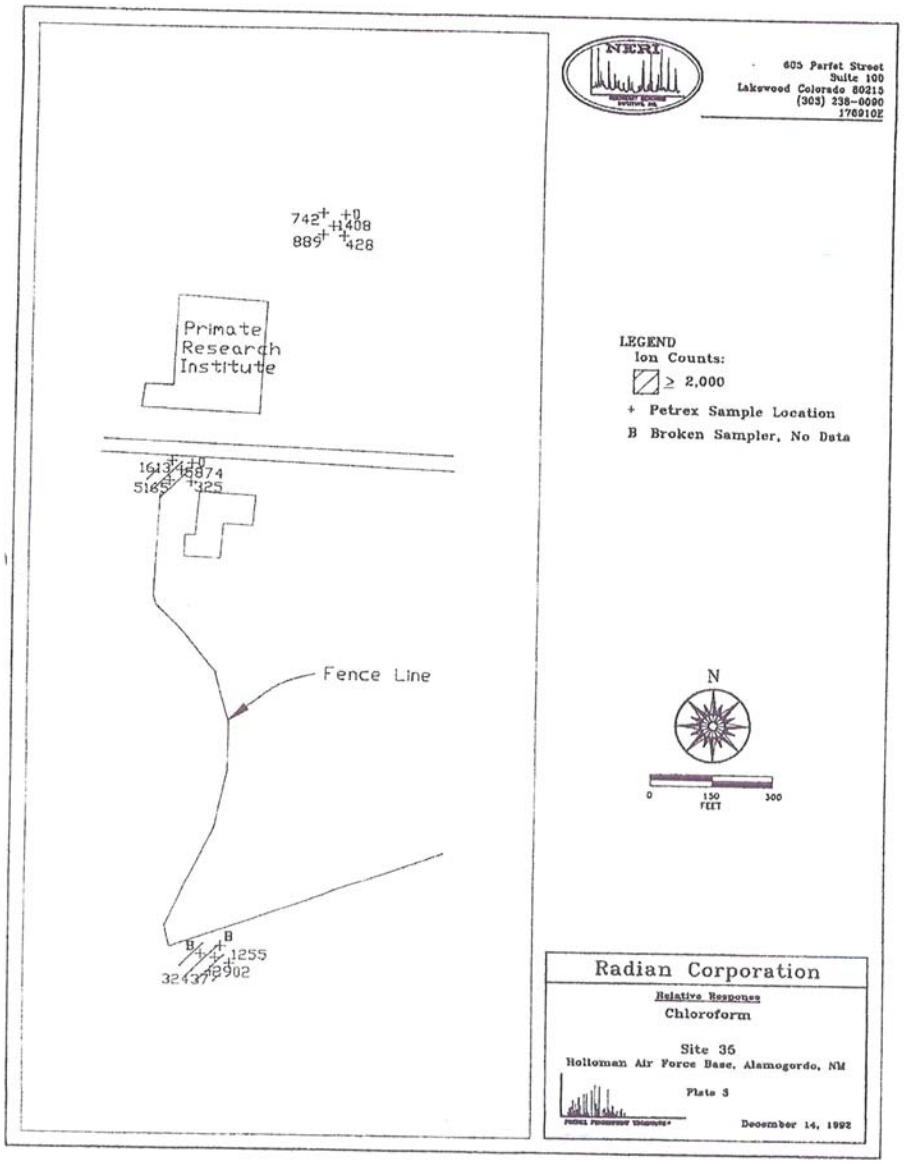
OT-35
Relative Responses - Hydrocarbons
Source: Radian 1993

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm

DRAWING NO: Figure 7

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 7



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

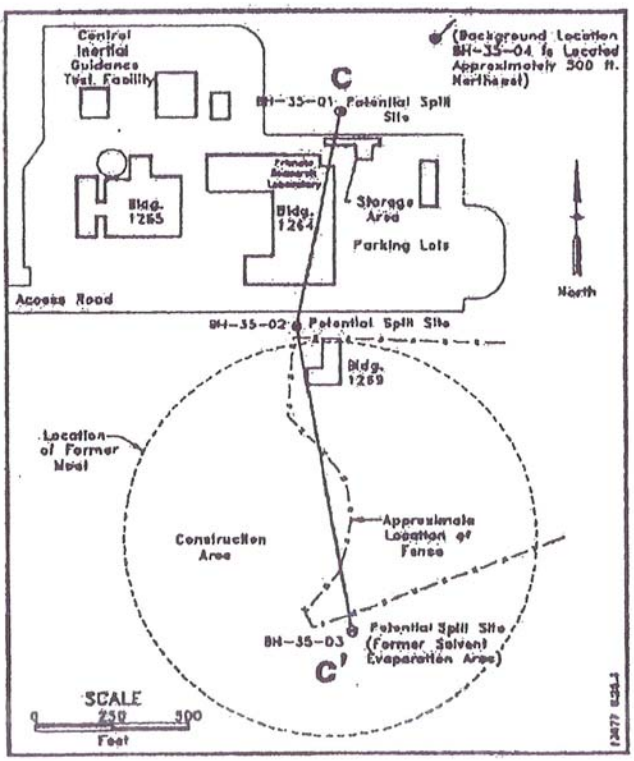
OT-35
Relative Responses - Chloroform
Source: Radian 1993

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm

DRAWING NO: Figure 8

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 8



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

Site OT-35 Soil Boring Locations

Source: Radian 1993

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm
			DRAWING NO: Figure 9

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 9

Table 2
Summary of Soil Analytical Results for ERP Site OT-35

Location	Depth (ft)	Gross Alpha (pCi/g)	RL (pCi/g)	Gross Beta (pCi/g)	RL (pCi/g)	Total Gamma (pCi/g)	RL (pCi/g)	VOCs (µg/kg)
BH-35-01	0-2	21.21	3.97	19.08	5.18	0.33	100	ND
	25-27	15.08	3.83	19.51	5.15	ND	100	ND
BH-35-02	2.5- 4.5	4.01	3.52	5.83	5.43	ND	100	ND
	10 – 12	12.06	3.51	17.94	5.47	ND	100	ND
BH-35-03	0-2	6.61	3.16	ND	5.05	ND	100	ND
	5-7	ND	3.0	ND	5.5	ND	100	ND
BH-35-04	0-2	7.87	2.93	5.95	5.61	ND	100	ND

Note: RL = Reporting Limit, µg/kg = micrograms per kilogram
Source: Radian, 1993

The subsurface conditions at Site OT-35 were defined by direct sampling and observation of the drill cuttings for the three soil borings conducted by Radian during the Site Investigation (Radian, 1993). The OT-35 site stratigraphy consists primarily of two broadly defined lithologic units. The upper-most unit consists of 10 ft of silt and silty sand that is underlain by 25 ft of clay. Interbedded lenses of sand and silt, ranging in thickness from 1 to 6 ft, occur within the clay layer. Based on the HAFB base-wide potentiometric surface, groundwater is estimated to be approximately 35 to 40 ft bgs in the vicinity of OT-35. The *Draft Final Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites* (Radian 1993) determined that there are no risks to human health or the environment and recommended CAC for OT-35.

H.9.4 Basis for Determination

CAC was requested for AOC-PRI-2 and AOC-PRI-5 (OT-35) because the SWMU/AOC cannot be located, does not exist or is a duplicate SWMU/AOC. In addition, the SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use

Presently, the sites investigated in 1993 have been graded and incorporated into the new primate research facility. This facility has rendered the site inaccessible because of the structures present and the requirements of primate management. Many of these animals are old and under protective care. The site has limited access (a fenced boundary) in order to provide these animals with minimal disturbance.

References

Bhate, 2006, *Accelerated Corrective Measures Work Plan*, Holloman Air Force Base, New Mexico.

CH_2M Hill. August 1983. *Installation Restoration Program, Records Search for Holloman Air Force Base, New Mexico*

International Commission on Radiological Protection. 2002. CD1: Database of Dose Coefficients: Workers and Members of the Public. (http://www.cea.fr/gb/publications/Clefs48/pdfgb/109a11.pdf).

Radian Corporation. November 1993. *Draft Final Preliminary Assessment and Site Investigation Report, Investigation of Four Waste Sites*, Holloman Air Force Base, NM.

Radian Corporation. June 1992. *Draft Final Remedial Investigation (RI) Report, Investigation, Study and Recommendation for 29 Waste Sites*, Holloman Air Force Base, NM.

H.10 FT-31 (SWMUs 39, 127, 135, and 170), Former Fire Training Area

H.10.1 Location/Unit Description

The Former Fire Training Area, ERP Site FT-31, is comprised of the following four SWMUs:

- SWMU 39 - Oil/Water Separator (OWS)
- SWMU 127 - Waste Oil Tank
- SWMU 135 - OWS Drainage Pit
- SWMU 170 - Fire Training Area 1

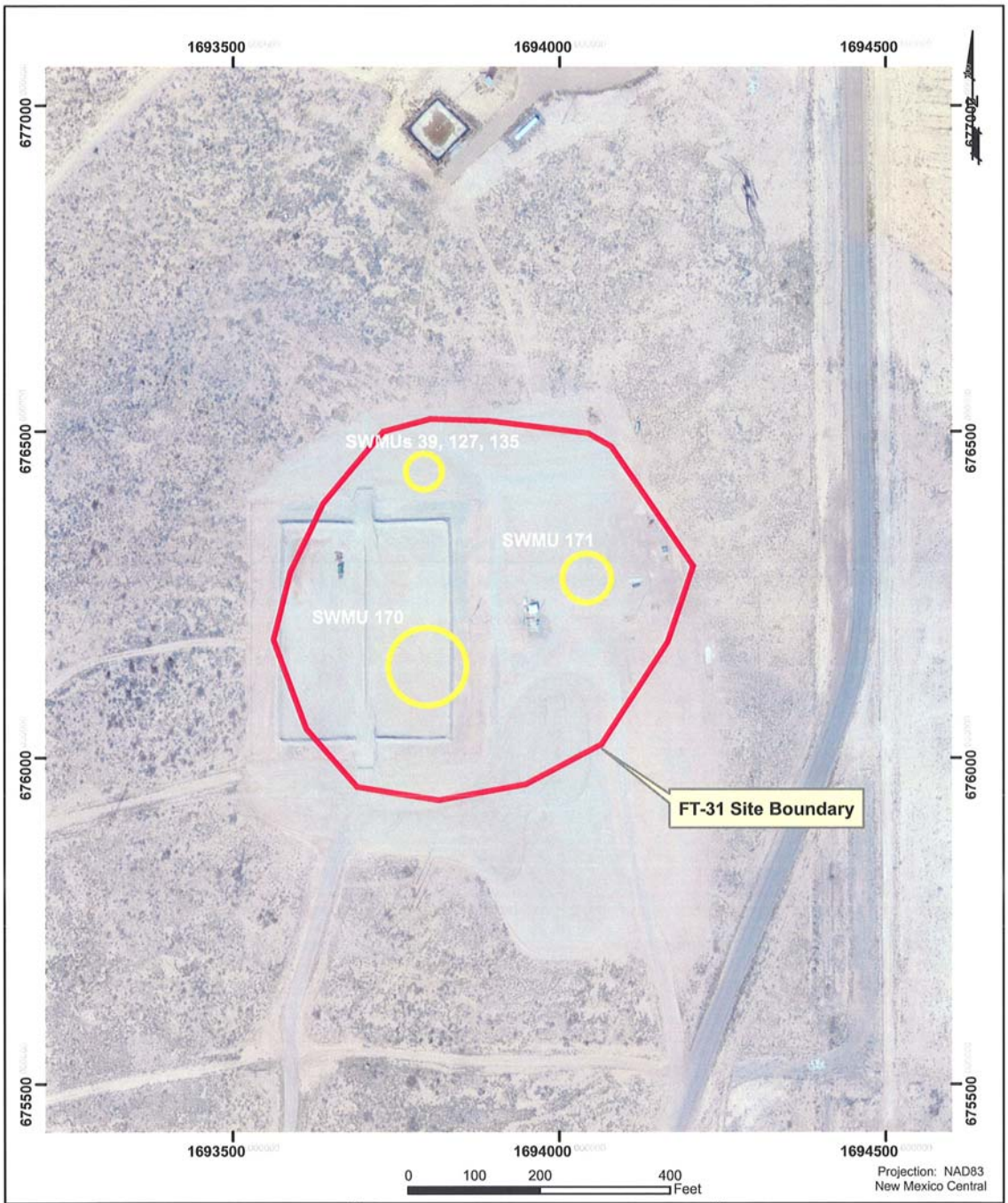
Collectively, these four SWMUs are known as FT-31 and were integral to the operation of the Former Fire Training Area at HAFB. In 2001, SWMU 171, located at the Fire Training Area, was removed from Appendix 4-A of the HAFB RCRA Permit.

Site FT-31, is located north of the Main Base Area and west of the former Main Base Landfill (see **Figures 2 and 10**). Collectively, these SWMUs were used to simulate aircraft and fuel fires for training the HAFB Fire Department. The site consists of a circular gravel bermed area (SWMU 170) which contained a mock-up of a large aircraft, a waste oil tank (SWMU 127), an oil/water separator (OWS, SWMU 39), and a drainage pit (SWMU 135) which accepted the effluent from the OWS. The site also contained an UST by definition, which supplied jet fuel (JP-4) to propagate training fires and was not listed as a SWMU. The tank resided in a concrete vault that was below ground surface; however, the tank was visible on all sides.

H.10.2 History/Current Use

Until 1979, waste oils, solvent, and fuel were delivered to FT-31 from all major industrial shops. The flammable liquids were sprayed on the mock aircraft and ignited for the training exercises. The start date of these activities at the site is unknown. Beginning in 1979, only new fuel was used in fire department training exercises. Training exercises included pre-soaking the area with water prior to fuel application and ignition. Most of the ignition materials were consumed in the fires; however, some percolation of these materials into the subsurface occurred. HAFB abandoned FT-31 in 1990 as a training facility and moved training exercises to a new propane fueled facility approximately 0.5 miles north of the site.

The FT-31 site is the current location of the FT31 Land Farm. On June 14, 2004 Holloman Air Force Base (New Mexico) was granted discharge permit DP 1446 to operate a landfarm for petroleum contaminated soil (PCS) at the closed Fire Training Area Site (FT-31) by the New Mexico Environment Department (NMED). On November 6, 2009, NMED renewed the operating permit (DP 1446) for the landfarm and its expansion. The new configuration allows for 16 cells containing 720 cubic yards each (11,520yards/lift). The operating permit requires that monitoring of subsurface conditions at the site (both soil and groundwater) be conducted in accordance with the approved discharge application and permit approval conditions listed in the November 9, 2009 authorization.



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

FT-31 Site Layout Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm
			DRAWING NO: Figure 10

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 10

The *Installation Restoration Program Records Search* (CH_2M Hill, 1983) concluded that percolation of waste fuel and solvents into the soil and groundwater was inevitable; therefore, further investigation was recommended. The Phase II Stage I Investigation of this site consisted of the installation of one monitoring well and the sampling of two soil borings. This study concluded that FT-31 had low levels of VOCs and semi-volatile organic compounds (SVOCs) contamination and recommended further study. Investigations for the *Final Remedial Investigation Report for Installation Restoration Program Sites* (Walk, Haydel & Associates, 1989) consisted of a soil-gas survey, installation of seven monitoring wells, drilling and sampling of two borings, and collection of four sediment samples. The Remedial Investigation (RI) report concluded that extensive soil and groundwater contaminated with total petroleum hydrocarbons (TPH), VOCs, and some SVOCs was found in the OWS area and recommended that the OWS be removed.

The NMED requested further investigation at the site and a *Phase I RCRA Facility Investigation* (Radian, 1993) was conducted at SWMUs 39, 127, and 135 in the northern part of the site. Additional investigation was conducted in the southern portion of the site at SWMUs 170 and 171, as part of the Table 1 Phase II RFI *Report* (Foster Wheeler Environmental Corporation [FWENC], 1995). These investigations delineated the impacts to soil and groundwater. In 1996, a bioventing remediation system was installed. The bioventing system was designed to remediate subsurface hydrocarbon impacts to soil and groundwater. Additionally, removal of the OWS (SWMU 39), the waste oil tank (SWMU 127), the OWS drainage pit (SWMU 135), the circular gravel area (including the plane), the JP-4 UST, and the excavation of the surrounding petroleum-contaminated soils (PCS) were performed between 1996 and 1999. The purpose of the bioventing system was to supply air to indigenous bacteria. The injection of air then accelerated the bioremediation of PCS in-situ. However, the system did not adequately remove PCS to the NMED Soil Screening Levels (SSLs) for PCS and related hazardous constituents. Limited excavation of PCS began in 1999 while the bioventing system was still operational. Excavation activities to remove recalcitrant PCS accelerated in January 2003 and were completed in July 2003. In 2005, additional investigations to address groundwater conditions were at the southeastern perimeter of the site. The completed VCM report was submitted to NMED in April 2006. The report was approved and the site was made eligible for CAC by NMED in October 2006. Excavated soil was transported offsite to a permitted landfarm facility. Clean soil was imported and used to backfill the VCM excavations.

H.10.3 Evaluation of Relevant Information

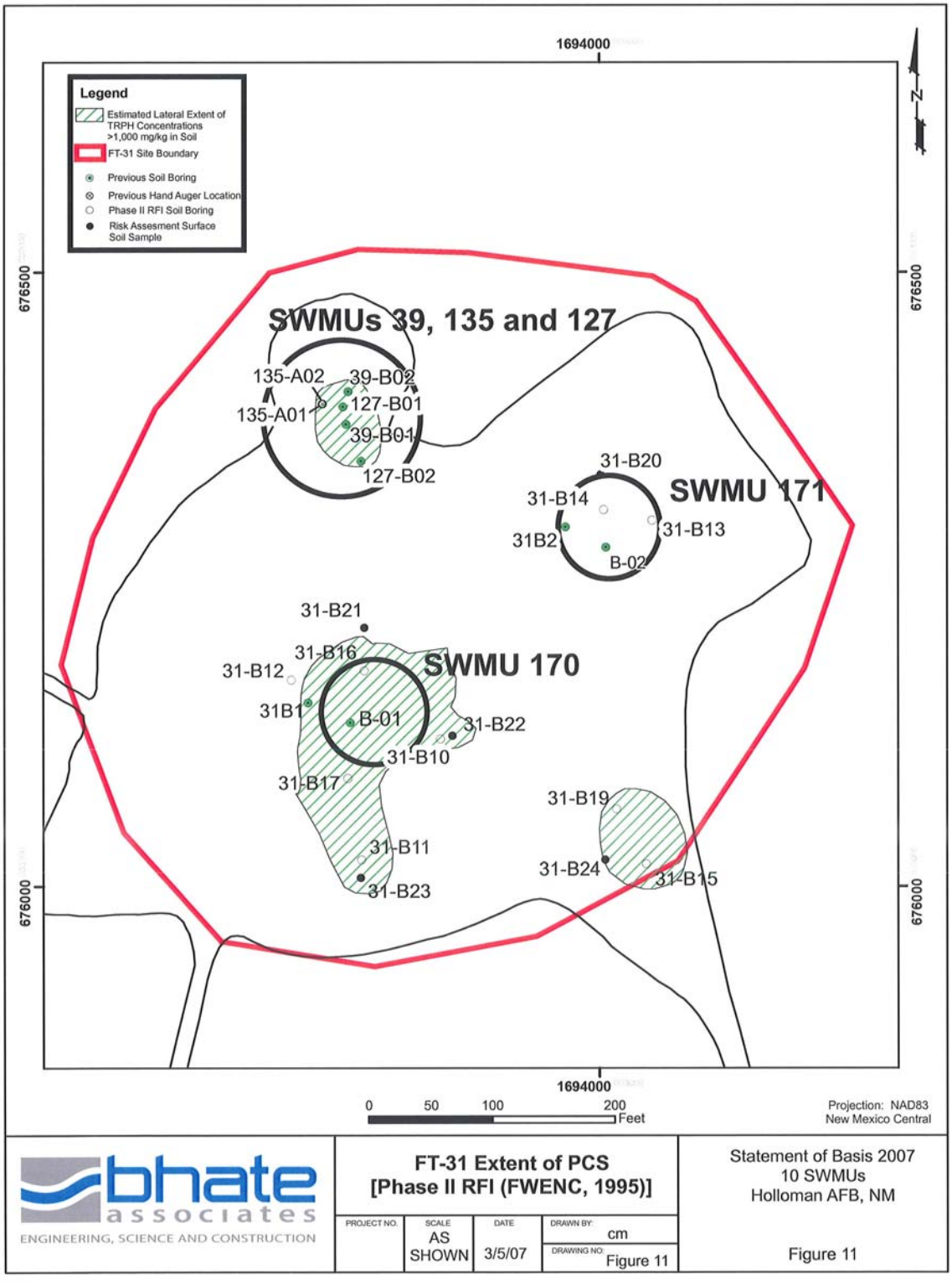
Several investigations were conducted at Site FT-31. Prior to the VCM, the most comprehensive representation of the nature and extent of PCS and other constituents was presented in the *Table 1 Phase II RFI Report* (FWENC, 1995). The data presented in *Table 1 Phase II RFI* was representative of site conditions prior to remedial efforts carried out by the VCM. The analytical results for soil data compiled in the *Table 1 Phase II RFI* are graphically represented on **Figures 11** and **12. Figure 11** presents the lateral extent of PCS where concentrations of total recoverable petroleum hydrocarbons

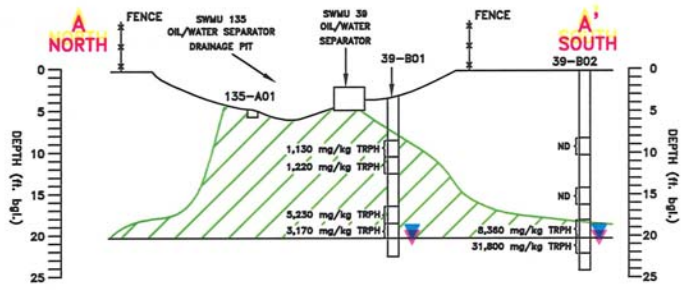
(TRPH) by Method 418.1 exceed 1,000 milligrams per kilogram (mg/kg). In turn, **Figure 12** provides a series of idealized cross sections illustrating the vertical extent of PCS using the maximum TPH concentrations reported. TPH concentrations in soil beneath SWMUs 39, 127, and 135 ranged from 1,130 mg/kg to 31,800 mg/kg. TPH in soil beneath SWMU 170 ranged from 1,060 mg/kg to 11,500 mg/kg. Additional PCS in excess of 1,000 mg/kg was detected near the dispensing area of the JP-4 UST where concentrations ranged between 1,170 mg/kg and 3,760 mg/kg. The maximum concentrations of VOCs detected in soil beneath these SWMUs were: benzene (2,200 µg/kg at 31-B15, 18 to 20 feet), ethylbenzene (19,000 µg/kg at 31-B15, 18 to 20 feet), toluene (13,000 µg/kg at 31-B11, 18 to 30 feet), xylenes (97,000 µg/kg at 31-B17, 6 to 8 feet), and 1,1,1-trichloroethane (2,000 µg/kg at 31-B15, 18 to 20 feet). The maximum concentrations of SVOCs detected in soil beneath these SWMUs were 2-methylnaphthalene (8.6 µg/kg at 31-B17, 6 to 8 feet) and naphthalene (5.0 µg/kg at 31-B17, 6 to 8 feet). An estimate of the volume of PCS present at FT-31 was calculated based upon the delineation provided in **Figure 11** and **Figure 12**. The conservative estimate was calculated by determining the area of contamination from the map provided in **Figure 11** and multiplying it by the depth to groundwater (21 feet). The conservative estimate of the total volume of PCS that was present at all the SWMUs plus the JP-4 UST was approximately 17,800 cubic yards.

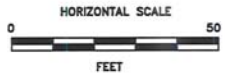
Three distinct areas of excavation, the north area, the south area, and the east area, were necessary to remove the PCS from the four SWMUs at Site FT-31. The extent of these excavations and associated SWMUs are illustrated on **Figure 13**.

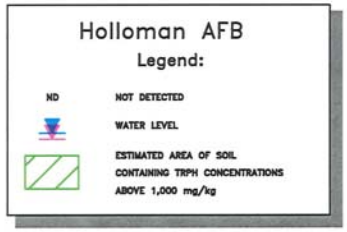
Soil excavated during the VCM was field screened with a PID to confirm that the soils were not contaminated. Clean soil removed to expose known PCS that either exhibited a PID response, hydrocarbon odors, and/or was visibly stained was classified as “suspect soil” and was segregated and placed on plastic liners for additional sampling and laboratory analysis. Every 100 cubic yards of suspect soil was sampled for laboratory analysis (sample prefix FT31-SP) of PCS contaminants.

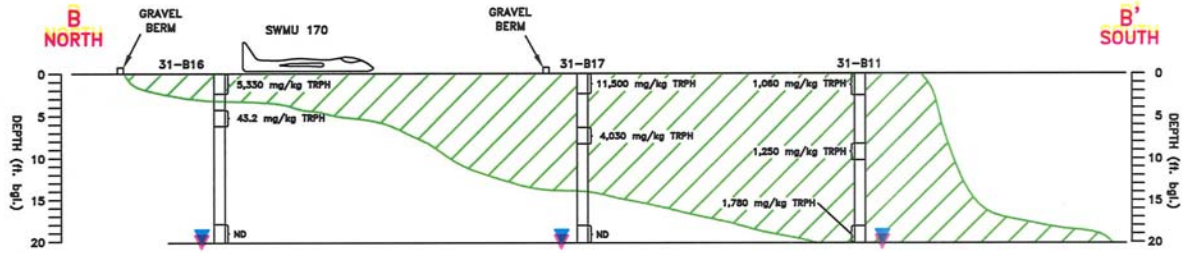
To determine the effectiveness of the VCM, confirmation soil samples were collected from the sidewalls of the excavations. Excavation confirmation samples were analyzed by the offsite laboratory for TPH Diesel-Range Organics (DRO), TPH Gasoline-Range Organics (GRO) and TPH Oil-Range Organics (ORO) by Method 8015, VOCs by Method 8260B, and SVOCs by Method 8270C. The results of the laboratory analyses were reviewed and compared to the SSLs to determine completeness of PCS removal or the disposition of PCS soil.

