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

28 Sep 2015

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NMED
Hazardous Waste Bureau

New Mexico Environment Department
Attn: Mr. John Kieling, Chief
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Dear Mr. Kieling,

Holloman AFB is pleased to submit the Final Corrective Action Complete Proposals SWMU 4 (OW-C519) and SWMU 8 (OW-C250) for your review.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions, please contact me (575) 572-3931 or by email at deanna.rothhaupt@holloman.af.mil.

Sincerely

DEANNA ROTHHAUPT, GS-12, DAFC

Attachment:
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FINAL
CORRECTIVE ACTION COMPLETE PROPOSALS
SWMU 4 (OW-519) AND SWMU 8 (OW-250)
HOLLOMAN AFB, NEW MEXICO

Prepared For:

49 CES/CEAN
Holloman Air Force Base
Mew Mexico

Under Contract To:

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

Contract No. W9128F-11-D-0032
Task Order No. 0002, Mod 2
Bhate Project No. NWO1132.0002.401

August 2015

CONSULTECH | BHATE
FEDERAL SERVICES JV, LLC
SBA 8 (a) Certified

Holloman Air Force Base

FINAL

CORRECTIVE ACTION COMPLETE PROPOSALS SWMU 4 (OW-C519) AND SWMU 8 (OW-C250) HOLLOMAN AIR FORCE BASE, NEW MEXICO

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Appendix A-2 Portions of: *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995,* November 1995, EBASCO Services, Inc., and Groundwater Technology Government Services, Inc.

Appendix A-3 Portions of: *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico,* July 2012, NationView, LLC

Appendix B SWMU 8 Historical Data from Previous Investigations

Appendix B-1 Portions of: *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995,* November 1995, EBASCO Services, Inc., and Groundwater Technology Government Services, Inc.

Appendix B-2 Portions of: *Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123 and OT-44, Holloman Air Force Base, New Mexico,* February 1996, Groundwater Technology Government Services, Inc.

Appendix B-3 Portions of: *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico,* December 1997, Foster Wheeler Environmental Corporation

Appendix B-4 Portions of: *Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis, Holloman AFB, New Mexico,* August 2, 2006, Bhate Environmental Associates, Inc.

Appendix B-5 Portions of: *Final RCRA Facility Investigation Work Plan, SWMU 8, Holloman Air Force Base, New Mexico,* March 2010, NationView, LLC

Appendix B-6 Portions of: *Final RCRA Facility Investigation Report SWMU 8, Holloman Air Force Base, New Mexico,* April 2012, NationView, LLC

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ACRONYMS AND ABBREVIATIONS

AAF	Army Air Field
ACC	Air Combat Command
ACM	Accelerated Corrective Measures
AFB	Air Force Base
AOC	Area of Concern
ASTM	American Society for Testing and Materials
B	Data Qualifier (analyte found in the associated method blank)
bgs	Below ground surface
Bhate	Bhate Environmental Associates, Inc.
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CAC	Corrective Action Complete
CES/CEAN	Civil Engineering Squadron/Environmental Asset Management Flight
COPC	Chemical of potential concern
1,2-DCA	1,2-Dichloroethane
1,2-DCP	1,2-Dichloropropane
DPT	Direct push technology
DQO	Data quality objectives
DRO	Diesel Range Organics
EBASCO	EBASCO Services, Inc.
ERP	Environmental Restoration Program
ft	Feet/foot
ft/ft	Feet per foot
FWENC	Foster Wheeler Environmental Corporation
GRO	Gasoline Range Organics
>	Greater than
GTI	Groundwater Technology, Inc.
HAFB	Holloman Air Force Base
J	Data Qualifier (denotes an estimated value)
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
NationView	NationView, LLC
NFA	No Further Action
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department

ACRONYMS AND ABBREVIATIONS (CONTINUED)

NMWQCC	New Mexico Water Quality Control Commission
NOD	Notice of Deficiency
ORO	Oil Range Organics
OWS	Oil/water separator
PCB	Polychlorinated biphenyl
PCS	Petroleum contaminated soil
PID	Photoionization detector
PMR	Permit Modification Request
POL	Petroleum, oil, and lubricants
ppm	Parts per million
RCRA	Resource Conservation Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RSL	Regional Screening Level
SSLs	Soil Screening Levels
SVOC	Semi-volatile Organic Compound
SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total dissolved solids
TPH	Total petroleum hydrocarbons
TRPH	Total recoverable petroleum hydrocarbons
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UTL	Upper tolerance limit
VCM	Voluntary Corrective Measures
VOC	Volatile Organic Compound

1 INTRODUCTION

The United States Air Force (USAF) and Holloman Air Force Base (AFB) (Permittee) is requesting Corrective Action Complete (CAC) Without Controls status for Solid Waste Management Units (SWMUs) 4 and 8 from the New Mexico Environment Department (NMED) in accordance with the New Mexico Hazardous Waste Act (Section 74-4-1 et seq., New Mexico Statutes Annotated 1978, as amended, 1992) and the New Mexico Hazardous Waste Management Regulations in 20.4.1 of the New Mexico Administrative Code (NMAC). These two SWMUs are listed in the Permitte's Resource Conservation and Recovery Act (RCRA) Part B Permit (NMED, 2004) pursuant to Title 40 Code of Federal Regulations Section 270.42(c) of the Hazardous and Solid Waste Amendments of 1984.

If the change status is approved, the Permittee requests NMED to initiate a Class 3 Permit Modification of Holloman AFB's RCRA permit (NMED, 2004). The modification would adjust the content of Tables A and B presented in Appendix 4-A of Holloman AFB's RCRA Permit (NMED, 2013). The tables list the status of SWMUs and Areas of Concern (AOCs) at the Base, and their content as follows:

- **Table A** – List of the SWMUs/AOCs Requiring Corrective Action (corrective action may be necessary to characterize and/or remediate past releases of hazardous wastes or hazardous constituents).
- **Table B** – List of the SWMUs/AOCs with Corrective Action Complete Without Controls status (corrective action has been completed and further corrective action is not currently required; no controls are required).
- **Table C** – List of the SWMUs/AOCs with Corrective Action Complete With Controls status (corrective action has been completed and further corrective action is not currently required; controls are required).

The proposed Class 3 Permit Modification would grant CAC without Controls for two SWMUs. The following SWMUS would move from Table A to Table B:

- **SWMU 4** – Building 131 Oil/Water Separator (OWS), USAF Site OW-C519
- **SWMU 8** – Building 231 OWS, USAF Site OW-C250

Table 1-1. SWMUs Proposed for Corrective Action Complete Without Controls

Section 4 Sub-section	SWMU / AOC	USAF Site Name	Description/Name
4.1	SWMU 4	OW-519	Building 131 OWS
4.2	SWMU 8	OW-250	Building 231 OWS

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2 FACILITY DESCRIPTION

2.1 Holloman AFB Site History and Geography

Holloman AFB is located in south central New Mexico, in the northwest central part of Otero County, approximately 75 miles north-north-east of El Paso, Texas (**Figure 2-1**). Holloman AFB has a population of 6,000 and occupies about 50,000 acres in the northeast quarter of Section 1, Township 17 South, Range 8 East. The White Sands Missile Range testing facilities occupy additional land extending northward from the Base. Private and public owned lands border the remainder of Holloman AFB. The major highway servicing Holloman AFB is Highway 70, which runs southwest from the town of Alamogordo and separates Holloman AFB from publicly owned lands to the south. Alamogordo is the county seat for Otero County, has a population of approximately 35,000 and is located approximately 7 miles east of the base. The economy of Alamogordo depends largely upon Holloman AFB and other military installations in the area.

Holloman AFB 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. The facility mission remained largely unchanged until 1971, although the facility identification changed several times during the 20-year span: Air Force Missile Test Center (1951-1952), Holloman Air Development Center (1952-1957), and Air Force Missile Development Center (1957-1971). The Tactical Air Command operated the facility from 1972 to 1992 and housed the 49th Tactical Fighter Wing, 479th Tactical Training Wing, 833rd Air Division, and 4449th Mobile Support Squadron. In 1992, Holloman AFB was realigned under the Air Combat Command (ACC) and also serves as the training center for the German Air Force's Tactical Training Center.

2.2 SWMU 4

SWMU 4 is located in an industrial area within the northeastern section of the main base area of Holloman AFB (**Figure 2-2**). SWMU 4 was a former OWS which serviced a washrack located southwest of Building 195 and north of former Building 131 in the vehicle maintenance area (**Figure 2-3**). Building 131 was a small structure that was previously located at the Site SD-08 (SWMU 82) washrack and was moved to its current location during the early 1980s when the SWMU 82 washrack was closed. All that currently remains of Building 131 is the foundation which is located along the south side of the washrack. The SWMU 4 OWS was an underground 50-gallon single chamber

OWS (steel and concrete construction) which was never connected to the sanitary sewer system and, during its use, drained to a former leach field reportedly located east of Building 195 (Foster Wheeler Environmental Corporation [FWENC], 1995).

The OWS was approximately 2.5 feet (ft) in diameter and 7 ft deep and accepted wash water from a heavy equipment washrack located adjacent to the unit. The separator received rinsate containing water, oils, detergents, and fuels from the washrack. The SWMU 4 OWS and settling tank were removed by EBASCO Services, Inc. (EBASCO) in July 1995 as part of the Base-wide remediation of petroleum, oil, and lubricants (POL) contaminated sites (EBASCO, 1995). The SWMU 4 leach field is located approximately 240 ft east-southeast of the former Building 131 OWS and is rectangular in size (30 ft x 60 ft). The location of the former SWMU 4 leach field and associated drain pipe are illustrated on **Figure 2-3**.

Additionally, as shown on **Figure 2-3**, Environmental Restoration Program (ERP) Site 9 is located approximately 225 ft northeast (and upgradient) of SWMU 4. ERP Site 9 was used as a waste POL drum storage area between 1965 and 1980. This site was investigated in 1992 and approved for No Further Action (NFA) status in February 2001. ERP Site 9 is listed as SWMU 42 - Building 1 Waste Accumulation Area on Table B (no further corrective action required) of the Holloman AFB Hazardous Waste Facility Permit (No. NM6572124422), Appendix 4-A (NMED, 2013).

2.3 SWMU 8

SWMU 8 (former Building 231 Oil/Water Separator) is located on the south side of Building 231. Building 231 (Auto Hobby Shop) is located on the Main Base at Holloman (**Figure 2-2**). The physical address of Building 231 is 642 West Connecticut Avenue, which is on the west side of the intersection of Second Street and Connecticut Avenue (**Figure 2-4**). The in-ground OWS at SWMU 8 was connected to the sanitary sewer (A.T. Kearney, Inc., 1988) and removed in August of 1995 (EBASCO, 1995). The in-ground OWS had a capacity of 300 gallons and was located east of the covered walkway which connected Buildings 231 and 232 and was approximately 4 ft wide, 6 ft long, and 4 ft deep, with the top of the unit raised a few inches above the ground surface (A.T. Kearney, Inc., 1988). The OWS was used to collect wash water, oil, and hydraulic water from the Auto Hobby Shop operation (Building 231).

3 HISTORY OF INVESTIGATIONS

The RCRA Part B Permit No. NM6572124442 (NMED, 2004) was initially issued by the NMED to Holloman AFB and became effective on September 25, 1991. The Holloman RCRA Part B Permit, Appendix 4-A (NMED, 2013) currently contains 25 SWMUs and 34 AOCs which are listed in Table A as sites requiring corrective action to characterize and/or remediate past releases of hazardous wastes or hazardous constituents.

Section 4 of this document describes the location and history of SWMUs 4 and 8, presents a summary of relevant information from previous site investigations, and provides the basis for the CAC without Controls determination. Detailed descriptions of the investigative results and remedial actions for each SWMU appear in the original investigative reports and/or the Holloman AFB administrative records. Historical environmental information and data collected from SWMUs 4 and 8 were obtained from the following documents. Analytical results tables, figures, and pertinent information from these reports are provided in the indicated appendices.

SWMU 4

- *RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report*, September 1988, A.T. Kearney, Inc. and DPRA, Inc.
- *Draft Final* [RCRA Facility Investigation] *RFI Report Table 3 RCRA Facility Investigation,* July 1995, FWENC and Radian Corporation (**Appendix A-1**)
- *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995,* November 1995, EBASCO and Groundwater Technology Government Services, Inc. (**Appendix A-2**)
- *Statement of Basis for Approval of No Further Action for 10 Solid Waste Management Units,* November 2004, Holloman Air Force Base
- *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico,* July 2012, NationView, LLC (NationView) (**Appendix A-3**)

SWMU 8

- *RCRA Facility Assessment Preliminary Review/Visual Site Inspection Report*, September 1988, A.T. Kearney, Inc., and DPRA, Inc.
- *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November*

1995, November 1995, EBASCO and Groundwater Technology Government Services, Inc. (**Appendix B-1**)

- *Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123 and OT-44, Holloman Air Force Base, New Mexico, February* 1996, Groundwater Technology Government Services, Inc. (**Appendix B-2**)

- *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico,* December 1997, FWENC. (**Appendix B-3**)

- *Memorandum Scope of Work for Soil and Groundwater Sampling and Analysis, Holloman Air Force Base, New Mexico,* May 2, 2006, Bhate Environmental Associates, Inc. (Bhate)

- *Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis, Holloman AFB, New Mexico,* August 2, 2006, Bhate (**Appendix B-4**)

- *Final RCRA Facility Investigation Work Plan, SWMU 8, Holloman Air Force Base, New Mexico,* March 2010, NationView (**Appendix B-5**)

- *Final RCRA Facility Investigation Report SWMU 8, Holloman Air Force Base, New Mexico,* April 2012, NationView (**Appendix B-6**)

4 SWMU DESCRIPTIONS

The following sections describe the location, history, and land use conditions for SWMUs 4 and 8. A site map showing the location of the two SWMUs is presented as **Figure 2-2**. A summary of relevant information from previous investigations and a basis for CAC determination for the two sites are also presented in this section. Historical analytical results were compared with the screening levels that were used at the time of the investigations. As per the HAFB RCRA Permit (NMED, 2013) the NMED soil screening levels (SSLs) were used as the primary action level for Volatile Organic Compounds (VOCs), Semi-volatile Compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) Metals. In the event a SSL has not been established for a particular chemical of potential concern (COPC) (e.g. 2-methylnapthalene) that constituent was compared to the U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs). There are two applicable standards for groundwater: the New Mexico Water Quality Control Commission (NMWQCC) groundwater standards for contaminants and the USEPA's *National Primary Drinking Water Regulations* (USEPA, 2009) Maximum Contaminant Levels (MCLs). The lower of the two standards was used as action levels for VOCs, SVOCs, pesticides, PCBs, and TAL metals detected in groundwater. Detected Total Petroleum Hydrocarbons (TPH) in soil and groundwater were compared to the NMED TPH Screening Guidelines. Additionally, all detected TAL metals (soil and groundwater) were compared to their respective NMED approved Background Levels (NMED, 2011).

4.1 SWMU 4 - Building 131 Oil/Water Separator

4.1.1 SWMU 4 Location

SWMU 4 is located southwest of Building 195 and north of former Building 131 in the vehicle maintenance area (**Figure 2-3**).

4.1.2 SWMU 4 History/Current and Anticipated Future Land Use

SWMU 4 was a former OWS which serviced a washrack located southwest of Building 195 and north of former Building 131 in the vehicle maintenance area (**Figure 2-3**). Building 131 was a small structure that was previously located at the Site SD-08 (SWMU 82) washrack and was moved to its current location during the early 1980s when the SWMU 82 washrack was closed. All that currently remains of Building 131 is the foundation which is located along the south side of the washrack. The SWMU 4 OWS was an underground 50-gallon single chamber OWS (steel and concrete construction) which was never connected to the sanitary sewer system and, during its use, drained to a former leach field reportedly located east of Building 195.

The OWS was approximately 2.5 feet ft in diameter and 7 ft deep and accepted wash water from a heavy equipment washrack located adjacent to the unit. The separator

received rinsate containing water, oils, detergents, and fuels from the washrack. The SWMU 4 OWS and settling tank were removed in July 1995 as part of the Base-wide remediation of POL contaminated sites. The SWMU 4 leach field is located approximately 240 ft east-southeast of the former Building 131 OWS and is rectangular in size (30 ft x 60 ft). The location of the former SWMU 4 leach field and associated drain pipe are illustrated on **Figure 2-3**. Current land use at SWMU 4 is industrial and is not expected to differ significantly in the future.

4.1.3 SWMU 4 Evaluation of Relevant Information

The SWMU 4 Leach Field is listed on Table A of the Holloman AFB RCRA Permit No. NM6572124422 as the Building 131 Oil/Water Separator. The RCRA Facility Assessment (RFA) Report (A.T. Kearney, 1988) identified the Building 131 OWS as SWMU 4 and reported that the OWS discharged to the Holloman AFB sanitary sewer system. It was subsequently determined (late 1980s/early 1990s) that the Building 131 OWS actually discharged to a leach field and not the Holloman AFB sanitary sewer.

Since 1988, SWMU 4 has been the subject of an environmental investigation, a remedial action, and the Accelerated Corrective Measures (ACM) investigation conducted in July/August 2010. This section provides a historical overview and chronology of the previous investigations conducted at SWMU 4 in 1994 and 1995 including the RFI, the OWS removal action, and the 2010 ACM investigation. The information (text, tables, and figures) provided in the following subsections and appendices has been reproduced from the previously submitted and NMED approved *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico* (NationView, 2012). The analytical results summary tables and figures depicting sampling locations from the previous investigations and the OWS removal action are included in **Appendix A**.

4.1.3.1 1994 RCRA Facility Investigation

SWMU 4 was initially investigated during the Table 3 RFI conducted by FWENC in the fall of 1994. During the construction of the Building 195 foundation (late 1980s) a leach field drain pipe from the Building 131 OWS (SWMU 4) was encountered. It was determined that the Building 131 OWS was never connected to the sanitary sewer system (RFA Report, A.T. Kearney, 1988) and during its use drained to a leach field reportedly located southeast of Building 195. The area of the reported leach field was investigated during the RFI to determine whether hazardous constituents had been released from the OWS. Four soil samples were collected at locations in the area of the leach field and near Building 195. The sample locations are shown on **Figure 4.1-1** in **Appendix A-1** of this report. As the OWS and settling tank were scheduled for removal in 1995 as part of the Base-wide POL remediation, soil samples were not collected from locations adjacent to the Building 131 OWS (FWENC, 1995).

As shown on **Figure 4.1-1** in **Appendix A-1**, three locations (04-06, 04-07, and 04-08) were sampled from 0 to 2 or 2 to 4 ft below ground surface (bgs) in the area of the suspected leach field. One sample (04-05) was also collected from 2 to 3 ft bgs near the southwest corner of Building 195, where it was reported that the leach field drain pipe was encountered during the construction of the building. All samples were analyzed for total recoverable petroleum hydrocarbons (TRPH) (FWENC, 1995). The results for the four samples collected during the RFI are listed in **Table 4.1-1** in **Appendix A-1**.

TRPH was detected in three samples (04-05, 04-06, and 04-07) with concentrations ranging from 7.6 to 18.4 milligrams per kilogram (mg/kg). TRPH was not detected in the soil sample collected from 2 to 4 ft bgs in soil boring 04-08. All detected concentrations of TRPH were below the TPH Screening Guidelines (residential direct exposure) for unknown oil. Additionally, no odor or visible staining was observed at any of the sampling locations. The RFI report concluded that there was no evidence to support that there had been a release in the area of the leach field or along the drain pipe to the leach field and recommended NFA for SWMU 4 (FWENC, 1995).

4.1.3.2 1995 Oil Water Separator Remedial Action

The Building 131 OWS (SWMU 4) remedial (removal) action was performed by EBASCO as part of the Holloman AFB POL Remediation project. The OWS and settling tank removal and site reclamation activities took place in late July/early August 1995. **Figure 6-1** in **Appendix A-2** of this report is a site map illustrating the extent of the OWS excavation. Representative samples of native soil (confirmation samples), and stockpiled soil were collected during the remedial action (EBASCO, 1995).

Approximately 92 cubic yards of potential petroleum contaminated soil (PCS) was stockpiled and transported offsite as non-hazardous waste to the Rhino Environmental treatment facility north of Newman, New Mexico for land-farming and disposal. Copies of the waste manifests and weight receipts are included in **Appendix A-2**. The demolished OWS, settling tank, and miscellaneous nonhazardous construction debris were transported to the Otero/Lincoln County Regional Landfill for disposal. The site was restored to its original condition and the laboratory analytical results indicated that only one detection of arsenic exceeded applicable action levels. Therefore, the Closure Report recommended no further action at SWMU 4 (EBASCO, 1995). A summary of the analytical data from this remedial action is presented below.

<u>Confirmation Soil Samples</u>

Five native soil confirmation samples were collected from within the excavation. Four soil samples were collected from the excavation corners (SWMU-4-1-8 through SWMU-4-4-8), and one from the center of the excavation (SWMU-4-5-8) at a depth of 8 ft bgs. The five confirmation soil samples were analyzed for VOCs, SVOCs, TRPH, and TAL metals. The analytical results are summarized in **Table 6-2** in **Appendix A-2**. VOCs

and SVOCs were not detected above the laboratory quantitation limits in any of the samples. TRPH was detected in the sample taken from the center of the excavation (SWMU-4-5-8) at a concentration of 47 mg/kg. This concentration of TRPH is below the TPH Screening Guidelines (residential direct exposure) for unknown oil. Various TAL metals were detected in all five samples. With the exception of arsenic detected in sample SWMU-4-4-8 at 13 mg/kg, all concentrations of TAL metals were below the residential SSLs. This singular detection of arsenic above the SSL is most likely the result of natural variability in soil geochemistry.

Stockpile Soil Samples

Headspace testing of soils with a photoionization detector (PID) and immunoassay field screening were used to determine VOC concentrations in the excavated stockpiled soil. TPH field screening indicated TPH concentrations ranging from 4.0 to 1,293 parts per million (ppm), therefore a composite soil sample was collected for offsite laboratory analysis. The composite stockpile soil sample was analyzed for TRPH, aromatic volatiles, Toxicity Characteristic Leaching Procedure (TCLP) VOCs, TCLP SVOCs, TCLP metals, waste characteristics, and lead.