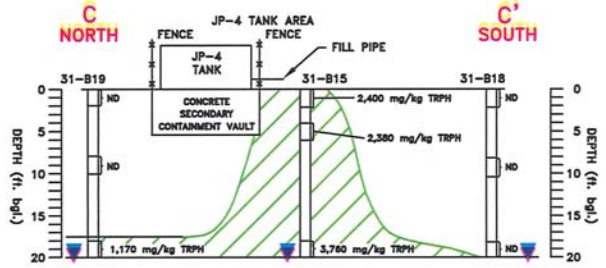

Legend
Estimated Lateral Extent of TRPH Concentrations >1,000 mg/kg in Soil
FT-31 Site Boundary
Previous Soil Boring
Previous Hand Auger Location
Phase II RFI Soil Boring
Risk Assesment Surface Soil Sample
1694000
676500
676000
N
SWMUs 39, 135 and 127
135-A02
39-B02
127-B01
135-A01
39-B01
127-B02
31-B20
SWMU 171
31-B14
31-B13
31B2
B-02
31-B21
31-B16
31-B12
SWMU 170
31B1
B-01
31-B22
31-B10
31-B17
31-B19
31-B11
31-B24
31-B15
31-B23
0 50 100 200 Feet
Projection: NAD83 New Mexico Central
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 Extent of PCS [Phase II RFI (FWENC, 1995)]
PROJECT NO.
SCALE AS SHOWN
DATE 3/5/07
DRAWN BY: cm
DRAWING NO: Figure 11
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 11

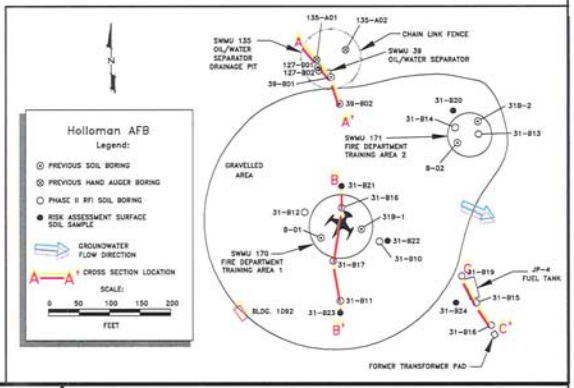












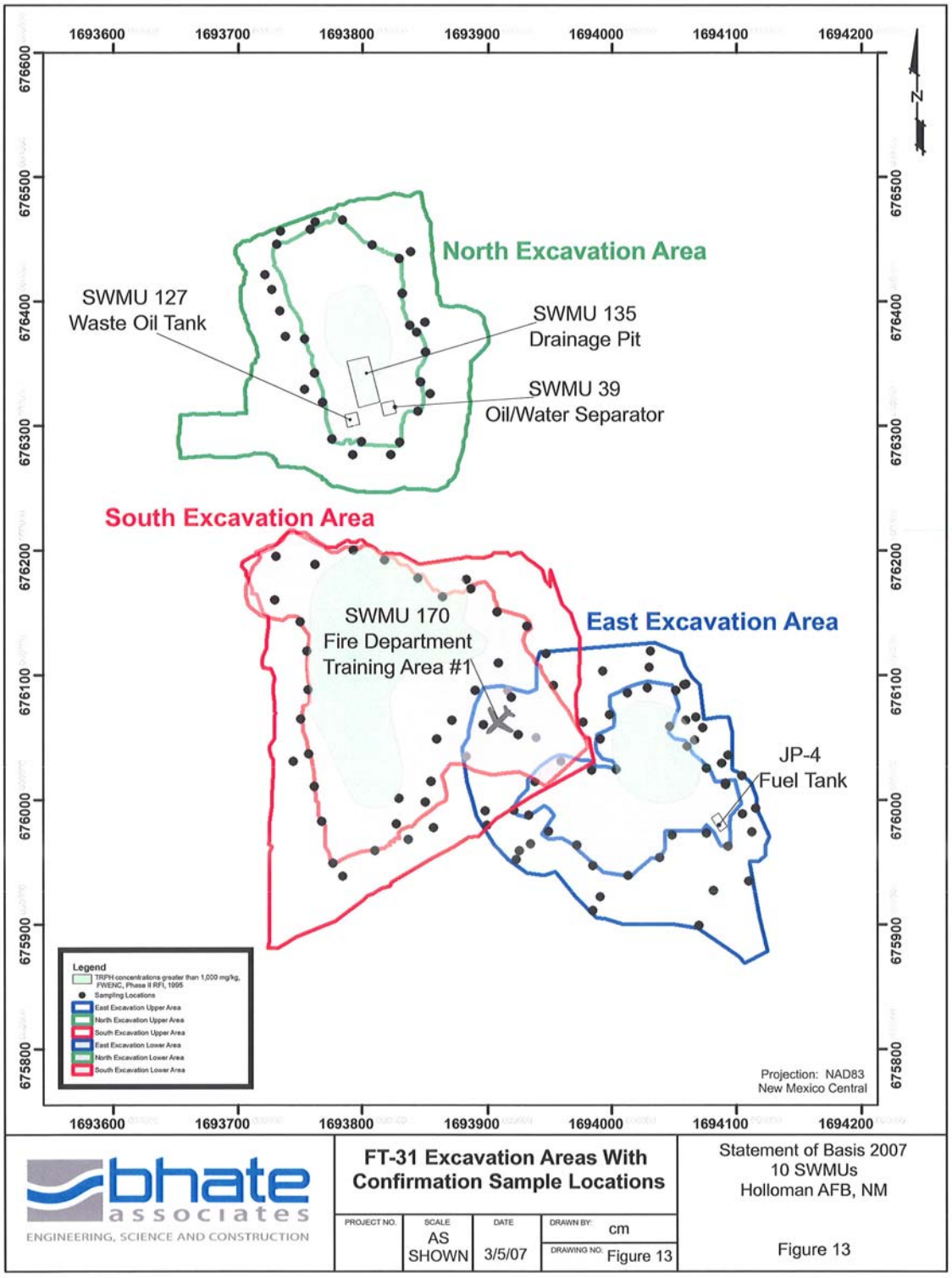
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

FT-31 CROSS SECTIONS
DELINEATION OF PCS

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	CM
			DRAWING NO: FIGURE 12

STATEMENT OF BASIS 2007
10 SWMUs
Holloman AFB, NM

Figure 12


1693600
1693700
1693800
1693900
1694000
1694100
1694200
676600
676500
676400
676300
676200
676100
676000
675900
675800
N
North Excavation Area
SWMU 127
Waste Oil Tank
SWMU 135
Drainage Pit
SWMU 39
Oil/Water Separator
South Excavation Area
SWMU 170
Fire Department
Training Area #1
East Excavation Area
JP-4
Fuel Tank
Legend
TRPH concentrations greater than 1,000 mg/kg, FWENC, Phase II RFI, 1995
Sampling Locations
East Excavation Upper Area
North Excavation Upper Area
South Excavation Upper Area
East Excavation Lower Area
North Excavation Lower Area
South Excavation Lower Area
Projection: NAD83
New Mexico Central
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 Excavation Areas With Confirmation Sample Locations
PROJECT NO.
SCALE
AS SHOWN
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 13
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 13

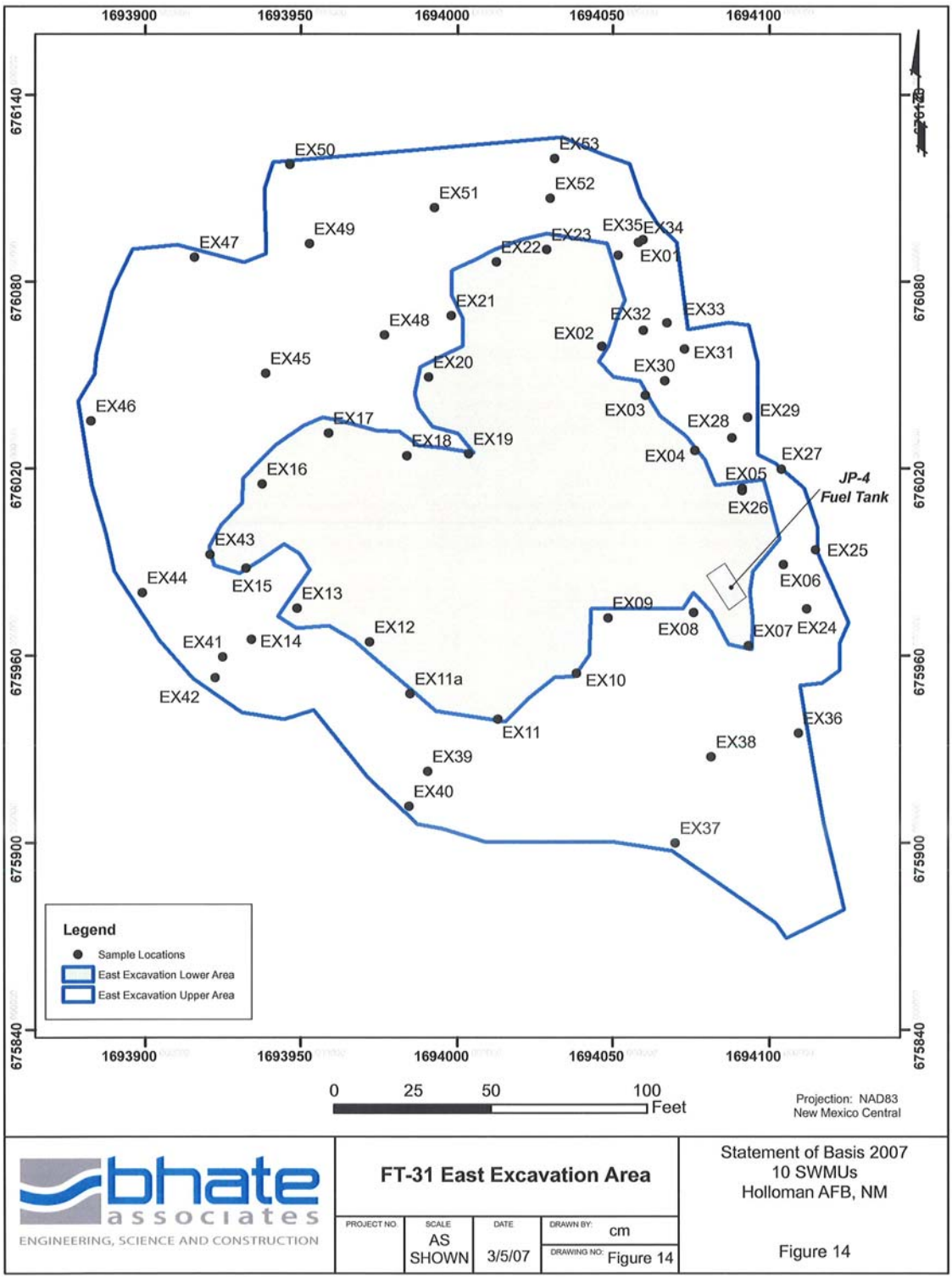
Hundreds of soil samples and several groundwater samples were collected to implement the VCM. These samples were used to document the completeness of the VCM excavations, the conditions of the PCS excavated and the quality of groundwater at the site. They document the successful removal of all PCS in excess of NMED SSLs. The tabulated results of these analyses required 58 pages in the original VCM Report, which can be viewed in the Administrative Record referred to in Section C of this FS/SOB.

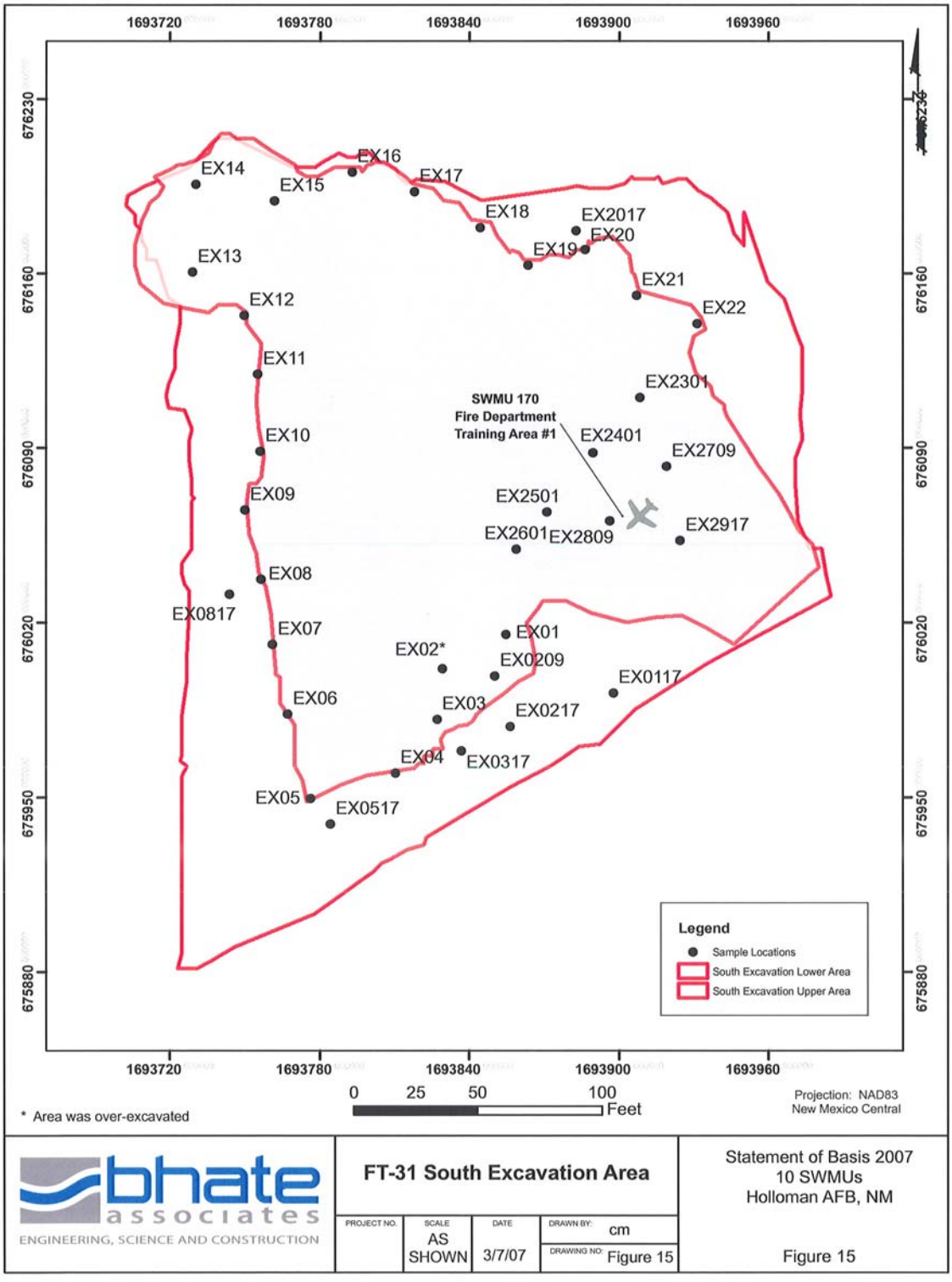
The east excavation, which encompassed SWMU 170 and the former location of the UST that contained JP-4, was the first excavation at FT-31. Approximately 2,030 cubic yards (2,298 tons) of PCS were excavated and transported offsite for disposal. "Suspect" soil was sampled and determined to be less than the NMED SSLs for PCS and was returned to the excavation as backfill. Confirmation samples were collected at 53 locations at varying depths from the sidewalls along the perimeter of the east excavation (**Figure 14**). Concentrations in these samples did not exceed the associated SSLs.

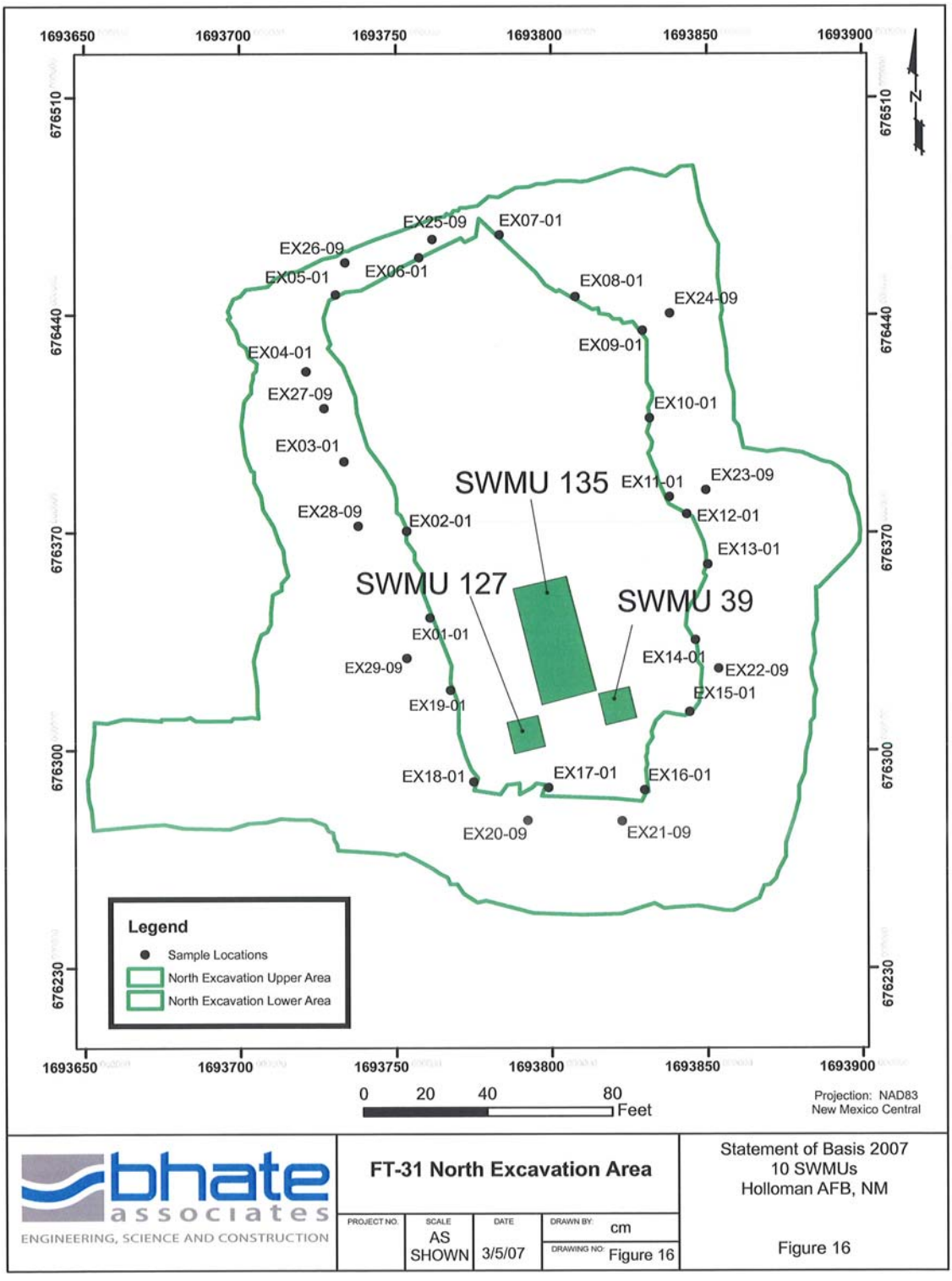
Excavation and removal activities began at the south excavation in March 2003, and were completed in June 2003. The approximate area of the final excavation was 23,800 square feet with a maximum depth of 21 feet. The calculated volume removed from the excavation was 18,510 cubic yards and 13,275 cubic yards (15,000 tons) of PCS were excavated and transported offsite for disposal. Confirmation samples were collected at 36 locations at varying depths from the sidewalls along the perimeter of the south excavation (**Figure 15**). Concentrations in these samples did not exceed the associated SSLs.

The north excavation encompasses the area of SWMUs 39 and 127. Excavation and removal activities began in June 2003 and were completed in July 2003. The approximate area of the final excavation was 9,600 square feet with a maximum depth of 21 feet. The calculated volume removed from the excavation was 7,470 cubic yards and approximately 2,750 cubic yards (3,100 tons) of PCS were excavated and transported offsite for disposal. Confirmation samples were collected at a total of 29 locations at varying depths from the sidewalls along the perimeter of the north excavation (**Figure 16**). Concentrations in these samples did not exceed the associated SSLs.

Site restoration activities for the project included backfilling the excavation with clean soil stockpiled during the excavation and additional base reuse material as needed. The backfill was compacted with a sheep's foot vibrating compactor. The excavation was graded to existing surface topography and slightly arched to provide drainage for storm water run-off.


1693900
1693950
1694000
1694050
1694100
676140
676080
676020
675960
675900
675840
EX50
EX53
EX51
EX52
EX49
EX47
EX35
EX34
EX23
EX22
EX01
EX21
EX48
EX32
EX33
EX02
EX31
EX45
EX20
EX30
EX46
EX03
EX28
EX29
EX17
EX18
EX19
EX04
EX27
EX16
EX05
JP-4
Fuel Tank
EX26
EX43
EX25
EX44
EX15
EX06
EX13
EX09
EX12
EX08
EX07
EX24
EX41
EX14
EX11a
EX10
EX42
EX36
EX11
EX38
EX39
EX40
EX37
Legend
Sample Locations
East Excavation Lower Area
East Excavation Upper Area
0
25
50
100
Feet
Projection: NAD83
New Mexico Central
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 East Excavation Area
PROJECT NO.
SCALE
AS SHOWN
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 14
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 14


1693720
1693780
1693840
1693900
1693960
676230
676160
676090
676020
675950
675880
EX14
EX15
EX16
EX17
EX18
EX2017
EX20
EX19
EX13
EX21
EX12
EX22
EX11
EX2301
SWMU 170
Fire Department
Training Area #1
EX10
EX2401
EX2709
EX09
EX2501
EX2601
EX2809
EX2917
EX08
EX0817
EX07
EX01
EX02*
EX0209
EX0117
EX06
EX03
EX0217
EX04
EX0317
EX05
EX0517
Legend
Sample Locations
South Excavation Lower Area
South Excavation Upper Area
0 25 50 100
Feet
Projection: NAD83
New Mexico Central
* Area was over-excavated
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 South Excavation Area
PROJECT NO.
SCALE
AS SHOWN
DATE
3/7/07
DRAWN BY:
cm
DRAWING NO:
Figure 15
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 15

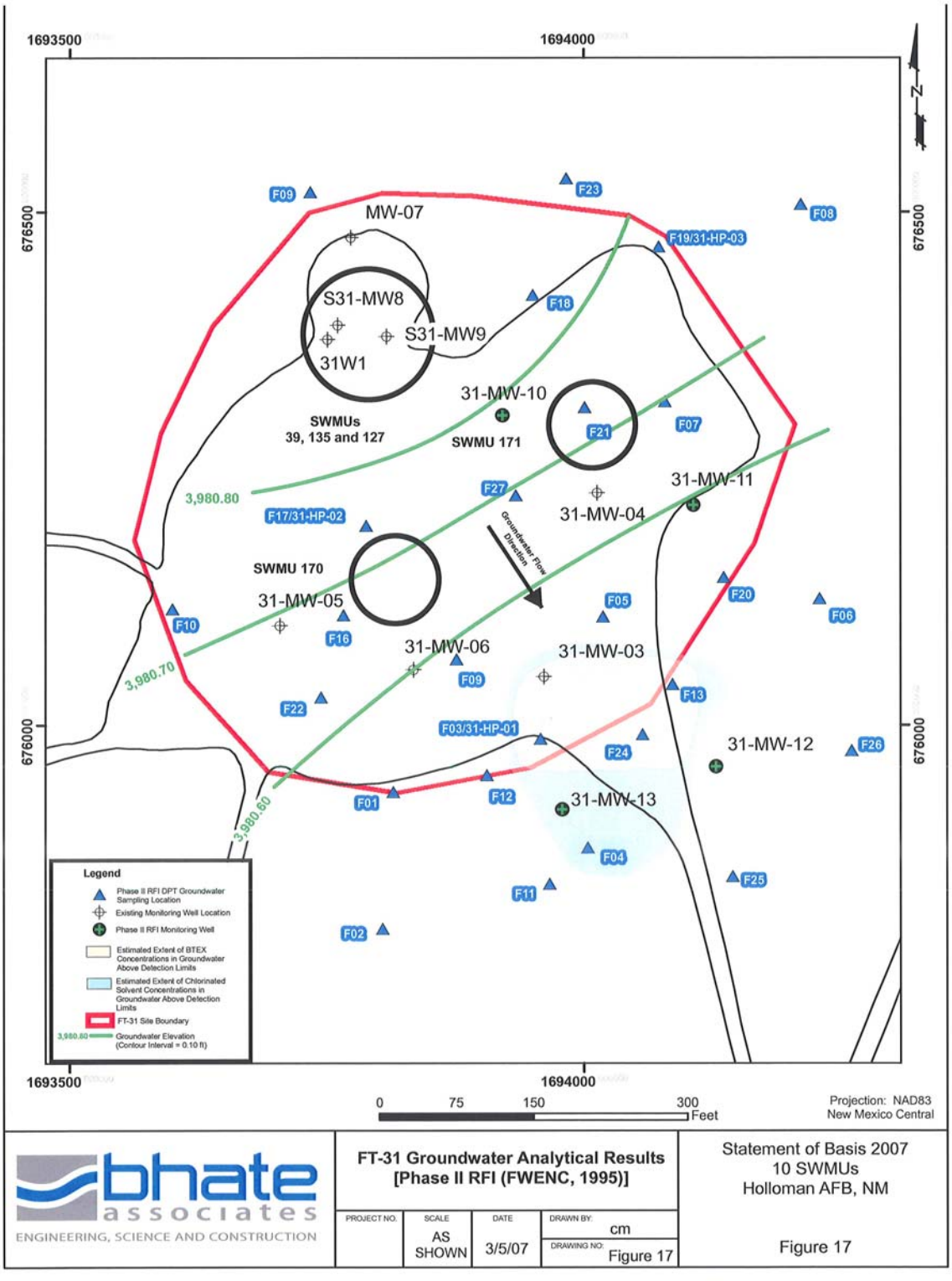

1693650
1693700
1693750
1693800
1693850
1693900
676510
676440
676370
676300
676230
N
EX25-09
EX07-01
EX26-09
EX05-01
EX06-01
EX08-01
EX24-09
EX09-01
EX04-01
EX27-09
EX10-01
EX03-01
SWMU 135
EX11-01
EX23-09
EX28-09
EX02-01
EX12-01
EX13-01
SWMU 127
SWMU 39
EX01-01
EX14-01
EX22-09
EX29-09
EX15-01
EX19-01
EX18-01
EX17-01
EX16-01
EX20-09
EX21-09
Legend
Sample Locations
North Excavation Upper Area
North Excavation Lower Area
0
20
40
80
Feet
Projection: NAD83
New Mexico Central
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 North Excavation Area
PROJECT NO.
SCALE
AS SHOWN
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 16
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 16

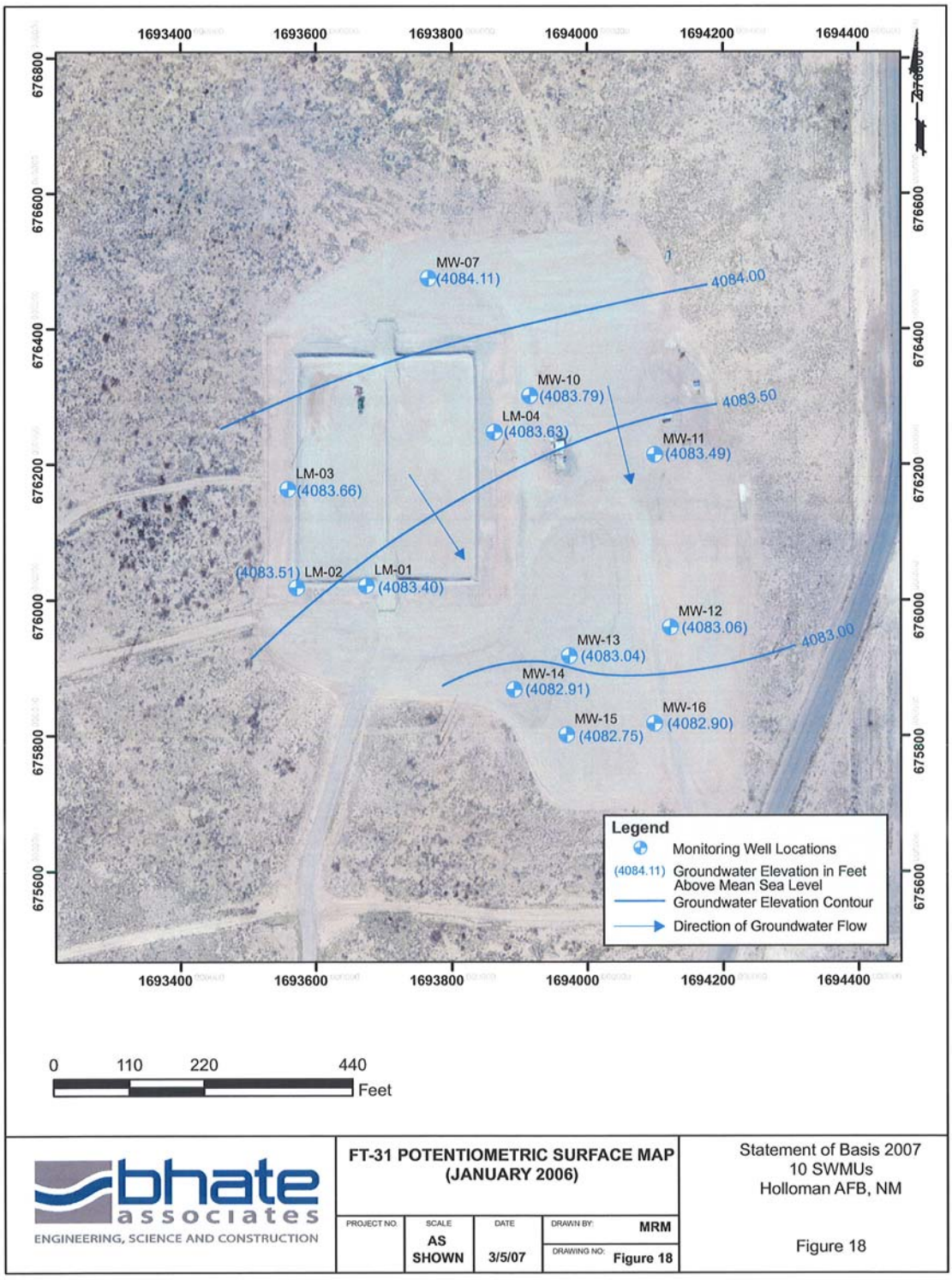
Groundwater samples were collected from several wells at the Site during the Table 1 Phase II RFI. Several wells identified VOCs and SVOCs. These results are summarized in **Figure 17.**

In 2005, groundwater samples were collected from wells MW-10 and MW-13 to determine the current concentrations of petroleum related constituents and TDS. Further, at the direction of NMED, three additional groundwater monitoring wells (MW-14, MW-15, and MW-16) were installed south of MW-13 to delineate the presence of VOCs identified in MW-13. Additional data concerning the presence of VOCs and the presence of TDS at the Site were derived from the Landfarm groundwater monitoring wells (LM-01, LM-02, LM-03, and LM-04) located on the Site. Well locations and a potentiometric surface map (January 2006) is included as **Figure 18**. Groundwater flow in the area of FT-31 is to the southeast.