The TCLP analytical results for VOCs, SVOCs, and aromatic volatiles were all below the laboratory quantitation limits (see **Table 6-3** in **Appendix A-2**). Only 0.0044 milligrams per liter (mg/L) of lead in the TCLP leachate was detected above the laboratory quantitation limits in the TCLP metals analysis. However, this detection is below the toxicity characteristic limit for lead of 5.0 mg/L. Laboratory analytical results also indicated 160 mg/kg of TRPH and 14 mg/kg of total lead (EBASCO, 1995).

4.1.3.3 2004 No Further Action Statement of Basis

Based on the findings from the RFI and the OWS remedial action, SWMU 4 was selected for NFA along with nine other SWMUs in a Statement of Basis issued in 2004 (HAFB, 2004). Based on a review of the NFA Statement of Basis, the NMED requested that additional sampling must be conducted for SWMU 4 prior to NFA approval. A copy of the NMED letter (HWB-HAFB-04-009) dated February 9, 2005, is included in **Attachment A**.

4.1.3.4 2010 ACM Investigation

The SWMU 4 ACM investigation was conducted by NationView from June through August 2010. The objectives of the ACM investigation were to fill in the data gaps from previous investigations and remove through excavation contaminated soil associated with the leach field and/or drain pipe (if contaminants were detected above soil screening criteria). To meet these objectives, the following field activities were performed during the ACM investigation conducted in July/August 2010:

- Conducted exploratory trenching to confirm the presence and orientation of the former OWS drain pipe and leach field.

- Advanced 10 soil borings (SWMU4-DP01 through SWMU4-DP10) within the OWS leach field and downgradient of the drain pipe to determine if a release had occurred. Two soil samples were collected from each soil boring and analyzed for VOCs, SVOCs, TPH (gasoline range organics [GRO], diesel range organics [DRO], and oil range organics [ORO]), pesticides, PCBs, and TAL metals.

- Installed a monitoring well network consisting of 10 wells. Monitoring wells SWMU4-MW02 through SWMU4-MW07 were installed downgradient of the removed Building 131 OWS, drain pipe, and former leach field. A transect of three wells (SWMU4-MW08 through SWMU4-MW10) was installed further downgradient to intercept potential groundwater contamination migration. For background purposes, one well (SWMU4-MW01) was installed centrally upgradient of the entire site.

- Collected one round of groundwater samples from each monitoring well (SWMU4-MW01 through SWMU4-MW10) and analyzed the samples for VOCs, SVOCs, TPH (GRO, DRO, and ORO), pesticides, PCBs, TAL metals, and total dissolved solids (TDS).

- Collected two geotechnical soil samples from the soil boring for the upgradient monitoring well (SWMU4-MW01) to provide geotechnical data of non-impacted soils at the site.

The following sections provide a summary of the field activities and analytical results from the SWMU 4 ACM investigation.

Exploratory Trenching

Prior to initiating the SWMU 4 ACM investigation, exploratory trenching was conducted to confirm the presence and orientation of the OWS drain pipe and OWS leach field. **Figure 4.1-1** in **Appendix A-1,** from the Draft Final Table 3 RFI Report (FWENC, 1995), shows that the Building 131 OWS drained to a leach field southeast of Building 195. The Table 3 RFI Report also states that the leach field drain pipe was encountered near the corner of Building 195 during construction of the building. However, the precise orientation and location of the remaining drain pipe and the leach field were not verified during the RFI. On June 30, 2010, NationView dug three exploratory trenches (60 to 100 ft long by 2 ft wide by 5-6 ft deep) to intercept the OWS drain pipe. The locations of the three exploratory trenches are shown on **Figure 5-1** in **Appendix A-3**. The leach field drain pipe was not encountered in any of the three exploratory trenches; therefore it was assumed that it had been previously removed. As a result the boreholes and monitoring well network were not relocated and were installed at the locations presented in the SWMU 4 ACM Work Plan (NationView, 2009).

Soil Investigation and Analytical Results

In July 2010, 23 subsurface soil samples (including 2 duplicates) were collected from the 11 DPT soil borings (SWMU4-DP01 through SWMU4-DP10 and –DP12) which were installed in close proximity to the Building 131 OWS, former OWS drain pipe, and within the area of the suspected leach field at SWMU 4 (see **Figures 5-2 and 5-3** in **Appendix A-3**). These samples were analyzed for VOCs, SVOCs, TPH (DRO, GRO, and ORO), PCBs, pesticides, and TAL metals. **Table 5-1** in **Appendix A-3** presents a summary of the SWMU 4 soil boring numbers, locations, sample intervals, and the analysis conducted on the samples by the offsite laboratory.

The subsurface soil samples collected from soil borings SWMU4-DP01 through SWMU4-DP10 were collected from 1 to 2 ft bgs and from 6 to 7 ft bgs. The soil sample from borehole SWMU4-DP12 (geotechnical borehole converted into MW01) was collected at 14 to 15 ft bgs from a slightly discolored interval which exhibited a faint sewer like odor. The last digit of the sample identification number indicates the bottom of the sample interval. The analytical results for these soil samples are summarized in **Table 7-1** in **Appendix A-3** and the geotechnical results are provided in **Table 7-2** in **Appendix A-3**. The following bullets provide a summary of the analytical and geotechnical results:

- Two VOCs (carbon disulfide and/or methylene chloride) were detected above the method detection level (MDL) in 14 of the 23 subsurface soil samples collected at SWMU 4. The maximum concentrations of carbon disulfide (5.9 J [estimated value] micrograms per kilogram [µg/kg]) and methylene chloride (20.7 B [analyte found in the associated method blank] µg/kg) were below their respective NMED SSLs. Furthermore, 10 of the 13 detections of methylene chloride were also detected in the associated method blank, resulting from laboratory cross-contamination.

- Low concentrations of 11 SVOCs were detected above the MDL in 4 of the 23 soil samples. All analyzed SVOCs were detected at concentrations below their respective NMED SSLs.

- The TPH fraction ORO (C22 – C36) was detected above the MDL in one sample (SWMU4-DP01-2) at a concentration of 47.1 mg/kg. TPH fractions GRO (C6 – C10) and DRO (C10 – C22) were not detected in any of the SWMU 4 ACM soil samples. The singular detection of TPH-ORO from 1-2 ft bgs in soil boring DP01 was below the NMED TPH screening guideline for unknown oil.

- All analyzed PCB and pesticide compounds were not detected in any of the 23 SWMU 4 soil samples.

- Twenty-two of the 23 TAL metals were detected above the MDL. With the exception of thallium (one sample) all detected TAL metals were below their

respective NMED SSLs. However, the singular detection of thallium (0.89 mg/kg) detected above the SSL in soil sample SWMU4-DP01-2 was below the NMED approved background level (1.3 mg/kg) (Table 1, NMED, 2011).

- Two geotechnical samples were collected from soil boring SWMU4-DP12. Soil samples SWMU4-DP12-2 and SWMU-DP12-3 were analyzed for bulk density, fractional organic carbon, moisture content, and specific gravity. The geotechnical results are provided in **Table 7-2** in **Appendix A-3**.

Groundwater Assessment and Analytical Results

Groundwater samples and water level elevations were collected from the 10 new monitoring wells (SWMU4-MW01 through SWMU4-MW10) in August 2010 (see **Figure 5-3** in **Appendix A-3**). The groundwater samples collected from the SWMU 4 monitoring well network were analyzed for VOCs, SVOCs, TPH (GRO, DRO, and ORO), PCBs, pesticides, TAL metals, and TDS. The analytical results are presented in **Table 7-3** in **Appendix A-3** and the monitoring well locations with selected data are shown on **Figure 7-1** in **Appendix A-3**. In addition, **Tables 3-2** and **3-3** in **Appendix A-3** present the August 2010 groundwater elevation data and SWMU 4 monitoring well construction details, respectively. The following narrative provides a summary of the ACM groundwater analytical results.

Ten VOCs were detected above the MDL in 7 of the 10 groundwater samples collected from the SWMU 4 monitoring well network (see **Table 7-3** in **Appendix A-3**). Of the 10 VOCs detected above the MDL, two VOCs (1,2-dichloroethane [1,2-DCA] and 1,2-dichloropropane [1,2-DCP]) were detected at concentrations which slightly exceeded their USEPA MCL. 1,2-DCA and 1,2-DCP were detected in the groundwater sample collected from monitoring well SWMU4-MW05 at 9.0 and 6.1 micrograms per liter (µg/L) respectively. **Figure 7-1** in **Appendix A-3** illustrates the location of SWMU4-MW05 in relation to the SWMU 4 monitoring well network.

Based on the VOC groundwater data generated from the SWMU 4 ACM investigation, coupled with the south-southeastern groundwater flow direction (see **Figure 3-8** in **Appendix A-3**), these isolated exceedances of 1,2-DCA and 1,2-DCP (detected in monitoring well SWMU4-MW05) with respect to applicable groundwater standards (USEPA MCL and NMWQCC) were delineated, as no VOCs were detected in the groundwater sample collected from monitoring well SWMU4-MW07 which is located 70 ft downgradient of SWMU4-MW05. Additionally, these isolated detections of 1,2-DCA and 1,2-DCP most likely represent residual groundwater contamination migrating from the upgradient ERP Site 9 (shown on **Figure 2-3**). During the Remedial Investigation conducted at ERP Site 9 in 1991, 1,2-DCA was detected in the groundwater sample collected from monitoring well MW-09-04 at a concentration of 3.3 J µg/L (Radian, 1992). Monitoring well MW-09-04 is located approximately 150 feet upgradient from monitoring well SWMU4-MW05.

All analyzed SVOCs, PCBs, and pesticides were not detected in any of the SWMU 4 groundwater samples collected during the ACM investigation (see **Table 7-3** in **Appendix A-3**).

Low concentrations of TPH fractions DRO (C_{10} – C_{22}) and/or ORO (C_{22} – C_{36}) were detected above the MDL in the groundwater samples collected from 9 of the SWMU 4 monitoring wells (see **Table 7-3** in **Appendix A-3**). The maximum concentration of TPH-DRO (0.634 mg/L) and TPH-ORO (1.94 mg/L) were detected in the duplicate groundwater sample SWMU4-MW07-A. TPH-GRO (C_6 – C_{10}) was not detected in any of the SWMU 4 monitoring wells. The duplicate groundwater sample SWMU4-MW07-A also contained the maximum combined TPH-GRO, DRO, and ORO concentration (2.574 mg/L). Each of these individual and combined TPH-GRO, DRO, and ORO detections was below the NMED TPH screening guideline for unknown oil.

A total of 16 TAL metals were detected above the MDL. Three of the TAL metals (aluminum, iron, and manganese) were detected above their respective USEPA Secondary MCLs and/or NMWQCC groundwater standards (see **Table 7-3** in **Appendix A-3**). Aluminum was detected in two groundwater samples (SWMU4-MW03 and SWMU4-MW09) above the USEPA Secondary MCL at concentrations of 292 µg/L and 870 µg/L, respectively. Iron was detected above the USEPA Secondary MCL and/or the NMWQCC standard in five groundwater samples (SWMU4-MW01, SWMU4-MW03, SWMU4-MW04, SWMU4-MW05, and SWMU4-MW09) with concentrations ranging from 667 µg/L to 17,400 µg/L. Manganese was detected in all 11 groundwater samples above the USEPA Secondary MCL and/or the NMWQCC standard with concentrations ranging from 131 µg/L (SWMU4-MW07-A) to 1,840 µg/L (SWMU4-MW05). **Figure 7-1** in **Appendix A-3** presents the distribution of TAL metals detected in groundwater which exceeded applicable USEPA Secondary MCLs and/or NMWQCC groundwater standards at SWMU 4.

The detections of aluminum, iron, and manganese were most likely due to the natural variability of groundwater geochemistry and were not related to a release from the previously removed OWS, leach field drain pipe, and former leach field as elevated concentrations of iron and manganese were detected in the upgradient monitoring well (SWMU4-MW01). Furthermore, the National Secondary Drinking Water Regulations are non-enforceable guidelines regarding contaminants that may cause aesthetic effects (such as taste, odor, or color in drinking water). In addition, five metals (barium, cobalt, iron, nickel, and vanadium) were detected in eight groundwater samples above their respective NMED approved background levels for dissolved constituents. With the exception of vanadium, these detections were below their respective action levels (MCLs and/or NMWQCC groundwater standards). There are no applicable action levels for vanadium, however the singular detection of vanadium in the groundwater sample collected from SWMU4-MW06 (75.2 µg/L) was only slightly above the NMED approved background level (73.8 µg/L) and most likely represents the natural variability of groundwater geochemistry at Holloman AFB.

TDS concentrations ranged from 1,860 mg/L (SWMU4-MW07) to 12,200 mg/L (SWMU4-MW05) and exceeded the NMWQCC groundwater standard and the USEPA Secondary MCL in each well sampled at SWMU 4. With the exception of SWMU4-MW05, TDS concentrations at SWMU 4 were below 10,000 mg/L, however it is believed that these deflated TDS concentrations are due to two leaking underground waterlines which traverse the site (see **Figure 3-8** in **Appendix A-3**) as the Holloman AFB unfiltered (total) upper tolerance limit (UTL) for TDS is 65,956.58 mg/L (NationView|Bhate JV III, 2011). Without the anthropogenic influence of leaking underground waterlines the TDS concentrations at the SWMU 4 site would be greater than 10,000 mg/L. Therefore, the TDS concentration at SWMU4-MW05 (12,200 mg/L) most likely represents the natural TDS value present onsite. Furthermore, TDS concentrations greater than 10,000 mg/L are classified by the USEPA as a Class III B aquifer which is designated as unfit for human consumption (USEPA, 1986). As a result of this classification the human ingestion of groundwater at this site is an incomplete pathway.

4.1.4 Basis of Determination – SWMU 4

SWMU 4 is proposed for Corrective Action Complete without Controls status, which would move the site from Table A to Table B (Appendix 4-A, Holloman AFB RCRA Permit [NMED, 2013]). The NMED approved the *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico* (NationView, 2012) which requested No Further Action, in correspondence dated August 14, 2014. A copy of the NMED approval letter (HWB-HAFB-12-016) is provided in **Attachment A**. The approval letter advised Holloman AFB to submit a Class 3 Permit Modification Request (PMR) to NMED to change the status of SWMU 4 from Correction Action Required to Corrective Action Complete in accordance with 20.4.1.900 NMAC incorporating 40 CFR §270.42(c) and the facility's RCRA Permit at Part 4, Appendix 4-B, Section III, *Determination of No Further Action.* The process for a Class 3 PMR includes requirements for public notice and for providing opportunity for public comment that are mandatory.

4.2 SWMU 8 - Building 231 Oil/Water Separator

4.2.1 Location – SWMU 8

SWMU 8 is located on the south side of Building 231 (Auto Hobby Center), northeast of the covered walkway which connected Buildings 231 and 232 (**Figure 2-4**). The physical address of Building 231 is 642 West Connecticut Avenue, which is on the west side of the intersection of Second Street and Connecticut Avenue.

4.2.2 SWMU 8 History/Current and Anticipated Future Land Use

The in-ground OWS at SWMU 8 was removed in August of 1995 (EBASCO, 1995). The in-ground OWS had a capacity of 300 gallons and was located east of the covered walkway which connected Buildings 231 and 232 and was approximately 4 feet wide, 6 feet long, and 4 feet deep, with the top of the unit raised a few inches above the ground surface. Current land use at SWMU 8 is industrial and is not expected to differ significantly in the future.

4.2.3 Evaluation of Relevant Information – SWMU 8

SWMU 8 is listed on Table A of the Holloman AFB RCRA Permit No. NM6572124422 as the Building 231 Oil/Water Separator. The RCRA Facility Assessment Report (A.T. Kearney, 1988) identified the Building 231 OWS as SWMU 8 and reported that a release had occurred from the OWS to the soil and/or groundwater. Stained soils on the north side of the unit, around the cleanout pipe were thought to be the result of spills, rather than overflow.

Since 1988 this SWMU has been the subject of four environmental investigations and three PCS remedial (removal) actions. This section provides a historical overview and chronology of the previous investigations and remedial actions which were conducted at SWMU 8 from 1995 through 2010. The information (text, tables, and figures) provided in the following subsections and appendices has been reproduced from the previously submitted and NMED approved *Final RCRA Facility Investigation Report SWMU 8, Holloman Air Force Base, New Mexico* (NationView, 2012). The analytical results summary tables and figures depicting sampling locations from the previous investigations and the OWS and PCS removal actions are included in **Appendix B** of this report.

4.2.3.1 1995 Oil Water Separator Remedial Action

The initial SWMU 8 remedial action (Building 231 OWS removal) was conducted by EBASCO and took place during August 1995 (EBASCO, 1995). Approximately 21 cubic yards (28 tons) of PCS was removed at this time. Four native soil confirmation samples were collected from the excavation corners (SWMU-8-01-7 through SWMU-8-04-7), and one from the center of the excavation (SWMU-8-05-7). The sample locations are shown on **Figure 10-1** in **Appendix B-1**.

TRPH concentrations above the NMED TPH Screening Guideline for unknown oil were detected in all 5 samples. TRPH concentrations of 23,000; 31,000; 6,500; 1,200; and 940 mg/kg were detected in samples SWMU-8-01-7, SWMU-8-02-7, SWMU-8-03-7, SWMU-8-04-7, and SWMU-8-05-7 respectively.

Several VOC analytes (USEPA Method 8240) were detected in samples SWMU-8-01-7 and SWMU-8-02-7. In the SVOC samples, naphthalene concentrations were present in

SWMU-8-01-7 and SWMU-8-05-7. In addition, 2-methylnaphthalene concentrations were present in SWMU-8-01-7 through SWMU-8-03-7. None of the other SVOC analytes in USEPA Method 8270 were detected. Additionally, all detected VOCs and SVOCs were below the NMED SSLs and/or USEPA RSLs.

All metals (USEPA 6000/7000 Series) were detected below the NMED SSLs. Analytical results for VOCs, SVOCs, and TAL metals are summarized in **Table 10-2** in **Appendix B-1**. Confirmation soil sample locations and analytical results from the EBASCO OWS removal and remedial excavation which exceeded NMED Residential SSLs, USEPA RSLs, and/or NMED TPH Screening Guidelines are presented on **Figure 2-4** in **Appendix B-6**.

Excavated contaminated soil was stockpiled and sampled for off-site disposal. Based on the analytical results from the stockpile samples (**Table 10-3** in **Appendix B-1**) the 21 cubic yards of contaminated soil was transported offsite as non-hazardous waste to the Rhino Environmental Services, Inc., landfarm facility located north of Newman, New Mexico for treatment and disposal in early October 1995. Copies of the waste manifests and weight certificates/receipts are also included in **Appendix B-1**. Due to the elevated TRPH detected in all four excavation sidewall samples and one bottom sample, the Closure Report (EBASCO, 1995) recommended further delineation and remediation of the remaining PCS (detected in samples SWMU-8-01-7 through SWMU-8-05-7).

4.2.3.2 1996 Site Characterization

Characterization to delineate the extent of subsurface soil in excess of the TPH action level at SWMU 8 was conducted by Groundwater Technology, Inc. (GTI), in February 1996. Four soil borings (DP-1 through DP-3, and DP-5) were advanced with direct push technology (DPT) drilling methods during this sampling event (see **Figure 3** in **Appendix B-2**). Each borehole was advanced to 12 ft bgs, sampled continuously, and field screened for VOCs with a PID.

The analytical results for these samples are summarized in **Table 3** in **Appendix B-2**. TRPH was not detected in any of the samples collected from the boreholes advanced in the vicinity of the former Building 231 OWS (SWMU 8). The GTI letter report stated that TRPH was not quantified under the slab at Building 231, and that based on the locations of the four borings (see **Figure 3** in **Appendix B-2**), it appeared that delineation of TRPH detected at the OWS was complete.

4.2.3.3 1997 Phase II Remedial Action

Based on an agreement between NMED and Holloman AFB, soil with TRPH concentrations exceeding the TPH action level which extended under large structures would not require remediation if this soil posed no potential health risk. As a result,

additional SWMU 8 excavation activities were planned to remove all TRPH-contaminated soil that did not extend under Buildings 231 and 232.

In April 1997, FWENC resumed remedial activities and removed an additional 31.8 cubic yards (43 tons) of PCS from an excavation which extended eastward from the eastern edge of the original SWMU 8 excavation (FWENC, 1997). Representative samples of in-place and stockpiled soil were also collected during the second remedial action. The four excavation sidewall samples (see **Figure 4-1** in **Appendix B-3**) were analyzed for TRPH; VOCs; SVOCs; benzene, toluene, ethylbenzene, xylenes (BTEX); and metals. VOC and SVOC analytical results for the Phase II excavation confirmation samples did not exceed the NMED SSLs. TRPH concentrations ranged from not-detected to 78 mg/kg and were all below the TPH Screening Guideline for an unknown oil. The analytical results for these samples are provided in **Table 4-1** in **Appendix B-3**.

The excavated contaminated soil was stockpiled and sampled for off-site disposal. One composite soil stockpile sample was collected and analyzed for TRPH, TCLP constituents (VOCs, SVOCs, and metals), BTEX, lead, and RCRA characteristics (FWENC, 1997). As shown in **Table 4-1** in **Appendix B-3,** the analytical result for TRPH was 36 mg/kg. All detections of VOCs, SVOCs, BTEX, and metals were below their respective NMED SSLs. Based on the analytical results from the stockpile sample, the 38.1-cubic yards of PCS from the second excavation was transported offsite as non-hazardous waste to the Rhino Environmental Services, Inc., landfarm facility located north of Newman, New Mexico for treatment and disposal. Copies of the waste manifests and weight certificates/receipts are also included in **Appendix B-3** of this report.

No further excavation of contaminated soil was possible at the site to the west of samples SWMU-8-01-7 and SWMU-8-02-7 (initial PCS removal action, EBASCO 1995) due to a covered walkway which connected Building 231 and 232. Foster Wheeler requested that NFA be granted for SWMU 8 because 80-90 percent of TRPH-contaminated soil had been excavated, and no further excavation was possible. The second excavation was backfilled with clean soil (FWENC, 1997).

4.2.3.4 2006 Additional Site Characterization

A Notice of Deficiency (NOD) letter from NMED to Holloman AFB dated April 14, 2006 (**Attachment B**), stated that the Base needed to conduct additional site characterization activities prior to initializing the SWMU 8 Voluntary Corrective Measures (VCM) Soil Remediation Work Plan (Phase III PCS excavation). This letter also required Holloman AFB to utilize the residential NMED TPH Screening Guideline for an “unknown oil” for performing all subsequent work at SWMU 8.

On behalf of Holloman AFB, Bhate submitted a response letter to this NOD from the NMED on June 12, 2006 (**Attachment B**). In the response letter, Bhate agreed to make appropriate changes to the Draft VCM Work Plan (Bhate, 2005) based on NMED

comments. Bhate also stated that additional delineation of soil and groundwater was performed in May 2006, based on the Memorandum Scope of Work for Soil and Groundwater Sampling and Analysis (Bhate, 2006a).

In response to the NMED NOD dated April 14, 2006, Bhate was subcontracted to address the recommendations made by NMED concerning further site characterization. The primary objective of this investigation was to characterize the remaining soil contamination at the site (which was not underneath the adjacent structures) and to install and sample groundwater monitoring wells. This additional investigational work had to be completed prior to NMED approval of the SWMU 8 VCM Work Plan. Field work for the SWMU 8 Additional Site Characterization was conducted in accordance with the Memorandum Scope of Work for Soil and Groundwater Sampling and Analysis (Bhate, 2006a) which was verbally approved by the NMED. The following information was obtained from the *Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis, Holloman AFB, New Mexico* (Bhate, 2006b).

A total of three DPT soil borings were advanced and converted into monitoring wells at SWMU 8 in May 2006. One soil sample was collected from SWMU-8-DP01 and SWMU-8-DP02 for laboratory analysis. A soil sample was not collected from SWMU-8-DP03 as this borehole was installed within clean backfill from the Phase II excavation. Three groundwater samples and a round of water levels were collected from the three monitoring wells on June 7, 2006. The locations of the DPT soil borings and subsequent monitoring wells are illustrated on **Figure 1** in **Appendix B-4**.

Table 1 in **Appendix B-4** presents the groundwater elevation data collected from the three monitoring wells and a potentiometric surface map was prepared using the data (see **Figure 2** in **Appendix B-4**). The contour map indicates that groundwater flow was to the west-southwest across the site at a gradient of approximately 0.013 feet per foot (ft/ft).

Soil Sampling Results

The three soil samples (including one duplicate) were analyzed for VOCs, SVOCs, TPH (GRO/DRO/ORO), TAL metals, and PCBs. **Table 2** in **Appendix B-4** of this report presents the analytical results for soil samples collected from the boreholes converted into monitoring wells. One VOC (naphthalene) was detected in the soil sample collected from SWMU-08-DP01-5; all other VOCs were not detected. The estimated concentration of naphthalene (2.7 µg/kg) was well below the NMED SSL for naphthalene. No other SVOCs, TPH (GRO/DRO/ORO), or PCBs were detected. Additionally all TAL metals detected in the subsurface soil samples were below their respective SSLs and NMED approved Holloman AFB background levels (Table 1, NMED 2011).

Groundwater Sampling Results

The four groundwater samples (including one duplicate) collected from monitoring wells SWMU-08-DP01, SWMU-08-DP02, and SWMU-08-DP03 were analyzed for VOCs, SVOCs, PCBs, TAL metals, and TDS. In addition to these analytes, the groundwater sample from SWMU-8-DP01 was analyzed for TPH (DRO/ORO), while groundwater samples from SWMU-08-DP02 and SWMU-08-DP03 were analyzed for TPH (GRO/DRO/ORO) (see **Table 3** in **Appendix B-4**). Low concentrations of four VOCs (bromodichloromethane, chloroform, dibromochloromethane, and o-dichlorobenzene) were detected in the groundwater samples from the three monitoring wells installed at SWMU 8. No other anlayzed VOCs were detected. All of the detected VOCs were below the NMWQCC Groundwater Standards. No other analyzed SVOCs, TPH (GRO/DRO/ORO), or PCBs were detected.

Fourteen TAL metals were detected in the four groundwater samples collected. Manganese exceeded the NMWQCC standard in SWMU-08-DP01 and SWMU-08-DP02. Arsenic and beryllium were both detected above their respective USEPA MCLs, and aluminum was detected above the USEPA Secondary Drinking Water Standard. All other detected metals were below their respective NMWQCC standards and USEPA MCLs.

TDS concentrations ranged from 2,600 to 3,190 mg/L. It was hypothesized that these TDS concentrations were artificially low due to the dilution of natural groundwater from leaking water lines. Interviews with the Postal Service Center (Building 232) personnel in 2006 indicated that two sink holes had developed along Connecticut Avenue (east side of Building 232) approximately 6 to 8 months prior to this work being completed (Bhate, 2006b). The development of these sinkholes was due to the leaking underground water lines and the soluble gypsiferous soils present at the site and HAFB. The main Base area at Holloman AFB is known to have had a number of leaking underground utilities which can affect local groundwater elevations and redirect the local groundwater flow direction. Groundwater sampling locations and analytical results from the sampling performed by Bhate in 2006 which exceeded NMWQCC standards or USEPA MCLs are presented on **Figure 2-5** in **Appendix B-6**.

4.2.3.5 2008 Voluntary Corrective Measures

After the additional site characterization had been completed, NMED provided a letter dated October 12, 2006, conditionally approving the Draft VCM Work Plan, SWMU 8 Soil Remediation (Bhate, 2005) once changes had been made and re-submitted. A copy of the conditional approval letter is located in **Attachment B** of this report. The Final VCM Work Plan, SWMU 8 Soil Remediation (Bhate, 2008) reflected the changes suggested by NMED, and was approved on December 11, 2008. A copy of the approval letter is located in **Attachment B** of this report. The primary objective of the VCM was to remove and properly dispose of the remaining PCS between Buildings 231 and 232. The VCM required the removal of all PCS (not including soil underneath

buildings) at the site through excavation with verification of complete removal via confirmation sampling from the excavation.

In October 2008, Bhate performed the VCM excavation at SWMU 8. During the implementation of the VCM, the covered walkway which connected Buildings 231 and 232 was demolished to allow for soil removal in the area to the west of the Phase I excavation performed by EBASCO in 1995. The approximate area of the VCM excavation was 560 square feet extending to a depth of 8.5 ft bgs. An additional 80 cubic yards of PCS was removed and transported to the permitted Holloman AFB FT-31 Landfarm for treatment. As shown on **Figure 1** in **Appendix B-5**, the 2008 VCM excavation extended 25 feet west of the Phase I excavation performed by EBASCO in 1995, overlapped the entire Phase I excavation along with the eastern third of the Phase II excavation performed by FWENC in 1997 and extended deeper than both previous removal actions.

Representative samples of in-place soil were collected during the VCM excavation. A total of 17 sidewall and 4 bottom confirmation soil samples were collected and analyzed for TPH, VOCs, SVOCs, PCBs, and TAL metals. TPH was analyzed for -GRO, -DRO, and -ORO fractions. TPH-GRO detections ranged from 5.3 mg/kg to 12 mg/kg. TPH-DRO detections ranged from 0.55J (data qualifier indicating an estimated concentration) mg/kg to 2,380 mg/kg. TPH-ORO detections ranged from 2.1J mg/kg to 743 mg/kg. The combined TPH (GRO/DRO/ORO) concentrations exceeded the NMED TPH Screening Guideline for unknown oil in 8 of the 17 excavation sidewall samples. VOC, SVOC, PCB, and TAL metal analytical results from the VCM confirmation soil samples did not exceed the NMED SSLs or USEPA RSLs. In addition, all TAL metals were detected below the NMED approved Holloman AFB background levels (Table 1, NMED 2011). A summary table of the analytical data for the sidewall and bottom samples collected in 2008 is presented in **Table 1** in **Appendix B-5**. Soil sampling locations and analytical results from the SWMU 8 VCM which exceeded NMED SSLs, USEPA RSLs, and/or NMED TPH Screening Guidelines are also presented on **Figure 1** in **Appendix B-5**.

4.2.3.6 2010 RCRA Facility Investigation

The SWMU 8 RFI was conducted by NationView from October through December 2010. The objectives of the RFI were to collect soil samples from below Buildings 231 and 232 to determine the nature and extent of soil contamination beneath these structures, install additional monitoring wells to determine the nature and extent of groundwater contamination beneath Buildings 231 and 232, and to collect sufficient analytical and geotechnical data in order to complete a site-specific risk assessment of the exposure pathways.

To meet these objectives, the following field activities were performed during the RFI:

- Advanced 12 soil borings (SWMU8-DP04 through SWMU8-DP15) within Buildings 231 and 232, in close proximity to the former Building 231 Oil/Water Separator (SWMU 8). One soil sample was collected from each soil boring and analyzed for VOCs, SVOCs, TPH (GRO, DRO, and ORO), PCBs, and TAL metals.

- Collected two geotechnical soil samples from the upgradient soil boring (SWMU8-DP16) to provide geotechnical data of non-impacted soils for the risk assessment.

- Installed three new monitoring wells (SWMU8-DP05, SWMU8-DP13, and SWMU8-DP17) to evaluate potential groundwater water impacts inside Buildings 231 and 232.

- Collected one round of groundwater samples from the three new monitoring wells (SWMU8-DP05, SWMU8-DP13, and SWMU8-DP17) and three existing onsite monitoring wells (SWMU8-DP01 through SWMU8-DP03). Groundwater samples were analyzed for VOCs, SVOCs, TPH (GRO, DRO, and ORO), PCBs, TAL metals, and TDS analysis.

The following sections provide a summary of the field activities and analytical results from the SWMU 8 RFI.

Soil Investigation and Analytical Results

In October 2010, 14 subsurface soil samples (including two duplicates) were collected from the 12 DPT soil borings (SWMU8-DP04 through SWMU8-DP15) which were advanced within Buildings 231 and 232, in close proximity to the former Building 231 OWS (see **Figure 5-1** in **Appendix B-6**). These samples were analyzed for VOCs, SVOCs, TPH (DRO, GRO, and ORO), PCBs, and TAL metals. **Table 5-1** in **Appendix B-6** presents a summary of the SWMU 8 soil boring locations, sample intervals, and the soil samples which were collected for offsite analysis.

Subsurface soil samples for chemical analysis were collected at 7 and 8 ft bgs with the last digit of the sample identification number indicating the bottom of the sample interval. The SWMU 8 soil analytical results for all detections above the MDL are summarized in **Table 7-1** in **Appendix B-6** and the boring locations with selected results are shown on **Figure 7-1** in **Appendix B-6**. The following bullets provide a summary of the analytical and geotechnical results:

- Twelve VOCs were detected above the MDL in the 14 subsurface soil samples collected during the RFI. The maximum concentrations of the detected VOCs were all below their respective SSLs or RSLs.

- Estimated concentrations of 3 SVOCs were detected above the MDL in 3 of the 14 subsurface soil samples collected during the RFI. The maximum concentrations of the detected SVOCs were all below their respective SSLs or RSLs.

- TPH were analyzed for GRO (C_6 – C_{10}), DRO (C_{10} – C_{22}), and ORO (>C_{22} – C_{36}) fractions. The samples containing TPH concentrations detected above the MDL were; SWMU8-DP04-7, SWMU8-DP05-7, SWMU8-DP05-7A (duplicate sample), SWMU8-DP06-7, and SWMU8-DP08-8. TPH-GRO detections ranged from 243 mg/kg to 737 mg/kg. TPH-DRO detections ranged from 110 mg/kg to 898 mg/kg. TPH-ORO detections ranged from 128 mg/kg to 453 mg/kg. The combined TPH (GRO/DRO/ORO) concentrations exceeded the NMED TPH Screening Guideline for unknown oil in 3 of the 14 soil samples (SWMU8-DP05-7, SWMU8-DP05-7A, and SWMU8-DP06-7) collected during the RFI. **Figure 7-1** in **Appendix B-6** shows the distribution of TPH detected above the NMED TPH Screening Guideline for unknown oil in the soil samples collected during the RFI.

- Estimated concentrations of 2 PCBs were detected above the MDL in 5 of the 14 subsurface soil samples collected during the RFI. Maximum concentrations of Aroclor 1232 (86.4J µg/kg) and Aroclor 1254 (40.2J µg/kg) were both below their respective SSLs.

- Nineteen of the 23 TAL metals were detected above the MDL. All TAL metals were detected below their respective SSLs or RSLs.

- The two geotechnical samples collected from borehole SWMU8-DP16 (SWMU8-DP16-2 and -3) were analyzed for bulk density, fractional organic carbon, percent solids, and specific gravity. The geotechnical analytical results are presented in **Table 7-2** in **Appendix B-6**.

Groundwater Assessment and Analytical Results

Groundwater samples were collected from the three new monitoring wells (SWMU8-DP05, SWMU8-DP13, and SWMU8-DP17) along with three existing onsite monitoring wells (SWMU8-DP01 through SWMU8-DP03) during the SWMU 8 RFI groundwater sampling event conducted in December 2010 (see **Figure 5-2** in **Appendix B-6**). A total of seven groundwater samples (including one duplicate) were analyzed for VOCs, SVOCs, TPH, PCBs, TAL metals, and TDS. Groundwater analytical results are presented in **Table 7-3** in **Appendix B-6** and monitoring well locations with selected results are shown on **Figure 7-2** in **Appendix B-6**. To determine the groundwater flow direction, groundwater elevations were measured at four monitoring wells on December 13, 2010. **Tables 3-2** and **5-2** in **Appendix B-6** present the December 2010 groundwater elevation data and SWMU 8 monitoring well construction details, respectively. The SWMU 8 groundwater flow direction is generally toward the south-southwest as shown on **Figure 3-8** in **Appendix B-6**. The following narrative provides

a summary of the RFI groundwater analytical results.

Low and estimated concentrations of eight VOCs and four SVOCs were detected above the MDL in groundwater samples collected during the SWMU 8 RFI. Each of these VOC and SVOC detections were below their respective USEPA MCL and/or the NMWQCC groundwater standards. Further, all analyzed PCB compounds were not detected in any of the SWMU 8 groundwater samples collected during the RFI.

TPH fractions GRO (C_6 – C_{10}), DRO (C_{10} – C_{22}), and ORO (>C_{22} – C_{36}) were detected above the MDL in the two groundwater samples collected from monitoring well SWMU8-DP05 during the RFI. All detections of TPH-GRO, -DRO, and –ORO (individual and combined) in groundwater samples collected during the RFI sampling event were below the NMED TPH screening guideline for unknown oil.

A total of 16 TAL metals were detected above the MDL. Manganese was the only TAL metal which was detected above its respective USEPA MCL, USEPA Secondary MCL, and/or NMQWCC groundwater standard. Manganese was detected above the USEPA Secondary MCL in three groundwater samples, with concentrations ranging from 111 µg/L (SWMU8-DP05-A [duplicate sample]) to 376 µg/L (SWMU8-DP17). The National Secondary Drinking Water Regulations are non-enforceable guidelines regarding contaminants that may cause aesthetic effects (such as taste, odor, or color in drinking water). **Figure 7-2** in **Appendix B-6** presents the distribution of manganese detected in groundwater which exceeded the USEPA Secondary MCL at SWMU 8.

TDS concentrations ranged from 241 mg/L (SWMU8-DP17) to 2,500 mg/L (SWMU8-DP05) and exceeded the NMWQCC groundwater standard and the USEPA Secondary MCL in five of the six wells sampled. TDS concentrations less than 10,000 mg/L contained in all of the SWMU 8 monitoring wells is likely anthropogenic due to leaking water lines which traverse the Main Base area at Holloman AFB. For example, in early 2006 two large sinkholes developed along the south side of Building 232 (Holloman AFB Postal Service Center) which resulted from a leaking underground water line located below Connecticut Avenue (G. Mayhall, 2006). **Figure 7-2** in **Appendix B-6** presents all of the TDS concentrations which were detected above the USEPA Secondary MCL and the NMWQCC groundwater standard during the 2010 groundwater sampling event.

Human Health Risk Assessment

The Final RCRA Facility Investigation Report SWMU 8 (NationView, 2012) also included a human health risk assessment. As presented in **Table 8-3** in **Appendix B-6,** the risk assessment identified eight COPCs in soil and groundwater. The risk to human health was calculated for each COPC, for each complete exposure pathway, and for each receptor. The cumulative risk for each receptor (i.e., the sum of risks for all chemicals and for all complete exposure pathways) was compared with target risks. The cumulative risk for each potential receptor was found to be less than the target risk

level for each potential receptor. Therefore, the residual concentration of COPCs in soil and groundwater at SWMU 8 are protective of current commercial/industrial workers, future residents (adults and children), and future construction workers.

4.2.4 Basis of Determination – SWMU 8

SWMU 8 is proposed for Corrective Action Complete without Controls, which would move the site from Table A to Table B (Appendix 4-A, Holloman AFB RCRA Permit [NMED, 2013]). The NMED approved the Final RCRA Facility Investigation Report SWMU 8 (NationView, 2012) which requested No Further Action, in correspondence dated February 5, 2014. A copy of the NMED approval letter (HWB-HAFB-12-009) is provided in **Attachment B**. The approval letter advised Holloman AFB to submit a Class 3 PMR to NMED to change the status of SWMU 8 from Correction Action Required to Corrective Action Complete in accordance with 20.4.1.900 NMAC incorporating 40 CFR §270.42(c) and the facility's RCRA Permit at Part 4, Appendix 4-B, Section III, *Determination of No Further Action.* The process for a Class 3 PMR includes requirements for public notice and for providing opportunity for public comment that are mandatory.

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5 REFERENCES

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

Bhate Environmental Associates, Inc. (Bhate). December 2005. *Draft Voluntary Corrective Measures Work Plan SWMU 8 Soil Remediation, Holloman Air Force Base, New Mexico.*

Bhate. May 2, 2006a. *Memorandum Scope of Work for Soil and Groundwater Sampling and Analysis, Holloman Air Force Base, New Mexico.*

Bhate. August 2, 2006b. *Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis, Holloman AFB, New Mexico.*

Bhate. October 2008. *Final Voluntary Corrective Action Measures Work Plan SWMU 8 Soil Remediation, Holloman Air Force Base, New Mexico.*

EBASCO Services, Inc., and Groundwater Technology Government Services, Inc. November 1995. *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995.*

Foster Wheeler Environmental Corporation (FWENC) and Radian Corporation. July 1995. *Draft Final RFI Report Table 3 RCRA Facility Investigation.*

FWENC. December 1997. *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico.*

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

Holloman Air Force Base. November 2004. *Statement of Basis for Approval of No Further Action for 10 Solid Waste Management Units.*

Mayhall Ginger, Postal Service Center, Building 232, Holloman AFB, May 22, 2006, personal communication with Jim Moore, Sr. Geologist Bhate Environmental Associates, Inc., regarding the development of two sinkholes from a leaking water line located below Connecticut Avenue.

NationView, LLC (NationView). October 2009. *Final Accelerated Corrective Measures Work Plan SWMU 4 Soil Remediation, Holloman AFB, New Mexico.*

NationView. March 2010. *Final RCRA Facility Investigation Work Plan, SWMU 8, Holloman Air Force Base, New Mexico.*

NationView. April 2012. *Final RCRA Facility Investigation Report SWMU 8, Holloman Air Force Base, New Mexico.*

NationView. July 2012. *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico.*

NationView|Bhate JV III. July 2011. Basewide Background Study, Holloman Air Force Base, New Mexico.

New Mexico Administrative Code (NMAC) 20.6.2.3103, New Mexico Water Quality Control Commission Regulations, September 15, 2002. (http://www.nmenv.state.nm.us/NMED_Regs/gwb/20_6_2_NMAC.pdf).

New Mexico Environment Department (NMED). February 24, 2004. *Holloman Air Force Base, Alamogordo, New Mexico, Hazardous Waste Permit No. NM6572124422.*

NMED. October 2006. *New Mexico Environment Department TPH Screening Guidelines.*

NMED. December 2009. *Technical Background Document for Development of Soil Screening Levels, Revision 5.0.*

NMED. December 28, 2011. *Conditional Approval: Basewide Background Study Report, Holloman Air Force Base, EPA ID# NM6572124422 (HWB-HAFB-09-004).*

NMED. February 2012. *Risk Assessment Guidance for Site Investigations and Remediation.*

NMED. March 2013. Appendix 4-A: Summary of Solid Waste Management Units (Tables A and B), Holloman Air Force Base, Hazardous Waste Permit No. NM6572124422.

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

United States Environmental Protection Agency (USEPA). November 1986. *Guidelines for Ground-water Classification Under the EPA Ground-water Protection Strategy.*

USEPA. July 14, 2006. *Toxicity Characteristic, Table 1 Maximum Concentration of Contaminants for the Toxicity Characteristic.* 40 CFR §261.24.

USEPA. May 2009. *National Primary Drinking Water Regulations* (EPA 816-F-09-004).

USEPA. November 2011. *USEPA Regions 3, 6, and 9 Regional Screening Levels.* http://www.epa.gov/region9/superfund/prg/.

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ATTACHMENT A

SWMU 4 NMED CORRESPONDENCE

State of New Mexico
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BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

DERRITH WATCHMAN-MOORE
DEPUTY SECRETARY

February 9, 2005

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

RE: ADDITIONAL INVESTIGATION REQUIREMENTS AT SITES - SS-02&05, SD-08, SS-39
HOLLOMAN AIR FORCE BASE
EPA ID# NM6572124422
HWB-HAFB-04-009

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed the 2003 Long-Term Groundwater Monitoring Report and older investigation reports for the above referenced sites. Based on this review the NMED has additional concerns and will require additional ground water investigations at these sites. The NMED's current policy (May 15, 1995) regarding the treatment of ground water contamination at Holloman AFB states, in part, that soil and ground water contaminant plumes must be adequately characterized and monitoring wells defining the plumes must be sampled at least annually. NMED interprets "monitoring wells defining the plumes" to include wells located within the plume, particularly in the area of highest contamination, not just the wells defining outside the perimeter of the plume. NMED does not believe the ground water monitoring at the referenced sites conforms to this policy.

The following provides a brief reasoning for requiring the additional work at each site.

Site SS-02/05 (SWMU AOC-T)

This site is currently undergoing a voluntary corrective measures to remove contaminated soils a part of the final remedy and site closure. As part of site closure a final risk assessment must be

performed. The risk assessment will need to look at the ground water exposure pathway in relation to potential vapors impacts under current and future land use scenarios. Currently only one cross-gradient well, MW-02&5-05, within the contaminant plume is being sampled.