TDS in groundwater at the site exceeds the NMWQCC (20.6.2 NMAC) standard for potable groundwater in all wells (average concentration of 20,000 mg/L) except well MW-16 which contained TDS at 8,990 mg/L. Well MW-13 contained the maximum concentrations of VOCs. At MW-13, benzene was detected at a concentration of 86.5 µg/L, sec-butylbenzene at 0.87 µg/L, 1,1-dichloroethane at 11.0 µg/L, 1,1-dichloroethene at 10.1 µg/L, isopropylbenzene at 2.8 µg/L, naphthalene at 7.2 µg/L, and trichloroethene at a concentration of 1.1 µg/L. Diethylphthalate, 2-methylnaphthalene, and naphthalene were the SVOCs detected at concentrations of 3.0 µg/L, 2.3 µg/L, and 6.4 µg/L, respectively. Wells LM-01 through LM-04 and MW-14 through MW-16 contained no VOCs or SVOCs. Well MW-15 contained one VOC, toluene at 0.53 µg/L, which is significantly below all applicable standards.

Concentrations of metals in samples from the monitoring wells (MW-14, MW-15, and MW-16) were compared to NMWQCC standards for potable groundwater, even though the concentration of TDS is above the 10,000 mg/L standard. Concentrations of four metals were detected above the NMWQCC standards. Lead was detected above the standard of 100 µg/L, at a concentration of 114 µg/L in the sample collected from MW-15; however, lead was not above the standard in the duplicate sample from this well. The standard for iron of 1,000 µg/L was exceeded in each sample collected from the new wells MW-14, MW-15, and MW-16. Concentrations ranged from 20,200 µg/L to 137,000 µg/L. Manganese was also exceeded in each of the samples collected. It was detected at concentrations ranging from 565 µg/L in the sample from MW-14 to 3,130 µg/L in the sample from MW-15. The standard for manganese is 200 µg/L. Selenium was also above the standard of 50 µg/L in each of the samples collected. Selenium concentrations ranged from 76.3 µg/L to 170 µg/L.


1693500
1694000
676500
676000
N
F09
F23
F08
MW-07
F19/31-HP-03
S31-MW8
S31-MW9
31W1
F18
31-MW-10
SWMUs
39, 135 and 127
SWMU 171
F21
F07
3,980.80
F27
31-MW-11
31-MW-04
F17/31-HP-02
Groundwater Flow Direction
SWMU 170
31-MW-05
F10
F16
F05
F20
F06
31-MW-06
31-MW-03
3,980.70
F09
F13
F22
F03/31-HP-01
F24
31-MW-12
F26
F01
F12
31-MW-13
3,980.60
F04
F25
F11
F02
Legend
Phase II RFI DPT Groundwater Sampling Location
Existing Monitoring Well Location
Phase II RFI Monitoring Well
Estimated Extent of BTEX Concentrations in Groundwater Above Detection Limits
Estimated Extent of Chlorinated Solvent Concentrations in Groundwater Above Detection Limits
FT-31 Site Boundary
3,980.80 Groundwater Elevation (Contour Interval = 0.10 ft)
0
75
150
300
Feet
Projection: NAD83
New Mexico Central
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
FT-31 Groundwater Analytical Results
[Phase II RFI (FWENC, 1995)]
PROJECT NO.
SCALE
AS SHOWN
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 17
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 17



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

FT-31 POTENTIOMETRIC SURFACE MAP (JANUARY 2006)

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
	AS SHOWN	3/5/07	MRM	Figure 18

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 18

H.10.4 Basis for Determination

PCS identified in the Table 1 Phase II RFI for FT-31 (SWMUs 39, 127, 135, and 170) and the JP-4 fuel UST were excavated and transported offsite for treatment and disposal. Soil samples collected from the sidewalls of each excavation (confirmation samples) provide documentation of the complete removal of soil containing petroleum hydrocarbons, VOCs, or SVOCs in excess of the NMED SSLs. Analytical results from groundwater samples collected at the site do not contain VOCs or SVOCs above detection limits. TDS in groundwater at the site consistently exceeds the NMWQCC standard for potable groundwater.

Based upon the sampling, laboratory analytical results, and documentation of excavation and disposal provided, CAC was recommended for the following SWMUs at site FT-31:

- SWMU 39 OWS
- SWMU 127 Waste Oil Tank
- SWMU 139 OWS Drainage Pit
- SWMU 170 Fire Department Training Area 1

The SWMUS at site FT-31 meet the requirements for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use. A September 27, 2006 NMED letter to HAFB indicated that the site is eligible for CAC.

H.10.5 References

Bhate Environmental, April 2006, *FT-31 Voluntary Corrective Measures Completion Report, Holloman AFB, New Mexico.*

CH_2M Hill, August 1983, *Installation Restoration Program Records Search, Holloman AFB, New Mexico*.

FWENC, June 1995, *Table 1 Phase II RFI Report, Holloman AFB, New Mexico.*

FWENC, June 2003, *Closure Report for the Excavations at FT-31 – South Area and the West POL Yard, Holloman Air Force Base, New Mexico.*

FWENC, January 2003, *Revised Final Letter Work Plan for Petroleum-Contaminated Soil Excavation at SS-17, FT-31, and The West POL Yard, Holloman Air Force Base, New Mexico.*

NMED, February 2004, *Technical Background Document for the Development of Soil Screening Levels, Revision 2*. Hazardous Waste Bureau, Ground Water Quality Bureau, and the Voluntary Remediation Program.

NMED, June 24, 2003, *New Mexico Environment Department TPH Screening Guidelines.*

Radian Corporation, 1993, *Phase I RCRA Facility Investigation*, Holloman AFB, New Mexico.

Walk, Haydel and Associates, December 1989, *Final Remedial Investigation Report for Installation Restoration Program Sites.*

H.11 AOC-2, Sewage Disposal Area Taxiway G

H.11.1 Location/Unit Description

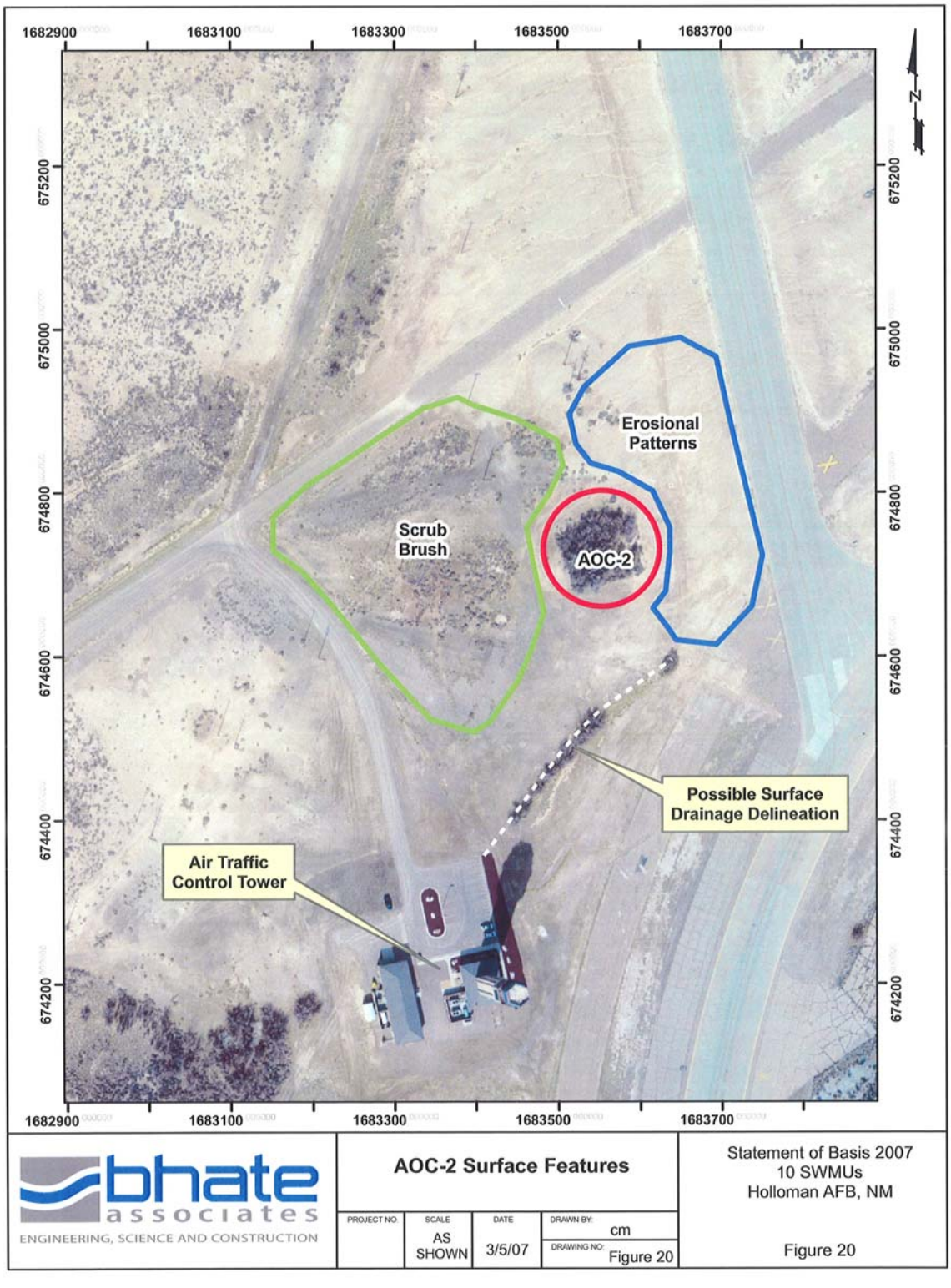
AOC-2 is located on the western part of the main base, across Taxiway G. AOC-2 is approximately 110 feet in diameter with primarily salt cedars comprising the vegetation and is slightly depressed topographically as compared to the surrounding area. The site boundary is defined by a wire fence with signage indicating the area to be a former sewage disposal area. The site is approximately 900 feet northeast of the existing air traffic control tower, Building 864. See **Figure 2** for a site location and a photomap with the surface features visible is provided as **Figure 20**.

Prior to 2004 and 2005 RFI efforts, no previous information relating to the environmental status of the site existed. It is inferred that disposal activities were terminated prior to 1984 although no documentation of disposal records are presently available to corroborate this assertion. Additionally, no regulatory permits, violations, or documents pertaining to AOC-2 were found that disclosed information on the purpose or past uses of the site. If the former air traffic tower was a source of disposal to the site, it has since been removed.

H.11.2 Evaluation of Relevant Information

Interviews of Base personnel were conducted in 2004 as part of the document review process. Personnel from the 49th Civil Engineering Squadron (CES) were interviewed concerning potential dumping, burial, or storage of wastes at the site. To the recollection of the personnel interviewed, there was no dumping, burial, or storage of hazardous wastes at the site. Each individual questioned had been stationed at HAFB for at least 30 years.

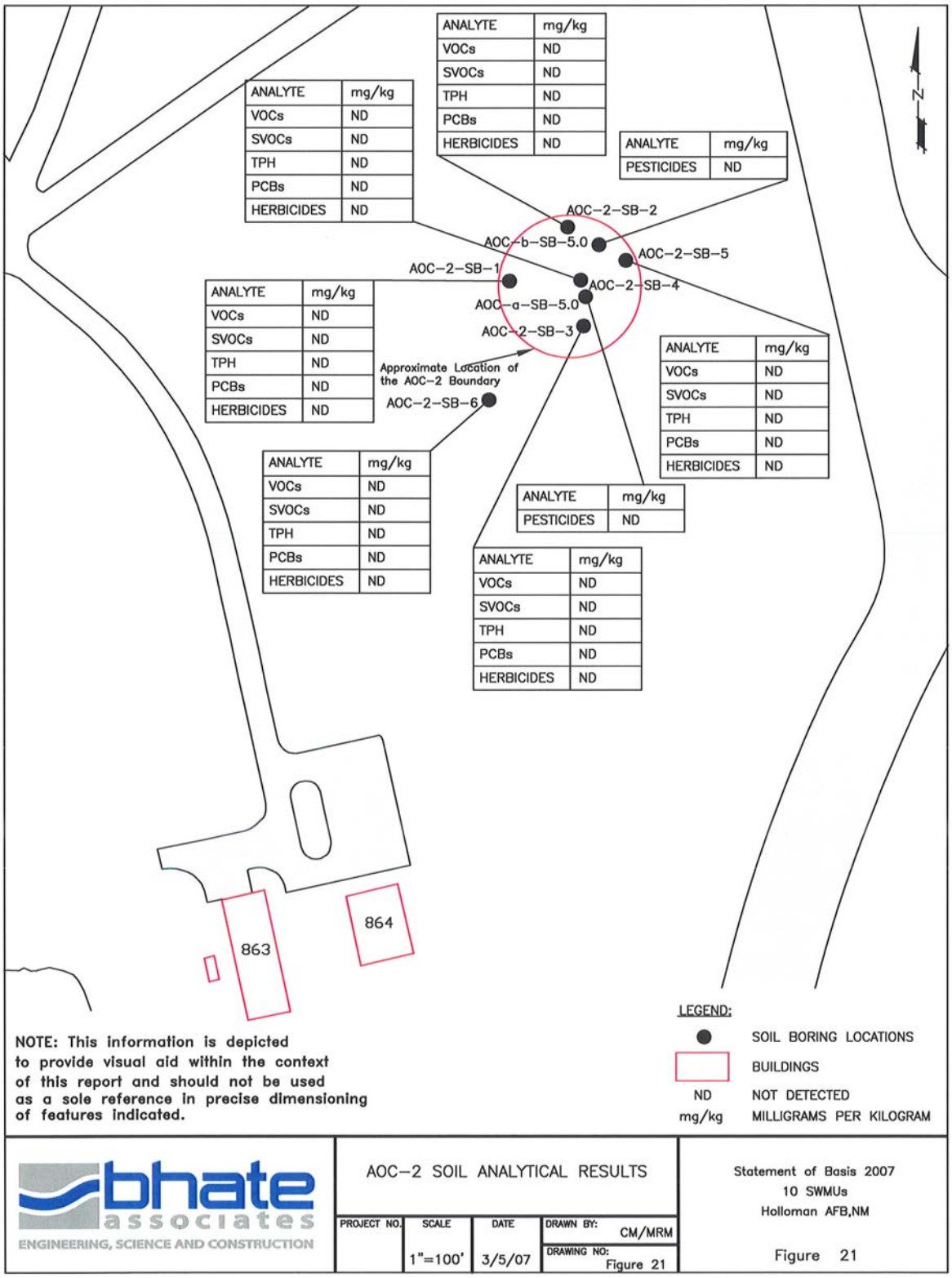
Aerial photographs from 1945, 1982, and 1997 were shown to CES personnel during the interviews. The photos show the former air traffic control tower that was located immediately west of AOC-2. There has been no indications from the documentation reviewed that disposal of any substance from the former tower to the area, septic or otherwise, has occurred in the past. No historical documents were found pertaining to the purpose or past uses of the site. No potential receptors have been identified for the soil, surface, and air media. It is inferred that only the groundwater media would have the potential to impact potential receptors; however, due to the large distances, even this is unlikely. In summary, based on the interviews, site reconnaissance, and the presence of the sewage disposal sign, the site may have been plumbed to the former control tower for sanitary purposes; however, no direct evidence is available to confirm this assertion.


1682900
1683100
1683300
1683500
1683700
675200
675000
674800
674600
674400
674200
N
Erosional Patterns
Scrub Brush
AOC-2
Possible Surface Drainage Delineation
Air Traffic Control Tower
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
AOC-2 Surface Features
PROJECT NO.
SCALE
AS SHOWN
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 20
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 20

RFI field activities were conducted in 2004. To facilitate the production and review of this document, figures summarizing the results and tables comparing the relevant results to regulatory standards have been included in the text. During the RFI, soil borings were advanced, and soil and groundwater samples were collected from selected locations at the site to determine the nature and extent of possible contamination. In May 2004, six soil borings (SB-1 through SB-6) were advanced around AOC-2 (**Figure 21**). These soil borings were sampled continuously to a depth of approximately 20 feet bgs. Two shallow boreholes (A and B) were advanced within the AOC-2 boundary using a hand auger. Temporary monitoring wells were installed in each of the six deep soil borings for the purpose of collecting groundwater samples. Groundwater samples were collected from each of the monitoring wells. The soil and groundwater samples were analyzed for VOCs; SVOCs; TPH-GRO, TPH-DRO, and TPHORO; RCRA-8 metals; polychlorinated biphenyls (PCBs); herbicides; and pesticides. Additionally, groundwater samples were also analyzed for TDS and nitrate and nitrite.

Analytical results for samples collected from AOC-2 indicate that no VOCs, SVOCs, PCBs, herbicides, TPH, or pesticides were detected above the method detection limits. However, several RCRA-8 metals were detected. Summaries of these soil results are illustrated on **Figures 21** and **22**. Each metal concentration was compared to the Base-wide upper tolerance limits (UTLs) (Radian, 1993) and then to the Residential SSLs (NMED, February 2004). As summarized in **Table 3**, arsenic, barium, cadmium, chromium, lead, and silver were all detected at low concentrations in the soil samples. Of these detections, two occurrences of arsenic (4.12 milligrams per kilogram [mg/kg] in SB03-3 and 4.91 mg/kg in SB-04-3) are below the base-wide UTL (6.88 mg/kg), but exceed the SSL (3.90 mg/kg). Two occurrences of silver (1.6 mg/kg in SB-04-9 and 0.86 mg/kg in SB-04-3) exceeded the base-wide UTL of 0.73 mg/kg though each is well below the SSL of 391 mg/kg. Because selenium and mercury were not detected in any soil samples they were not included in the table.

Analytical results for groundwater samples collected from AOC-2 indicate that with the exception of low levels of several RCRA-8 metals, no VOCs, SVOCs, TPH, pesticides, or herbicides were detected. Each metal concentration has been compared to the base-wide UTLs for total metals in groundwater (Radian, 1993), the NMWQCC Groundwater Standards (NMAC 20.6.2), EPA Maximum Contaminant Levels (MCLs), and EPA Region 6 Preliminary Remediation Goals (PRGs). Cadmium, lead, mercury, and silver were not detected in groundwater at the site. Analytical results for groundwater are summarized on **Figures 23** and **24**. Comparison of groundwater results with the applicable regulatory standards and background values is presented in **Table 4**.


ANALYTE mg/kg
VOCs ND
SVOCs ND
TPH ND
PCBs ND
HERBICIDES ND
ANALYTE mg/kg
VOCs ND
SVOCs ND
TPH ND
PCBs ND
HERBICIDES ND
ANALYTE mg/kg
PESTICIDES ND
AOC-2-SB-2
AOC-b-SB-5.0
AOC-2-SB-5
AOC-2-SB-1
AOC-2-SB-4
AOC-a-SB-5.0
AOC-2-SB-3
ANALYTE mg/kg
VOCs ND
SVOCs ND
TPH ND
PCBs ND
HERBICIDES ND
Approximate Location of the AOC-2 Boundary
AOC-2-SB-6
ANALYTE mg/kg
VOCs ND
SVOCs ND
TPH ND
PCBs ND
HERBICIDES ND
ANALYTE mg/kg
VOCs ND
SVOCs ND
TPH ND
PCBs ND
HERBICIDES ND
ANALYTE mg/kg
PESTICIDES ND
N
863
864
LEGEND:
SOIL BORING LOCATIONS
BUILDINGS
ND NOT DETECTED
mg/kg MILLIGRAMS PER KILOGRAM
NOTE: This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
AOC-2 SOIL ANALYTICAL RESULTS
PROJECT NO.
SCALE 1"=100'
DATE 3/5/07
DRAWN BY: CM/MRM
DRAWING NO: Figure 21
Statement of Basis 2007
10 SWMUs
Holloman AFB,NM
Figure 21

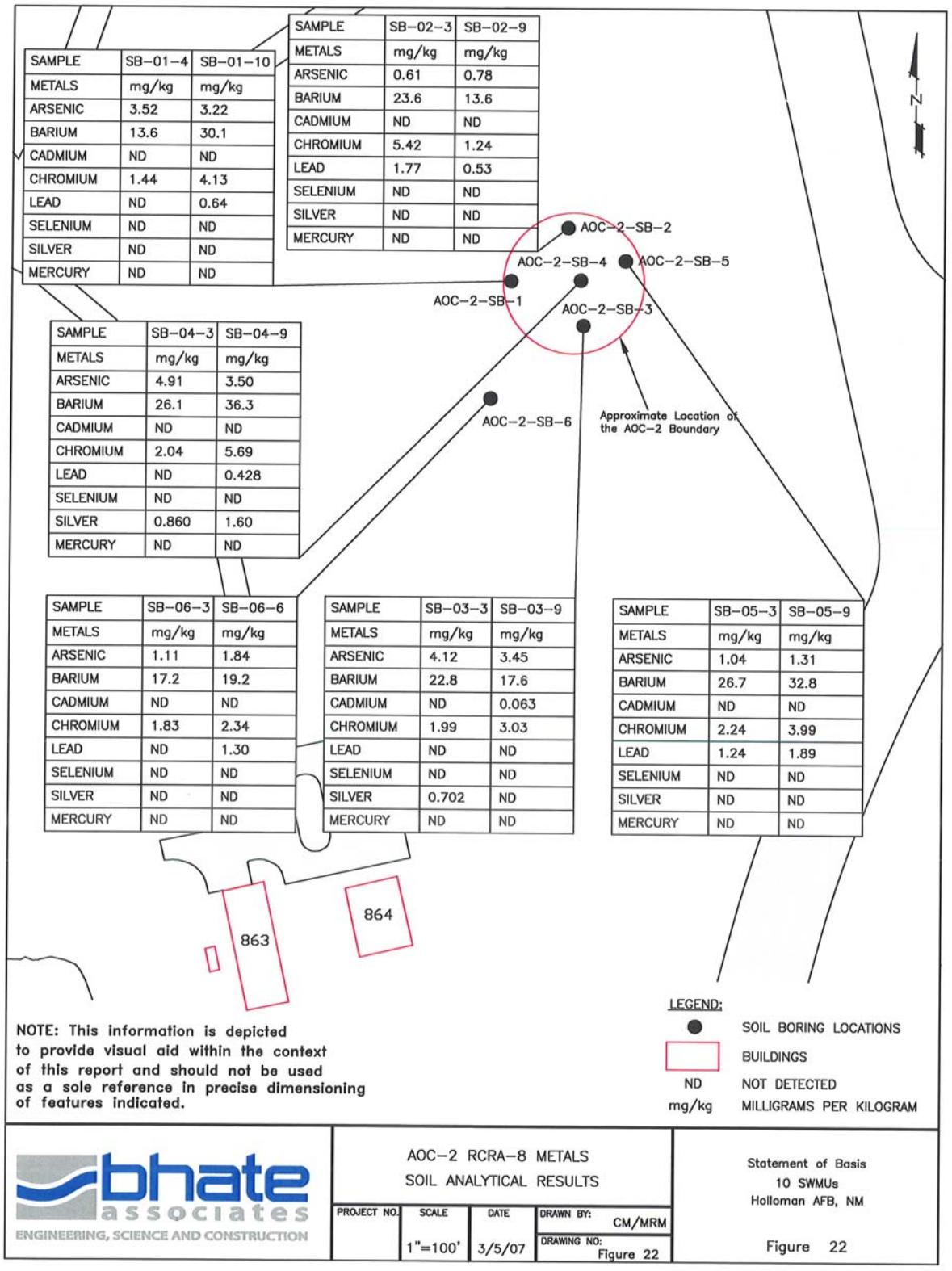
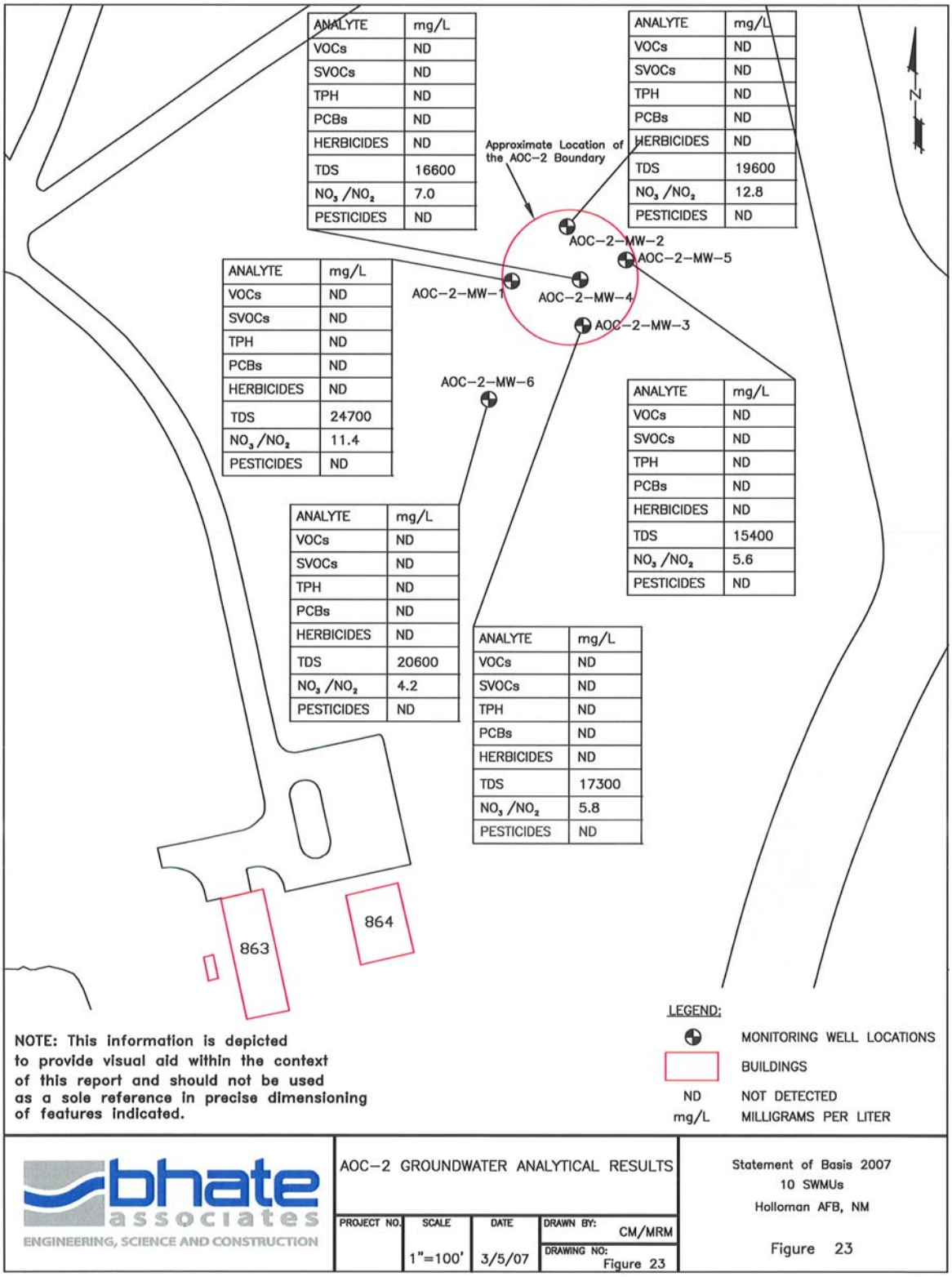