NMED believes additional ground water sampling from throughout the contaminant plume is required to support the risk assessment and eventual site closure. Therefore, the following actions must be implemented:

1. A two-year groundwater-sampling program should be initiated. Samples should be collected on a quarterly or semi-annual basis for volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs).

2. Ground water samples should be collected from MW-02&5-02. This well is located in the source area with historically the highest concentrations and would provide information on the affects of the soil excavation had on the ground water plume.

3. At least one additional well should be installed approximately 100 feet east of the excavation to better define the ground water plume. The only true down gradient well, MW-02&5-06, is located over 400 feet from the source area. As most petroleum plume are < 400 feet in length, especially at sites with flat gradients, this well is not real useful for monitoring plume characteristics but is better suited as a sentinel well to monitor plume migration. A second well should also be considered to the southeast of MW-02&5-02 based on the historic ground water flow direction.

4. Sampling and review of historical data from other site wells that have not been part of the LTM monitoring program should be performed to ensure that ground water conditions have not changed since the original investigations were performed. Wells such as MW-02&5-01, MW-02&5-07, and S1-MW3 should be included in inital sampling event.

<u>Site SD-08 (SWMU 4 and SWMU 82)</u>

The review of the current and historic ground water potentiometric surface maps presented in the LTM reports indicates a south/southwest ground water flow direction. Based on the location of SWMU 82 (source area) presented in the recently submitted no further action statement of basis (NFA SOB, November 2004), all of the monitoring wells sampled as part of the LTM program are either up gradient or cross-gradient from the known source area. Therefore, site ground water conditions cannot be adequately assessed. In addition, based on the information presented in the NFA SOB the drain field was not adequately characterized.

The following actions must be implemented:

1. As stated in NMED review of the NFA SOB (February 2005), the location of the SWMU 4 drain field must be positively identified and additional characterization must be performed.

2. Monitoring wells must be installed in the former drain field and at or down gradient of the wash rack. Ground water shall be sampled for VOCs, SVOCs, metals, and organochlorine pesticides.

3. Samples from these new wells should be collected on a quarterly or semi-annual basis over a two-year period.

Site SS-39 (SWMUs 165, 177, 179, 181)

As part of the LTM review, the NMED also looked at the original site investigation material presented in the *Phase I RCRA Facility Investigation Report, Table 2 Solid Waste Management Units*, September 1997 report. Based on the review of the original characterization data, it appears that all monitoring wells are installed up gradient of the TCE plume as determined by Geoprobe sampling locations. Ground water samples collected from several Geoprobe locations showed TCE concentrations between 324 *ug*/L and 2730 *ug*/L in locations down gradient of the LTM sampling locations. Additional ground water characterization work was performed in 1998 that defined the ground water plume but no permanent monitoring wells were installed. See the attached map. Also, according to the site summary presented in the HAFB's September 1995 Decision Document, tetrachloroethene (PCE) concentration of 95 mg/kg was detected in the soils around the drainage sumps at Building 1176. This is above the NMED's residential risk based soil screening levels of 9.83 mg/kg.

Therefore, the following actions are required:

1. An in-depth review of previous investigations should be performed and summarized in the work plan. An investigation of the current soil and ground water conditions shall be performed based on the analysis of the historical data.

2. Ground water monitoring wells shall be installed in area of highest contaminant concentrations and at down gradient locations. The distance between well(s) shall be no more than 200 feet, unless approved by NMED. The down gradient extent of the plume shall be defined where the concentration of TCE in the ground water is less than 5 mg/L. The wells shall be installed at the shallowest depth possible to yield representative ground water samples.

3. A vertical extent well shall be installed in the area of highest contaminant concentrations.

4. Initially, samples shall be analyzed for VOCs, SVOCs, RCRA metals, and perchlorate.

5. Samples from these new wells should be collected on a quarterly or semi-annual basis over a two-year period.

Additional requirements for these sites may be required based on the historical information provided in the work plans.

Work plans for the above requirements must be reviewed and approved by the NMED before the work is performed. The work plans shall include detailed summaries of the operational history and investigational history of each site, potential contaminants of concern, proposed monitoring well locations and construction details, analytical parameters and methods, quality controls and any other details as determined by the NMED as necessary to properly investigate each site. The work plans shall be submitted within 90 days from receipt of this letter.

If you have any questions, please contact me at (505) 845-5932.

Sincerely,

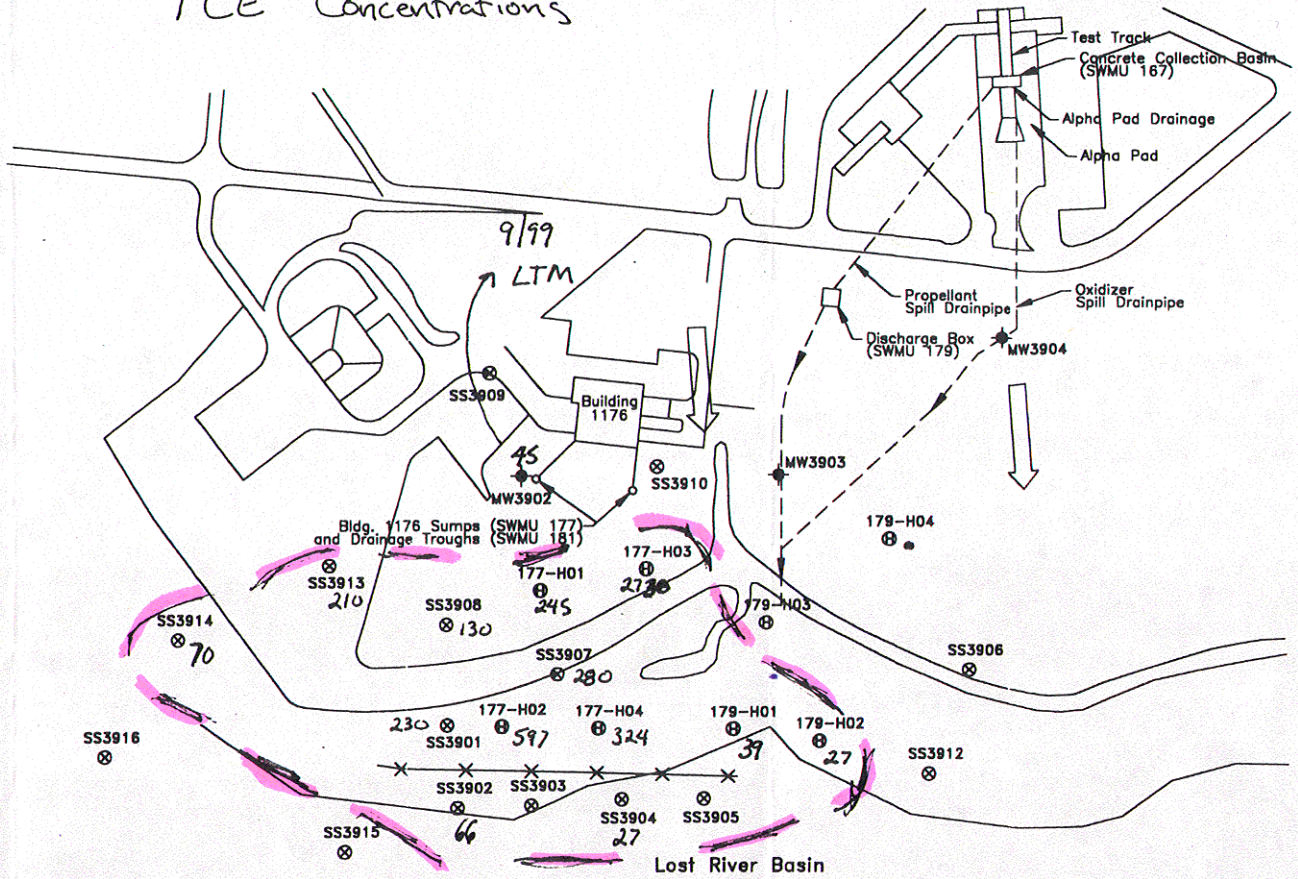
Steve Jetter
Permits Management Program

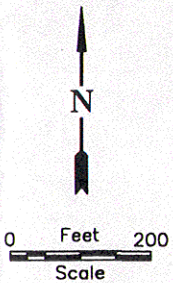
cc: James Bearzi, NMED HWB
John Kieling, NMED HWB
Cornelius Amindyas, NMED HWB
James Harris, EPA-Region 6
Dan Holmquist, HAFB
File: Reading and HAFB-HSWA 2005

SS-39 SWMU 177 & 179

TCE Concentrations

Look in
- Phase II, Table 2 RFI Report
  Radian 1994
  or
- Phase I, Table 2, RFI Report
  Sept 97





LEGEND

- Monitoring Well
- Previous Groundwater Sample Location (1993)
- DPT Groundwater Sample Location 5/98
- Fence
- Groundwater Flow Direction (November, 1991)

0307SS59.DWG (1:200) 08-06-98

Figure 1. SS-39 SITE MAP WITH DPT GROUNDWATER SAMPLING LOCATIO

NEW MEXICO ENVIRONMENT DEPARTMENT

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RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

August 14, 2014

Ms. DeAnna Rothhaupt
Chief, Holloman AFB Environmental
49 CES/CEIE
550 Tabosa Avenue
Holloman AFB, NM 88330-8261

RE: APPROVAL
SWMU 4, ACCELERATED CORRECTIVE MEASURES COMPLETION REPORT, JULY 2012
HOLLOMAN AIR FORCE BASE
EPA ID # NM6572124422, HWB-HAFB-12-016

Dear Ms. Rothhaupt:

The New Mexico Environment Department (NMED) has reviewed Holloman Air Force Base's (the Permittee's) Accelerated Corrective Measures Completion Report for Solid Waste Management Unit 4 (Building 131 Oil/Water Separator), dated July 2012 and received on August 16, 2012. The report is hereby approved.

The Permittee may submit a Class 3 permit modification request (PMR) to NMED to change the status of SWMU 4 from Corrective Action Required to Corrective Action Complete in accordance with 20.4.1.900 NMAC incorporating 40 C.F.R. §270.42(c) and the facility's RCRA Permit at Part 4, Appendix 4-B, Section III, *Determination of No Further Action*. The process for a Class 3 PMR includes requirements for public notice and for providing opportunity for public comment that are mandatory. NMED's preliminary determination that corrective action is complete is subject to NMED's reservation of rights to require additional corrective action on the basis of new information, including information that may be provided to the NMED in public comment.

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

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Rizzuto, HAFB
C. Hendrickson, EPA-Region 6 (6PD-N)

File: HAFB 2014 and Reading
HAFB-12-016

ATTACHMENT B

SWMU 8 NMED CORRESPONDENCE

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RON CURRY
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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

April 14, 2006

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

SUBJECT: NOTICE OF DEFICIENCY: VOLUNTARY CORRECTIVE MEASURES WORK PLAN, SWMU 8 SOIL REMEDIATION, DECEMBER 2005 HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422 HWB-HAFB-06-002

Dear Ms. Hartell:

The New Mexico Environment Department (NMED) has reviewed the Holloman Air Force Base (HAFB) document entitled "Voluntary Corrective Measures Work Plan, SWMU 8 Soil Remediation". The following are the deficiencies that HAFB (the Permittee) is required to address before the Work Plan can be approved.

1. <u>General Comment</u>

Based upon review of the subject Work Plan, which included review of applicable portions of the previous Phase I and Phase II remediation reports, the extent of soil and ground water contamination at this site has not been adequately characterized. Therefore, the Permittee is required to conduct additional site characterization activities prior to Phase III soil excavation, as follows:

a) Figure 5 of the Work Plan shows the proposed boundary of the Phase III excavation. However, there is no indication as to how the southwest limit of the excavation was determined, as no soil sampling was conducted in this area. Therefore, the Permittee is required to submit a soil sampling plan as part of the revised Work Plan that will be

required as a result of this Notice. This plan should include a sufficient number of samples to adequately characterize the remaining soil contamination at this site that is not underneath the adjacent structures. NMED understands that soil and ground water conditions under the adjacent structures will be evaluated under a separate Work Plan addendum after the Phase III excavation and sampling is conducted. Soils should be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), polychlorinated biphenyls (PCBs), and target analyte list (TAL) metals (see Comment No. 6).

b) The Work Plan indicates that ground water at SWMU 8 is found at approximately 10 feet below ground surface. The Work Plan states that contaminated soils will be removed to approximately one (1) foot below the encountered ground water table. Contaminated soil is therefore in contact with ground water. The two previous remediation activities did not include ground water sampling and the proposed VCM does not include ground water sampling.

Therefore, the Permittee is required to submit a ground water sampling plan as part of the revised Work Plan that will be required as a result of this Notice. This shall be done prior to performing the Phase III excavation. The plan must include, at a minimum, the installation of two monitoring wells at the site, which can be temporary wells. One well should be installed within the boundary of the Phase II excavation and the other within the boundary of the proposed Phase III excavation. Ground water should be analyzed for VOCs, SVOCs, TPH, PCBs, TAL Metals and total dissolved solids (TDS).

2. **General Comment**

The Permittee is required to submit documentation regarding the Method Detection Limits of all soil and ground water analytes.

3. **Page 3-1, Section 3, Excavation Procedures, 1st Paragraph, 2nd Sentence**

This sentence states that soils contaminated by hydrocarbons at levels exceeding 880 mg/kg TPH will be removed. Based upon the description of the material released from the oil and water separator provided in Section 1.1.2, which included "oils, detergents and fuels" from an auto hobby shop, these materials are classified as "unknown oil". In accordance with the NMED TPH Screening Guidelines (November 2005), the residential TPH screening guideline for unknown oil is 800 mg/kg. Therefore, the Permittee is required to utilize the 800 mg/kg screening level. All sections of the Work Plan specifying TPH screening levels must be revised to reflect this change.

4. **Page 3-4, Section 3.3.3.1, Soil Screening, 1st Paragraph, 5th Sentence**

This sentence states that soils demonstrating a concentration below 880 (to be 800) mg/kg TPH will be stockpiled for backfill. This sentence must be revised to also state that soil used for backfill shall not have TPH hazardous constituent (e.g., VOCs, SVOCs) concentrations in excess of NMED residential soil screening levels.

5. **Page 3-5, Section 3.3.3.3, Confirmation Soil Sampling, Page 4-2, Section 4.2, Excavation Confirmation Sampling, and Table 3-1**

The Work Plan must be revised to show that, in addition to collecting confirmation samples at a frequency of one per 20 linear feet per sidewall and one per sidewall, a minimum of two soil samples shall be collected from any sidewall greater than 18 feet in length. Also, confirmatory sampling shall be biased to areas with the greatest potential for contamination.

6. **Page 4-1, Section 4.1.3, Laboratory Validation, 1st Sentence**

This sentence indicates that a minimum of one sample per site will be subject to laboratory validation. The Permittee shall be required to collect a minimum of two samples from suspect soil for laboratory validation. In addition, the November 2005 NMED TPH Screening Guidelines require that for sites with unknown oil sources, soil analysis must include VOCs, SVOCs, metals (TAL), and PCBs, as well as TPH. Therefore, the Permittee must revise the soil sampling plan to include laboratory analysis of soils for these parameters.

7. **Table 3-1, Sampling Plan and Related Sections**

Table 3-1 includes a column showing the "Frequency" of sample collection. NMED requires that the following changes be made regarding frequency to Table 3-1 and related sections:

a) During "Field Screening" of suspect soils for field confirmatory purposes, sample every 50 cubic yards (cy), not 100, and for laboratory validation purposes sample every 100 cy, not 300.

b) Sample the "Stock Pile" for backfill characterization every 200 cy, not 500.

8. **Figures 3, 4, and 5**

NMED requires that all site figures include a coordinate system (e.g., UTM, latitude/ longitude) and the boundaries of the site must be shown on the figures. Coordinates of

site boundaries must also be shown. High accuracy (+/-3 ft) GPS coordinates are acceptable. The Permittee is required to resubmit the subject figures satisfying these requirements.

Please respond to this Notice of Deficiency by June 15, 2006. If you have any questions regarding this letter, please contact David Strasser of my staff at (505) 222-9526.

Sincerely,

James P. Bearzi
Chief
Hazardous Waste Bureau

JPB:dcs

cc: J. Kieling, NMED HWB
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C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Tellez, EPA, Region 6 (6PD-F)
D. Griffin, HAFB
File: Reading and HAFB 2006

bhate associates
ENGINEERING, SCIENCE AND CONSTRUCTION

445 Union Blvd, Suite 129, Lakewood, CO 80228
303-815-1762 main 303-815-1763 fax www.bhate.com

RESPONSIVENESS – INTEGRITY - TEAMWORK

June 12, 2006

New Mexico Environment Department
Hazardous Waste Bureau
Permits Management Program
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6303

Attention: Mr. John E. Kieling
Program Manager

Subject: Response to Notice of Deficiency: Voluntary Corrective Measures Work Plan, SWMU 8 Soil Remediation, December 2005, Holloman Air Force Base, EPA ID# NM6572124422, HWB-HAFB-06-002.

Dear Mr. Kieling,

Enclosed please find tabulated responses to the subject Notice of Deficiency (HWB-HAFB-06-002). Upon verbal or written concurrence from NMED, Bhate will submit the changed pages to NMED.

If you have any questions, please feel free to call me at 303-815-1762.

Sincerely,
Bhate Environmental Associates, Inc.

Frank Gardner, PG
Program Manager

cc w/ encl: C. Amindyas, NMED HWB
D. Strasser, NMED HWB
D. Griffin, HAFB

Voluntary Corrective Measures Work Plan SWMU 08 Soil Remediation, December 2005 Holloman AFB				
Comment No.	Section	Page	Comment	Response
Author	David Strasser		Date of Comments: April 14, 2006, Notice of Deficiency	Date of Response: June 12, 2006
1	General		Based upon review of the subject Work Plan, which included review of applicable portions of the previous Phase I and Phase II remediation reports, the extent of soil and groundwater contamination at this site has not been adequately characterized. Therefore, the Permittee is required to conduct additional site characterization activities prior to Phase III soil excavation as follows: a) Figure 5 of the Work Plan shows the proposed boundary of the Phase III excavation. However, there is no indication as to how the southwest limit of the excavation was determined, as no soil sampling was conducted in this area. Therefore, the Permittee is required to submit a soil sampling plan as part of the revised Work Plan that will be required as a result of this Notice. This plan should include a sufficient number of samples to adequately characterize the remaining soil contamination at this site that is not underneath adjacent structures. NMED understands that soil and groundwater conditions under the adjacent structures will be evaluated under a separate Work Plan addendum after the Phase III excavation and sampling is conducted. Soils should be analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), total petroleum hydrocarbons, (TPH), polychlorinated biphenyls (PCBSs), and target analyte list (TAL) metals (see Comment No. 6) b) The Work Plan indicates that groundwater at SWMU 8 is found at approximately 10 feet below ground surface. The Work Plan indicates that contaminated soils will be removed to approximately on (1) foot below the encountered ground water table. Contaminated soil is therefore in contact with ground water. The two previous remediation activities did not include ground water sampling and the proposed VCM does	Agreed. Delineation of soil and groundwater contamination at SWMU 08 was carried out in May 22, 2006, using guidance provided in the May 2, 2006, Memorandum Work Plan. The latter was provided and approved by NMED prior to the performance of the characterization. In summary, three groundwater monitoring wells were installed to delineate soil and groundwater conditions within: 1. the formerly excavated area, 2. the area proposed for excavation in the SWMU 08 Soil Remediation Work Plan and, 3. the immediate downgradient area south of Building 232. Although analytical results for soil and groundwater samples collected are not available at this time, they will be used to guide the soil excavation proposed in this work plan. The analyses requested in the NOD were performed on the samples collected on May 22, 2006. Well locations are provided in Figure 1, Attachment 1.

Voluntary Corrective Measures Work Plan SWMU 08 Soil Remediation, December 2005 Holloman AFB				
Comment No.	Section	Page	Comment	Response
Author	David Strasser		Date of Comments: April 14, 2006, Notice of Deficiency	Date of Response: June 12, 2006
			not include ground water sampling. Therefore, the Permittee is required to submit a ground water sampling plan as part of the revised Work Plan that will be required as a result of this Notice. This shall be done prior to performing Phase III excavation. The plan must include, at a minimum, installation of two monitoring wells at the site, which can be temporary wells. One well should be installed within the boundary of the Phase II excavation and the other within the boundary of the proposed Phase III excavation. Ground water should be analyzed for VOCs, SVOCs, TPH, PCBs, TAL Metals and total dissolved solids (TDS).	
2	General		The Permittee is required to submit documentation regarding the Method Detection Limits of all soil and ground water analytes.	Agreed. Table 4-3 has been changed to represent a summary of laboratory quality control criteria to include the method detection limits.
3	Section 3, 1st Para, 2nd sentence	3-1	This sentence states that soils contaminated by hydrocarbons at levels exceeding 880 mg/kg TPH will be removed. Based upon the description of the material released form the oil and water separator provided in Section 1.1.2, which included "oils, detergents and fuels" from an auto hobby shop, these materials are classified as "unknown oil". In accordance with NMED TPH Screening Guidelines (November 2005), the residential TPH screening guideline for unknown oil is 800 mg/kg. Therefore, the Permittee is required to utilize the 800 mg/kg screening level. All sections of the Work Plan specifying TPH screening levels must be revised to reflect this change.	Agreed. The 800 mg/kg TPH standard will be used as the screening level and all relevant sections of the Work Plan will be modified to reflect this change.
4	Section 3.3.3.1, 1st Para, 5th sentence	3-4	This sentence states that soils demonstrating a concentration below 880 (to be 800) mg/kg TPH will be stockpiled for backfill. This sentence must be revised to also state that soil used for backfill shall not have TPH hazardous constituent (e.g. VOCs, SVOC) concentrations in excess of NMED residential screening levels.	The following sentence has been added to the discussion: All soil stockpiled for backfill will undergo laboratory analysis to verify no TPH hazardous constituents (e.g., VOCs, SVOCs) in excess of NMED residential SSLs are present.

Voluntary Corrective Measures Work Plan SWMU 08 Soil Remediation, December 2005 Holloman AFB				
Comment No.	Section	Page	Comment	Response
Author	David Strasser		Date of Comments: April 14, 2006, Notice of Deficiency	Date of Response: June 12, 2006
5	Sections 3.3.3.3 & 4.2 & Table 3-1	3-5 & 4-2	The Work Plan must be revised to show that, in addition to collecting confirmation samples at a frequency of one per 20 linear feet per sidewall, a minimum of two soil samples shall be collected from any sidewall greater than 18 feet in length. Also, confirmatory sampling shall be biased to areas with the greatest potential for contamination.	The affected pages (3-5, 4-2 and Table 3-1) have been modified as follows: Excavation confirmation samples will be collected at a frequency of 2 per 18 linear feet (ln ft) for each side wall at mid-depth of the contamination zone. At a minimum, 1 sample per side wall will be collected for side walls less than 18 ln ft. Also, confirmatory sampling shall be biased to areas with the greatest potential for contamination.
6	Section 4.1.3, 1st sentence	4-2	This sentence indicates that a minimum of one sample per site will be subject to laboratory validation. The Permittee shall be required to collect a minimum of two samples from suspect soil for laboratory validation. In addition, the November 2005 NMED TPH Screening Guidelines require that for sites with unknown soil sources, soil analysis must include VOCs, SVOCs, metals (TAL), and PCBs as well as TPH. Therefore, the Permittee must revise the soil sampling plan to include laboratory anlaysis of soils for these parameters.	Section 4 of the work plan has been streamlined to resonate with the excavation process outlined in Section 3. Essentially, all suspect soil will be treated as contaminated soil and taken to the FT-31 Land farm for treatment. Therefore, sampling of suspect soils is no longer applicable. Table 3-1 has been changed accordingly.
7	Table 3-1		Table 3-1 includes a column showing the "Frequency" of sample collection. NMED requires that the following changes be made regarding frequency to Table 3-1 and related sections: a) During "Field Screening" of suspect soils for field confirmatory purposes, sample every 50 cubic yards (cy), not 100, and for laboratory validation purposes sample every 100 cy, not 300. b) Sample the "Stock Pile" for backfill characterization every 200 cy, not 500.	The requested changes have been made to Table 3-1 with the exception of comment 7a as all suspect soil will be handled as though contaminated and transported to the FT-31 Land farm for treatment. Table 3-1 has been changed to remove all references to suspect soils.
8	Figures 3, 4, and 5		NMED requires that all site figures include a coordinate system (e.g., UTM, latitude/longitude) and the boundaries of the site must be shown on the figures. Coordinates of site boundaries must also be shown. High accuracy (+/- 3 ft) GPS coordinates are acceptable. The	Agreed. Site coordinate information will be added to the indicated figures.

Voluntary Corrective Measures Work Plan SWMU 08 Soil Remediation, December 2005 Holloman AFB				
Comment No.	Section	Page	Comment	Response
Author	David Strasser		Date of Comments: April 14, 2006, Notice of Deficiency	Date of Response: June 12, 2006
			Permittee is required to resubmit the subject figures satisfying these requirements.	
			Response to NOD due by June 15, 2006.	

State of New Mexico
ENVIRONMENT DEPARTMENT
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
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Fax (505) 428-2567
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BILL RICHARDSON
GOVERNOR

RON CURRY
SECRETARY

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

October 12, 2006

REC'D OCT 17 2006

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

RE: APPROVAL OF THE VOLUNTARY CORRECTIVE MEASURES WORK PLAN, SWMU 8 SOIL REMEDIATION, DECEMBER 2005
HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422
HWB-HAFB-06-002

Dear Ms. Hartell:

The New Mexico Environment Department (**NMED**) has reviewed Holloman Air Force Base's (the **Permittee's**) June 12, 2006 response to NMED's April 14, 2006 Notice of Deficiency for the SWMU 8 Voluntary Corrective Measures Work Plan, dated December 2005, for the removal of contaminated soils. The NMED has also reviewed the Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis (**Letter Report**), dated August 2006, which was required to be submitted in response to the Notice of Deficiency.

The NMED hereby concurs with the Response and approves the Work Plan for implementation. The Permittee is now required to submit the changed pages, as indicated in the response, for incorporation into the Work Plan. The NMED also concurs that the soil and groundwater sampling results presented in the Letter Report indicate that the extent of contamination has been adequately defined.

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

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)
G. Fish, HAFB
File: HAFB 2006 and Reading
HWB-HAFB-06-002

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
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www.nmenv.state.nm.us

BILL RICHARDSON
Governor

DIANE DENISH
Lieutenant Governor

RON CURRY
Secretary

JON GOLDSTEIN
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

December 11, 2008

12-16-2008 A08:58

Mr. David Scruggs, Chief
Environmental Restoration Program
49 CES/CEVR
550 Tabosa Ave.
Holloman AFB, NM 88330-8458

SUBJECT: APPROVAL OF THE FINAL SUBMITTAL: VOLUNTARY CORRECTIVE MEASURES WORK PLAN, SWMU 8 SOIL REMEDIATION, OCTOBER 21, 2008 HOLLOMAN AIR FORCE BASE, EPA ID# NM6572124422 HWB-HAFB-06-002

Dear Mr. Scruggs:

The New Mexico Environment Department (NMED) has reviewed Holloman Air Force Base's October 21, 2008 submittal of the finalized text, tables and figures for the SWMU 8 Voluntary Corrective Measures Work Plan. This submittal was required pursuant to NMED's October 12, 2006 letter conditionally approving the Work Plan. NMED hereby approves this final submittal.

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

Sincerely,

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

NEW MEXICO ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
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Governor

JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary-Designate

BUTCH TONGATE
Deputy Secretary

THOMAS BLAINE, PE
Director
Environmental Health Division

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

February 5, 2014

Ms. DeAnna Rothhaupt
Chief, Compliance and Restoration
49 CES/CEAN
550 Tabosa Avenue
Holloman AFB, NM 88330-8261

RE: APPROVAL
RCRA FACILITY INVESTIGATION REPORT, SWMU 8, APRIL 2012
HOLLOMAN AIR FORCE BASE
EPA ID # NM6572124422
HWB-HAFB-12-009

Dear Ms. Rothhaupt:

The New Mexico Environment Department (NMED) has reviewed Holloman Air Force Base's (the Permittee's) Resource Conservation and Recovery Act (RCRA) Facility Investigation Report for Solid Waste Management Unit (SWMU) 8, the Building 231 Oil/Water Separator, dated April 2012 and received on April 30, 2012. The report is hereby approved. The NMED does not require further corrective action at the subject site at this time.

The Permittee may submit a Class 3 permit modification request (PMR) to NMED to change the status of SWMU 8 from Corrective Action Required to Corrective Action Complete (CAC) in accordance with 20.4.1.900 NMAC incorporating 40 C.F.R. §270.42(c). The process for a Class 3 PMR includes requirements for public notice and for providing opportunity for public comment that are mandatory. NMED's preliminary determination that corrective action is complete is subject to NMED's reservation of rights for new information or unknown conditions, including information that may be provided to the NMED in public comment.

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

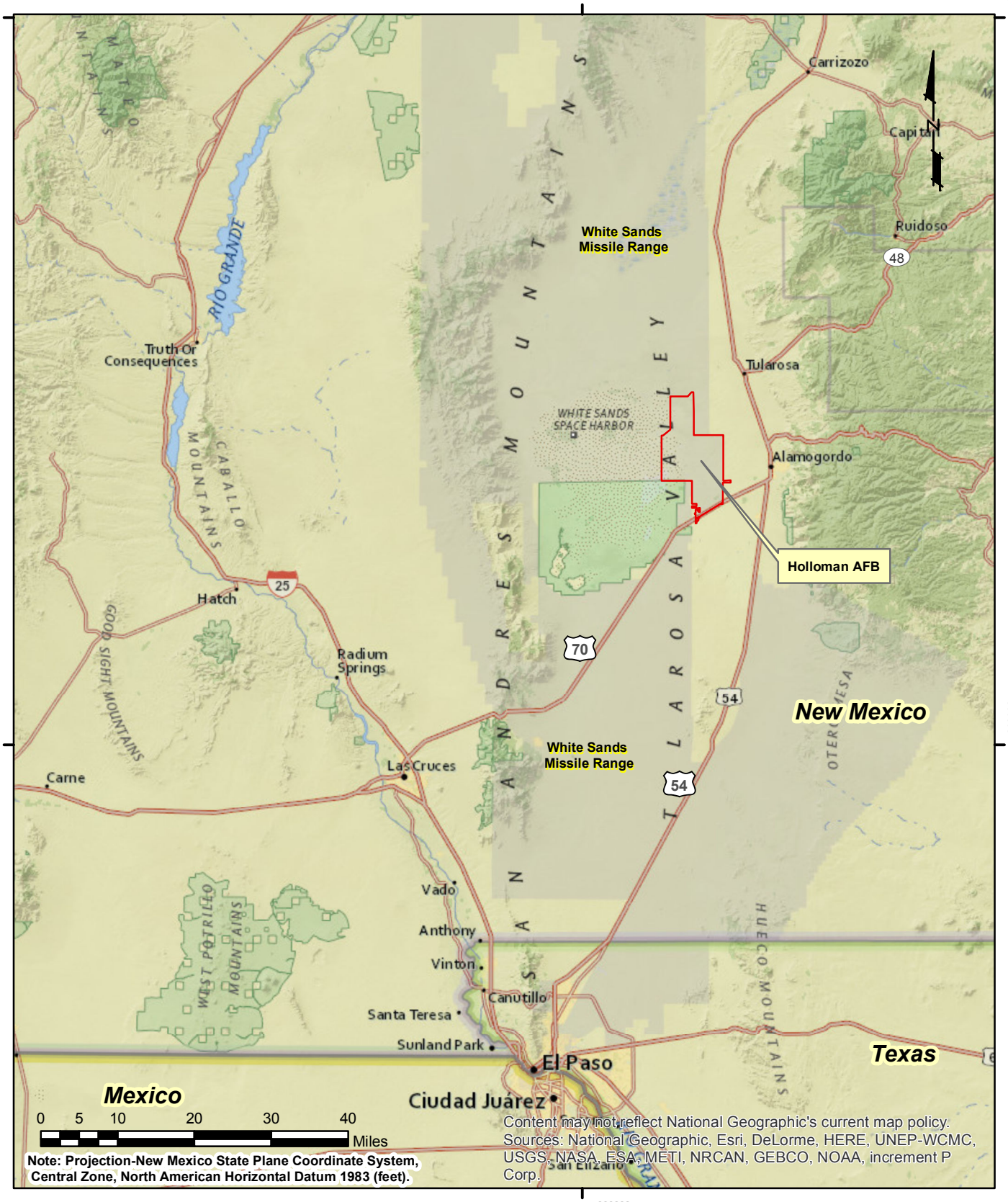
Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
W. Moats, NMED HWB
C. Amindyas, NMED HWB
D. Strasser, NMED HWB
B. Salem, NMED HWB
C. Hendrickson, EPA-Region 6 (6PD-N)

File: HAFB 2014 and Reading
HAFB-12-009

FIGURES



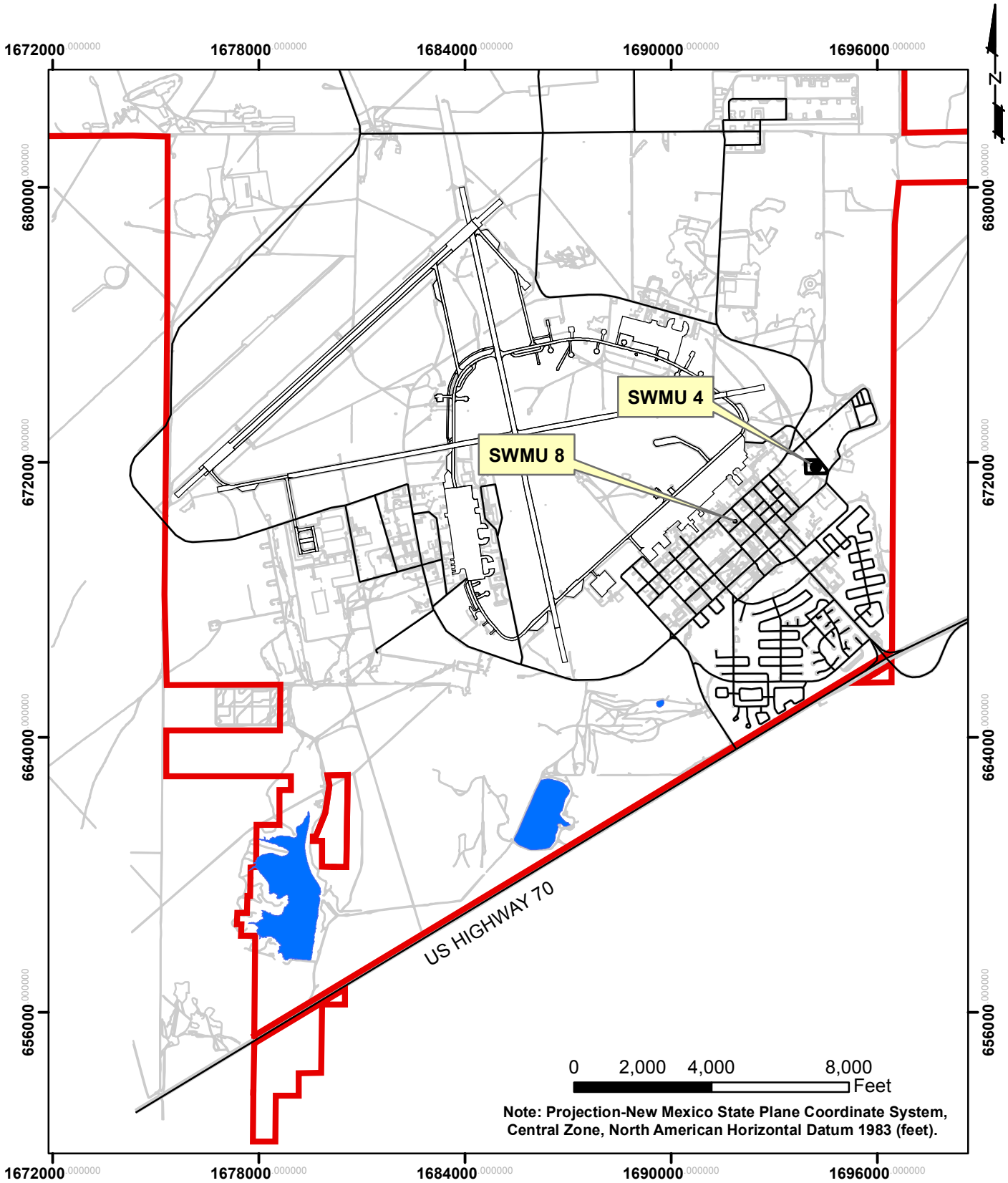
CONSULTECH | BHATE
FEDERAL SERVICES JV, LLC
SBA 8 (a) Certified

Holloman AFB, New Mexico Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
NWO1132.0002.401	Shown	5/20/2015	cm
			DRAWING NO: Figure 2-1

Corrective Action Complete Proposal
SWMU 4 and SWMU 8
Holloman AFB, New Mexico

Figure 2-1



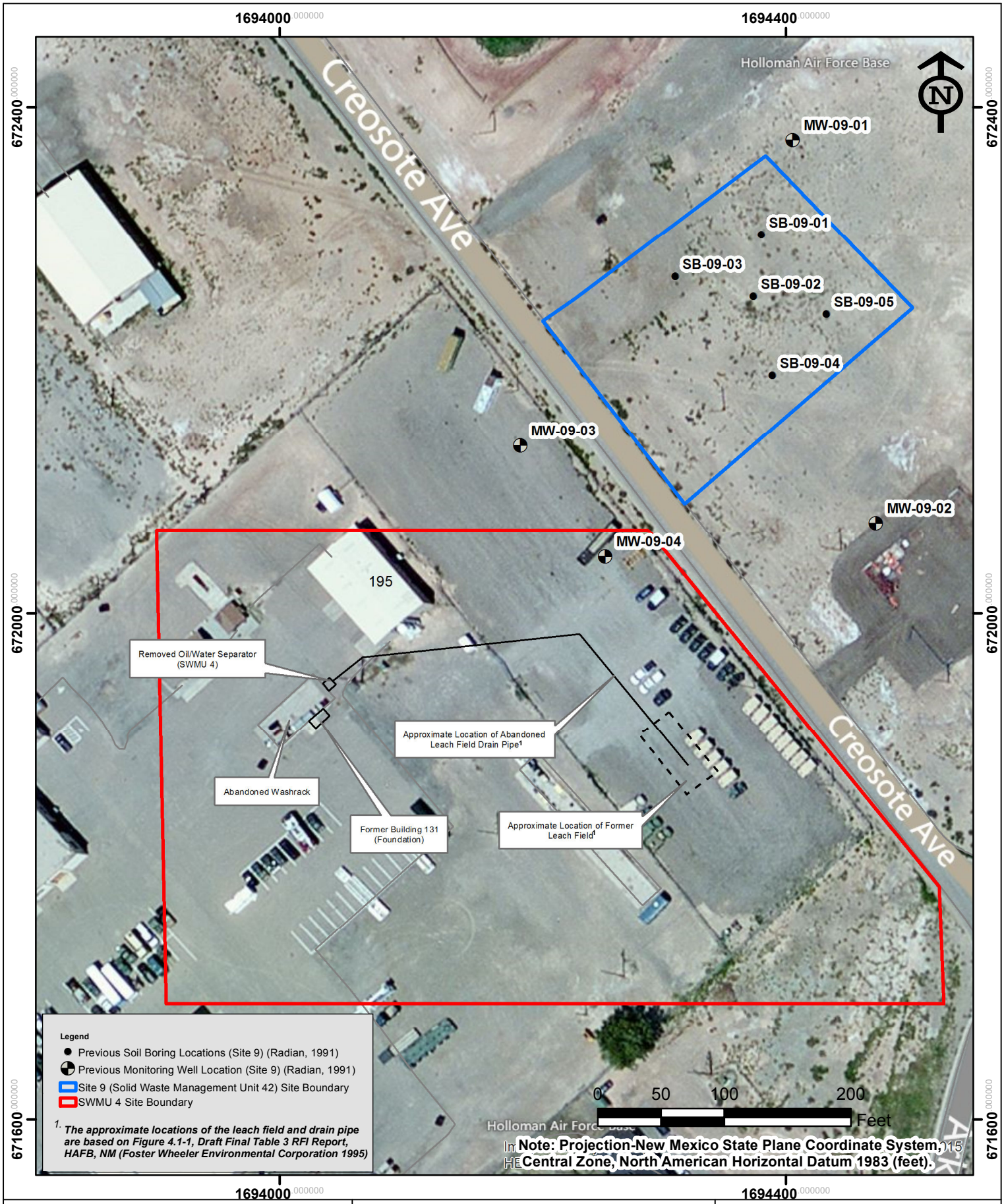
CONSULTECH | BHATE
FEDERAL SERVICES JV, LLC
SBA 8 (a) Certified

SWMU 4 and SWMU 8
Site Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
NWO1132.0002.401	1"=4000'	5/20/2015	cm
			DRAWING NO: Figure 2-2

Corrective Action Complete Proposal
SWMU 4 and SWMU 8
Holloman AFB, New Mexico

Figure 2-2



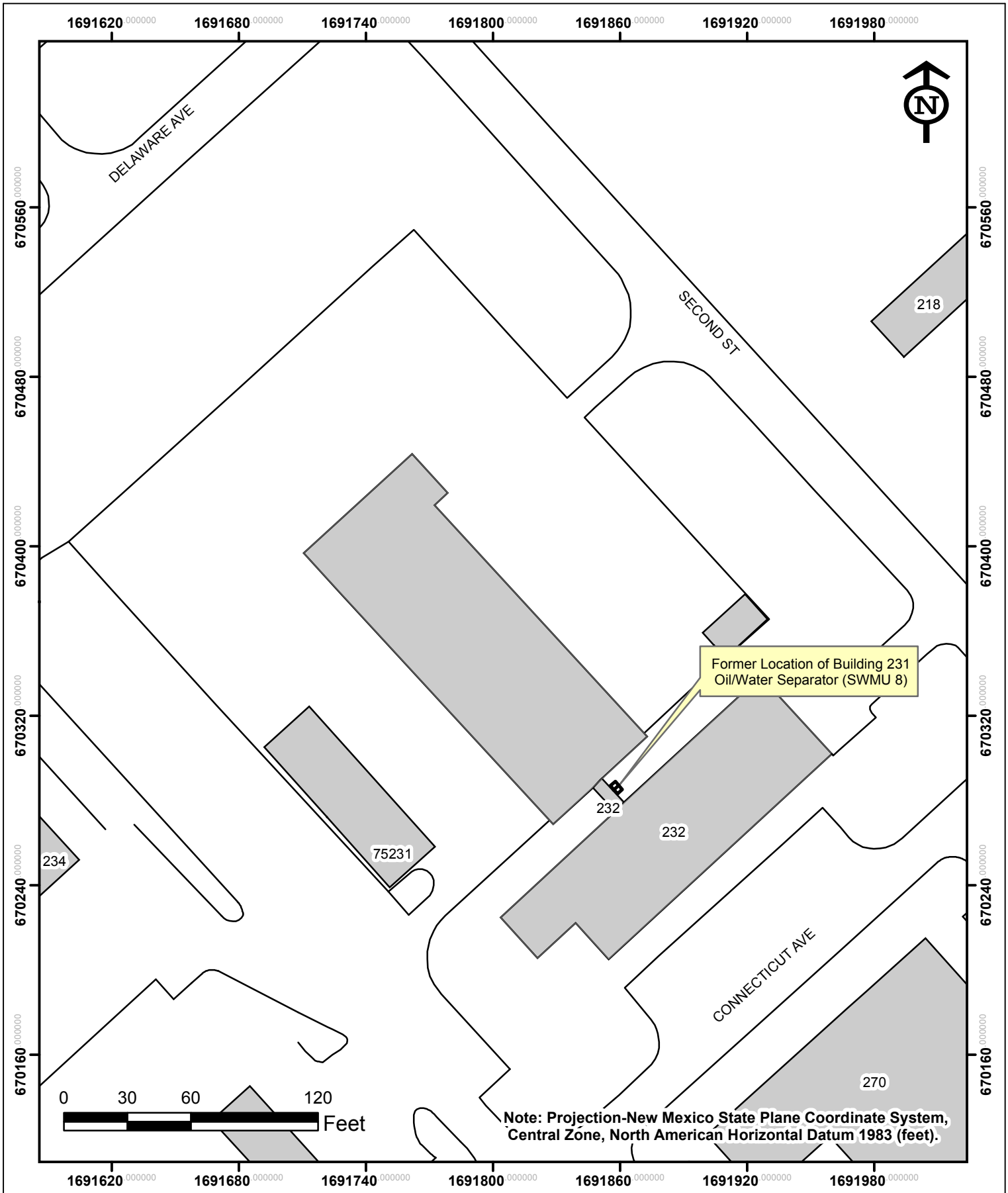
CONSULTECH | BHATE
FEDERAL SERVICES JV, LLC
SBA 8 (a) Certified