SAMPLE | SB-01-4 | SB-01-10
METALS | mg/kg | mg/kg
ARSENIC | 3.52 | 3.22
BARIUM | 13.6 | 30.1
CADMIUM | ND | ND
CHROMIUM | 1.44 | 4.13
LEAD | ND | 0.64
SELENIUM | ND | ND
SILVER | ND | ND
MERCURY | ND | ND
SAMPLE | SB-02-3 | SB-02-9
METALS | mg/kg | mg/kg
ARSENIC | 0.61 | 0.78
BARIUM | 23.6 | 13.6
CADMIUM | ND | ND
CHROMIUM | 5.42 | 1.24
LEAD | 1.77 | 0.53
SELENIUM | ND | ND
SILVER | ND | ND
MERCURY | ND | ND
SAMPLE | SB-04-3 | SB-04-9
METALS | mg/kg | mg/kg
ARSENIC | 4.91 | 3.50
BARIUM | 26.1 | 36.3
CADMIUM | ND | ND
CHROMIUM | 2.04 | 5.69
LEAD | ND | 0.428
SELENIUM | ND | ND
SILVER | 0.860 | 1.60
MERCURY | ND | ND
SAMPLE | SB-06-3 | SB-06-6
METALS | mg/kg | mg/kg
ARSENIC | 1.11 | 1.84
BARIUM | 17.2 | 19.2
CADMIUM | ND | ND
CHROMIUM | 1.83 | 2.34
LEAD | ND | 1.30
SELENIUM | ND | ND
SILVER | ND | ND
MERCURY | ND | ND
SAMPLE | SB-03-3 | SB-03-9
METALS | mg/kg | mg/kg
ARSENIC | 4.12 | 3.45
BARIUM | 22.8 | 17.6
CADMIUM | ND | 0.063
CHROMIUM | 1.99 | 3.03
LEAD | ND | ND
SELENIUM | ND | ND
SILVER | 0.702 | ND
MERCURY | ND | ND
SAMPLE | SB-05-3 | SB-05-9
METALS | mg/kg | mg/kg
ARSENIC | 1.04 | 1.31
BARIUM | 26.7 | 32.8
CADMIUM | ND | ND
CHROMIUM | 2.24 | 3.99
LEAD | 1.24 | 1.89
SELENIUM | ND | ND
SILVER | ND | ND
MERCURY | ND | ND
AOC-2-SB-2
AOC-2-SB-4
AOC-2-SB-5
AOC-2-SB-1
AOC-2-SB-3
AOC-2-SB-6
Approximate Location of the AOC-2 Boundary
863
864
N
NOTE: This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
LEGEND:
SOIL BORING LOCATIONS
BUILDINGS
ND NOT DETECTED
mg/kg MILLIGRAMS PER KILOGRAM
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
AOC-2 RCRA-8 METALS
SOIL ANALYTICAL RESULTS
PROJECT NO.
SCALE 1"=100'
DATE 3/5/07
DRAWN BY: CM/MRM
DRAWING NO: Figure 22
Statement of Basis
10 SWMUs
Holloman AFB, NM
Figure 22

Table 3. Comparison of AOC-2 Soil Analytical Results to Base-wide Background Levels and NMED SSLs

Analyte	Arsenic	Barium	Cadmium	Chromium	Lead	Silver
Number of samples with detections	14 (including duplicates)	14 (including duplicates)	1	14 (including duplicates)	9 (including duplicates)	3
Range	0.61 to 4.91 mg/kg	13.6 to 36.3 mg/kg	0.063 mg/kg	1.24 to 5.69 mg/kg	0.428 to 1.89 mg/kg	0.702 to 1.6 mg/kg
High	SB-04-3	SB-04-9	SB-03-9	SB-04-9	SB-05-9	SB-04-9
Base-wide UTL	6.88 mg/kg	84.36 mg/kg	1.04 mg/kg	6.6 mg/kg	*	0.73 mg/kg
NMED SSL	3.9 mg/kg	5,450 mg/kg	74.1 mg/kg	234 mg/kg	400 mg/kg	391 mg/kg
Exceed UTL	No	No	No	No	N/A	Yes
Exceed SSL	Yes	No	No	No	No	No

Notes: * calculated UTL was a non-positive value, which is not a usable value for screening.
N/A = Not Applicable


ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 16600
NO3 /NO2 | 7.0
PESTICIDES | ND
ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 19600
NO3 /NO2 | 12.8
PESTICIDES | ND
Approximate Location of the AOC-2 Boundary
AOC-2-MW-2
AOC-2-MW-5
AOC-2-MW-1
AOC-2-MW-4
AOC-2-MW-3
AOC-2-MW-6
ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 24700
NO3 /NO2 | 11.4
PESTICIDES | ND
ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 15400
NO3 /NO2 | 5.6
PESTICIDES | ND
ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 20600
NO3 /NO2 | 4.2
PESTICIDES | ND
ANALYTE | mg/L
VOCs | ND
SVOCs | ND
TPH | ND
PCBs | ND
HERBICIDES | ND
TDS | 17300
NO3 /NO2 | 5.8
PESTICIDES | ND
N
863
864
NOTE: This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
LEGEND:
MONITORING WELL LOCATIONS
BUILDINGS
ND NOT DETECTED
mg/L MILLIGRAMS PER LITER
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
AOC-2 GROUNDWATER ANALYTICAL RESULTS
PROJECT NO.
SCALE 1"=100'
DATE 3/5/07
DRAWN BY: CM/MRM
DRAWING NO: Figure 23
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 23

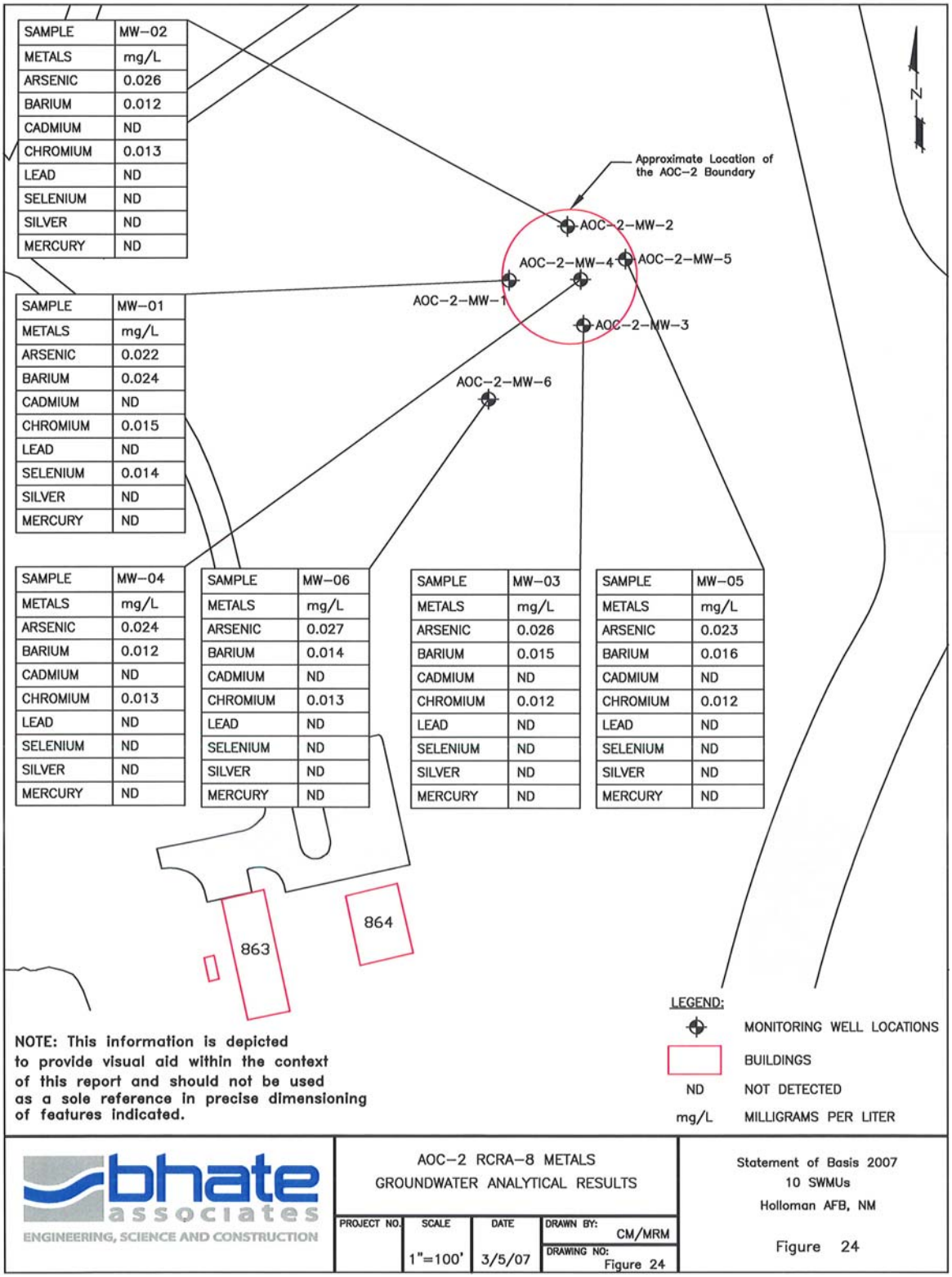

SAMPLE MW–02
METALS mg/L
ARSENIC 0.026
BARIUM 0.012
CADMIUM ND
CHROMIUM 0.013
LEAD ND
SELENIUM ND
SILVER ND
MERCURY ND
SAMPLE MW–01
METALS mg/L
ARSENIC 0.022
BARIUM 0.024
CADMIUM ND
CHROMIUM 0.015
LEAD ND
SELENIUM 0.014
SILVER ND
MERCURY ND
SAMPLE MW–04
METALS mg/L
ARSENIC 0.024
BARIUM 0.012
CADMIUM ND
CHROMIUM 0.013
LEAD ND
SELENIUM ND
SILVER ND
MERCURY ND
SAMPLE MW–06
METALS mg/L
ARSENIC 0.027
BARIUM 0.014
CADMIUM ND
CHROMIUM 0.013
LEAD ND
SELENIUM ND
SILVER ND
MERCURY ND
SAMPLE MW–03
METALS mg/L
ARSENIC 0.026
BARIUM 0.015
CADMIUM ND
CHROMIUM 0.012
LEAD ND
SELENIUM ND
SILVER ND
MERCURY ND
SAMPLE MW–05
METALS mg/L
ARSENIC 0.023
BARIUM 0.016
CADMIUM ND
CHROMIUM 0.012
LEAD ND
SELENIUM ND
SILVER ND
MERCURY ND
Approximate Location of the AOC–2 Boundary
AOC–2–MW–2
AOC–2–MW–4
AOC–2–MW–5
AOC–2–MW–1
AOC–2–MW–3
AOC–2–MW–6
N
863
864
NOTE: This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated.
LEGEND:
MONITORING WELL LOCATIONS
BUILDINGS
ND NOT DETECTED
mg/L MILLIGRAMS PER LITER
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
AOC–2 RCRA–8 METALS
GROUNDWATER ANALYTICAL RESULTS
PROJECT NO.
SCALE 1"=100'
DATE 3/5/07
DRAWN BY: CM/MRM
DRAWING NO: Figure 24
Statement of Basis 2007
10 SWMUs
Holloman AFB, NM
Figure 24

Table 4. SWMU AOC-2 Comparison of Groundwater Analytical Results for Metals with Applicable Regulatory Standards

Analyte	Arsenic	Barium	Chromium	Selenium
Number of samples with detections	6	6	6	1
Range	0.022 to 0.027 mg/L	0.012 to 0.024 mg/L	0.012 to 0.015 mg/L	0.014 mg/L
High	MW-06	MW-01	MW-01	MW-01
Base-wide UTL	0.0723 mg/L	0.9293 mg/L	0.234 mg/L	0.0793 mg/L
NMWQCC	0.1 mg/L	1.0 mg/L	0.05 mg/L	0.05 mg/L
EPA MCLs	0.01 mg/L	2.0 mg/L	0.1 mg/L	0.05 mg/L
EPA Region 6 PRG	0.000045 mg/L	2.6 mg/L	0.11 mg/L	0.18 mg/L
Exceed Base-wide UTL	No	No	No	No
Exceed NMWQCC	No	No	No	No
Exceed MCL	Yes	No	No	No
Exceed Region 6 PRG	Yes	No	No	No

Nitrate/nitrite as nitrogen concentrations ranged from 4.2 to 12.8 mg/L in the groundwater samples. The nitrate/nitrite concentrations in wells MW-01 (11.4 mg/L) and MW-02 (12.8 mg/L) exceeded the NMWQCC standard and the MCL of 10 mg/L. There is no base-wide UTL for nitrate but data presented in the January 2004 *Long Term Groundwater Monitoring Program for ERA Sites: Groundwater Quality Evaluation, Holloman Air Force Base, New Mexico* (Tetra Tech FW, 2004) suggests a background nitrate concentration of 3.44 mg/L (data from well MW-BG-4 located upgradient of AOC 2). The relatively narrow extent of nitrate concentrations above the MCL would suggest there is no continuing source. The NMWQCC Regulations apply to groundwater with TDS concentrations less than or equal to 10,000 mg/L (20.6.2.3101 NMAC). TDS concentrations in samples from wells MW-01 through MW-06 were above 10,000 mg/L with concentrations ranging from a low of 15,400 mg/L at MW-05 to a high of 24,700 mg/L at MW-01. Each of the wells exceeds the allowable limits for TDS for the groundwater to be considered a viable drinking water source.

H.11.3 Basis for Determination

AOC-2 is located in an isolated area near Taxiway G with the nearest structure, an air traffic control tower, Building 864. Document searches, personnel interviews, and field investigation activities have revealed no indication of previous activity which would create a need for further investigations. There was no indication of a release to the soil or groundwater pathways. Analytical results for soil samples collected do not exceed the NMED SSLs. Groundwater analytical results do not exceed NMWQCC standards except for nitrate with a maximum concentration of 12.8 mg/L. The RFI Report concluded that the presence of nitrate above the NMWQCC standard of 10 mg/L is not considered a risk due to the naturally high TDS concentrations and the lack of an ongoing discharge at the site. TDS concentrations in each of the monitoring wells exceed the NMWQCC standard of 10,000 mg/L which indicates the shallow groundwater at AOC-2 cannot be used for human consumption.

Based upon the RFI investigation conducted at SWMU AOC-2, this site meets the requirements for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use. A January 25, 2006 letter from NMED indicated that the site is eligible for CAC status.

H.11.4 References

Bhate, 2005, Revised Final Facility Investigation Site AOC-2 Holloman AFB, New Mexico

Radian Corporation. December 1993. *Base-wide Background Study – Sewage Lagoons and Lakes Investigation*, Holloman Air Force Base, NM.

Tetra Tech FW. January 2004. Letter Report *Long Term Groundwater Monitoring Program for ERA Sites: Groundwater Quality Evaluation, Holloman Air Force Base, New Mexico*.

H.12 SS-06 (AOC-R) JP-4 Fuel Line Spill Site

H.12.1 Location/Unit Description

AOC-R, JP-4 Fuel Spill Site (ERP Site SS-06) is located along the eastern boundary of the Base, in the Main Base Area near Building 1254 (**Figures 2 and 26**). The site is situated approximately 200 feet south of the Petroleum, Oil, and Lubricants (POL) storage area.

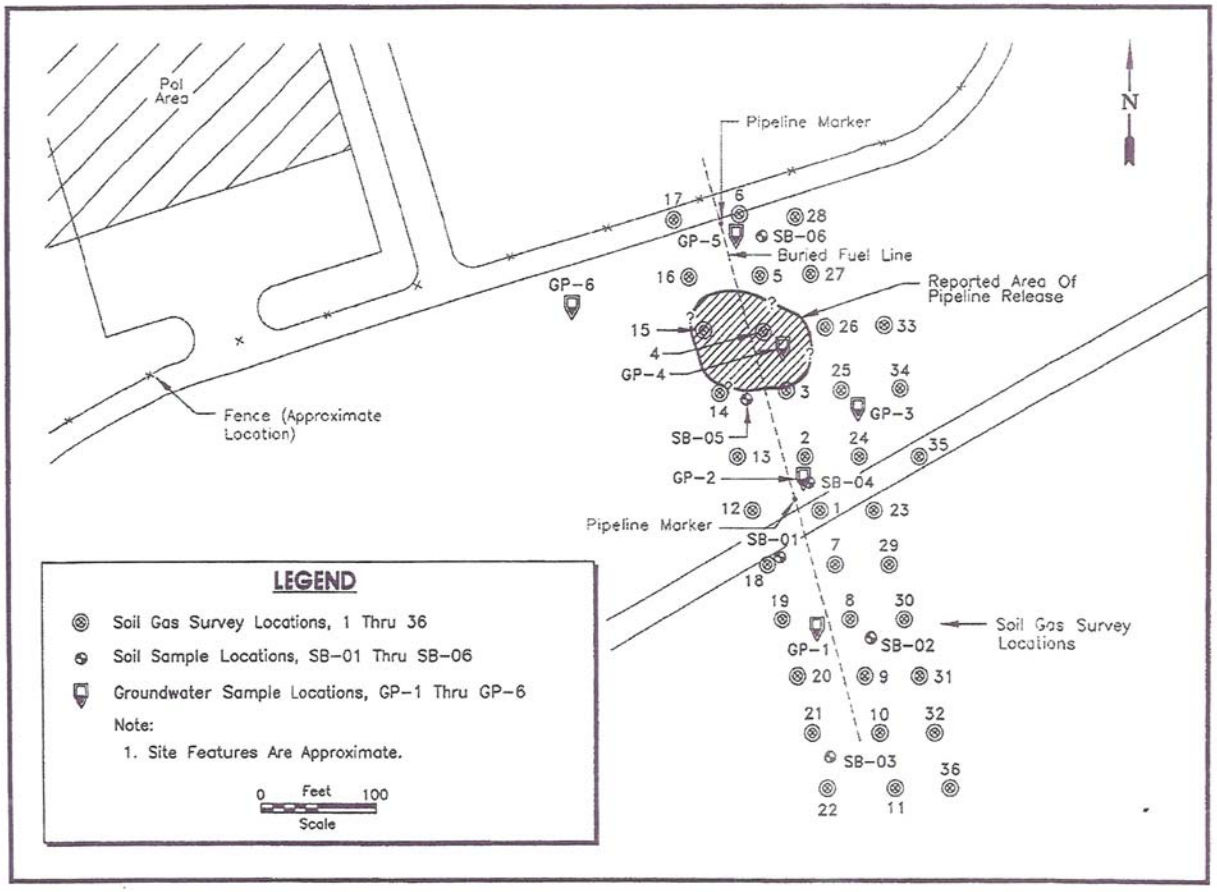
H.12.2 History

In 1979, a road grader accidentally hit and ruptured the JP-4 fuel line leading to the POL storage areas. Approximately 8,000 gallons of JP-4 spilled onto the ground before the release could be stopped. Cleanup operations were immediately performed and the majority of the jet fuel was reportedly recovered.

A records search for Site SS-06 was conducted by CH_2M Hill in 1982. The site was not considered to present a significant risk and further investigation of the site was not recommended at that time. A SI was conducted at SS-06 in March 1995 by Ebasco Services, Inc. The objective of the SI was to determine the presence or absence of contaminants in the soil and groundwater related to the 1979 JP-4 release from the pipeline.

The scope of work for the SS-06 SI included the following field activities:

- Thirty-six (36) soil-vapor points (SS-06-SG-1 through SS-06-SG-36) were installed in a rectangular pattern around the spill area. Soil-vapor samples were analyzed by an on-site mobile laboratory for benzene, toluene, ethylbenzene, and xylene (BTEX) constituents and TPH as JP-4.
- Six soil boring locations (SS-06-SB-01 through SS-06-SB-06) were drilled in a pattern that straddled the pipeline. Two samples, one from the groundwater interface and the other from the highest headspace VOC reading were selected for analysis. Soil samples were analyzed for TPH, VOCs, and Target Analyte List (TAL) metals. One sample for each boring was also selected for geotechnical analysis.
- Six temporary monitoring well points (GP-01 through GP-06) were installed during the SI. Groundwater samples were collected from wells GP-01, GP-02, and GP-03. Wells GP-04, GP-05, and GP-06 did not contain water and were not sampled. The three groundwater samples were analyzed for VOCs, dissolved TAL metals, and field parameters (pH, temperature, and specific conductance).



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SS-06 Site Map and Sample Locations

Source: FWENC, 1995

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm
		DRAWING NO:	Figure 26

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 26

H.12.3 Evaluation of the Relevant Data

Results from the soil-vapor survey did not identify areas of potential soil and/or groundwater contamination. TPH was detected in only one sample (SG-36) with a concentration of 22 µg/L (micrograms per liter of air). Benzene and toluene concentrations ranged from not detected (<0.05 µg/L) to 0.14 µg/L and 1.20 µg/L, respectively at soil-vapor point SG-1. Total BTEX concentrations ranged from 0.24 µg/L (SG-31) to 2.05 µg/L (SG-1). However, total BTEX concentrations in the field blanks ranged from 0.45 µg/L to 1.13 µg/L.

No VOCs or TPH constituents were detected above the reporting limits in each of the 12 soil samples collected at SS-06, and all of the TAL metal concentrations were below their respective SSLs. No VOCs except acetone (17 µg/L) were detected in the three groundwater samples and duplicate samples analyzed. Zinc and lead were the only TAL metals detected above the Base-wide UTLs with concentrations of 3.4 mg/L and 0.063 mg/L, respectively. **Figures 28** and **29** summarize the results from soil and groundwater analyses respectively.

The subsurface conditions at SS-06 were defined by direct sampling and observation of the six soil borings. The lithology at SS-06 consists of fine grained materials, mostly inorganic silts and clayey sands with abundant gypsum crystals. The unconsolidated material varies from a light brown sand or clayey sand near the surface to a red silt with depth. Groundwater was encountered from 9 to 13 feet during borehole and direct push technology (DPT) sampling but some wells at this depth did not produce enough water for sampling. A hard caliche layer is located above the groundwater table

H.12.4 Basis for Determination

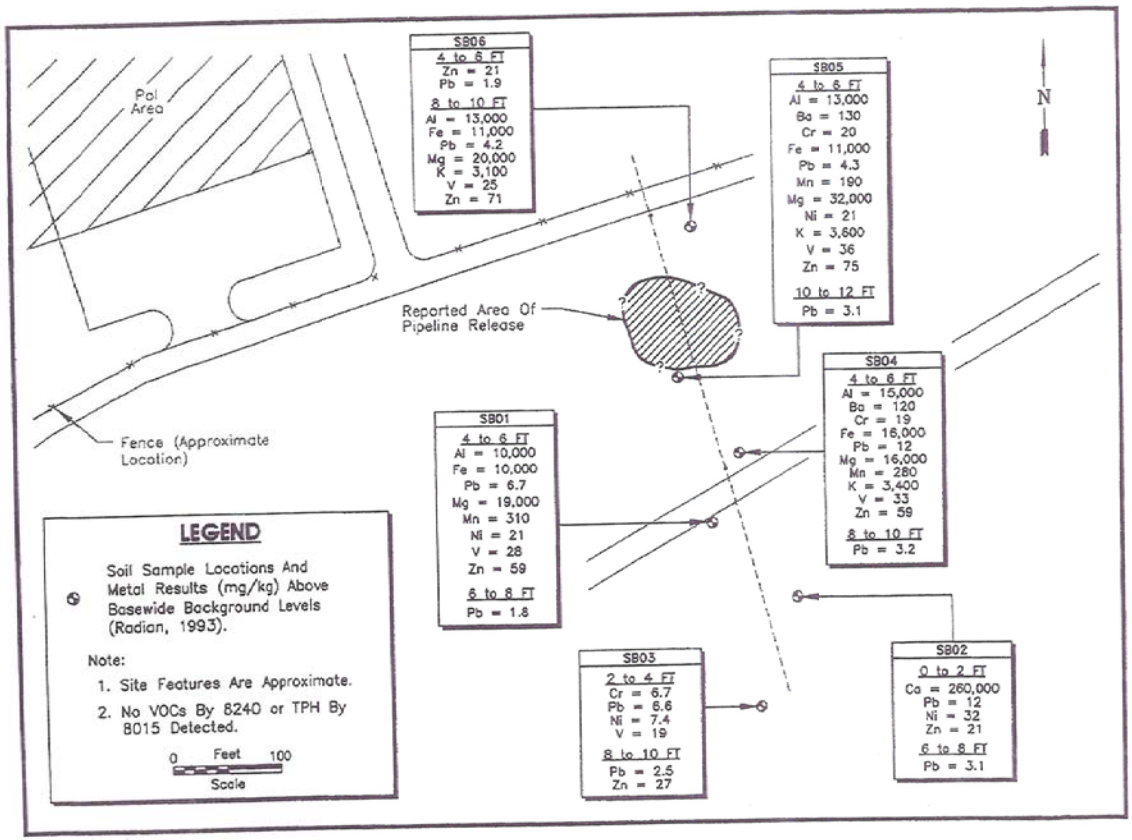
No petroleum related constituents were detected in the soil or groundwater samples collected during the investigation. The data indicates that the 1979 release did not impact the subsurface.

Based upon the investigation conducted at AOC-R, this site meets the requirements for CAC since the SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

H.12.5 References

CH_2M Hill. August 1983. *Installation Restoration Program Records Search for Holloman Air Force Base, New Mexico.*

Ebasco Services, Inc. (Foster Wheeler Environmental Corp), 1995. *Draft Final Site Investigation Report, Sites SS-06, SD-15, AOC-RR, and AOC-BBMS.* Holloman AFB, New Mexico.