SWMU 4 Site Plan

PROJECT NO.	SCALE	DATE	DRAWN BY:
NWO1132.0002.401	1"=100'	5/20/2015	cm
			DRAWING NO. Figure 2-3

Corrective Action Complete Proposal
SWMU 4 and SWMU 8
Holloman AFB, New Mexico

Figure 2-3



CONSULTECH | BHATE
FEDERAL SERVICES JV, LLC
SBA 8 (a) Certified

SWMU 8 Site Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
NWO1132.0002.401	1"=60'	8/13/2015	cm
			DRAWING NO: Figure 2-4

Corrective Action Complete Proposal
SWMU 4 and SWMU 8
Holloman AFB, New Mexico

Figure 2-4

APPENDIX A

SWMU 4 HISTORICAL DATA FROM PREVIOUS INVESTIGATIONS

Appendix A-1

Portions of: *Draft Final RFI Report Table 3 RCRA Facility Investigation*

Foster Wheeler Environmental Corporation and Radian Corporation, July 1995

DCN 95-670-008-10

RFI REPORT
TABLE 3 RCRA FACILITY INVESTIGATION

Draft Final

Volume I

Prepared for:

49 CES/CEV
Holloman Air Force Base, NM

and

HQ ACC #CES/ESVR
Langley Air Force Base, VA

Prepared by:

Foster Wheeler Environmental Corporation
143 Union Blvd.
Suite 1010
Lakewood, Colorado 80203
303/988-2202

Radian Corporation
8501 North Mopac Blvd.
P.O. Box 201088
Austin, Texas 78720
512/454-4797

Under Contract No. DACW45-94-D-0003, DO No. 3, WAD No. 1 with:

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

July 1995

Table 4-1
Investigation Summary for Phase I SWMUs

SWMU[a]	Release to Soil?	Type of Release	Maximum TRPH Concentration (mg/kg)	Special Considerations	Current Operation	RFI Recommendation
4 (Leach Field)	No	No Release	< 100	None	Abandoned	NFA
9	No	No Release	< 100	None	In use	NFA
19	Yes	Overflow	>1000	Suspected release from this SWMU will be addressed under the SWMU 229 IRA/RA	In use as sediment trap	CNFA
20	No	No Release	< 100	None	Abandoned	NFA
24	No	No Release	< 100	None	In use as sediment trap	NFA
25	No	No Release	< 100	None	Removed and replaced with new O/WS	NFA
29	Yes	Overflow	>1000	Suspected release from this SWMU will be addressed under the SWMU 230 CMI	Replaced with new O/WS	CNFA
35	No	No Release	< 100	None	Removed and replaced with new O/WS	NFA

CMI = Corrective measures implementation.
CNFA = Conditional no further action.
IRA = Interim remedial action.
NFA = No further action.
O/WS = Oil/water separator.
RA = Remedial action.
SWMU = Solid waste management unit.
TRPH = Total recoverable petroleum hydrocarbons.

[a] With the exception of SWMU 4, all investigated SWMUs are oil/water separators. Their associated building numbers are given in each subsection and are on the sample location figures.
[b] The condition of NFA is the remediation of TRPH-contaminated soils during the remedial actions in the area around the SWMU.

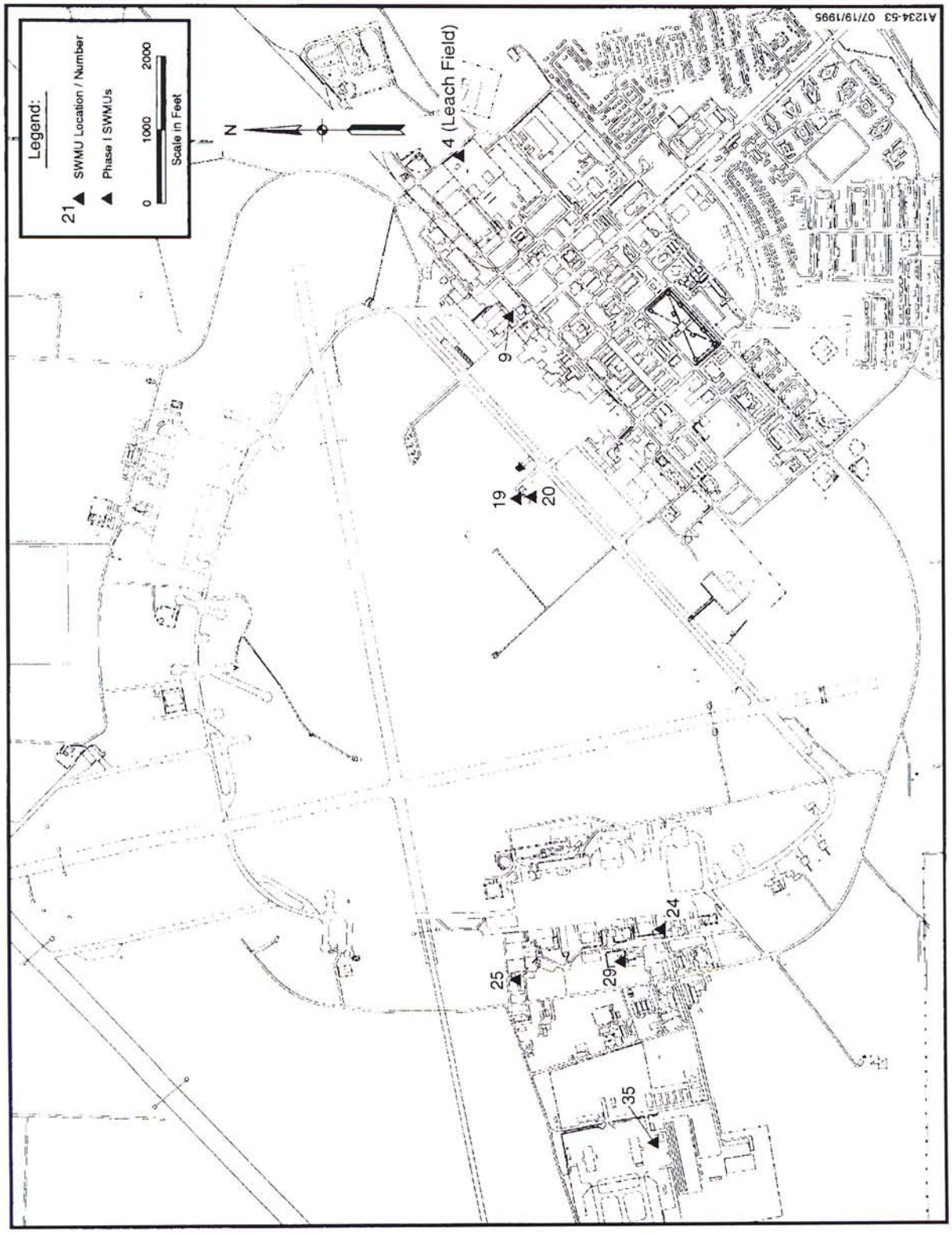


Figure 4-1. Location of the Phase I SWMUs

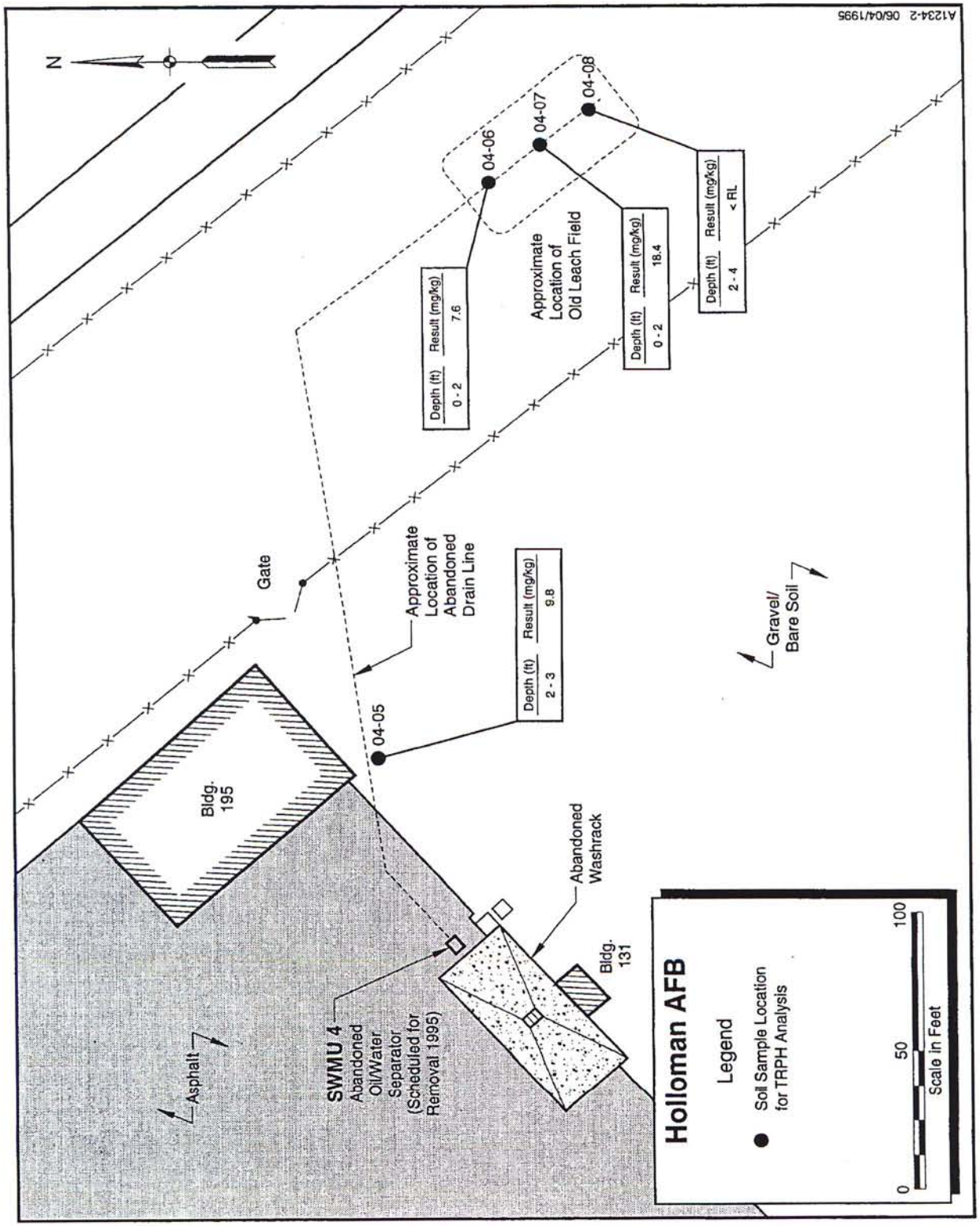


Figure 4.1-1. SWMU 4, Leach Field - Building 131 O/WS Sample Locations and Phase I TRPH Results

Table 4.1-1
TRPH Results for Soil at SWMU 4

Location	Depth (ft)		TRPH (mg/kg)		Location	Depth (ft)		TRPH (mg/kg)
	Top	Bottom				Top	Bottom	
04-05	2	3	9.8		04-07	0	2	18.4
04-06	0	2	7.6	(< RL)	04-08	2	4	< RL

RL = Reporting limit (field laboratory = 5 mg/kg, fixed laboratory ≈30 mg/kg).
( ) = Result from fixed analytical laboratory.

Appendix A-2

Portions of: *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995*

EBASCO Services, Inc., and Groundwater Technology Government Services, Inc., November 1995

CLOSURE REPORT FOR REMEDIATION OF POL - CONTAMINATED SITES AND OIL/WATER SEPARATOR REMOVALS HOLLOMAN AIR FORCE BASE, NEW MEXICO JULY - NOVEMBER 1995

Prepared for:

49 CES/CEV
Holloman Air Force Base, New Mexico

AND

HQ ACC/ESVR
Langley Air Force Base, Virginia

Prepared by:

EBASCO Services, Inc., dba
Foster Wheeler Environmental Corporation
143 Union Blvd., Suite 1010
Lakewood, Colorado 80228-1824

and

Groundwater Technology
Government Services, Inc.
2501 Yale Blvd., S.E.
Albuquerque, New Mexico 87106

Under Contract No. DACW-45-94 D0003
Delivery Order 6, Work Authorization Directive 13 and
Delivery Order 8, Work Authorization Directive 33

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

November 1995

HAFB-12/OW-CLOS.RPT

TABLE 6-1
CHRONOLOGY OF ACTIVITIES DURING OIL/WATER SEPARATOR REMOVAL AND RECLAMATION AT SWMU 4 - ABANDONED WASHRACK - BUILDING 131 HOLLOMAN AFB, NEW MEXICO

DATE	ACTIVITY	NOTES
20 JUL 95	- Mobilized equipment and personnel. - Built bermed soil storage cell, lined with 40 mil plastic tarp. - Removed asphalt and 2.5' x 2.5' OWS. - Excavated approx. 18 CY of PCS. - Screened soils; range 4.0-1,293 ppm - Excavation halted when contacted water table at approx. 10.5' bgs.	
21 JUL 95	- Demobilized from SWMU 4 to remobilize at SWMU 36.	
24 JUL 95	- Remobilized equipment and personnel. - Continued excavation. Removed total of 92 CY (including previous 18 CY) of PCS. - Soil screening; range 17.4-1,054 ppm. - Removed settling tank. - Capped 5.5-inch cast iron settling tank basin outlet pipe with concrete. - Demolished OWS with 80-pound jack-hammer.	EBASCO instructed contractor to continue excavating soil beyond 5 feet from the lateral perimeter of the OWS.
25 JUL 95	- Squared off excavation to prep. for backfill. - Capped 5.5-inch cast iron OWS inlet/outlet pipe with concrete. - Collected 4 sidewall and 1 bottom verification soil samples from the excavation. - Backfilled excavation with gravel and clean native soil.	
4 AUG 95	- Squared up asphalt edges with concrete cutter.	

TABLE 6-2
SUMMARY OF NATIVE SOIL CONFIRMATION ANALYTICAL RESULTS AT SWMU 4 - BUILDING 131 HOLLOMAN AFB, NEW MEXICO JULY 1995

Sample No. SWMU-4	-1-8	-2-8	-3-8	-4-8	-5-8
Sample Location	North Corner	East Corner	South Corner	West Corner	Center
Date Sampled	7-25-95	7-25-95	7-25-95	7-25-95	7-25-95
TRPH by 418.1 (mg/kg)	<20	<20	<20	<20	47
VOCS by 8240 (μg/kg)					
Acetone	<20	<20	<20	<20	<20
Toluene	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	<10	<10	<10	<10	<10
SEMI VOCS by 8270 (ug/Kg)					
Naphthalene	<330	<330	<330	<330	<330
2-Methylnaphthalene	<330	<330	<330	<330	<330
TAL METALS by 6000/7000 series (mg/kg)					
Aluminum	2,900	7,300	6,100	2,400	3,600
Arsenic	1.1	1.6	1.5	13	1.1
Barium	31	56	56	27	35
Calcium	170,000	70,000	110,000	130,000	80,000
Chromium	<3.0	8.7	6.2	4.7	3.8
Copper	<2.5	6.5	3.1	3.0	3.3
Iron	3,000	6,700	5,400	2,200	3,100
Lead	4.6	23	10	24	8.0
Magnesium	1,300	3,500	2,400	1,800	1,500
Manganese	38	120	94	30	43
Nickel	<4.0	6.0	<4.0	<4.0	<4.0
Potassium	640	2,300	1,500	1,200	890
Sodium	690	740	830	<500	<500
Vanadium	7.2	15	13	13	7.6
Zinc	39	79	300	28	22

Notes: < = Constituent not detected above laboratory quantitation limit

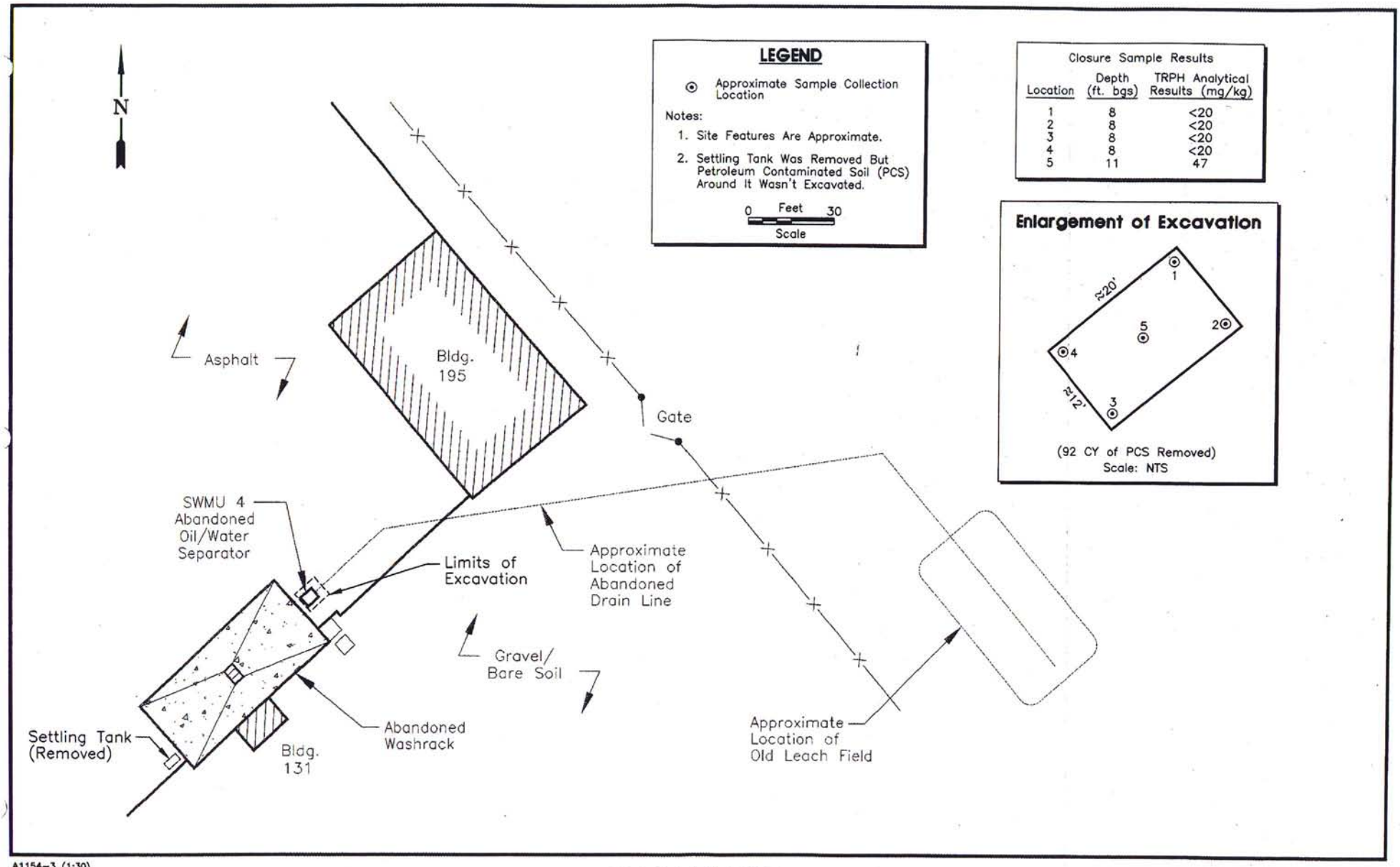
TABLE 6-3
SUMMARY OF STOCKPILE SOIL ANALYTICAL RESULTS AT SWMU 4 - BUILDING 131 HOLLOMAN AFB, NEW MEXICO SEPTEMBER 1995

Sample No. SWMU-4	-DP
Sample Type	Composite
Date Sampled	7/25/95
TRPH by 418.1 (mg/kg)	160
Aromatic Volatiles by 8021A (mg/kg)	Results
Benzene	<0.05
Toluene	<0.10
Ethylbenzene	<0.10
Xylenes	<0.20
BTEX Total	--
TPH as Gasoline	NA
Lead by 7421 (mg/kg)	14
TCLP Volatiles by 1311/8240 (mg/l)	
Benzene	<0.05
Carbon tetrachloride	<0.05
Chlorobenzene	<0.05
Chloroform	<0.05
1,4-Dichlorobenzene	<0.05
1,2-Dichloroethane	<0.05
1,1-Dichloroethene	<0.05
2-Butanone	<0.2
Tetrachloroethene	<0.05
Trichloroethene	<0.05
Vinyl Chloride	<0.1
Miscellaneous Waste Characterization Analysis	
Closed Cup Flashpoint by ASTM D-93	>200
Paint Filter by EPA 9095	No Liquids
pH by EPA 9045A	7.3
Total Cyanide by EPA 9010A (mg/kg)	<2.0
Reactivity Sulfide by SW 846 7.3.4.2 (mg/kg)	<25

TABLE 6-3 (continued)
SUMMARY OF STOCKPILE SOIL ANALYTICAL RESULTS
AT SWMU 4 - BUILDING 131
HOLLOMAN AFB, NEW MEXICO
SEPTEMBER 1995

Sample No. SWMU-4	-DP
Sample Type	Composite
Date Sampled	7/25/95
TCLP Semivolatiles by 8270A (mg/l)	Results
o-Cresol	<0.033
m+p-Cresol	<0.033
1,4-Dichlorobenzene	<0.033
2,4-Dinitrotoluene	<0.033
Hexachloro-1,3-butadiene	<0.033
Hexachlorobenzene	<0.033
Hexachloroethane	<0.033
Nitrobenzene	<0.033
Pentachlorophenol	<0.17
Pyridine	<0.033
2,4,5-Trichlorophenol	<0.033
2,4,6-Trichlorophenol	<0.033
TCLP Metals by 6000/7000 Series (mg/l)	
Arsenic	<0.010
Barium	<2.0
Cadmium	<0.020
Chromium	<0.030
Lead	0.0044
Mercury	<0.0010
Selenium	<0.010
Silver	<0.020

Notes: < = Constituents not detected above laboratory quantitiation limit
NA = Not Analyzed



A1154-3 (1:30)

Figure 6-1: Site Map
SWMU 4, Building 131 OWS

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Alaine

Vehicle Identification 330

Name of Shipper

Origin of Shipment Destination of Shipment

78700

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary jacks, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Ray [illegible]
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-[illegible] B/L No.

Ron Lowe (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

GENERATOR

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

Sunny 1

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services- DF-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone
B. Transporter's Phone 505-392-44
C. Facility's Phone 505-392-48

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARNER NEFF
Signature: Warner Neff
Month 10 Day 04 Year 91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Ray Perry
Signature
Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR'S COPY

NR [illegible]

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHIND

Vehicle Identification 550 111

Name of Shipper

Origin of Shipment

Destination of Shipment

410

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed Hugo Barber
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER
ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-4-75 B/L No.

(Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generatpr's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services--DF-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone 505-392-445
B. Transporter's Phone
C. Facility's Phone 505 392-485

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: Walker Neff
Signature: Walker Neff
Month 1 Day 04 Year 95

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR

TRANSPORTER

FACILITY

GENERATOR'S COPY

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER RHINO

Vehicle Identification 550 111

Name of Shipper

Origin of Shipment Destination of Shipment

89460

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary chains, shovel, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed [illegible] Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-5-71 B/L No. [illegible] (Driver's Signature)

[redacted] WASTE MANIFEST	1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of	1 550-111

3. Generator's Name and Mailing Address
[redacted] Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: [redacted] Environmental Services
6. US EPA ID Number: N/A

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address: [redacted] Environmental Services--DF-994
1 mile North of Hobbs, NM
Hobbs, NM
10. US EPA ID Number

A. Transporter's Phone 505-392-44
B. Transporter's Phone
C. Facility's Phone 505-392-43

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
WARREN NEFF	Warren Neff			

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

FACILITY

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR'S COPY

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER

Vehicle Identification 5-D-111

Name of Shipper

Origin of Shipment Destination of Shipment

81700

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary tools, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Patterson
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S)	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M.	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-4-75 B/L No. (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of	1

GENERATOR

3. Generator's Name and Mailing Address: Holloman Air Force Base, Holloman Air Force Base, NM

Contract No. DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services — 6. US EPA ID Number: N/A

7. Transporter 2 Company Name — 8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services--DF-994, 1 mile North of Hosmer, NM, Hosmer, NM — 10. US EPA ID Number

A. Transporter's Phone: 505-392-44

B. Transporter's Phone

C. Facility's Phone: 505-392-46

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name	Signature	Month	Day	Year
WARREN NEFF	Warren Neff	10	09	94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Tim Johnson				

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR'S COPY

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER

Vehicle Identification [redacted] 111

Name of Shipper

Origin of Shipment

Destination of Shipment

77710

lbs. Gross — Gross weight of loaded vehicle, with driver only thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all accessories, tool, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed [illegible]
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER
ON ☐ OFF ☑

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE [illegible] B/L No.

(Driver's Signature)

HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DAC945-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services
6. US EPA ID Number: N/A

7. Transporter 2 Company Name
8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services--DP-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone
B. Transporter's Phone 505-392-44
C. Facility's Phone 505-392-42

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARREN NEFF
Signature: Warren Neff
Month 10 Day 04 Year 95

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Tim Shoemaker
Signature
Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR

TRANSPORTER

FACILITY

GENERATOR'S COPY

Appendix A-3

Portions of: *Final SWMU 4 Accelerated Corrective Measures Completion Report, Holloman Air Force Base, New Mexico*

NationView, LLC, July 2012

FINAL

SWMU 4
ACCELERATED CORRECTIVE MEASURES COMPLETION REPORT
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract to:

U.S. Army Corps of Engineers - Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Contract No. W912PP-09-D-0003
Delivery Order No. 0004

Prepared by:

NationView, LLC
1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205
NationView Project No. 09-0008

July 2012

Table 3-2
Survey Data and Groundwater Elevation Summary (August 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman AFB, New Mexico

Well	Northing (NAD 83)	Easting (NAD 83)	TOC Elevation (ft above msl)	DTW from TOC (ft below TOC)	Groundwater Elevation August 9, 2010 (ft above msl)
SWMU4-MW01	672016.821	1694200.146	4,083.233	6.84	4,076.39
SWMU4-MW02	671951.174	1694079.991	4,084.403	7.93	4,076.47
SWMU4-MW03	671972.918	1694231.641	4,082.900	6.48	4,076.42
SWMU4-MW04	671921.595	1694052.093	4,084.580	8.10	4,076.48
SWMU4-MW05	671904.714	1694351.845	4,082.300	6.03	4,076.27
SWMU4-MW06	671854.071	1694298.828	4,082.320	5.97	4,076.35
SWMU4-MW07	671845.725	1694374.188	4,081.801	5.42	4,076.38
SWMU4-MW08	671763.285	1694036.075	4,083.562	7.41	4,076.15
SWMU4-MW09	671766.342	1694178.199	4,082.948	6.54	4,076.41
SWMU4-MW10	671752.356	1694331.287	4,082.292	6.06	4,076.23

Notes:
NAD 83 = North American Datum 1983
TOC = Top of Casing
DTW = Depth to Water
ft = feet
msl = mean sea level
SWMU4 = Solid Waste Management Unit 4
MW = Monitoring Well

Table 3-3
Monitoring Well Construction Details
SWMU 4 Accelerated Corrective Measures Report
Holloman AFB, New Mexico

Well Identification	Installation Date	Sampled 2010	Diameter (inches)	Screen Interval (ft bgs)	Depth to Water (ft below TOC)	Total depth (feet)	Status
SWMU4-MW01	17-Jul-2010	1	1	5.75 - 15.75	6.84	16.0	Active
SWMU4-MW02	19-Jul-2010	1	1	4.75 - 14.75	7.93	15.0	Active
SWMU4-MW03	16-Jul-2010	1	1	3.75 - 13.75	6.48	14	Active
SWMU4-MW04	19-Jul-2010	1	1	4.75 - 14.75	8.10	15.0	Active
SWMU4-MW05	16-Jul-2010	1	1	3.75 - 13.75	6.03	14.0	Active
SWMU4-MW06	16-Jul-2010	1	1	3.75 - 13.75	5.97	14.0	Active
SWMU4-MW07	16-Jul-2010	1	1	4.25 - 14.25	5.42	14.5	Active
SWMU4-MW08	19-Jul-2010	1	1	4.25 - 14.25	7.41	14.5	Active
SWMU4-MW09	19-Jul-2010	1	1	3.25 - 13.25	6.54	13.5	Active
SWMU4-MW10	19-Jul-2010	1	1	3.75 - 13.75	6.06	14.0	Active

Notes:
ft bgs = Feet below ground surface
ft below TOC = Feet below top of casing (based on August 9, 2010, groundwater elevation)
SWMU4 = Solid Waste Management Unit
MW = Monitoring Well

Table 5-1
Summary of Soil Boring Locations and Sample Intervals
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Soil Boring Number	Location	Northing	Easting	Total Depth (ft bgs)	Sample Depths for Analysis (ft bgs)	Laboratory Analysis
SWMU4-DP01 (MW02)	Downgradient of Removed OWS	671951.17	1694079.99	15.0	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP02 (MW03)	Along Leach Field Drain Pipe	671972.92	1694231.64	13.0	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP03	Suspected Leach Field Area	671913.04	1694307.22	8.0	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP04	Suspected Leach Field Area	671903.51	1694295.31	9.5	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP05	Suspected Leach Field Area	671898.74	1694307.22	9.5	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP06	Suspected Leach Field Area	671886.04	1694318.34	9.5	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP07	Suspected Leach Field Area	671870.16	1694323.10	9.5	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP08	Suspected Leach Field Area	671878.10	1694334.22	9.0	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP09 (MW06)	Downgradient of Leach Field	671854.07	1694298.83	14.0	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP10 (MW07)	Downgradient of Leach Field	671845.72	1694374.19	14.5	1.0-2.0, 6.0-7.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides
SWMU4-DP12 (MW01)	Upgradient of Drain Pipe	672016.82	1694200.15	16.0	1.0-2.0, 2.0-3.0	MC, DBD, SG, FOC
SWMU4-DP12 (MW01)[1]	Upgradient of Drain Pipe	672016.82	1694200.15	16.0	14.0-15.0	VOCs, SVOCs, TPH, PCBs, TAL Metals, Pesticides

Notes:
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
TPH = Total Petroleum Hydrocarbons (Gasoline Range Organics, Diesel Range Organics, and Oil Range Organics)
PCBs = Polychlorinated Biphenyls
TAL = Target Analyte List
MC = Moisture Content
DBD = Dry Bulk Density
SG = Specific Gravity
FOC = Fractional Organic Carbon
ft bgs = feet below ground surface
OWS = Oil Water Separator
SWMU4 = Solid Waste Management Unit 4
DP = Direct Push
MW = Monitoring Well
[1] Additional soil sample collected at 15 ft bgs due to the presence of visible staining and a slight odor. See Variance Form in Attachment B.

Table 7-1
Soil Analytical Results (July 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background		SWMU4-DP01-2			SWMU4-DP01-7			SWMU4-DP01-7-A			SWMU4-DP02-2			SWMU4-DP02-7			SWMU4-DP03-2		
Lab Sample Identification:	NMED Residential [1]	NMED Approved Background Level [2]	Combined Soil Background Level [3]	F75096-2			F75096-3			F75096-4			F75092-4			F75096-1			F75061-1		
Date Sampled:				7/14/2010			7/14/2010			7/14/2010			7/14/2010			7/14/2010			7/13/2010		
Analyte				Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ
Volatile Organic Compounds (8260B)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Carbon disulfide	1,530	NV	NV	2.2	U		2.8	U		2.5	U		2.3	U		5.9	J	J	2.5	U	
Methylene chloride	409	NV	NV	4.6	U		6.0	JB	J	5.1	U		7.8	J		11.2	JB	J	7.4	JB	J
Semi-Volatile Organic Compounds (8270C)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Benzo(a)anthracene	1.48	NV	NV	37	U		42	U		40	U		61.3	J		45	U		36	U	
Benzo(a)pyrene	0.148	NV	NV	37	U		42	U		40	U		81.6	J		45	U		36	U	
Benzo(b)fluoranthene	1.48	NV	NV	37	U		42	U		40	U		134	J		45	U		36	U	
Benzo(g,h,i)perylene	NV [6]	NV	NV	37	U		42	U		40	U		96.0	J		45	U		36	U	
Benzo(k)fluoranthene	14.8	NV	NV	37	U		42	U		40	U		50.1	J		45	U		36	U	
Chrysene	148	NV	NV	37	U		42	U		40	U		92.1	J		45	U		36	U	
Diethyl phthalate	48,900	NV	NV	180	U		210	U		200	U		190	U		220	U		180	U	
Fluoranthene	2,290	NV	NV	37	U		42	U		40	U		154	J		45	U		36	U	
Indeno(1,2,3-cd)pyrene	1.48	NV	NV	37	U		42	U		40	U		85.2	J		45	U		36	U	
Phenanthrene	1,830	NV	NV	37	U		42	U		40	U		52.5	J		45	U		36	U	
Pyrene	1,720	NV	NV	37	U		42	U		40	U		143	J		45	U		36	U	
Total Petroleum Hydrocarbons (8015)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Gasoline Range Organics (C6-C10)	1,000 [7]	NV	NV	2.8	U		3.4	U		3.2	U		3.0	U		4.1	U		3.0	U	
Diesel Range Organics (C10-C22)	1,000 [7]	NV	NV	11	U		6.1	U		5.6	U		5.6	U		6.7	U		5.8	U	
Oil Range Organics (>C22-C36)	1,000 [7]	NV	NV	47.1			6.1	U		5.6	U		5.6	U		6.7	U		5.8	U	
PCBs (8082)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All PCBs	NV	NV	NV	ND			ND			ND			ND			ND			ND		
Pesticides (8081A)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All Pesticides	NV	NV	NV	ND			ND			ND			ND			ND			ND		
TAL Metals Analysis (6010B/7471A)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Aluminum	78,000	13,722	13,722.27	5,570		J	2,260		J	2,630		J	6,690		J	3,000		J	11,200		
Antimony	31.3	1.6	1.6	0.35	J		0.33	J		0.40	J		0.31	J		0.53	J		0.17	J	
Arsenic	3.9	3.7	3.66	1.4			0.54	J		0.57	J		1.7			0.66			2.7		
Barium	15,600	169.3	169.25	55.7		J	21.5			25.6			52.9		J	17.7			110		
Beryllium	156	1.6	1.53	0.22	J		0.084	J		0.098	J		0.27			0.11	J		0.46		
Cadmium	70.3	0.3	0.28	0.29			0.19	J		0.22	J		0.45			0.21	J		0.18		
Calcium	NV [6]	317,332	317,331.59	94,200			171,000			171,000			98,200			220,000			37,800		J
Chromium	117,000	25	24.95	11.2			2.8	J		2.8	J		10.1			3.2	J		10.1		J
Cobalt	23 [5]	7.7	7.70	4.1	J		1.0	J		1.1	J		2.8	J		0.99	J		5.0		
Copper	3,130	13	12.96	7.6			1.4	J		1.6	J		5.0	J		1.9	J		7.8		
Iron	54,800	23,049	23,049.48	5,340		J	1,870		J	2,130		J	5,160		J	2,170		J	8,460		J
Lead	400	10.9	10.87	28.5		J	1.5	J		1.6	J		16.0		J	1.6	J		6.7		J
Magnesium	NV [6]	16,991	16,990.65	3,340		J	986		J	1,150		J	2,750		J	1,250		J	4,970		J
Manganese	1,860	393	393.47	129		J	37.0		J	39.2		J	90.9		J	35.1		J	143		J
Mercury	15.6	10.8	10.76	0.29			0.013	U		0.012	U		0.012	U		0.012	U		0.012	U	
Nickel	1,560	17.4	17.34	7.4	J		1.9	J		2.0	J		5.7	J		2.1	J		10.2		
Potassium	NV [6]	5,077	5,077.12	1,300		J	562	J		656			1,790		J	662			3,070		J
Selenium	391	1.4	1.4	0.76	U		2.4	U		2.3	U		0.81	U		2.5	U		0.37	U	
Sodium	NV [6]	5,196	5,195.97	208	J		160	J		126	J		273	J		357	J		241	J	
Thallium	0.782	1.3	1.3	0.89	J		0.68	J		0.78	J		0.41	U		0.61	U		0.092	U	
Vanadium	391	42.6	42.53	12.4		J	5.7		J	6.1		J	11.5		J	6.1		J	17.0		J
Zinc	23,500	54.6	54.53	28.2			4.3	J		5.1	J		18.4			5.0	J		25.7		J
General Chemistry (2540B M)	**%**	**%**	**%**	**%**			**%**			**%**			**%**			**%**			**%**		
Solids, Percent	NV	NV	NV	90.6			78.2			82.7			86.9			73.5			85.9		

Notes:

NMED = New Mexico Environment Department
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCBs = Polychlorinated Biphenyls
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
NV = No Value
ND = Entire analyte list not detected
LQ = Laboratory Qualifier
CQ = Validating Chemist Qualifier

Qualifiers
U = Not detected
J = Indicates an estimated value
B = Analyte found in the associated method blank

[1] Table A-1, NMED Soil Screening Levels. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)
[2] Table 1, *Conditional Approval Letter, Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)
[3] Established in the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView/Bhate JV III, July 2011)
[4] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[5] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (November 2011)
[6] No Value established for NMED Residential SSL (February 2012) and USEPA RSL (November 2011)
[7] Table 6-3, TPH Screening Guidelines for Unknown Oil, Residential Direct Exposure. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)

Bold value indicates analytes above NMED SSLs (February 2012) or TPH results above NMED TPH Screening Guidelines (February 2012)
Indicates analytical results above the NMED Residential SSL or USEPA RSL, but below the NMED Approved Background Levels
Indicates analytical results above the NMED Approved Background Levels, but below the NMED Residential SSL and USEPA RSL

Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit # 4
DP = Direct Push borehole soil sample
Final digit(s) equal the sample depth in feet below ground surface
A = Denotes a field duplicate sample

Table 7-1
Soil Analytical Results (July 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background		SWMU4-DP03-7			SWMU4-DP04-2			SWMU4-DP04-7			SWMU4-DP05-2			SWMU4-DP05-7			SWMU4-DP06-2		
Lab Sample Identification:	NMED	NMED Approved	Combined Soil	F75061-2			F75061-3			F75061-4			F75051-1			F75051-2			F75051-3		
Date Sampled:	Residential [1]	Background Level [2]	Background Level [3]	7/13/2010			7/13/2010			7/13/2010			7/13/2010			7/13/2010			7/13/2010		
Analyte				Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ
Volatile Organic Compounds (8260B)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Carbon disulfide	1,530	NV	NV	3.2	U		2.6	U		2.9	U		2.3	U		3.1	U		3.3	U	
Methylene chloride	409	NV	NV	6.7	U		8.5	JB	J	6.9	JB	J	6.2	J		6.5	U		6.8	U	
Semi-Volatile Organic Compounds (8270C)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Benzo(a)anthracene	1.48	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Benzo(a)pyrene	0.148	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Benzo(b)fluoranthene	1.48	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Benzo(g,h,i)perylene	NV [6]	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Benzo(k)fluoranthene	14.8	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Chrysene	148	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Diethyl phthalate	48,900	NV	NV	220	U		200	U		220	U		180	U		240	U		220	U	
Fluoranthene	2,290	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Indeno(1,2,3-cd)pyrene	1.48	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Phenanthrene	1,830	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Pyrene	1,720	NV	NV	45	U		40	U		44	U		36	U		47	U		44	U	
Total Petroleum Hydrocarbons (8015)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Gasoline Range Organics (C6-C10)	1,000 [7]	NV	NV	4.2	U		3.3	U		3.9	U		2.8	U		4.4	U		4.3	U	
Diesel Range Organics (C10-C22)	1,000 [7]	NV	NV	7.0	U		6.0	U		6.6	U		5.6	U		7.1	U		6.8	U	
Oil Range Organics (>C22-C36)	1,000 [7]	NV	NV	7.0	U		6.0	U		6.6	U		5.6	U		7.1	U		6.8	U	
PCBs (8082)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All PCBs	NV	NV	NV	ND			ND			ND			ND			ND			ND		
Pesticides (8081A)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All Pesticides	NV	NV	NV	ND			ND			ND			ND			ND			ND		
TAL Metals Analysis (6010B/7471A)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Aluminum	78,000	13,722	13,722.27	4,330			6,310			6,290			8,310			4,200			2,210		
Antimony	31.3	1.6	1.6	0.38	J		0.35	J		0.21	J		0.34	J		0.43	J		0.42	J	
Arsenic	3.9	3.7	3.66	0.86			1.8			1.7			2.0			0.74			0.83		
Barium	15,600	169.3	169.25	25.3			56.8			44.6			74.2			36.0			34.2		
Beryllium	156	1.6	1.53	0.18	J		0.23			0.26			0.35			0.17	J		0.068	J	
Cadmium	70.3	0.3	0.28	0.35			0.087	J		0.075	J		0.055	J		0.32			0.15	J	
Calcium	NV [6]	317,332	317,331.59	194,000		J	95,300		J	87,800		J	55,200		J	199,000		J	211,000		J
Chromium	117,000	25	24.95	4.9			6.5			7.2			7.8		J	4.4	J		2.3	J	
Cobalt	23 [5]	7.7	7.70	1.7	J		2.7	J		2.1	J		3.4			1.4	J		0.93	J	
Copper	3,130	13	12.96	2.6	J		4.9	J		3.0	J		5.1			2.3	J		3.5	J	
Iron	54,800	23,049	23,049.48	2,960		J	4,550		J	4,620		J	6,660		J	2,960		J	1,590		J
Lead	400	10.9	10.87	1.9	J	J	4.0		J	3.1	J	J	4.8		J	1.9	J	J	1.5	J	J
Magnesium	NV [6]	16,991	16,990.65	2,300		J	2,540		J	2,520		J	2,830		J	1,940		J	1,310		J
Manganese	1,860	393	393.47	44.3		J	79.7		J	55.1		J	114		J	49.7		J	28.7		J
Mercury	15.6	10.8	10.76	0.015	U		0.012	U		0.013	U		0.012	U		0.014	U		0.014	U	
Nickel	1,560	17.4	17.34	3.3	J		5.2	J		4.6	J		6.9		J	3.1	J	J	1.6	J	J
Potassium	NV [6]	5,077	5,077.12	994		J	1,780		J	1,410		J	2,060		J	983		J	647	J	J
Selenium	391	1.4	1.4	2.0	U		0.92	U		0.93	U		0.54	J		2.4	U		2.7	U	
Sodium	NV [6]	5,196	5,195.97	483	J		137	J		464	J		694			529	J		576	J	
Thallium	0.782	1.3	1.3	0.40	U		0.42	J		0.37	U		0.11	U		0.24	U		0.54	U	
Vanadium	391	42.6	42.53	14.1		J	11.3		J	13.9		J	12.5		J	8.1		J	5.2		J
Zinc	23,500	54.6	54.53	6.9	J	J	14.0		J	12.7		J	20.1		J	7.8	J	J	3.8	J	J
General Chemistry (2540B M)	**%**	**%**	**%**	**%**			**%**			**%**			**%**			**%**			**%**		
Solids, Percent	NV	NV	NV	71.2			82.3			74.9			88.1			69.8			73.5		

Notes:

NMED = New Mexico Environment Department
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCBs = Polychlorinated Biphenyls
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
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U = Not detected
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[1] Table A-1, NMED Soil Screening Levels. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)
[2] Table 1, *Conditional Approval Letter, Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)
[3] Established in the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView/Bhate JV III, July 2011)
[4] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[5] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (November 2011)
[6] No Value established for NMED Residential SSL (February 2012) and USEPA RSL (November 2011)
[7] Table 6-3, TPH Screening Guidelines for Unknown Oil, Residential Direct Exposure. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)