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

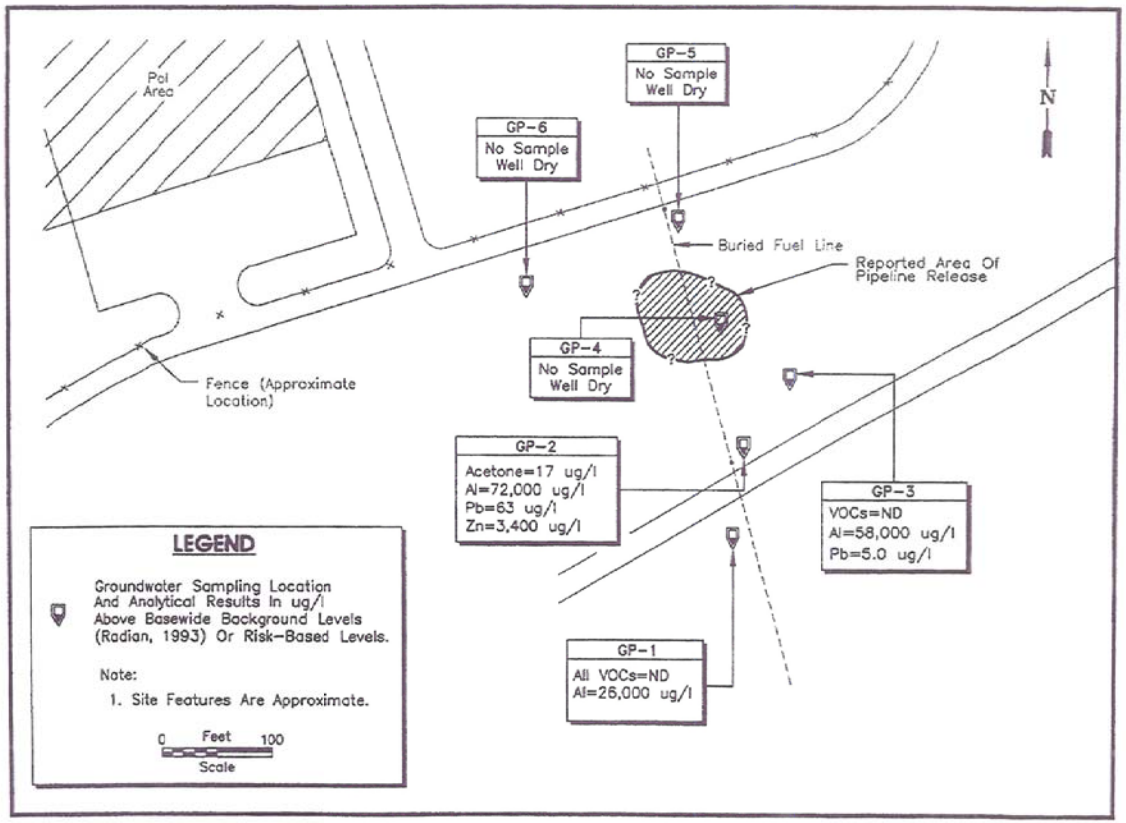
SS-06 Soil Analytical Results, March 1995

Source: FWENC, 1995

PROJECT NO.	SCALE	DATE	DRAWN BY:
	AS SHOWN	3/5/07	cm
			DRAWING NO: Figure 28

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 28



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SS-06 Groundwater Analytical Results, April 1995

Source: FWENC, 1995

PROJECT NO.	SCALE	DATE	DRAWN BY
	AS SHOWN	3/5/07	cm

DRAWING NO: Figure 29

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 29

H.13 SS-57 (AOC-V), Officer's Club

H.13.1 Location

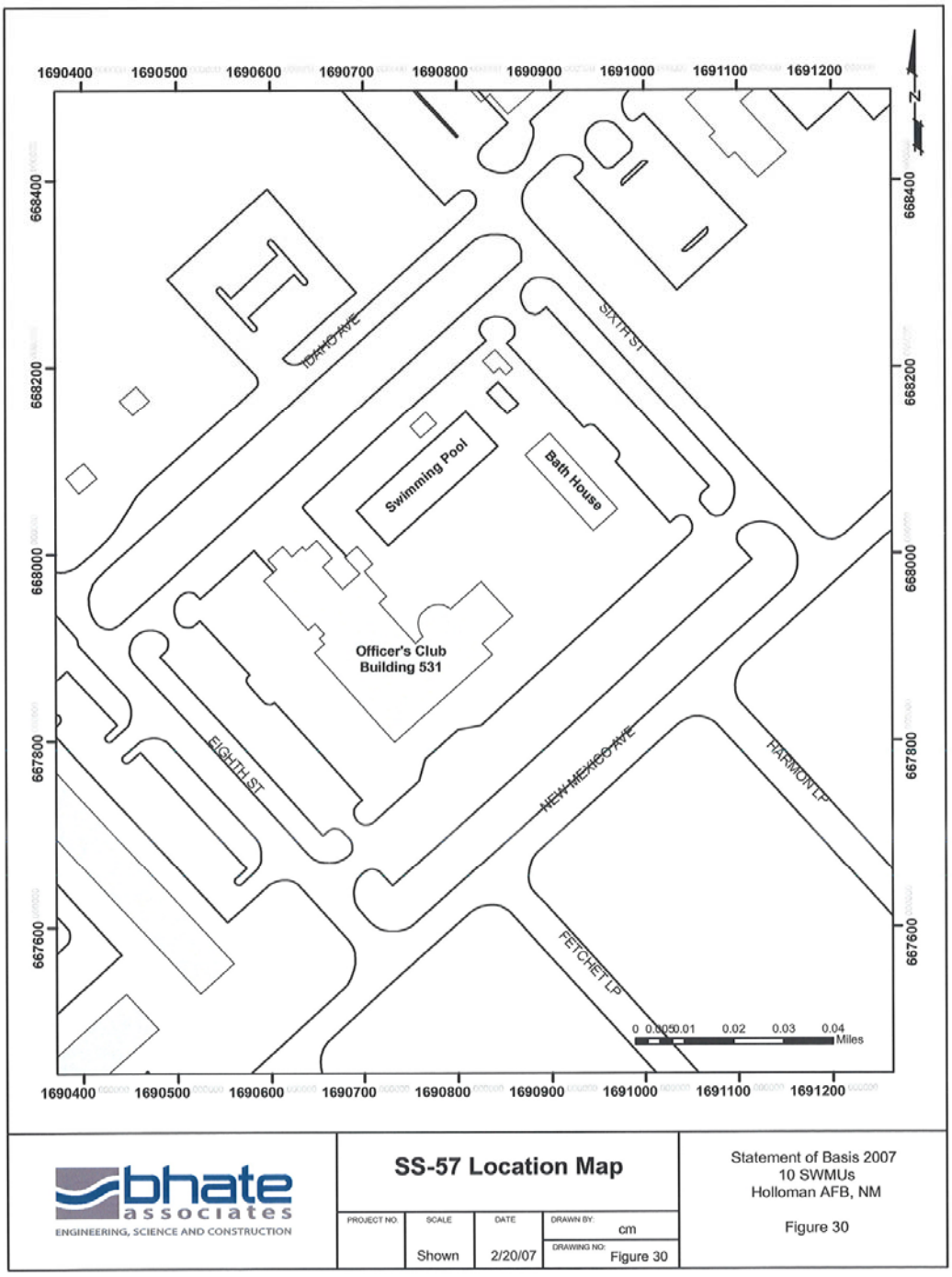
AOC-V, the Officer's Club (Building No. 531, ERP Site SS-57), is located at the corner of West 8th Street and West New Mexico Avenue (**Figures 2 and 30)**. The grounds around the Officer's Club are landscaped along the southwestern and western sides of the building while the northern and eastern portions of the site are paved with asphalt and concrete. The Officer's Club was designed in early 1957 and constructed as an addition to an existing dining hall. Remodeling and additions in 1985 and 1991 detected leaks from the swimming pool along with hydrogen sulfide odors. Site SS-57 was identified in the fall of 1991 when hydrogen sulfide odors were assumed to result from the natural anaerobic organic degradation of diesel fuel hydrocarbons which leaked from an UST prior to 1991. This UST was located near the southwestern corner of the Officer's Club and was removed prior to 1991.

H.13.2 History

From 1991 to 2004, the Officer's Club (Site SS-57) was the subject of a series of environmental investigations related to evaluating the soil and groundwater conditions to determine the cause of the hydrogen sulfide odors present in the Officer's Club. The first investigation was geotechnical and conducted in 1991. Two investigations were conducted in 1992 to determine the lateral and vertical extent of hydrocarbon contamination and the hydrogen sulfide gas. In 1996, an Air Sparging/Soil Vapor Extraction (AS/SVE) pilot test to determine the feasibility of using AS in conjunction with SVE to minimize the hydrogen sulfide generation (FWENC and Groundwater Technology, Inc., 1996). A system was installed in late 1996 and operated at the site until 2002. In 2002, a risk assessment and follow on investigation were conducted to better characterize the remaining hydrocarbons at the site. Additional characterization to document current subsurface conditions and support a risk assessment were performed in 2004. The results from the 2004 risk assessment and investigation demonstrated that conditions at the site were remediated below risk based standards. Soil boring and monitoring well locations for all the investigations are shown on **Figure 31.**

H.13.3 Evaluation of Relevant Information

A geotechnical investigation was performed in October 1991 to evaluate soil and groundwater conditions to determine the source of hydrogen sulfide odors emanating from the subsurface below the Officer's Club. Nine soil borings (B-1 to B-9) were advanced to depths ranging from approximately 1 to 29 feet below existing grade. Three monitoring wells (MW-5, MW-7, and MW-9) were installed at three of the nine borings. These borings and monitoring wells identified the presence of hydrocarbons (diesel fuel) in soil and groundwater samples collected from these wells.



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

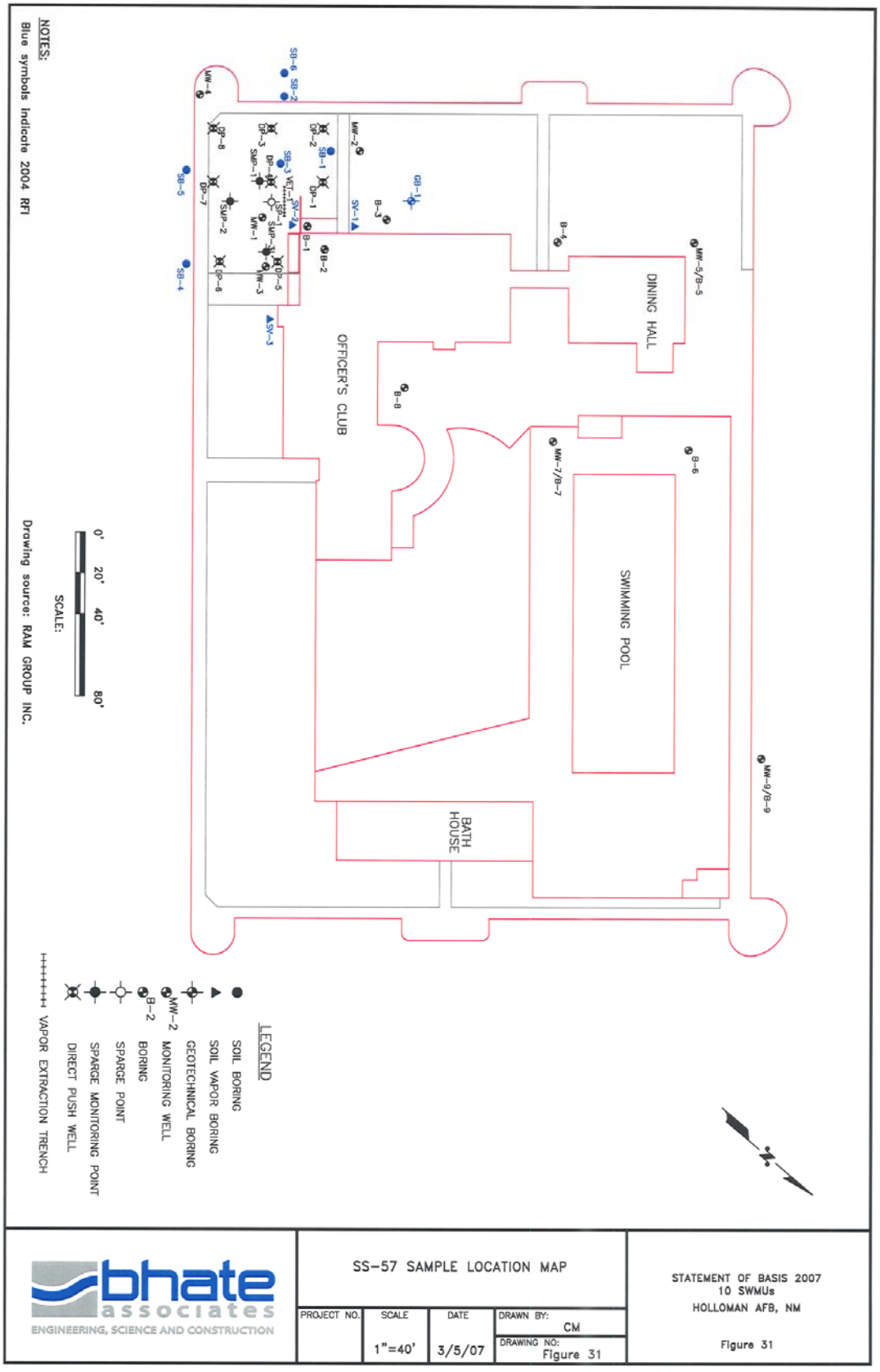
SS-57 Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
	Shown	2/20/07	cm

DRAWING NO: Figure 30

Statement of Basis 2007
10 SWMUs
Holloman AFB, NM

Figure 30



bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

SS-57 SAMPLE LOCATION MAP

PROJECT NO.	SCALE	DATE	DRAWN BY:
	1"=40'	3/5/07	CM
			DRAWING NO: Figure 31

STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM

Figure 31

The subsurface investigation conducted in 1992 consisted of drilling four vertical borings (VB-01 to VB-04) and two angle borings (AB-01 and AB-02) near the southern corner of the Officer's Club. Soil samples were collected from the surface to 31 feet below ground surface. The objectives of this investigation were to better define the horizontal and vertical extent of the hydrocarbon contamination, determine the source of the offensive odor and to gather data necessary to enable the selection of a remedial action for the site. Twenty-five soil samples were collected and analyzed for TPH as diesel using Modified American Society for Testing and Materials (ASTM) Method D3328 and thirteen soil samples were analyzed for a bacteria enumeration study and a biological screening. The investigation concluded that the maximum TPH as diesel concentration was encountered at 18 feet bgs in boring AB-02 with a concentration of 12,000 micrograms per gram (µg/g). It appears from the 1992 investigation that most of the contamination exists primarily in the saturated zone. Diesel concentrations greater than 1,000 µg/g were detected in 14 of the 25 subsurface soil samples collected and analyzed. The report determined that the remedial alternative with the highest potential to reduce soil, water, and air contamination at the Officers Club was bio-sparging and SVE.

A pilot study was conducted at the site in 1996. Four existing wells, three new monitoring wells, and a triple nested sparge well were sampled for the study. The groundwater samples were analyzed for TPH as diesel by Modified ASTM Method D3328, dissolved iron by EPA Method 6010A, and sulfate by Modified EPA Method 375.4. An AS/SVE pilot test was conducted to determine the feasibility of using air sparging in conjunction with SVE to minimize the hydrogen sulfide generation.

TPH as diesel concentrations ranged from less than 10 mg/kg (MW-04) to 4,800 mg/kg (SMP-03) and were generally greatest at the 14 to 19-foot bgs sampling interval. Based on these results, it appeared that the TPH impact to the soil was limited to the southwest lawn of the Officer's Club and extended to a depth of 20 feet bgs. Groundwater samples were collected from seven monitoring wells (MW-1 through MW-4, and MW-5, MW-7, and MW-9) and the sparge well (SP-01) at all three screened intervals. TPH as diesel concentrations ranged from <100 to 9,700 µg/L with the highest concentration in MW-3. Based on the analytical results for the AS/SVE pilot test air samples, air emission rates of approximately 0.14 pound per hour TPH (as gasoline) was expected from the AS/SVE remediation system. The maximum hydrogen sulfide removal rate during the pilot tests was 0.0043 pounds per day (FWENC and GTI, 1996).

The AS/SVE system was installed in 1996 and operated until 1999. The AS/SVE system performance/long term monitoring was conducted from 1997 to 1999 at SS-57. System performance monitoring consisted of collecting subsurface soil samples at various locations for determining the effectiveness of the AS/SVE system.

In July 2002, 16 soil samples were collected from 8 soil borings (DP-1 to DP-8) at SS-57 to adequately characterize the nature and extent of contamination in the source area in order to conduct a human health risk assessment (HHRA) and ecological screening assessment (ESA). The assessments were performed to evaluate the magnitude and probability of threats to public health and the environment posed by site-related

chemicals in untreated soil and groundwater (Foster Wheeler, 2003). Groundwater samples were not collected during the 2002 event. A complete discussion of the HHRA and the ESA was presented in the *Phase I Human Health Risk Assessment and Ecological Screening-Level Assessment for SS-57- Officers Club, Holloman Air Force Base, New Mexico* (Foster Wheeler, 2003). This assessment, however, was determined to not be representative of subsurface conditions. Additional data collection was deemed necessary to completely evaluate the site for suitability for risk-based closure.

In 2004, RFI activities were conducted at SS-57. The purpose of this RFI was to collect soil, groundwater, and soil-vapor data to characterize the current site conditions for a comprehensive site-specific risk assessment. Data from this investigation was used to determine whether the residual soil and groundwater concentrations of petroleum hydrocarbons result in an unacceptable risk. Data collected before June 2002 was not considered representative of current site conditions due to the natural biodegradation of petroleum hydrocarbons. Additionally, data collected during the operation of the AS/SVE system would be biased to the low end and would not be representative of static or current conditions. Although the pre June 2002 data was not used quantitatively, it was used qualitatively to develop the data acquisition plan for the risk assessment.

In February 2004, five shallow soil borings (SB-01 to SB-05) were advanced in the vicinity of the source area at SS-57 (**Figure 32**). The soil borings were advanced using a DPT rig. Two soil samples were collected from each borehole at various intervals from 2 to 10 feet bgs. In addition, two soil samples were collected from each of the three dual completion soil-vapor borings (SV-1 to SV-3). In August 2004, one additional borehole (SB-6) was drilled 10 feet west of SB-2 to a depth of six feet bgs. Groundwater samples were collected from each of the five soil borings (SB-1 to SB-5) and monitoring wells MW-1 to MW-5 and MW-7. Six soil-vapor samples were collected from three dual completion soil-vapor borings (SV-1 to SV-3) that were advanced adjacent to the basement area at the Officer's Club. Soil-vapor samples were collected in order to assess the potential for exposure to VOCs via indoor air.

The soil samples collected during this RFI were analyzed for VOCs, SVOCs, TPH, and carbon fractions to identify chemicals of potential concern (COPCs). Based on the review of soil data collected in July 2002, February 2004, and August 2004 the following was observed:

- Twenty-seven subsurface soil samples were collected from borings DP-1 to DP-7, SB-1 to SB-6, and SV-1 to SV-3.
- Acetone, carbon disulfide, chrysene, ethylbenzene, diethylphthalate, fluoranthene, 2-methylnaphthalene, phenanthrene, TPH, hexane, indeno(1,2,3-c,d)pyrene, isopropylbenzene, xylenes, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, and pyrene were detected in the subsurface soil.
- The maximum depth of soil analysis was at 12 feet bgs for boring DP-4. TPH-DRO and TPH-ORO were detected.
- The maximum TPH-DRO concentration observed was 9,350,000 µg/kg at 6-8 feet bgs in SB-2.

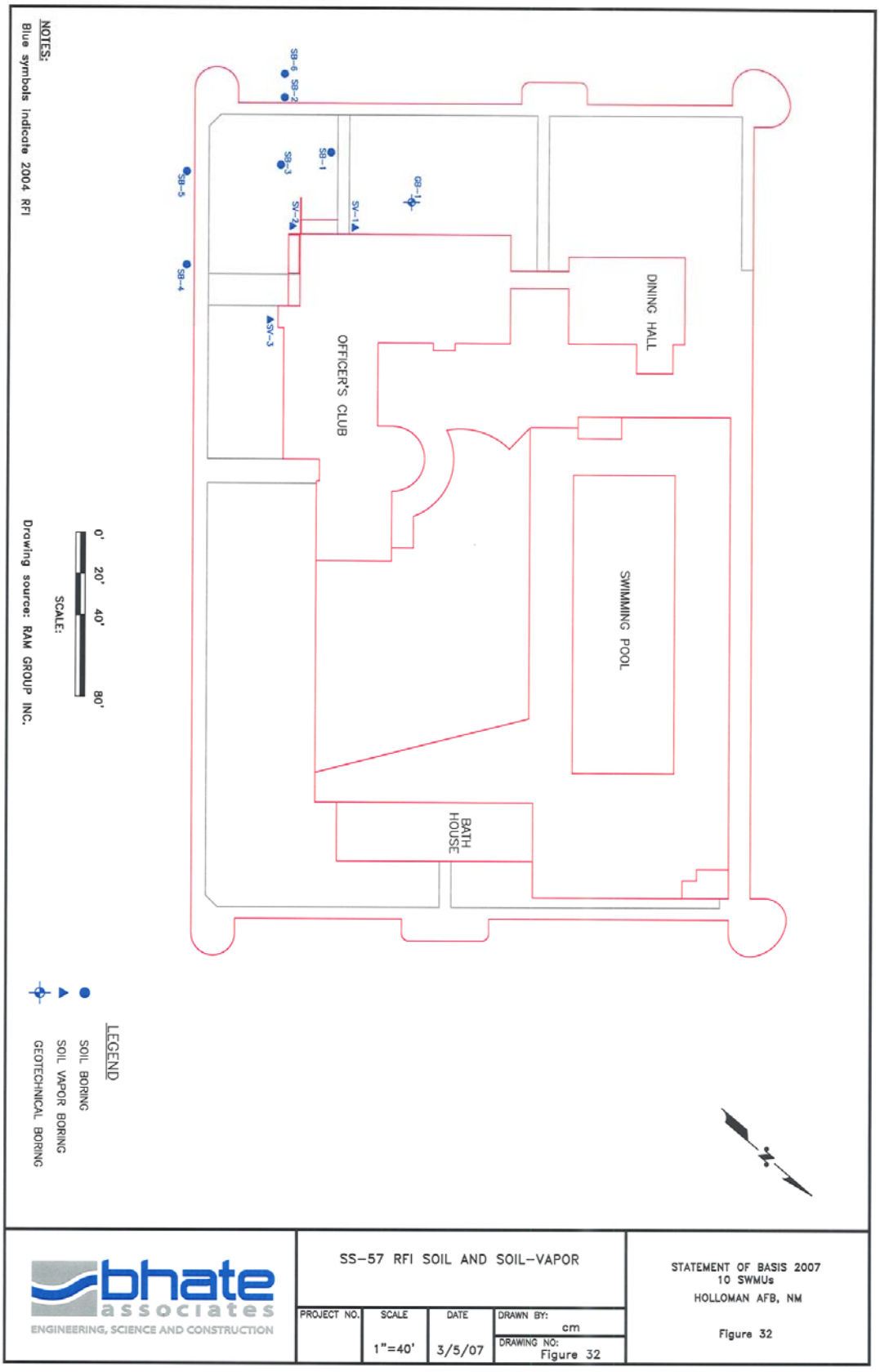
- Except for TPH-DRO, none of the maximum soil concentrations exceeded the NMED SSLs.

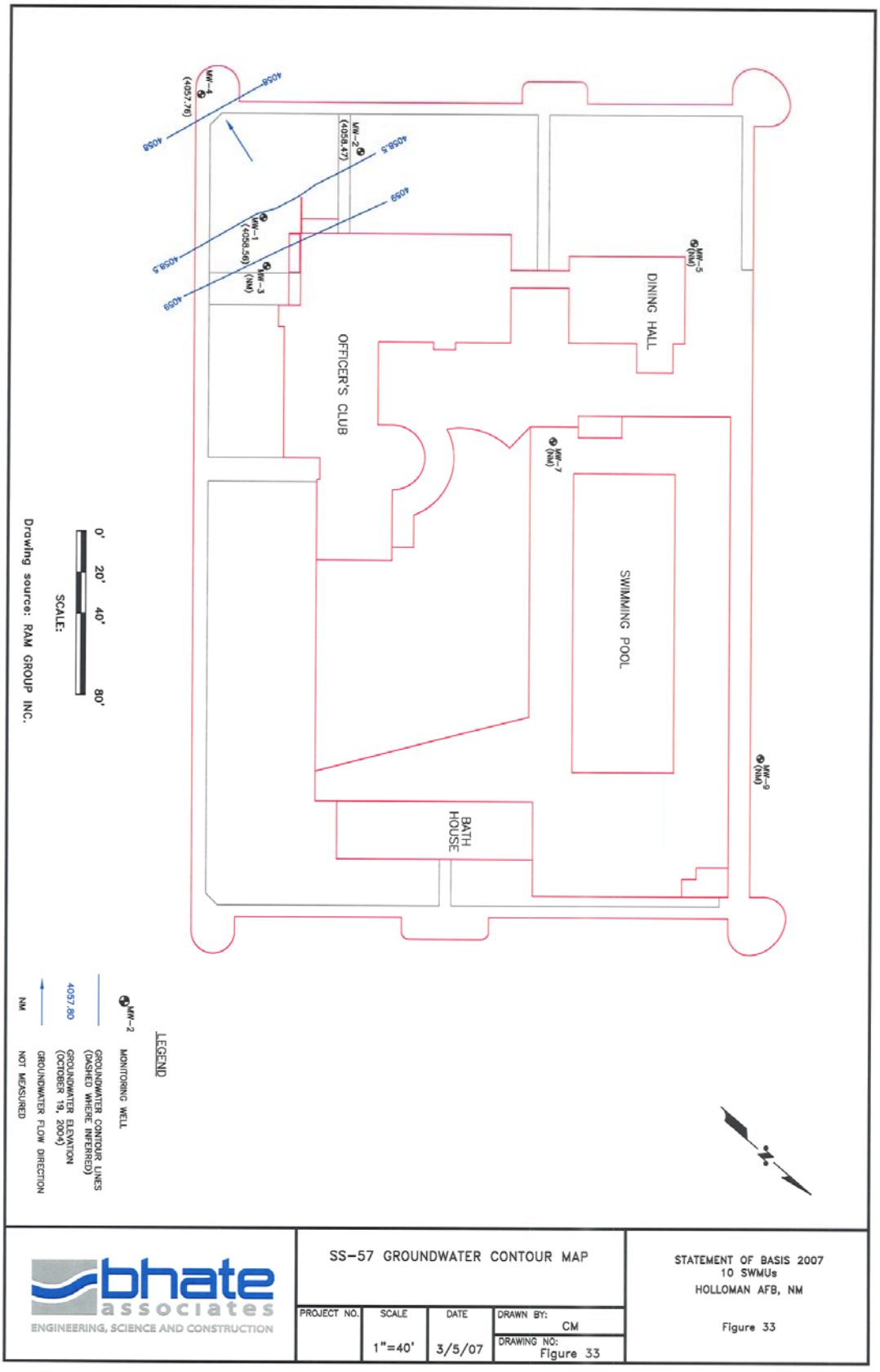
The groundwater samples collected during this investigation were analyzed for TPH, VOCs, and TDS. Based on the review of groundwater data collected in February and August 2004 and February 2006, the following was observed:

- The 11 groundwater samples collected from borings SB-1 to SB-5, and monitoring wells MW-1 through MW-5, and MW-7 were analyzed for VOCs and TPH.
- TPH-DRO, acetone, benzene, 2-butanone, carbon disulfide, chloroform, cyclohexane, 1,3-dichlorobenzene, 1,4-dichlorobenzene, dichlorodifluoromethane, ethylbenzene, isopropylbenzene, methylcyclohexane, trichloroethene, trichlorofluoromethane, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, and xylenes were detected in the groundwater samples referenced above.
- The maximum TPH-DRO concentration of 3,600 µg/L was observed in the sample from SB-3.
- Except for TPH-DRO, none of the maximum groundwater concentrations exceeded the groundwater standards.
- The four groundwater samples collected from monitoring wells MW-1 to MW-4 in February 2006 were analyzed for TDS. TDS concentrations ranged from 2,040 mg/L (MW-1) to 4,590 mg/L (MW-4).
- Groundwater flow direction is southward at the site (**Figure 33**).

Soil-Vapor analytical results are summarized as follows:

- Six soil-vapor samples were collected from the soil-vapor borings (two each from locations SV-1 to SV-3).
- TPH-GRO, 2-propanol, 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, acetone, chloroform, toluene, m/p-xylene, o-xylene, and naphthalene were detected in the soil-vapor samples.
- The maximum TPH-GRO concentration of 530 micrograms per cubic meter ($\mu g/m^3$) was observed in the sample from SV-2.
- A toluene concentration of 5.2 $\mu g/m^3$ was detected at 3 feet bgs at soil-vapor boring location SV-3.


NOTES:
Blue symbols indicate 2004 RFI
Drawing source: RAM GROUP INC.
SCALE:
0'
20'
40'
80'
LEGEND
SOIL BORING
SOIL VAPOR BORING
GEOTECHNICAL BORING
SB-6
SB-2
SB-1
SB-3
SB-5
SB-4
SV-2
SV-1
SV-3
GB-1
OFFICER'S CLUB
DINING HALL
SWIMMING POOL
BATH HOUSE
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
SS-57 RFI SOIL AND SOIL-VAPOR
PROJECT NO.
SCALE
1"=40'
DATE
3/5/07
DRAWN BY:
cm
DRAWING NO:
Figure 32
STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM
Figure 32


MW-4 (4057.76)
MW-2 (4058.47)
MW-1 (4058.56)
MW-3 (NM)
MW-5 (NM)
MW-7 (NM)
MW-9 (NM)
4058
4058.5
4059
4058.5
4059
DINING HALL
OFFICER'S CLUB
SWIMMING POOL
BATH HOUSE
LEGEND
MONITORING WELL
GROUNDWATER CONTOUR LINES (DASHED WHERE INFERRED)
4057.80
GROUNDWATER ELEVATION (OCTOBER 19, 2004)
GROUNDWATER FLOW DIRECTION
NM
NOT MEASURED
SCALE:
0'
20'
40'
80'
Drawing source: RAM GROUP INC.
N
bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION
SS-57 GROUNDWATER CONTOUR MAP
PROJECT NO.
SCALE
1"=40'
DATE
3/5/07
DRAWN BY:
CM
DRAWING NO:
Figure 33
STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM
Figure 33

An exposure model (EM) and a conceptual site model (CSM) were developed for the Officer's Club, Site SS-57. These models were used to determine potential present and future risks to commercial/industrial workers and construction workers. The analysis concluded that present concentrations of petroleum hydrocarbon constituents in soil, groundwater, and outdoor vapors do not pose a threat to commercial/industrial workers and construction workers. The analysis concluded that concentrations of petroleum hydrocarbon constituents in soil, groundwater, and outdoor vapors do not pose a threat to commercial/industrial workers and construction workers. Likewise, indoor inhalation risk was evaluated and the levels of petroleum hydrocarbon constituents at the site do not pose a risk by indoor inhalation.

H.13.4 Basis for Determination

The maximum soil, groundwater, and soil-vapor concentrations were compared with NMED SSLs, NMWQCC standards, and air inhalation target levels (New Mexico Underground Storage Tank Bureau, 2000), respectively. None of the concentrations exceeded the standards. However, NMED target levels do not account for indoor inhalation of vapors from soil or groundwater. Therefore, the Johnson & Ettinger (J&E) model was used to estimate soil and groundwater target levels protective of indoor inhalation. None of the site soil and groundwater maximum concentrations exceed these target levels. Speciation of TPH-DRO data into aromatic and aliphatic fractions was based on the Total Petroleum Hydrocarbon Criteria Working Group (TPHCWG) approach. Site-Specific Target Levels (SSTLs) were calculated for each fraction for each complete routes of exposure (ROE). Neither TPH-DRO nor the carbon fractions exceeded the SSTLs for the ROEs.

Based upon the RFI investigation conducted at SWMU AOC-V, ERP Site SS-57, the Officer's Club, this site meets the requirements for CAC: The SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

The residual soil, groundwater, and soil-vapor concentrations are protective of current and reasonable future receptors at the site. These concentrations are anticipated to reduce in time due to natural attenuation processes further reducing the risk. An October 13, 2006 NMED letter to HAFB accepted the RFI report thus completing efforts at the site.

H.13.5 References

Bhate Environmental Associates, Inc. April 2006, *Final RCRA Facility Investigation Report, Officer's Club, Site SS-57, Holloman AFB, New Mexico*.

Bhate Environmental Associates, Inc. July 2005. *Risk-Based Evaluation Officer's Club, Site SS-57.*

Foster Wheeler Environmental Corporation and Groundwater Technology, Inc. October, 1996. *Draft Final Air Sparging and Soil Vapor Extraction Pilot Test Report for Officers Club Site SS-57, Holloman Air Force Base, New Mexico*.

Foster Wheeler Environmental Corporation and Groundwater Technology, Inc. October 1996. *Air Sparging/Soil Vapor Extraction System, Site SS-57 Officer's Club, Holloman Air Force Base, New Mexico.*

Foster Wheeler Environmental Corporation and Groundwater Technology. February 1997. *Final Remedial Action Plan, Officer's Club, Site SS-57, Holloman Air Force Base, New Mexico*.

Foster Wheeler. July 2002. *2001 Long-Term Groundwater Monitoring Report, Holloman Air Force Base, New Mexico*.

Foster Wheeler Environmental Corporation. April 2003. TERC No. DACW45-94-D-003, Delivery Order 37, Work Authorization Directive 1; AF Project No. KWRD20027018; Submittal of Letter Report for the Risk Assessments Completed for SS-57-Officer's Club, Holloman Air Force Base, New Mexico.

Foster Wheeler Environmental Corporation. April 2003. *Phase I Human Health Risk Assessment and Ecological Screening-Level Assessment for SS-57 - Officer's Club, Holloman Air Force Base, New Mexico.*

New Mexico Environment Department. February 2004. Appendix 4-B RCRA Facility Investigation (RFI) Outline, Holloman Air Force Base, Hazardous Waste Facility Permit No. NM6572124422.

New Mexico Environment Department. January 26, 2006. Notice of Deficiency Letter from James P. Bearzi (NMED, HWB) to Debbie Hartell, Chief of Environmental Flight, 49 CES/CEV, Holloman AFB, NM.

Radian Corporation. May 1993. *Final Sample and Quality Control Summary Report (SQCSR) Officers Club Soil Investigation, Holloman Air Force Base, New Mexico.*

Radian Corporation. December 1993. *Base-wide Background Study – Sewage Lagoons and Lakes Investigation, Holloman Air Force Base, New Mexico.*

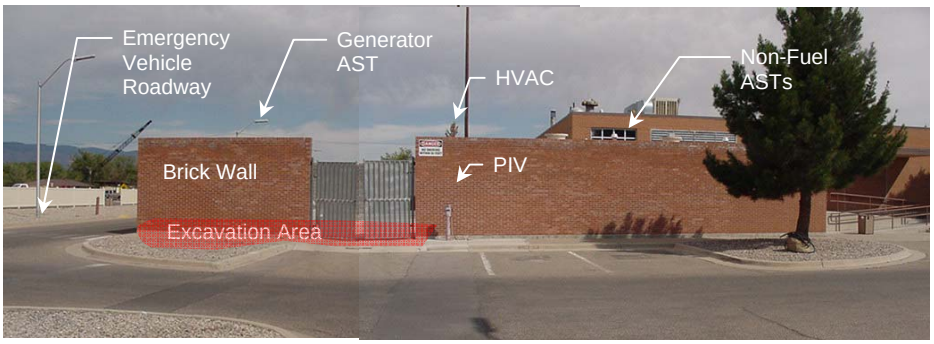
Sergent, Hauskins & Beckwith. December 1991. *Geotechnical Investigation, Officer's Club, Holloman Air Force Base, Alamogordo, New Mexico*.

Wilson & Company. June 1992. *Engineering Report for Study to Determine Source of Odor at the Officer's Club SVS 91-0206*.

H.14 BHUST (AOC-S), BASE HOSPITAL UST

H.14.1 Location/Unit Description

AOC-S, the Base Hospital UST (ERP Site BHUST) is located at Building 15, the Base Hospital. The Base Hospital is located at the corner of 1st Street and Arnold Avenue on HAFB (**Figure 2**). The site is located on the north end of the hospital, adjacent to the west parking lot and the ambulance driveway. A brick and concrete block privacy wall which surrounds the hospital utility and mechanical equipment is evident from the front parking area (**Photograph 1**).



Photograph 1. Front View of Base Hospital UST Area

Photograph 2 provides detail for the interior of the walled area. Within this area there are the existing diesel fuel AST for the back-up generator, two medium size heating, ventilation, and air conditioning (HVAC) units, and two additional large ASTs to the right (south) with the contents unknown. To the immediate north, or left in **Photograph 1**, is the emergency roadway for the hospital emergency vehicles. In front of the privacy wall, and where the PCS was located, exists a concrete sidewalk.

Photograph 2. Inside View of Hospital Area

H.14.2 History

Records indicate the UST was installed at the Base Hospital in the early 1970s for storage of diesel fuel for the back-up generator. The UST was last used in early 1991 and abandoned by filling in place with sand on February 25, 1991. At that time, the UST

abandonment was considered a clean closure. The site currently has a new 10,000-gallon AST within secondary containment, partially situated over the former UST location. A new 7-inch steel-reinforced concrete slab that serves as a loading and unloading area for hospital maintenance covers the remainder of the area.

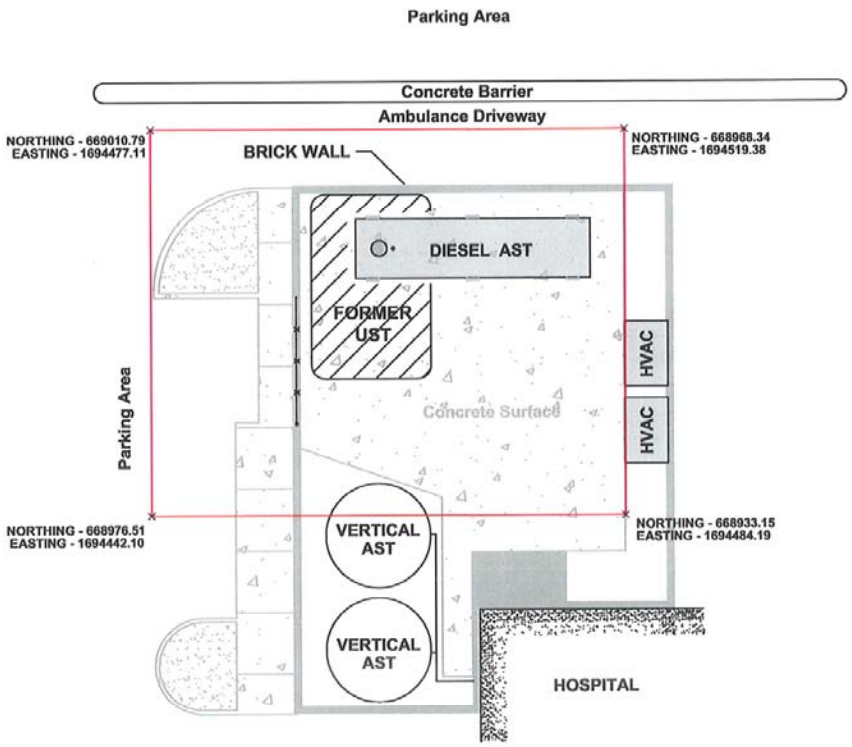
The UST was removed on July 28, 1999, and the AST was installed at the same location (**Figure 35**). During removal, contamination was identified in subsurface soils as discoloration and petroleum hydrocarbon odors, but no free product was observed on the groundwater. Two soil samples were collected from the sidewalls and bottom of the excavation in compliance with NMED UST regulations and analyzed for TPH-DRO, BTEX, and PCBs. The release was confirmed by laboratory analytical results on July 28, 1999. The NMED UST Bureau was subsequently notified of the release.

The cause of the release was undetermined. Interviews with employees indicated that the release may have been due to periodic overfilling. This was consistent with the location of the highest TPH concentrations, which appeared below the reported location of the fill port for the former UST. The release of diesel fuel was estimated at not to exceed 1,000 gallons. There was no sign of free-phase product on the water table and the extent of soil contamination suggested that the amount of released diesel fuel did not exceed the estimate.

Subsequent remediation conducted in 1999 and 2004 at the site involved the removal of PCS from the area beneath and just to the west of the AST following an additional soil sampling and investigation of the area.

H.14.3 Evaluation of Relevant Data

In October and November 1999, an investigation was performed at the BHUST site (Foster Wheeler, 1999). There were 16 locations with a total of 22 soil samples collected from the area during the investigation **(Figure 36**) and submitted to the laboratory for analysis. Locations were sampled at continuous 1-foot increments with intervals of the highest PID readings analyzed by a fixed-base laboratory. Analyzed samples were predominantly collected from mid depths ranging from 1 ft to a maximum depth of 10.5 ft bgs with a modal depth interval of 4 to 5 ft. Samples from three locations; SB-06, SB-13, and SB-14, demonstrated TPH levels above the NMED allowable limit of 880 mg/kg, at 1,890 mg/kg, 8,190 mg/kg, and 3,970 mg/kg, respectively. Samples from locations SB-11 and SB-07 also indicated TPH contamination, but concentrations in these samples were below 880 mg/kg. TPH concentrations were 60 mg/kg, 230 mg/kg, and 430 mg/kg, respectively. The remaining locations sampled had concentrations below the laboratory method detection limit and were reported as not-detected.



NOTES:

This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated. Please verify the location of all features including underground and aboveground utilities prior to conducting any subsurface exploration or site assessment.

All coordinates are in NAD 1983 New Mexico Central State Plane

NOTES

AST = Aboveground Storage Tank
UST = Underground Storage Tank
Site Boundary

The contents of the vertical ASTs are unknown.

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

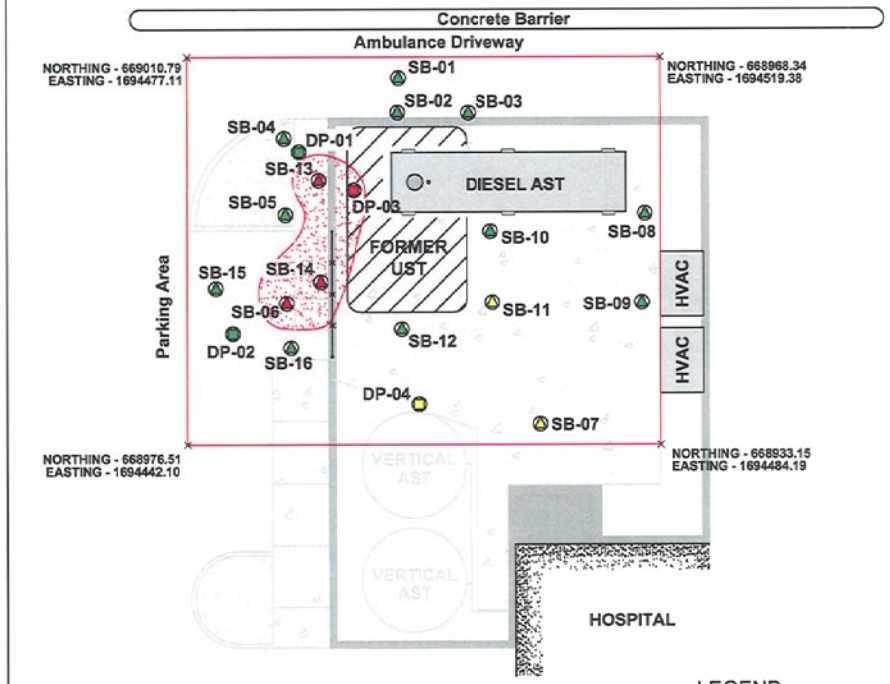
BASE HOSPITAL UST SITE LAYOUT

PROJECT NO.	SCALE	DATE	DRAWN BY:
	1"=20'	3/5/07	CM

DRAWING NO: Figure 35

STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM

Figure 35



	Location	Depth (ft bgs)	TPH Concentration (mg/kg)
INITIAL SAMPLING	SB-01	4 - 5	ND
	SB-02	4 - 5	ND
	SB-03	4 - 5	ND
	SB-04	5 - 6	ND
	SB-05	3 - 4	ND
		5 - 6	ND
	SB-06	3 - 4	1,890
		5 - 6	ND
	SB-07	0 - 1	430
		4.5 - 5.5	ND
	SB-08	4 - 5	ND
	SB-09	4 - 5	ND
	SB-10	4 - 5	ND
		9 - 10	ND
	SB-11	7 - 8	230
		9 - 10	60
	SB-12	9.5 - 10.5	ND
	SB-13	4 - 5	8,190
		9 - 10	ND
	SB-14	7 - 8	3,970
	SB-15	6.5 - 7.5	ND
	SB-16	6.5 - 7.5	ND
SECOND SAMPLING	DP-01	2 - 3	ND
		5 - 6	ND
	DP-02	4 - 5	ND
		5 - 6	ND
	DP-03	3 - 4	2,080
		6 - 7	165
	DP-04	1 - 2	ND
		6 - 7	701

Exceeds NMED allowable limit of 880 mg/kg

LEGEND

SB-15 Soil Borehole Location (October 1999)

DP-01 Soil Borehole Location (April 2004)

Contaminated soils above NMED limit of 880 mg/kg

Site Boundary

TPH (mg/kg)

- ≥ 880 mg/kg
- > ND and < 880 mg/kg
- ND

NOTES:

This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated. Please verify the location of all features including underground and aboveground utilities prior to conducting any subsurface exploration or site assessment.

All coordinates are in NAD 1983 New Mexico Central State Plane

NOTES

ND	Not Detected
mg/kg	Milligrams per kilogram
NMED	New Mexico Environment Department
AST	Aboveground Storage Tank
UST	Underground Storage Tank
TPH	Total Petroleum Hydrocarbons
ft bgs	Feet below ground surface
DRO	Diesel-Range Organics

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

BASE HOSPITAL UST
TPH–DRO PRE–EXCAVATION PCS DISTRIBUTION

PROJECT NO.	SCALE	DATE	DRAWN BY:
	1"=20'	3/5/07	CM

DRAWING NO: Figure 36

STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM

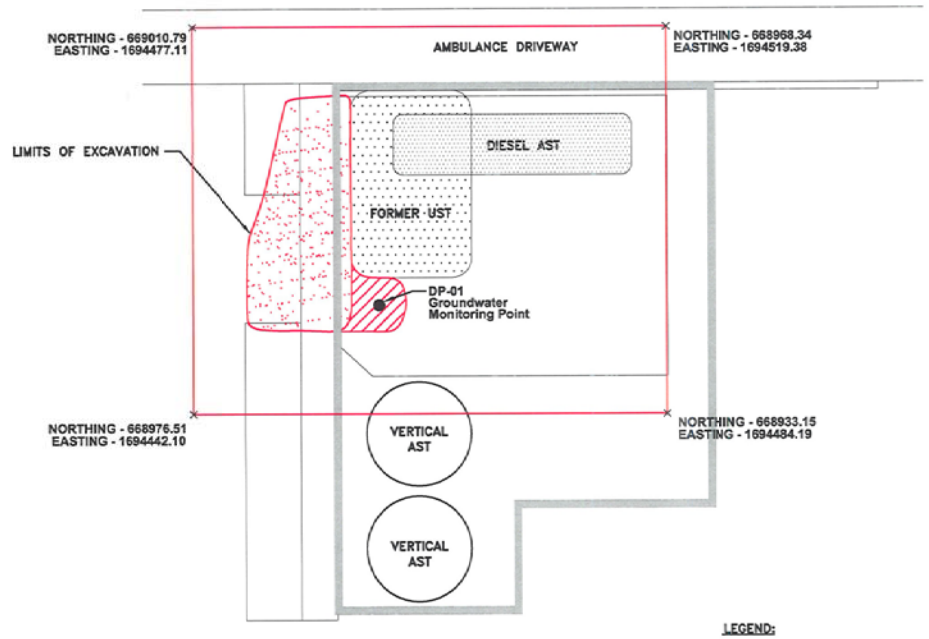
Figure 36

The area of concern for soil contamination above the NMED guidelines was limited to the proximity of SB-06, SB-13, and SB-14. These three locations are on the outside of the north wall. To further delineate the vertical and lateral boundaries of the contaminated soil, additional soil samples were collected in April 2004 and submitted to the laboratory for analysis. These are shown as locations DP-01 through DP-04 (**Figure 36**). Location DP-03 indicated TPH contamination at a concentration of 2,080 mg/kg from the 3 to 4 ft bgs interval. The soils sampled below this depth from 6 to 7 ft bgs demonstrated a sharp decline at this location having a TPH concentration of 165 mg/kg. The remaining samples collected did not indicate any petroleum hydrocarbon contamination above the NMED level for diesel. The sample from location DP-04, near the large non-fuel ASTs, had a TPH concentration of 701 mg/kg and is below the NMED allowable limit for TPH-DRO of 880 mg/kg.

VCM Excavation and Confirmation Sampling were performed in November 2004. Petroleum hydrocarbon contamination exceeding the NMED allowable limit for diesel of 880 mg/kg (*TPH Screening Guidelines*, June 24, 2003) at the site was limited to a small area west northwest of the former UST location. Initially, the estimated volume of PCS was approximately 300 cubic yards (cy). However, the actual total impacted yardage excavated was 90 cy. The limits of the final excavation are shown on **Figure 37**. Groundwater in the area of the excavation was 7.5 feet below land surface. Groundwater in the excavation did not have a sheen or other visible signs of contamination. The 90 cy of soil were transported to the FT-31 Landfarm for treatment.

To determine the effectiveness of the VCM, confirmation soil samples were collected from the sidewalls of the excavations on November 4, 2004. A total of 10 sidewall samples (9 samples plus 1 duplicate) were collected from the excavation at 7 feet bgs. The samples were analyzed for TPH as DRO, VOCs, and SVOCs. The results of the sidewall sampling for the BHUST excavation confirmation samples indicate that soils exceeding the NMED SSLs were removed from the excavation area. These analytical results are presented on **Figure 38**.

In May 2006, a temporary groundwater monitoring well (DP-01) was installed just outside of the downgradient corner of the UST excavation (**Figure 37**). A groundwater sample was collected from the site and analyzed for VOCs, SVOCs, TDS, TPH as DRO, and TAL Metals. The groundwater sample contained no VOCs, SVOCs, or TPH as DRO. The concentrations of metals detected in the sample and TDS did not exceed NMWQCC standards.



NOTES:

This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated. Please verify the location of all features including underground and aboveground utilities prior to conducting any subsurface exploration or site assessment.

All coordinates are in NAD 1983 New Mexico Central State Plane

LEGEND:

- AREA OF EXCAVATION
- AREA OVER-EXCAVATED DUE TO HIGH FIELD READINGS
- AST ABOVEGROUND STORAGE TANK
- UST UNDERGROUND STORAGE TANK

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

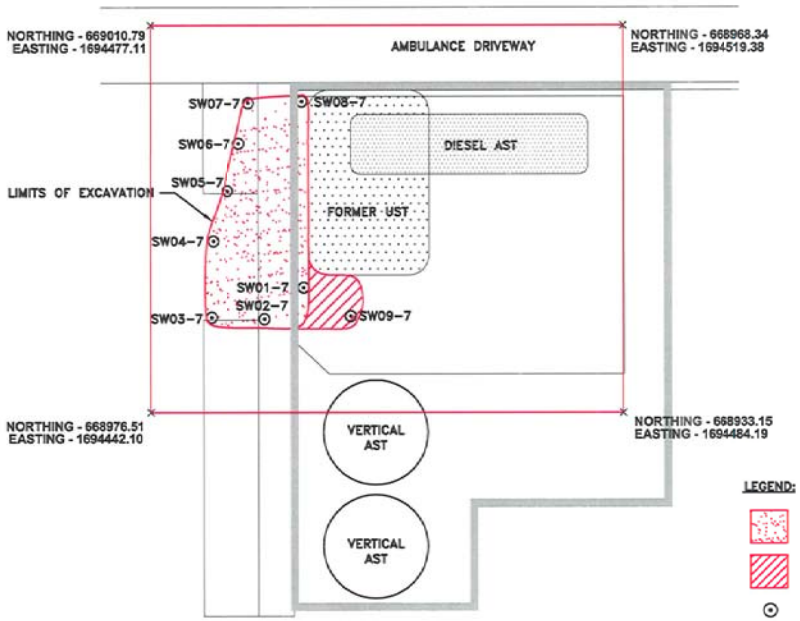
BASE HOSPITAL UST
PCS LIMITS OF EXCAVATION

PROJECT NO.	SCALE	DATE	DRAWN BY:
	1"=20'	3/5/07	CM

DRAWING NO: Figure 37

STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM

Figure 37



Location	Depth (ft bgs)	TPH Concentration (mg/kg)
SW01-7	7	711
SW02-7	7	212
SW03-7	7	ND
SW04-7	7	23
	7	25
SW05-7	7	ND
SW06-7	7	ND
SW07-7	7	10
SW08-7	7	147
SW09-7	7	267

Exceeds NMED allowable limit of 880 mg/kg

LEGEND:

- AREA OF EXCAVATION
- AREA OVER-EXCAVATED DUE TO HIGH FIELD READINGS
- ⊙ SIDEWALL SAMPLE LOCATION
- ND NOT DETECTED
- mg/kg MILLIGRAMS PER KILOGRAM
- NMED NEW MEXICO ENVIRONMENT DEPARTMENT
- AST ABOVEGROUND STORAGE TANK
- UST UNDERGROUND STORAGE TANK
- TPH TOTAL PETROLEUM HYDROCARBONS
- ft bgs FEET BELOW GROUND SURFACE

NOTES:

This information is depicted to provide visual aid within the context of this report and should not be used as a sole reference in precise dimensioning of features indicated. Please verify the location of all features including underground and aboveground utilities prior to conducting any subsurface exploration or site assessment.

All coordinates are in NAD 1983 New Mexico Central State Plane

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

BASE HOSPITAL UST
SIDEWALL CONFIRMATION SOIL SAMPLE LOCATIONS

PROJECT NO.	SCALE	DATE	DRAWN BY:
	1"=20'	3/5/07	CM

DRAWING NO: Figure 38

STATEMENT OF BASIS 2007
10 SWMUs
HOLLOMAN AFB, NM

Figure 38

H.14.4 Basis for Determination

Based upon the sampling, laboratory analytical results, and documentation of excavation conducted, AOC-S (ERP Site HUST, the Hospital UST) meets the requirements for CAC: The SWMU/AOC has been characterized or remediated in accordance with current applicable State or federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use.

PCS identified in the previous investigations at the BHUST site were excavated and transported to the FT-31 Landfarm for treatment. Soil samples collected from the sidewalls of the excavation (confirmation samples) provide documentation of the complete removal of soil containing petroleum hydrocarbons, VOCs, or SVOCs in excess of the NMED SSLs. Further, groundwater samples collected from the site do not indicate impact by petroleum hydrocarbon constituents.

The NMED has concurred with this request for CAC in correspondence to HAFB dated August 9, 2006.

H.14.5 References

Bhate Environmental Associates, June 2004. *Base Hospital UST Voluntary Corrective Measures Report, Holloman AFB, New Mexico.*

Foster Wheeler Environmental Corporation, 1999. *On-Site Investigation Report for the Petroleum-Contaminated Soil Investigation at Building 15 (Base Hospital) Holloman Air Force Base, New Mexico.*

Foster Wheeler Environmental Corporation and Radian Corporation, June 1995. *Draft Final Phase II RCRA Facility Investigation Report, Table 1 Solid Waste Management Units*, Holloman Air Force Base, New Mexico, Volume I.

HAFB, July 2006, Letter from HAFB to NMED with groundwater characterization (DP-01) data from BHUST, Holloman AFB, NM.

New Mexico Water Quality Control Commission, September 15, 2002, *New Mexico Water Quality Control Commission Regulations* (20.6.2 NMAC).

NMED, 1995, *Guidance for Evaluation of NFA (No Further Action Proposals).*

NMED (New Mexico Environment Department), June 24, 2003, *New Mexico Environment Department TPH Screening Guidelines.*

Radian Corporation, 1993, *Phase I RCRA Facility Investigation.*

APPENDIX A

HGL RESPONSE TO NMED COMMENTS
FINAL 2005 LONG-TERM GROUNDWATER MONITORING REPORT

Via Electronic Mail and Federal Express

14 November 2006

Mr. John E. Kieling
Manager, Permits Management Program
State of New Mexico Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

RE: Response to NMED Comments
Final 2005 Long-Term Groundwater Monitoring Report
Holloman Air Force Base, New Mexico, May 2006
EPA ID# NM6572124422

Dear Mr. Kieling:

Per the direction of and on behalf of Holloman Air Force Base, HGL is pleased to provide you with this response to the New Mexico Environment Department comments on the *Final 2005 Long-Term Groundwater Monitoring Report* dated 04 October 2006. A copy of the comment letter is included as Attachment A. NMED provided Solid Waste Management (SWMU)-specific comments for each of the SWMUs discussed in the LTM report. NMED concurred with the recommendations offered in the report for nine of the LTM sites, as reflected in NMED comments 1 (LF-01 - SWMU 106), 2 (SS-02 and SS-05 – AOC-T), 3 (SD-08 – SWMUs 4 and 82), 5 (SS-17 – AOC Q), 6 (LF-21 – SWMU 116), 7 (LF-29 – SWMU 104), 8 (DP-30 and SD-33 – SWMU 113B), 9 (SS-39 – SWMUs 165, 177, 179, and 181) and 10 (SS-46). NMED did not concur with the recommendations provided in the report for sites OT-16 (SWMUs 118 and 132 and AOC-A) and SS-48 (AOC N), and requested additional information for these sites in comments 4 and 11, respectively. These NMED comments and associated responses are provided below.

4.) OT-16 – Former Entomology Shop Area (SWMUs 118 and 132 and AOC-A)

The LTM Report recommended the following: "*The 2005 LTM Program concluded the fifth sampling event for site OT-16, satisfying the commitment to 10 years of LTM. It is therefore recommended that LTM cease. Although three VOCs and two pesticides were detected, all three were below the NMGWQ Standards. Furthermore, these compounds were present in the upgradient monitoring well. Therefore, OT-16 is also recommended for no further action. A report summarizing the RFIs and LTM program for this site will be submitted to NMED to further support the NFA recommendation.*"

The NMED does not concur with this recommendation. Gamma-BHC (Lindane) was detected in monitoring well 118-MW1601 at a concentration of 0.2 µg/L. This concentration equals the US Environmental Protection Agency's maximum contaminant level (EPA MCL) as per the National Primary Drinking Water Standards and, therefore, equals the standard set by the facility's permit. It should be noted that Lindane has not been detected in this well since LTM sampling began in September 1997. NMED acknowledges that this well is presently hydrologically upgradient of the source area. However, due to the close well spacing and the very low flow gradient, seasonal groundwater fluctuations could account for this well's groundwater being impacted by the source area. It should also be noted that total dissolved solids (TDS) concentrations in all wells at this site are below 10,000 mg/L.

Therefore, the Permittee is required to sample groundwater from all wells at this site for pesticides and TDS on a quarterly basis for eight consecutive quarters. The Permittee is required to submit a letter work plan confirming the scheduling of this sampling activity, including the methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status for this site is warranted will be made after the required quarterly sampling.

Response: The OT-16 Long-Term Monitoring Work Plan addressing field activities associated with two additional years of quarterly groundwater monitoring is provided as Attachment B.

11.) **SS-48 – Military Gas Station (AOC-N)**

The LTM Report recommended the following: *"The 2005 LTM Program concluded the sixth sampling event for site SS-48 and over 10 years of LTM. Therefore, it is recommended that LTM cease. Although benzene was detected above NMGWQ Standards in one monitoring well (S55-MW05), SS-48 is recommended for NFA. The TDS concentrations in four of the six wells were above 10,000 mg/L. It is hypothesized that the two wells with TDS concentrations below 10,000 mg/L are artificially low due to the dilution of natural groundwater from leaking water lines and surface irrigation from the domestic water supply. In conclusion, the NMGWQ Standard for TDS does not apply because SS-48 groundwater in its natural state would have TDS concentrations greater than 10,000 mg/L. Therefore, the groundwater is not a potential domestic or agricultural water supply."*

The NMED does not concur with the recommendation that LTM cease and the site be considered for NFA status. Nor does the NMED agree with the conclusion that TDS concentrations in groundwater above 10,000 mg/L necessarily negate application of NM Water Quality Control Commission (NMWQCC) groundwater standards. Evaluation of potential risks from exposure pathways (e.g., vapor inhalation or construction worker exposure) will be deemed necessary for contaminants above NMWQCC Standards, regardless of TDS concentrations. The NMED also does not agree that the NMWQCC Standards to not apply to groundwater with TDS concentrations below 10,000 mg/L where this condition appears *"artificially low due to dilution of natural groundwater"*. If TDS concentrations are below 10,000 mg/L, the NMWQCC Standards will apply, regardless of hypothetical reasons for the lower concentrations.

The Benzene concentration in well S55-MW5 during this LTM event was 83 μg/L. The NMWQCC Standard is 10 μg/L. Benzene concentrations in this well have been above the NMWQCC Standard since September 1999. The TDS concentrations in this well during the 2005 LTM event were above 10,000 mg/L. In addition, the concentration of Methyl tertbutyl ether (MTBE) in well S55-MW5 was 419 μg/L and the MTBE concentration in well S55-MW7 was 161 μg/L. Although there are no NMGWQCC Standards or EPA MCLs for MTBE in groundwater, the calculated standard as specified in the facility permit is 131 μg/L and the NM Environmental Improvement Board Standard for groundwater remediation is 100 μg/L (reference 20.5.12.1233 (a)(2) NMAC). These concentrations are exceeded in both wells. The TDS concentrations in these wells during the 2005 LTM event were above 10,000 mg/L. Therefore, the Permittee is required to conduct a risk assessment for volatile organic compounds, particularly Benzene and MTBE, evaluating the vapor inhalation and construction worker exposure pathways in the vicinity of this site. The Permittee is required to submit a letter work plan confirming the scheduling of this evaluation, including methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status or further LTM for this site is warranted will be made after the required risk assessment.

Response: NMED has requested that a work plan to perform a risk assessment be conducted evaluating the vapor inhalation and construction worker exposure pathways for volatile organic compounds (particularly benzene and MTBE) at the site. New Mexico has established Tier 1 risk-based screening levels for these receptors and pathways in the New Mexico Risk Based Decision Making (NMRBDM) process set forth in the *New Mexico Underground Storage Tank Bureau Guidelines for Corrective Action, March 13, 2000.* The Guidelines in Section 4.1 state that the NMED has determined that a risk-based decision making (RBDM) program is appropriate for managing petroleum releases at underground storage tank (UST) sites, which is also consistent with the NMED's overall objective of protecting public health, safety and welfare, and the environment. The process was developed and is administered by the department's Underground Storage Tank Bureau (the bureau), but conceptually, could apply to all contaminated sites.

The Tier 1 screening levels are criteria developed using default exposure assumptions presented in the Guidelines. The NMRBDM process directs that contaminant concentrations in applicable media for appropriate receptors be compared to these screening levels. If these levels are exceeded, remediation or proceeding to a site-specific Tier 2 risk evaluation would be the next course of action. NMED may approve NFA status if the site satisfies the requirements of 20 NMAC 5.12.1227. These requirements include but are not limited to:

- Representative concentrations for each medium meet the criteria established in accordance with 20 NMAC 5.12 and the maximum concentration in each medium does not exceed the representative concentration by a factor of 10,
- No nuisance conditions exist at the site,
- NAPL and contaminant saturated soil have been removed or remediated,

- The bureau agrees with the overall tier 1 evaluation, and
- The overall size of the plume is shrinking as determined based on concentration trends observed in the monitoring wells.

In light of this, we compared contaminant concentrations in the groundwater to the Tier 1 RBSLs to determine whether further evaluation using a Tier 2 risk assessment is warranted. In accordance with the Guidelines, the groundwater data were initially screened against U.S. Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs) and New Mexico Groundwater Quality (NMGWQ) standards. With respect to methyl tertiary butyl ether (MTBE), the New Mexico Environmental Improvement Board Standard of 100 μg/L was utilized for screening purposes. The only compounds detected at concentrations exceeding the initial screening criteria include benzene, ethylbenzene, MTBE, and trichloroethene (TCE). As presented in the Final 2005 Long-Term Groundwater Monitoring Report (Bhate, 2006), TCE was detected at the highest concentrations up and cross-gradient of the site and is not site-related. Thus, benzene, ethylbenzene, and MTBE concentrations were evaluated with respect to the RBSLs.

Although the site and surrounding area are defined as commercial in accordance with Section 4.3.1 of the corrective action guidance document, benzene, ethylbenzene, and MTBE were compared to both residential and commercial groundwater indoor inhalation RBSLs, provided in Tables 4-17 and 4-18 of the guidance document, respectively. In addition, the concentrations of the three VOCs was also compared to the construction worker groundwater outdoor inhalation RBSLs located in Table 4-19 of the corrective action guidance document (NM USTB, 2000). This comparison is provided on Table 1, included as Attachment C to this Comment Response Letter. Table 1 summarizes the groundwater analytical data obtained from 10 years of biennial groundwater sampling at site SS-48 for these three compounds, as presented in the Final 2005 Long-Term Groundwater Monitoring Report (Bhate, 2006). Based on direct comparison, none of the three contaminants have historically or currently been detected at concentrations exceeding these RBSLs, as described in the following paragraphs.

Benzene. The historic maximum concentration of benzene (560 μg/L at S55-MW5 in 2001) is nearly half of the residential groundwater inhalation RBSL (957 μg/L), over 10 times lower than the commercial groundwater inhalation RBSL (5,920 μg/L), and over 50 times lower than the construction worker outdoor groundwater inhalation value (33,300 μg/L). Benzene concentrations have declined, currently ranging from non-detect to 83 μg/L.

Ethylbenzene. Ethylbenzene has historically been detected only once above the MCL, in monitoring well S55-MW5 in September 1999. This historic maximum concentration (870 μg/L) is orders of magnitude lower than the residential groundwater indoor inhalation RBSL (200,000 μg/L), commercial groundwater indoor inhalation RBSL (1,500,000 μg/L), and construction worker groundwater outdoor inhalation RBSL (4,770,000 μg/L). Since that time, ethylbenzene concentrations have declined, and range from non-detect to 6.8 μg/L.

MTBE. The highest MTBE concentration detected during the December 2005 sampling event, 419 µg/L in S55-MW5, is several thousand times lower than the residential groundwater indoor inhalation RBSL (2,340,000 µg/L), the commercial groundwater indoor inhalation RBSL (25,400,000 µg/L), and construction worker groundwater outdoor inhalation RBSL (81,100,000 µg/L). MTBE has been detected at concentrations of 419 µg/L or lower throughout the monitoring program.

In summary, all concentrations are several orders of magnitude below Tier 1 RBSLs. The site also satisfies the other criteria described above, namely no nuisance conditions exist at the site, there are no NAPL and contaminant saturated soils present (based on the RFI soil data - provided on Table 2 in Attachment C -, and low groundwater contaminant levels), and BTEX concentrations have decreased. The TDS of groundwater containing contaminants above standards is greater than 10,000 mg/L. It is important to note that the facility is active, and that sporadic MTBE detections may be associated with current operations, and not any former release, since MTBE addition at high concentrations only began in 1992 to fulfill the oxygenate requirements set by Congress in the 1990 Clean Air Act Amendments.

Based on this evaluation and the satisfaction of these criteria, we request that NMED consider cessation of LTM and NFA for the site under NMED Criterion 5.

Kenneth J. Cottrell, C.P.G., P.G.
Senior Project Manager

Attachments

CC: George Fish, Holloman AFB
Lora Fly, ACC
Dave Griffin, Holloman AFB
Debbie Hartell, Holloman AFB
Rene Hefner, AFCEE
Stan Scott, ACC
Dave Strasser, NMED

ATTACHMENT A

NMED 04 OCTOBER 2006 COMMENT LETTER
ON
FINAL 2005 LONG-TERM GROUNDWATER MONITORING REPORT

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Telephone (505) 428-2500
Fax (505) 428-2567
www.nmenv.state.nm.us

BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 4, 2006

Ms. Debbie Hartell
Chief
Environmental Flight
49 CES/CEV
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

SUBJECT: FINAL 2005 LONG-TERM GROUNDWATER MONITORING REPORT
HOLLOMAN AIR FORCE BASE, NEW MEXICO, MAY 2006
EPA ID# NM6572124422
HWB-HAFB-06-003

Dear Ms. Hartell:

The New Mexico Environment Department **(NMED)** has reviewed Holloman Air Force Base's **(the Permittee's)** "Final 2005 Long-Term Groundwater Monitoring Report" **(LTM Report)** and has the following Solid Waste Management Unit **(SWMU)**-specific comments.

1. LF-01 – Main Base Landfill (SWMU 106)

The LTM Report recommended the following: *"The presence of benzene and manganese above the* NM Groundwater Quality *(NMGWQ) Standards in one monitoring well (S1-MW3) has triggered additional characterization associated with Site SS-02 and SS-05 to delineate the nature and extent. In accordance with the Class III Permit Modification for No Further Action* **(NFA)** *Status for seven Solid Waste Management Units at HAFB granted by the NMED on November 29, 2005, no additional characterization or monitoring is required at LF-01."*

The NMED concurs with this recommendation. Therefore no long term monitoring **(LTM)** is required at this site at this time. Contamination in monitoring well S1-MW3 shall subsequently

be addressed by further investigation activities proposed by the Permittee at the adjoining site SS-02/SS-05.

2. SS-02 and SS-05 – POL Spill Sites 1 and 2 (AOC-T)

The LTM Report recommended the following: *"A Voluntary Corrective Measures* **(VCM)** *Report summarizing soil remediation, additional groundwater characterization, and risk evaluation will be submitted to NMED in support of a NFA recommendation."*

The NMED concurs with this recommendation.

3. SD-08 – Refuse Collection Truck Washrack (SWMUs 4 and 82)

The LTM Report recommended the following: *"Manganese in wells MW-08-04 and MW-08-05 was the only contaminant detected above the NMGWQ Standard at SD-08 during the 2005 event. 1,2-Dichloroethane was detected in groundwater at MW-08-01 (73 µg/L) during the 2003 LTM event at a concentration greater than the NMGWQ Standard. This result was not confirmed during the 2005 event as the well was dry. SD-08 is recommended for closeout pending results of additional characterization to be performed in 2006."*

The NMED concurs with this recommendation.

4. OT-16 – Former Entomology Shop Area (SWMUs 118 and 132 and AOC-A)

The LTM Report recommended the following: *"The 2005 LTM Program concluded the fifth sampling event for site OT-16, satisfying the commitment to 10 years of LTM. It is therefore recommended that LTM cease. Although three VOCs and two pesticides were detected, all three were below the NMGWQ Standards. Furthermore, these compounds were present in the upgradient monitoring well. Therefore, OT-16 is also recommended for no further action. A report summarizing the RFIs and LTM program for this site will be submitted to NMED to further support the NFA recommendation."*

The NMED does not concur with this recommendation. Gamma-BHC (Lindane) was detected in monitoring well 118-MW1601 at a concentration of 0.2 µg/L. This concentration equals the US Environmental Protection Agency's maximum contaminant level **(EPA MCL)** as per the National Primary Drinking Water Standards and, therefore, equals the standard set by the facility's permit. It should be noted that Lindane has not been detected in this well since LTM sampling began in September 1997. NMED acknowledges that this well is presently hydrologically upgradient of the source area. However, due to the close well spacing and the very low flow gradient, seasonal groundwater fluctuations could account for this well's groundwater being impacted by the source area. It should also be noted that total dissolved solids **(TDS)** concentrations in all wells at this site are below 10,000 mg/L.

Therefore, the Permittee is required to sample groundwater from all wells at this site for pesticides and TDS on a quarterly basis for eight consecutive quarters. The Permittee is required to submit a letter work plan confirming the scheduling of this sampling activity, including the methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status for this site is warranted will be made after the required quarterly sampling.

5. SS-17 – BX Service Station (AOC-Q)

The LTM Report recommended the following: *"Contaminated soil removal is underway and will be completed in 2008. Upon conclusion of this removal, a Voluntary Corrective Measures Report summarizing soil remediation, nature and extent of groundwater conditions, and risk evaluation will be submitted to NMED to support further decisions with regard to this site."*

The NMED concurs with this recommendation.

6. LF-21 – West Area Landfill No. 2 (SWMU 116)

The LTM Report recommended the following: *"The 2005 LTM Program concluded its sixth sampling event for LF-21, representing over 10 years of LTM, satisfying the Decision Document commitment. Manganese detected in well MW-21-02 was the only contaminant detected above the NMGWQ Standards at LF-21 during the 2005 event. It is recommended that LTM cease. Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments, to support future decisions with regard to LF-21."*

The NMED concurs with this recommendation.

7. LF-29 – Former Army Landfill (SWMU 104)

The LTM Report recommended the following: *"This round completes 10 years of LTM at LF-29 and it is recommended that LTM cease. Additional characterization work to support future decisions with regard to LF-29 is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments."*

The NMED concurs with this recommendation.

8. DP-30 and SD-33 – Grease Trap Disposal Pits (SWMU 113B)

The LTM Report recommended the following: *"Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments. This characterization includes continued groundwater sampling on a semi-annual basis for VOCs, metals and TDS."*

The NMED concurs with this recommendation.

9. SS-39 – Missile Fuel Spill Area (SWMUs 165, 177, 179 and 181)

The LTM Report recommended the following: *"Supplemental characterization work is being performed this year in accordance with the July 2005 HydroGeoLogic RFI work plan, as amended in response to NMED comments. This characterization includes continued groundwater sampling on a semi-annual basis for VOCs, RCRA metals, perchlorate and TDS."*

The NMED concurs with this recommendation.

10. SS-46 – JP-4 Spill Site (SWMU 130)

The LTM Report recommended the following: *"The 2005 LTM Program concluded the fifth sampling event for site SS-46 and 10 years of monitoring. It is recommended that LTM cease. Furthermore, VOCs were not detected above the CRDLs and SS-46 is recommended for No Further Action under NMED Criterion 5."*

The NMED concurs with this recommendation.

11. SS-48 – Military Gas Station (AOC-N)

The LTM Report recommended the following: *"The 2005 LTM Program concluded the sixth sampling event for site SS-48 and over 10 years of LTM. Therefore, it is recommended that LTM cease. Although benzene was detected above the NMGWQ Standards in one monitoring well (S55-MW5), SS-48 is recommended for NFA. The TDS concentrations in four of the six wells were above 10,000 mg/L. It is hypothesized that the two wells with TDS concentrations below 10,000 mg/L are artificially low due to the dilution of natural groundwater from leaking water lines and surface irrigation from the domestic water supply. In conclusion, the NMGWQ Standard for TDS does not apply because SS-48 groundwater in its natural state would have TDS concentrations greater than 10,000 mg/L. Therefore, the groundwater is not a potential domestic or agricultural water supply."*

The NMED does not concur with the recommendation that LTM cease and the site be considered for NFA status. Nor does the NMED agree with the conclusion that TDS concentrations in groundwater above 10,000 mg/L necessarily negate application of NM Water Quality Control Commission (**NMWQCC**) groundwater standards. Evaluation of potential risks from exposure pathways (e.g. vapor inhalation or construction worker exposure) will be deemed necessary for contaminants above NMWQCC Standards, regardless of TDS concentrations. The NMED also does not agree that the NMWQCC Standards do not apply to groundwater with TDS concentrations below 10,000 mg/L where this condition appears *"artificially low due to dilution*

of natural groundwater". If TDS concentrations are below 10,000 mg/L, the NMWQCC Standards will apply, regardless of hypothetical reasons for the lower concentrations.

The Benzene concentration in well S55-MW5 during this LTM event was 83 µg/L. The NMWQCC Standard is 10 µg/L. Benzene concentrations in this well have been above the NMWQCC Standard since September 1999. The TDS concentrations in this well during the 2005 LTM event were above 10,000 mg/L. In addition, the concentration of Methyl tertbutyl ether (**MTBE**) in well S55-MW5 was 419 µg/L and the MTBE concentration in well S55-MW7 was 161 µg/L. Although there are no NMWQCC Standards or EPA MCLs for MTBE in groundwater, the calculated standard as specified in the facility permit is 131 µg/L and the NM Environmental Improvement Board Standard for groundwater remediation is 100 µg/L (reference 20.5.12.1233 (a)(2) NMAC). These concentrations are exceeded in both wells. The TDS concentrations in these wells during the 2005 LTM event were above 10,000 mg/L. Therefore, the Permittee is required to conduct a risk assessment for volatile organic compounds, particularly Benzene and MTBE, evaluating the vapor inhalation and construction worker exposure pathways in the vicinity of this site. The Permittee is required to submit a letter work plan confirming the scheduling of this evaluation, including methodologies to be used. This work plan shall be submitted within 30 days of the date of this letter. A decision on whether NFA status or further LTM for this site is warranted will be made after the required risk assessment.

If you have any questions regarding this matter, please contact David Strasser of my staff at (505) 222-9526 or at the above address.

Sincerely,

John E. Kieling
Manager
Permits Management Program

JEK:dcs

cc: J. Bearzi, NMED, HWB
W. Moats, NMED, HWB
C. Amindyas, NMED, HWB
D. Strasser, NMED, HWB
D. Tellez, EPA, Region 6 (6PD-F)
D. Griffin, HAFB
File: HAFB, 2006 and Reading
HWB-HAFB-06-003 (2005 LTM Report)
HWB-HAFB-05-003 (SD-08 RFI WP)
HWB-HAFB-05-004 (SS-02/SS-05 RFI WP)
HWB-HAFB-05-006 (LF-21, LF-29, DP-30/SD-33 and SS-39 RFI WP)

ATTACHMENT C

TABLE 1
GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC-N) – MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO

TABLE 2
RFI SOIL DATA
SS-48 (AOC-N) – MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 2 of 6

Well Number	Groundwater Indoor Inhalation of vapor emissions		Construction Worker[2] Groundwater Outdoor Inhalation of vapor emissions	USEPA MCL[5]	NMGWQ Standard[7]	555-MW3											
						Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	Residential[1] (µg/L)	Commercial[1] (µg/L)	(µg/L)	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual		
VOCs[3] (µg/L)																	
Benzene	957	5,920	33,300	5	10	NA		NA		NA		NA		0.38	(J)	--	
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[6]	NA		NA		NA		NA		7.7		--	
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	NA		NA		NA		NA		1.4		--	
Filterable Residue (mg/L)																	
TDS	NA	NA	NA	NA	N	NA		NA		NA		NA		NA		6,110	

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 19, 2006
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
-- - not detected
NS - not sampled

Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers- assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers- assigned as a result of independent data validation
(J)-- Estimated value based on QC criteria
(UJ)-- Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 1 of 6

Well Number / Sampling Date	Groundwater Indoor Inhalation of vapor emissions: Residential[1] (µg/L)	Groundwater Indoor Inhalation of vapor emissions: Commercial[2] (µg/L)	Construction Worker[3] Groundwater Outdoor Inhalation of vapor emissions (µg/L)	USEPA MCL[5] (µg/L)	NMGWQ Standard[7] (µg/L)	355-MW2[8] Aug-95 Result	Qual	Sep-97 Result	Qual	Sep-99 Result	Qual	Sep-01 Result	Qual	Apr-03 Result	Qual	Dec-05 Result	Qual
VOCs[4] (µg/L)																	
Benzene	957	5,920	33,300	5	10	–		–		–		–		–		–	
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[6]	–		–		NA		–		–		–	
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	–		–		–		–		–		–	
Filterable Residue (mg/L)																	
TDS	NA	NA	NA	NA	N	NA		NA		NA		NA		NA		11,500	

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 19, 2006
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
– - not detected
NS - not sampled

Results in BOLD and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in BOLD exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers– assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers– assigned as a result of independent data validation
(J)– Estimated value based on QC criteria
(UJ)– Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 3 of 6

Well Number / Sampling Date	Groundwater Indoor Inhalation of vapor emissions: Residential[1] (µg/L)	Groundwater Indoor Inhalation of vapor emissions: Commercial[2] (µg/L)	Construction Worker[3] Groundwater Outdoor Inhalation of vapor emissions (µg/L)	USEPA MCL[6] (µg/L)	NMGWQ Standard[7] (µg/L)	SS5-MW4 Aug-95 Result	Qual	Sep-97 Result	Qual	Sep-99 Result	Qual	Sep-01 Result	Qual	Apr-03 Result	Qual	Dec-05
VOCs[4] (µg/L)																
Benzene	957	5,920	33,300	5	10	--		--		--		--		--		--
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[9]	--		--		NA		--		--		--
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	--		0.81	J	--		--		--		--
Filterable Residue (mg/L)																
TDS	NA	NA	NA	NA	N	NA		NA		NA		NA		NA		10,200

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 18, 2006
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
-- - not detected
NS - not sampled

Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers- assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers- assigned as a result of independent data validation
(J)-- Estimated value based on QC criteria
(UJ)-- Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 4 of 6

Well Number / Sampling Date	Groundwater Indoor Inhalation of vapor emissions: Residential[1] (µg/L)	Groundwater Indoor Inhalation of vapor emissions: Commercial[1] (µg/L)	Construction Worker[2] Groundwater Outdoor Inhalation of vapor emissions (µg/L)	USEPA MCL[5] (µg/L)	NMGWQ Standard[7] (µg/L)	355-MW5 Aug-95 Result	Qual	Sep-97 Result	Qual	Sep-99 Result	Qual	Sep-01 Result	Qual	Apr-03 Result	Qual	Dec-05	
VOCs[4] (µg/L)																	
Benzene	957	5,920	33,300	5	10	***38***		--		***170***	D	***560***		***100***		***83***	
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[9]	--		350		NA		100		25		419	
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	--		--		***870***	D	19	J	140		6.8	
Filterable Residue (mg/L)																	
TDS	NA	NA	NA	NA	N	NA		NA		NA		NA		NA		11,700	

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 19, 2006
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
-- - not detected
NS - not sampled

Results in **BOLD** and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in **BOLD** exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers- assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers- assigned as a result of independent data validation
(J)- Estimated value based on QC criteria
(UJ)- Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 5 of 6

Well Number	Groundwater Indoor Inhalation of vapor emissions		Construction Worker[2] Groundwater Outdoor Inhalation of vapor emissions	USEPA MCL[5]	NMGWQ Standard[7]	SS5-MW6											
						Aug-95		Sep-97		Sep-99		Sep-01		Apr-03		Dec-05	
Sampling Date	Residential[1] (µg/L)	Commercial[2] (µg/L)	(µg/L)	(µg/L)	(µg/L)	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
VOCs[3] (µg/L)																	
Benzene	957	5,920	33,300	5	10	NS		NS		NS		NS		NS		--	
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[9]	NS		NS		NS		NS		NS		--	
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	NS		NS		NS		NS		NS		--	
Filterable Residue (mg/L)																	
TDS	NA	NA	NA	NA	N	NS		NS		NS		NS		NS		6,340	

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 19, 2006
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
-- - not detected
NS - not sampled

Results in BOLD and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in BOLD exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers– assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers– assigned as a result of independent data validation
(J)– Estimated value based on QC criteria
(UJ)– Estimated non-detect based on QC criteria

2003 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

TABLE 1

GROUNDWATER RISK BASED SCREENING EVALUATION
SS-48 (AOC N) MILITARY GAS STATION
HOLLOMAN AIR FORCE BASE, NEW MEXICO
Page 6 of 6

Well Number / Sampling Date	Groundwater Indoor Inhalation of vapor emissions: Residential[1] (µg/L)	Groundwater Indoor Inhalation of vapor emissions: Commercial[2] (µg/L)	Construction Worker[3] Groundwater Outdoor Inhalation of vapor emissions (µg/L)	USEPA MCL[5] (µg/L)	NMGWQ Standard[7] (µg/L)	SS5-MW7 Aug-95 Result	Qual	Sep-97 Result	Qual	Sep-99 Result	Qual	Sep-01 Result	Qual	Apr-03 Result	Qual	Dec-05 Result	Qual
VOCs[4] (µg/L)																	
Benzene	957	5,920	33,300	5	10	--		--		--		--		0.5	(J)	--	
Methyl tertiary butyl ether	2,340,000	25,400,000	81,100,000	NA	100[9]	--		--		NA		3	J	280		161	
Ethylbenzene	200,000	1,500,000	4,770,000	700	750	--		--		--		--		--		--	
Filterable Residue (mg/L)																	
TDS	NA	NA	NA	NA	N	NA		NA		NA		NA		NA		12,100	

(1) Obtained from Table 4-17 of the Guidance on Corrective Action (NMED, 2000)
(2) Obtained from Table 4-18 of the Guidance on Corrective Action (NMED, 2000)
(3) Obtained from Table 4-19 of the Guidance on Corrective Action (NMED, 2000)
(4) for mixed Xylenes
(5) USEPA MCLs updated on October 18, 2000
(6) Maximum allowable annual average level for Total Trihalomethanes
(7) Values obtained from New Mexico Administrative Code 20.6.2.3103A, B, and C
(8) Background (upgradient) well
(9) New Mexico Administrative Code 20.5.12.1233

CRDL - contract-required detection limit
IDL - instrument detection limit
ND -not detected at or above method reporting limit
NA - not analyzed/not applicable
VOCs - volatile organic compounds
µg/L - micrograms per liter
mg/L - milligrams per liter
USEPA - U. S. Environmental Protection Agency
MCL - Maximum Contaminant Level
NMGWQ - New Mexico Groundwater Quality
-- - not detected
NS - not sampled

Results in BOLD and *italics* exceed NMGWQ Standards for Human Health and USEPA Primary Drinking Water MCLs
Results in BOLD exceed NMGWQ Standards for Human Health
Results in *italics* exceed USEPA Primary Drinking Water MCLs

Laboratory Qualifiers- assigned as a result of laboratory data assessment procedures
J - Estimated value; less than CRDL but greater than or equal to IDL
D - Value derived from analysis of diluted sample.
UB - Qualifies as non-detect due to presence of analyte in associated laboratory blank

EPA Qualifiers- assigned as a result of independent data validation
(J)-- Estimated value based on QC criteria
(UJ)-- Estimated non-detect based on QC criteria

2009 Validation Qualifiers
J - Estimated value detected less than the CRDL but greater than the reporting limit.
U - The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.
UJ - Estimated as non-detect at the dtection limit.

Table 2
Analytical Soil Results from SS-48
Phase I RI 1989

				B1						B2					
				Sample Depth						Sample Depth					
Analyte	Residential	Industrial/ Occupational	Construction Worker	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	27000	73600	157000	--	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Ehtylbenzene (µg/kg)	10600000	25400000	571000000	--	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Toluene (µg/kg)	248000	248000	248000	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA
Total Xylenes (µg/kg)	132000	132000	132000	NA	--	NA	NA	--	NA	NA	--	NA	NA	--	NA
BN/AE (µg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRPH (mg/kg)	1000	--	--	307	--	NA	NA	--	NA	--	--	NA	NA	--	NA
Lead (µg/kg)	400000	750000	750000	5	5	NA	NA	3.2	NA	--	0.8	NA	NA	1.3	NA

µg/kg = micrograms per kilogram
RI = Remedial Investigation
NA = Not Analyzed
BN/AE = Base Neutrals/Acid Extractables
TRPH = Total Recoverable Petroleum Hydrocarbons
-- = Not Detected/Not Applicable
( ) = Stage II data
* = Acid extractables not valid due to out-of-n
** = Outside QC limits-one surrogate recover out-of-range
# = Corps of Engineers lab data

Table 2
Analytical Soil Results from SS-48
Phase I RI 1989

				B3						B4					
				Sample Depth						Sample Depth					
Analyte	Residential	Industrial/ Occupational	Construction Worker	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	27000	73600	157000	74	85**	NA	NA	--	NA	NA	(--)	NA	(--)	NA	(--)
Ehtylbenzene (µg/kg)	10600000	25400000	571000000	31	134	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
Toluene (µg/kg)	248000	248000	248000	8	41	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
Total Xylenes (µg/kg)	132000	132000	132000	11	335	NA	NA	--	NA	NA	NA	NA	(--)	NA	(--)
BN/AE (µg/kg)	--	--	--	NA	NA	NA	NA	NA	NA	NA	(--)	NA	(--)	NA	(--)
TRPH (mg/kg)	1000	--	--	--	36	NA	NA	--	NA	NA	(--)	NA	(--)	NA	(12)
Lead (µg/kg)	400000	750000	750000	--	2	NA	NA	3.9	NA	NA	(--)	NA	(5)	NA	(3)

µg/kg = micrograms per kilogram
RI = Remedial Investigation
NA = Not Analyzed
BN/AE = Base Neutrals/Acid Extractables
TRPH = Total Recoverable Petroleum Hydrocarbons
-- = Not Detected/Not Applicable
( ) = Stage II data
* = Acid extractables not valid due to out-of-n
** = Outside QC limits-one surrogate recover out-of-range
# = Corps of Engineers lab data

Table 2
Analytical Soil Results from SS-48
Phase I RI 1989

				B5 Sample Depth						B6 Sample Depth					
Analyte	Residential	Industrial/ Occupational	Construction Worker	2.5	5	7.5	10	12.5	20	2.5	5	7.5	10	12.5	20
Volatiles															
Benzene (µg/kg)	27000	73600	157000	NA	(--)	(--)	NA	NA	(--)	NA	(--)	(--)	NA	NA	(--)
Ehtylbenzene (µg/kg)	10600000	25400000	571000000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
Toluene (µg/kg)	248000	248000	248000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
Total Xylenes (µg/kg)	132000	132000	132000	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)	NA	NA	(--)
BN/AE (µg/kg)	--	--	--	NA	NA	(--)	(--)	NA	(--)	NA	(--)#	(--)*	NA	NA	(--)*
TRPH (mg/kg)	1000	--	--	NA	(--)	(15)	NA	NA	(14)	NA	(16)	(--)	NA	NA	(--)
Lead (µg/kg)	400000	750000	750000	NA	(--)	(2)	NA	NA	(4)	NA	(1)	(3)	NA	NA	(4)

µg/kg = micrograms per kilogram
RI = Remedial Investigation
NA = Not Analyzed
BN/AE = Base Neutrals/Acid Extractables
TRPH = Total Recoverable Petroleum Hydrocarbons
-- = Not Detected/Not Applicable
( ) = Stage II data
* = Acid extractables not valid due to out-of-r
** = Outside QC limits-one surrogate recover out-of-range
# = Corps of Engineers lab data

Table 2
Analytical Soil Results from SS-48
Phase I RI 1989

				B7					
				Sample Depth					
Analyte	Residential	Industrial/ Occupational	Construction Worker*	2.5	5	7.5	10	12.5	20
Volatiles									
Benzene (µg/kg)	27000	73600	157000	NA	(--)	NA	NA	NA	(--)
Ehtylbenzene (µg/kg)	10600000	25400000	571000000	NA	NA	NA	NA	NA	(--)
Toluene (µg/kg)	248000	248000	248000	NA	NA	NA	NA	NA	(--)
Total Xylenes (µg/kg)	132000	132000	132000	NA	NA	NA	NA	NA	(--)
BN/AE (µg/kg)	--	--	--	(--)*	(--)*	NA	NA	NA	(--)*
TRPH (mg/kg)	1000	--	--	(--)	(--)	NA	NA	NA	(--)
Lead (µg/kg)	400000	750000	750000	(--)	(1)	NA	NA	NA	(9)

µg/kg = micrograms per kilogram
RI = Remedial Investigation
NA = Not Analyzed
BN/AE = Base Neutrals/Acid Extractables
TRPH = Total Recoverable Petroleum Hydrocarbons
-- = Not Detected/Not Applicable
( ) = Stage II data
* = Acid extractables not valid due to out-of-ri
** = Outside QC limits-one surrogate recover out-of-range
# = Corps of Engineers lab data

APPENDIX B

DRAFT PERMIT

MODIFIED TABLES
PERMIT APPENDIX 4-A
SUMMARY OF SOLID WASTE MANAGEMENT UNITS

TABLE A
(*Summary of SWMUs/AOCs Requiring Corrective Action*)

TABLE B
(*Summary of SWMUs/AOCs With ~~Not Currently Requiring~~ Corrective Action Complete Without Controls~~)~~*)

TABLE C

(Summary of SWMUs/AOCs With Corrective Action Complete With Controls)

APPENDIX 4-A
SUMMARY OF SOLID WASTE MANAGEMENT UNITS
TABLE A

The following is the Prioritized list of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Requiring Corrective Action

SERIAL NO.	SWMU	ERP SITE ID	UNIT NAME
1	4	N/A	Building 131 Oil/Water Separator
2	8	N/A	Building 231 Oil/Water Separator
3	19	SS-59	Building 638 Oil/Water Separator
4	20	SS-59	Building 639 Oil/Water Separator
~~5~~	~~39~~	~~N/A~~	~~Building 1092 Oil/Water Separator~~
5	82	SD-08	Building 131 Washrack
6	101	LF-10	Building 121 Landfill
7	104	LF-29	Former Army Landfill
~~9~~	~~105~~	~~LF-19~~	~~Golf Course Landfill~~
~~11~~	~~108~~	~~LF-23~~	~~MOBSS Landfill Disposal Trench~~
8	109	LF-10	Old Main Base Landfill
9	111	RW-42	Radioactive Waste Disposal Area
10	113A	OT-20	Sludge Disposal Trench near Lagoons
11	113B	DP-30/SD-33	Sludge Disposal Trenches Fire Training Area
12	114	OT-03	TEL Disposal Site
~~17~~	~~115~~	~~LF-22~~	~~West Area Landfill #1 PCB Disposal Area~~
~~18~~	~~116~~	~~LF-21~~	~~West Area Landfill #2~~
13	118	OT-16	Building 21 Pesticides Holding Tank
14	122	N/A	Building 702 Waste Oil Tank
15	123	N/A	Building 704 Waste Oil Tank
~~22~~	~~127~~	~~FT-31~~	~~Building 1092 Waste Oil Tank~~
~~23~~	~~130~~	~~SS-46~~	~~Taxiway 4 Tank 28 JP-4 Underground Waste Tank~~
16	132	OT-16	Building 21 Entomology Leach Field
~~25~~	~~135~~	~~FT-31~~	~~Building 1092 Oil/Water Separator Drainage Pit~~
17	137	OT-38	Building 1166 Test Track Drain Field
18	141	SD-27	Pad 9 Drainage Pit
19	165	SS-39	Building 1176 Pond
~~33~~	~~170~~	~~FT-31~~	~~Fire Department Training Area 1~~
20	177	SS-39	Building 1176 Sumps
21	179	SS-39	Discharge Box
22	181	SS-39	Building 1176 Drainage Trough
23	183	N/A	Air Base Sewer System
24	197	OT-14	Former Entomology Shop
25	229	SS-59	Test Cell Fuel Spill Site
26	AOC-1	DP-64	Chemical Agent Site
~~41~~	~~AOC-2~~	~~N/A~~	~~Sewage Drainage Pit NE of Building 864~~

SERIAL NO.	SWMU/AOC	ERP SITE ID	UNIT NAME
27	AOC-3	DP-63	Ammunition Yard Disposal Pit
28	AOC-4	N/A	West POL Fuel Spill Site
29	AOC-1001	SS-61	Building 1001 Fuel Spill Site
30	AOC-A	OT-16	Building 21 Pesticide Rinse-water Spill Area
31	AOC-B	SS-65	Building 807 Test Cell Surface Spill Area
32	AOC-C	SS-66	Building 835 Spills
33	AOC-E	SS-67	Buildings 903-909 Sand Blast Residues
~~50~~	~~AOC-F~~	~~SS-68~~	~~Asphalt Tank Spill Area~~
34	AOC-H	SS-18	Chromic Acid Spill Area
35	AOC-I	SS-69	Fighter Wing Flight Line Spill
36	AOC-J	SS-13	Herbicide Sodium Arsenite Spill Area
37	AOC-K	SS-12	Northeast Fuel Line Spill #1
38	AOC-L	OT-37	Early Missile Test Site
39	AOC-M	RW-70	Building 18 Product Storage Tank
~~57~~	~~AOC-N~~	~~SS-48~~	~~Building 137 Military Gas Tank Leak~~
40	AOC-O	OT-45	Building 296 Old AGE Refueling Station
~~59~~	~~AOC-P~~	~~OT-44~~	~~Building 301 Fuel Tank Leak~~
41	AOC-Q	SS-17	BX Gas Station Fuel Line Leaks
~~61~~	~~AOC-R~~	~~SS-06~~	~~JP-4 Fuel Line Spill Site~~
~~63~~	~~AOC-S~~	~~BHUST~~	~~Leaking Underground Storage Tank~~
42	AOC-T	SS-05	POL Storage Tank Spill Sites 1 & 2
43	AOC-U	N/A	Lost River Basin
~~66~~	~~AOC-V~~	~~SS-57~~	~~Officer's Club~~
~~67~~	~~PRI-2~~	~~OT-35~~	~~PRI Bldg 1264 Solvent Burn Area~~
~~68~~	~~PRI-5~~	~~OT-35~~	~~PRI Bldg 1264 Solvent Burn Area~~
44	AOC-UST-221	TU/US-C503	Building 221 UST
45	AOC-UST-298	TU/US-C508	Building 298 UST
46	AOC-UST-300	TU/US-C500	Building 300 UST
47	AOC-UST-301	TU/US-C504	Building 301 UST
48	AOC-UST-684	TU/US-C516	Building 684 UST
49	AOC-UST-882	TU/US-C514	Building 882 UST
50	AOC-UST-889	TU/US-C515	Building 889 UST
51	AOC-UST-898	TU/US-C513	Building 898 UST
52	AOC-UST-901	TU/US-C506	Building 901 UST
53	AOC-UST-1097	TU/US-C505	Building 1097 UST
54	AOC-UST-1113	TU/US-C501	Building 1113 UST
55	AOC-UST-1272	TU/US-C507	Building 1272 UST
56	AOC-UST-2395	TU/US-C502	Building 2395 UST
57	AOC-UST-7003	TU/US-C518	National Radar Test Facility UST
58	AOC-838	SS-72	TCE Groundwater Contamination Upgradient of LF-21
59	AOC-1088	SS-73	TCE in Groundwater Upgradient of SS-61

TOTAL OF CORRECTIVE ACTION SITES = ~~62~~ 59 [i.e., ~~34~~ 25 SWMUs + ~~28~~ 34 AOCs].

APPENDIX IV-A
SUMMARY OF SOLID WASTE MANAGEMENT UNITS
TABLE B

The Following is a list of Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Not Currently Requiring Corrective Action.

SWMU/AOC	DESCRIPTION	COMMENT
1	Building 55 Oil/Water Separator	Site NFAd in February 2001
2	Building 121 Oil/Water Separator	Site NFAd in February 2001
3	Building 130 Oil/Water Separator	Site NFAd in February 2001
5	Building 137 Oil/Water Separator	Site NFAd in February 2001
6	Building 193Oil/Water Separator	Site NFAd in February 2001
7	Building 198 Oil/Water Separator	Site NFAd in February 2001
9	Building 282 Oil/Water Separator	Site NFAd in February 2001
10	Building 283 Oil/Water Separator	Site NFAd in February 2001
11	Building 300 Oil/Water Separator	Site NFAd in February 2001
12	Building 304 Oil/Water Separator	Site NFAd in February 2001
13	Building 304A Oil/Water Separator	Site NFAd in February 2001
14	Building 306 Oil/Water Separator	Site NFAd in February 2001
15	Building 309 Oil/Water Separator	Site NFAd in February 2001
16	Building 315 Oil/Water Separator	Site NFAd in February 2001
17	Building 316 Oil/Water Separator	Site NFAd in February 2001
18	Building 500 Oil/Water Separator	Site NFAd in February 2001
21	Building 702 Oil/Water Separator	Site NFAd in February 2001
22	Building 704 Oil/Water Separator	Site NFAd in February 2001
23	Building 800 Oil/Water Separator	Site NFAd in February 2001
24	Building 801 Oil/Water Separator	Site NFAd in February 2001
25	Building 805 Oil/Water Separator	Site NFAd in February 2001
26	Building 809 Oil/Water Separator	Site NFAd in February 2001
27	Building810 Oil/Water Separator	Site NFAd in February 2001
28	Building 822 Oil/Water Separator	Site NFAd in February 2001
29	Building 827 Oil/Water Separator	Site NFAd in February 2001
30	Building 830 Oil/Water Separator	Site NFAd in February 2001
31	Building 855 Oil/Water Separator	Site NFAd in February 2001
32	Building 868 Oil/Water Separator	Site NFAd in February 2001
33	Building869 Oil/Water Separator	Site NFAd in February 2001
34	Building 902 Oil/Water Separator	Site NFAd in February 2001
35	Building 903 Oil/Water Separator	Site NFAd in February 2001
36	Building 1000 Oil/Water Separator	Site NFAd in February 2001
37	Building 1080 Oil/Water Separator	Site NFAd in February 2001
38	Building 1080A Oil/Water Separator	Site NFAd in February 2001
39	Building 1092 Oil/Water Separator (FT31)	Pending
40	Building 1166 Oil/Water Separator	Site NFAd in February 2001
41	Building 1266 Oil/Water Separator	Site NFAd in February 2001

42	Building 1 Waste Accumulation Area	Site NFAd in February 2001
43	Building 55 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
44	Building 121 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
45	Building 195 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
46	Building 198 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
47	Building 280 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
48	Building 282 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
49	Building 300 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
50	Building 301 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
51	Building 308 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
52	Building 500 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
53	Building 638 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
54	Building 702 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
55	Building 702A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
56	Building 807 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
57	Building 809 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
58	Building 822 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
59	Building 837 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
60	Building 844 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
61	Building 851 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
62	Building 855 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
63	Building 867 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
64	Building 869 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
65	Building 901 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
66	Building 901Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
67	Building 909 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
68	Building 910 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.

69	Building 807 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
70	Building 1119 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
71	Building 1778A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
72	Building 11778A Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
73	Building 1266 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
74	Building 7005 Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
76	DRMO Non-Hazardous Waste Drain	EPA listed the site in 1988 as a SWMU with no further action required.
77	RATSCAT Waste Accumulation Area	EPA listed the site in 1988 as a SWMU with no further action required.
78	Trim pad 3 WAA	EPA listed the site in 1988 as a SWMU with no further action required.
79	Building 21 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
80	Building 55 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
81	Building 121 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
83	Building 134 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
84	Building 137 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
85	Building 283 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
86	Building 304A Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
87	Building 306 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
88	Building 309 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
89	Building 703 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
90	Building 801 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
91	Building 816 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
92	Building 822 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
93	Building 827 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
94	Building 830 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
95	Building 902 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
96	Building 1080 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
97	Building 1119 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.

98	Building 1116 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
99	Building 1266 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
100	Pad 9 Wash Rack	EPA listed the site in 1988 as a SWMU with no further action required.
102	Acid Trailer Burial Site	EPA listed the site in 1988 as a SWMU with no further action required.
103	Causeway Rubble Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
105	LF-19 Golf Course Landfill	Pending
106	Main Base Landfill	Site NFAd in November 2005
107	Main Base Substation PCB Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
108	LF-23 MOBSS Landfill Disposal Trench	Pending
110	POL Rubble Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
112	RATSCAT Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
115	LF-22 West Area Landfill #1 PCB Disposal Area	Pending
116	LF-21 West Area Landfill #2	Pending
117	Wire Spool Disposal Area	EPA listed the site in 1988 as a SWMU with no further action required.
119	Building 121 Waste Oil Tank	Site NFAd in February 2001
120	Building 309 Waste Oil Tank	Site NFAd in February 2001
121	Building 316 Waste Oil Tank	Site NFAd in February 2001
124	Building 752 Waste Oil Tank	Site NFAd in February 2001
125	Building 868 Waste Oil Tank	Site NFAd in February 2001
126	Building 1000 Waste Oil Tank	Site NFAd in February 2001
127	Building 1092 Waste Oil Tank (FT-31)	Pending
128	Building 1166 Waste Oil Tank	Site NFAd in February 2001
129	Building 1191 and 1192 Spill Tanks	Site NFAd in February 2001
130	SS-46 Taxiway 4 Tank 28 JP-4 Underground Waste Tank	Pending
131	Waste Oil Bowsers	Site NFAd in February 2001
133	Building 703 Wash Rack Discharge Pit	Site NFAd in February 2001
134	Buildings 902-925 Drainage Ditch	Site NFAd in February 2001
135	Building 1092 Oil/Water Separator Drainage Pit (FT-31)	Pending
136	Building 1119 Washrack Drainage Area	Site NFAd in November 2005
138	Building 1166 Oil/Water Sep Drainage Pit	Site NFAd in February 2001
139	SWMU 139 Lake Holloman	Site NFAd in November 2005
140	SWMU 140 Lake Stinky	Site NFAd in November 2005
142	Wastewater Influent Chamber	Site NFAd in February 2001
143	Bar Screen	Site NFAd in February 2001
144	Comminutor	Site NFAd in February 2001
145	Grit Chamber	Site NFAd in February 2001
146	Parshall Flume Wet Well	Site NFAd in February 2001

147	Splitter Box	Site NFAd in February 2001
148	Sewage Lagoon A	Closed June 30, 2000
149	Sewage Lagoon B	Closed June 30, 2000
150	Sewage Lagoon C	Closed June 30, 2000
151	Sewage Lagoon D	Closed June 30, 2000
152	Sewage Lagoon E	Closed June 30, 2000
153	Sewage Lagoon F	Closed June 30, 2000
154	Sewage Lagoon G	Closed June 30, 2000
155	Sludge Drying Beds	Site NFAd in February 2001
156	Imhoff Tanks (5)	Site NFAd in February 2001
157	ABLE 51 PCB Storage Area	Site NFAd in February 2001
158	PCB Storage Bunker	Site NFAd in February 2001
159	Building 500 Pb Storage Shelves	Site NFAd in February 2001
160	Building 500 NiCd Battery Storage Area	Site NFAd in February 2001
161	Building 844 Battery Storage Area	Site NFAd in February 2001
162	DRMO Scrap Metal Storage Area	EPA called this site a SWMU in 1988 but did not require corrective action [1].
163	DRMO Wood Pile	EPA called this site a SWMU in 1988 but did not require corrective action [1].
164	Building 1080 Pond	Site NFAd in February 2001
165	Building 1176 Pond	Site NFAd in February 2001
166	SD-25 MOBSS Drainage Lagoon	Site NFAd in November 2005
167	Test Shed Launch Area Collection Basin	EPA identified it in 1988 as a SWMU without requiring further corrective action
169	Burn Kettle	EPA identified it in 1988 as a SWMU without requiring further corrective action
170	Fire Department Training Area 1 (FT-31)	Pending
171	Fire Department Training Area 2 (FT-31)	Site NFAd in February 2001
173	Building 198 Sand Trap	EPA listed this as a SWMU in the 1988 RFA Report
174	Building 231 Hobby Shop Silver Recovery Unit	EPA listed this as a SWMU in the 1988 RFA Report
176	Building 844 Sand Trap	EPA listed this as a SWMU in the 1988 RFA Report
178	Building 1191 Fuel Runoff Pits	Site NFAd in February 2001
180	Building 301 Outdoor Drainage Flume	Site NFAd in February 2001
182	Building Floor Drains	Site NFAd in February 2001
184	Wastewater Re-circulation Line	Site NFAd in February 2001
185	Building 332 Silver Recovery Unit	EPA identified this site as a SWMU in 1988
186	Hospital Silver Recovery Unit	EPA identified this site as a SWMU in 1988
187	West Area Silver Recovery Unit	EPA identified this site as a SWMU in 1988
188	Building 161 Acid Neutralization Unit	EPA identified this site as a SWMU in 1988
189	Building 232 Recycling Area	EPA identified this site as a SWMU in 1988
190	Building 500 Battery Neutralization Unit	EPA identified this site as a SWMU in 1988
191	Building 855 Concrete Pad	EPA identified this site as a SWMU in 1988
192	Coco Block House Disposal Well	EPA identified this site as a SWMU in

		1988
193	Trash Dumpster	EPA identified this site as a SWMU in 1988
194-228	SWMUs which no Longer exist or Could not be Located	EPA identified this site as a SWMU in 1988
212	Former north Area Wash Rack	Site NFAd in February 2001
230	Building 828 Fuel Spill Site	Site NFAd in February 2001
231	Incinerator/Landfill	Site NFAd in February 2001
194-228	SWMUs which no Longer exist or Could not be Located	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-2	Sewage Drainage Pit NE of Building 864	Pending
AOC-BBMS	Bare Base Mobility Squadron Spill Area	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-D	SD-26 Building 882 Spills	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-F	Asphalt Tank Spill Area (SS-68)	Pending
AOC-FST837	Building 837 Fuel Spill Site	Site NFA November 2005
AOC-G	Atlas Substation PCB Spill	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-N	SS-48 Building 137 Military Gas Tank Leak	Pending
AOC-P	OT-44 Building 301 Fuel Tank Leak	Pending
AOC-R	JP-4 Fuel Line Spill Site (SS-06)	Pending
AOC-RD	DP-62 Rita's Draw Disposal Pit	Site NFAd November 2005
AOC-RR	Buried RR Cars.	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-S	Leaking Underground Storage Tank (BHUST)	Pending
AOC-V	SS-57 Officer's Club	Pending
AOC-PRI-A	OT-35 Primate Research Lab Sewer Line	EPA listed the site in 1988 as a SWMU with no further action required.
AOC-PRI-S	Primate Research Lab Borehole Disposal Site	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-PRI-1	Primate Research Institute (PRI) Building 1264: Waste Accumulation Area	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-PRI-2	PRI Bldg 1264 Solvent Burn Area (OT-35)	Pending
AOC-PRI-3	PRI Building 1264: Biological Incinerator	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-PRI-4	PRI Building 1264: Quarantine Area	EPA called the site in the 1988 RFA but did not require corrective action [1].
AOC-PRI-5	PRI Bldg 1264 Solvent Burn Area (OT-35)	Pending

HOLLOMAN AIR FORCE BASE OPERATING AND CLOSED UNITS

OPERATING/CLOSED UNIT	DESCRIPTION	COMMENT
20,000-Pound Open Detonation (OD) Treatment Unit/SWMU #168	The OD Unit was permitted in 1997	Permitted in 1997 and is undergoing closure approval.
Container Storage Unit/SWMU # 75	Permit Expired July 4, 2001	Undergoing Renewal[2]
300-Pound Open Burn (OB) Unit. This site was listed in the 1988 RFA Report as SWMU 72	The OB Unit was under Interim from 1965 to 1979 status HAFB conducted risk-based closure as per approved Work Plan of 1997	NMED approved Closure of this site on February 3, 1997.

1. Unit underwent Corrective Action, was approved for NFA, and is limited by Institutional Controls
2. Unit is a Hazardous Waste Management Unit.

APPENDIX IV-A
SUMMARY OF SOLID WASTE MANAGEMENT UNITS
TABLE C

The following is a list of Solid Waste Management Units (SWMUs and Areas of Concern (AOCs) with Corrective Action Complete with Controls

SWMU/AOC	Control(s) Needed