Bold value indicates analytes above NMED SSLs (February 2012) or TPH results above NMED TPH Screening Guidelines (February 2012)
Indicates analytical results above the NMED Residential SSL or USEPA RSL, but below the NMED Approved Background Levels
Indicates analytical results above the NMED Approved Background Levels, but below the NMED Residential SSL and USEPA RSL

Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit # 4
DP = Direct Push borehole soil sample
Final digit(s) equal the sample depth in feet below ground surface
A = Denotes a field duplicate sample

Table 7-1
Soil Analytical Results (July 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background		SWMU4-DP06-7			SWMU4-DP06-7-A			SWMU4-DP07-2			SWMU4-DP07-7			SWMU4-DP08-2			SWMU4-DP08-7		
Lab Sample Identification:	NMED Residential [1]	NMED Approved Background Level [2]	Combined Soil Background Level [3]	F75051-4			F75052-1			F75052-2			F75052-3			F75052-4			F75093-1		
Date Sampled:				7/13/2010			7/13/2010			7/13/2010			7/13/2010			7/13/2010			7/13/2010		
Analyte				Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ
Volatile Organic Compounds (8260B)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Carbon disulfide	1,530	NV	NV	3.3	U		2.8	U		2.5	U		2.6	U		3.3	U		2.9	U	
Methylene chloride	409	NV	NV	6.8	U		20.7	B	J	9.4	JB	J	10.1	JB	J	8.7	JB	J	6.1	U	
Semi-Volatile Organic Compounds (8270C)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Benzo(a)anthracene	1.48	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Benzo(a)pyrene	0.148	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Benzo(b)fluoranthene	1.48	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Benzo(g,h,i)perylene	NV [6]	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Benzo(k)fluoranthene	14.8	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Chrysene	148	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Diethyl phthalate	48,900	NV	NV	250	U		210	U		200	U		210	U		948			220	U	
Fluoranthene	2,290	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Indeno(1,2,3-cd)pyrene	1.48	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Phenanthrene	1,830	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Pyrene	1,720	NV	NV	50	U		43	U		40	U		42	U		47	U		43	U	
Total Petroleum Hydrocarbons (8015)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Gasoline Range Organics (C6-C10)	1,000 [7]	NV	NV	4.8	U		4.0	U		3.3	U		3.5	U		4.3	U		3.8	U	
Diesel Range Organics (C10-C22)	1,000 [7]	NV	NV	7.5	U		6.4	U		6.4	U		6.4	U		7.0	U		6.6	U	
Oil Range Organics (>C22-C36)	1,000 [7]	NV	NV	7.5	U		6.4	U		6.4	U		6.4	U		7.0	U		6.6	U	
PCBs (8082)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All PCBs	NV	NV	NV	ND			ND			ND			ND			ND			ND		
Pesticides (8081A)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All Pesticides	NV	NV	NV	ND			ND			ND			ND			ND			ND		
TAL Metals Analysis (6010B/7471A)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Aluminum	78,000	13,722	13,722.27	6,630		J	3,740		J	6,320			5,370			201			6,220		
Antimony	31.3	1.6	1.6	0.45	J		0.42	J		0.28	J		0.22	J		0.40	J		0.12	J	
Arsenic	3.9	3.7	3.66	1.0		J	2.3		J	1.7			2.0			0.41	J		2.0		
Barium	15,600	169.3	169.25	46.9			30.3			54.4			52.5			5.0	J		45.6		
Beryllium	156	1.6	1.53	0.29	J	J	0.15	J	J	0.22			0.19	J		0.064	U		0.25		
Cadmium	70.3	0.3	0.28	0.52			0.32			0.54			0.18	J		0.064	U		0.54		
Calcium	NV [6]	317,332	317,331.59	191,000		J	159,000		J	165,000		J	118,000		J	247,000		J	145,000		
Chromium	117,000	25	24.95	8.1		J	4.4	J	J	6.5			5.5			0.64	U		6.8		
Cobalt	23 [5]	7.7	7.70	2.1	J		1.4	J		2.5	J		1.9	J		0.35	J		1.7	J	
Copper	3,130	13	12.96	3.4	J		2.3	J		5.5	J		3.3	J		3.1	J		3.1	J	
Iron	54,800	23,049	23,049.48	4,670		J	2,890		J	4,330		J	3,750		J	137		J	4,220		J
Lead	400	10.9	10.87	3.2	J	J	1.9	J	J	4.4		J	2.7	J	J	0.26	U	UJ	8.7		J
Magnesium	NV [6]	16,991	16,990.65	4,480		J	1,630		J	2,930		J	3,540		J	334		J	3,370		J
Manganese	1,860	393	393.47	67.6		J	38.7		J	84.2		J	62.8		J	4.2		J	61.8		J
Mercury	15.6	10.8	10.76	0.015	U		0.013	U		0.012	U		0.012	U		0.013	U		0.012	U	
Nickel	1,560	17.4	17.34	5.0	J	J	2.7	J	J	4.8	J		3.6	J		0.50	J		3.8	J	
Potassium	NV [6]	5,077	5,077.12	1,560		J	882		J	1,780		J	1,320		J	104	J	J	1,500		
Selenium	391	1.4	1.4	2.9	U		2.0	U		1.7	U		1.1	U		2.6	U		2.0	U	
Sodium	NV [6]	5,196	5,195.97	321	J		209	J		495			398	J		828			320	J	
Thallium	0.782	1.3	1.3	0.74	J		0.41	U		0.36	J		0.45	U		0.51	U		0.20	U	
Vanadium	391	42.6	42.53	18.5		J	11.6		J	10.5		J	14.6		J	1.4	J		20.9		J
Zinc	23,500	54.6	54.53	12.6	J	J	7.0	J	J	14.7		J	10.9		J	3.2	U	UJ	13.6		
General Chemistry (2540B M)	**%**	**%**	**%**	**%**			**%**			**%**			**%**			**%**			**%**		
Solids, Percent	NV	NV	NV	66.7			77.4			78.9			78.5			71.5			75.9		

Notes:

NMED = New Mexico Environment Department
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCBs = Polychlorinated Biphenyls
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
NV = No Value
ND = Entire analyte list not detected
LQ = Laboratory Qualifier
CQ = Validating Chemist Qualifier

Qualifiers
U = Not detected
J = Indicates an estimated value
B = Analyte found in the associated method blank

[1] Table A-1, NMED Soil Screening Levels. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)
[2] Table 1, *Conditional Approval Letter, Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)
[3] Established in the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView/Bhate JV III, July 2011)
[4] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[5] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (November 2011)
[6] No Value established for NMED Residential SSL (February 2012) and USEPA RSL (November 2011)
[7] Table 6-3, TPH Screening Guidelines for Unknown Oil, Residential Direct Exposure. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, February 2012)

Bold value indicates analytes above NMED SSLs (February 2012) or TPH results above NMED TPH Screening Guidelines (February 2012)
Indicates analytical results above the NMED Residential SSL or USEPA RSL, but below the NMED Approved Background Levels
Indicates analytical results above the NMED Approved Background Levels, but below the NMED Residential SSL and USEPA RSL

Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit # 4
DP = Direct Push borehole soil sample
Final digit(s) equal the sample depth in feet below ground surface
A = Denotes a field duplicate sample

Table 7-1
Soil Analytical Results (July 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background		SWMU4-DP09-2			SWMU4-DP09-7			SWMU4-DP10-2			SWMU4-DP10-7			SWMU4-DP12-15		
Lab Sample Identification:	NMED Residential [1]	NMED Approved Background Level [2]	Combined Soil Background Level [3]	F75093-2			F75092-1			F75092-2			F75092-3			F75223-1		
Date Sampled:				7/13/2010			7/13/2010			7/13/2010			7/13/2010			7/17/2010		
Analyte				Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ	Result [4]	LQ	CQ
Volatile Organic Compounds (8260B)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Carbon disulfide	1,530	NV	NV	2.4	U		2.8	U		2.3	U		2.5	U		5.6		J
Methylene chloride	409	NV	NV	6.8	JB	J	5.9	U		4.8	U		6.4	J		5.1	U	
Semi-Volatile Organic Compounds (8270C)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Benzo(a)anthracene	1.48	NV	NV	40	U		43	U		38	U		41	U		41	U	
Benzo(a)pyrene	0.148	NV	NV	40	U		43	U		38	U		41	U		41	U	
Benzo(b)fluoranthene	1.48	NV	NV	40	U		43	U		38	U		41	U		41	U	
Benzo(g,h,i)perylene	NV [6]	NV	NV	40	U		43	U		38	U		41	U		41	U	
Benzo(k)fluoranthene	14.8	NV	NV	40	U		43	U		38	U		41	U		41	U	
Chrysene	148	NV	NV	40	U		43	U		38	U		41	U		41	U	
Diethyl phthalate	48,900	NV	NV	200	U		542			190	U		210	U		1,270		
Fluoranthene	2,290	NV	NV	40	U		43	U		38	U		41	U		41	U	
Indeno(1,2,3-cd)pyrene	1.48	NV	NV	40	U		43	U		38	U		41	U		41	U	
Phenanthrene	1,830	NV	NV	40	U		43	U		38	U		41	U		41	U	
Pyrene	1,720	NV	NV	40	U		43	U		38	U		41	U		41	U	
Total Petroleum Hydrocarbons (8015)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Gasoline Range Organics (C6-C10)	1,000 [7]	NV	NV	2.9	U		3.7	U		2.8	U		3.3	U		3.2	U	
Diesel Range Organics (C10-C22)	1,000 [7]	NV	NV	5.8	U		6.3	U		5.8	U		6.2	U		6.1	U	
Oil Range Organics (>C22-C36)	1,000 [7]	NV	NV	5.8	U		6.3	U		5.8	U		6.2	U		6.1	U	
PCBs (8082)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All PCBs	NV	NV	NV	ND			ND			ND			ND			ND		
Pesticides (8081A)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
All Pesticides	NV	NV	NV	ND			ND			ND			ND			ND		
TAL Metals Analysis (6010B/7471A)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Aluminum	78,000	13,722	13,722.27	10,300			3,250		J	16,900		J	6,530		J	1,800		
Antimony	31.3	1.6	1.6	0.17	J		0.32	J		0.15	J		0.20	J		0.26	J	
Arsenic	3.9	3.7	3.66	3.0			0.98			2.2			1.6			0.59		
Barium	15,600	169.3	169.25	146			31.5		J	123		J	87.9		J	24.4		
Beryllium	156	1.6	1.53	0.40			0.14	J		0.73	J		0.29			0.060	J	
Cadmium	70.3	0.3	0.28	0.15	J		0.27			0.29			0.58			0.14	J	
Calcium	NV [6]	317,332	317,331.59	97,200			170,000			37,600			160,000			164,000		
Chromium	117,000	25	24.95	9.6			3.7	J		12.8			7.6			2.0	J	
Cobalt	23 [5]	7.7	7.70	3.9			1.3	J		5.7			2.3	J		1.0	J	
Copper	3,130	13	12.96	7.8			1.8	J		9.1		J	2.5	J		1.7	J	
Iron	54,800	23,049	23,049.48	7,070		J	2,210		J	14,600		J	4,880		J	1,540		J
Lead	400	10.9	10.87	5.4		J	1.6	J		8.3		J	3.5	J		0.54	J	
Magnesium	NV [6]	16,991	16,990.65	4,030		J	1,390		J	8,620		J	2,700		J	1,120		J
Manganese	1,860	393	393.47	96.5		J	34.9		J	299		J	65.2		J	28.9		J
Mercury	15.6	10.8	10.76	0.012	U		0.013	U		0.012	U		0.012	U		0.012	U	
Nickel	1,560	17.4	17.34	8.0			2.4			12.1			5.2	J		1.2	J	
Potassium	NV [6]	5,077	5,077.12	2,610			729			5,300		J	1,270			545		
Selenium	391	1.4	1.4	0.95	U		2.1	U		0.31	U		2.2	U		0.20	U	
Sodium	NV [6]	5,196	5,195.97	414	J		314	J		1,080	J		457	J		568		
Thallium	0.782	1.3	1.3	0.24	J		0.11	U		0.078	U		0.43	U		1.0	U	
Vanadium	391	42.6	42.53	14.6		J	9.8		J	20.2		J	11.9		J	4.3		J
Zinc	23,500	54.6	54.53	24.2			5.4	J		32.3		J	12.3			2.7	J	
General Chemistry (2540B M)	**%**	**%**	**%**	**%**			**%**			**%**			**%**			**%**		
Solids, Percent	NV	NV	NV	83.3			78.2			87.1			81.3			81.3		

Notes:
NMED = New Mexico Environment Department
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCBs = Polychlorinated Biphenyls
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
NV = No Value
ND = Entire analyte list not detected
LQ = Laboratory Qualifier
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Indicates analytical results above the NMED Approved Background Levels, but below the NMED Residential SSL and USEPA RSL
Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit # 4
DP = Direct Push borehole soil sample
Final digit(s) equal the sample depth in feet below ground surface
A = Denotes a field duplicate sample

Table 7-2
Soil Geotechnical Data
SWMU 4 ACM Completion Report
Holloman Air Force Base, New Mexico

Sample Identification	**Method**	**Unit**	**SWMU4-DP12-2**	**SWMU4-DP12-3**	**Average**
Depth (ft bgs)			**1-2**	**2-3**	
Laboratory Identification			**F75223-2**	**F75223-3**	
Date sampled			**7/17/2010**	**7/17/2010**	
Parameter					
Bulk Density (Dry Basis)	ASTM D2937-94 M	g/mL	1.4	1.4	1.40
Fractional Organic Carbon	ASTM D2974-87	%	3.4	16.6	10.00
Moisture Content (Solids, Percent)	SM19 2540B M	%	91	89.3	90.15
Specific Gravity	ASTM 1429		1.7	2	1.85

Notes:
ASTM - American Society for Testing and Materials
SM = Standard Method
ft bgs - Feet below ground surface
g/mL - grams per milliliter
% - percent
SWMU4 = Solid Waste Management Unit 4
DP = Direct Push

Table 7-3
Groundwater Analytical Results (August 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Groundwater Screening Levels		Basewide Background		SWMU4-MW01			SWMU4-MW02			SWMU4-MW03			SWMU4-MW04			SWMU4-MW05			SWMU4-MW06		
Lab Sample Identification:	NMWQCC[1]	USEPA MCL [2]	NMED Approved Background Levels (Dissolved Constituents)[3]	Dissolved Metals in Groundwater Background Level [4]	F75728-3			F75728-4			F75728-11			F75728-5			F75728-1			F75728-2		
Date Sampled:					8/9/2010			8/10/2010			8/10/2010			8/10/2010			8/9/2010			8/9/2010		
Analyte					Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1
Volatile Organic Compounds (8260B)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L			µg/L		
Acetone	NV	NV	NV	NV	10	U	UJ	10	U		10	U	UJ	11.4	J		10	U		10	U	
Benzene	10	5	NV	NV	0.49	J	J	0.21	U		0.21	U	UJ	0.21	U		0.35	J		0.21	U	
Bromodichloromethane	NV	NV	NV	NV	0.28	U	UJ	0.28	U		0.28	U	UJ	0.28	U		0.28	U		0.28	U	
Chlorobenzene	NV	100	NV	NV	0.20	U	UJ	0.20	U		0.20	U	UJ	0.20	U		0.41	J		0.20	U	
Chloroform	100	NV	NV	NV	0.25	U	UJ	0.25	U		0.25	U	UJ	0.88	J		0.25	U		0.25	U	
Carbon disulfide	NV	NV	NV	NV	0.40	U	UJ	0.40	U		0.40	U	UJ	0.51	J		0.40	U		1.8	J	
1,2-Dichloroethane	10	5	NV	NV	0.33	U	UJ	0.33	U		0.68	J	J	0.33	U		**9.0**			0.33	U	
1,2-Dichloropropane	NV	5	NV	NV	0.28	J	J	0.27	U		0.55	J	J	0.27	U		**6.1**			0.27	U	
o-Dichlorobenzene	NV	600	NV	NV	0.26	U	UJ	0.26	U		0.26	U	UJ	0.26	U		1.4			0.26	U	
Toluene	750	1,000	NV	NV	0.46	J	J	0.20	U		0.20	U	UJ	0.20	U		0.20	U		0.20	U	
Semi-Volatile Organic Compounds (8270C)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L			µg/L		
All SVOCs	NV	NV	NV	NV	ND			ND			ND			ND			ND			ND		
Total Petroleum Hydrocarbons (8015 M)	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L			mg/L			mg/L			mg/L			mg/L		
Gasoline Range Organics (C6-C10)	50.0 [6]	NV	NV	NV	0.050	U		0.050	U		0.050	U		0.050	U		0.050	U		0.050	U	
Diesel Range Organics (C10-C22)	50.0 [6]	NV	NV	NV	0.400			0.10	U		0.521			0.115	J		0.376			0.332		
Oil Range Organics (>C22-C36)	50.0 [6]	NV	NV	NV	0.481			0.219	J		0.636			0.0962	J		0.477			0.836		
PCBs (8082)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L			µg/L		
All PCBs	NV	NV	NV	NV	ND			ND			ND			ND			ND			ND		
Pesticides (8081A)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L			µg/L		
All Pesticides	NV	NV	NV	NV	ND			ND			ND			ND			ND			ND		
TAL Metals Analysis (200.7/245.1)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L			µg/L		
Aluminum	5,000	50 [7]	54	54	25	U		25	U		**292**			25	U		25	U		25	U	
Antimony	NV	6	6	10	2.0	U		2.0	U		5.3	J		2.0	U		2.0	U		2.0	U	
Arsenic	100	10	10	28.53	2.0	U		5.5	J		6.0	J		8.8	J		4.1	J		2.0	U	
Barium	1,000	2,000	30.2	30.13	27.4	J		18.4	J		28.6	J		24.0	J		30.7	J		47.5	J	
Calcium	NV	NV	1,151,302	1,151,301.20	642,000			536,000			803,000		J	560,000			890,000			671,000		
Chromium	50	100	2.5	2.5	2.0	U		2.0	U		2.0	U		2.0	U		2.0	U		2.0	U	
Cobalt	50	NV	2.6	2.6	2.0	U		1.0	U		3.0	J		1.1	J		12.8	J		4.8	J	
Copper	1,000	1,300	22	57.46	6.1	J		4.0	U		6.6	J		4.0	U		7.1	J		7.5	J	
Iron	1,000	300 [7]	65.6	65.56	**4,180**		J	156	J		**6,590**		J	**7,040**		J	**17,400**		J	59.0	J	
Magnesium	NV	NV	3,630,927	3,630,926.70	588,000			100,000			391,000			122,000			926,000			378,000		
Manganese	200	50 [7]	50	118.65	**669**			**288**			**1,650**			**719**			**1,840**			**330**		
Nickel	200	NV	15.9	15.89	4.0	U		2.0	U		3.6	J		2.1	J		19.5	J		7.2	J	
Potassium	NV	NV	120,480	120,479.98	9,530	J		1,830	J		6,780	J		5,600	J		9,480	J		5,740	J	
Selenium	50	50	25.3	25.26	4.0	U		4.0	U		4.0	U		4.0	U		4.0	U		8.5	J	
Sodium	NV	NV	19,972,499	19,972,499.00	2,010,000			22,500			1,200,000			147,000			1,770,000			604,000		
Vanadium	NV	NV	73.8	73.73	1.0	U		20.7	J		1.0	U		1.0	U		5.9	J		75.2		
General Chemistry (2540C)	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L			mg/L			mg/L			mg/L			mg/L		
Solids, Total Dissolved	1,000	500 [7]	NV	65,956.58 [8]	**8,660**			**2,790**			**5,880**			**3,220**			**12,200**			**4,870**		

Notes:

NMWQCC = New Mexico Water Quality Control Commission
USEPA = United States Environmental Protection Agency
NMED = New Mexico Environment Department
MCL = Maximum Contaminant Level
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCB = Polychlorinated Biphenyls
µg/L = micrograms per liter
mg/L = milligrams per liter
% = percent
NV = No Value
Q = Laboratory Qualifier
Q1 = Validating Chemist Qualifier

Qualifiers
U = Not detected
J = Indicates an estimated value

[1] Standards for Groundwater, if 10,000 mg/L Total Dissolved Solids (TDS) Concentration or Less, New Mexico Administrative Code 20.6.2.3103
[2] USEPA National Primary Drinking Water Regulations MCLs (816-F-09-004, May 2009)
[3] Table 3, *Conditional Approval Letter*, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)
[4] Table 5-18, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView|Bhate JV III, July 2011)
[5] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[6] Table 6-3, TPH Screening Guidelines, Unknown Oil, Conc. in Groundwater. *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, Feb 2012)
[7] USEPA Secondary Drinking Water Standard (816-F-09-004, May 2009)
[8] Value established in the Basewide Background Study Report, HAFB, New Mexico (NationView/Bhate JV III, July 2011) and derived from the Total Groundwater UTL

Bold value indicates analytes above the New Mexico Groundwater Quality Standards, the USEPA MCLs, or the NMED TPH Screening Guidelines
Indicates combined TPH-GRO/DRO/ORO analytical results above the NMED TPH Screening Guideline for Unknown Oil, Concentration in Groundwater, Table 6-3
Indicates analytical results above the New Mexico Groundwater Quality Standard, or USEPA MCL, but below the NMED approved Background Level
Indicates analytical results above the NMED approved Background Level, but not above applicable New Mexico Groundwater Quality Standards and/or USEPA MCLs

Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit #4
MW = Monitoring Well
A = Sample suffix denoting a field duplicate sample

Table 7-3
Groundwater Analytical Results (August 2010)
SWMU 4 Accelerated Corrective Measures Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Groundwater Screening Levels		Basewide Background		SWMU4-MW07			SWMU4-MW07-A			SWMU4-MW08			SWMU4-MW09			SWMU4-MW10		
Lab Sample Identification:	NMWQCC[1]	USEPA MCL [2]	NMED Approved Background Levels (Dissolved Constituents)[3]	Dissolved Metals in Groundwater Background Level [4]	F75700-1			F75700-2			F75770-3			F75770-2			F75770-1		
Date Sampled:					8/9/2010			8/9/2010			8/11/2010			8/10/2010			8/10/2010		
Analyte					Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1
Volatile Organic Compounds (8260B)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L		
Acetone	NV	NV	NV	NV	10	U		10	U		10	U		10	U		10	U	
Benzene	10	5	NV	NV	0.21	U		0.21	U		0.21	U		0.21	U		0.21	U	
Bromodichloromethane	NV	NV	NV	NV	0.28	U		0.28	U		0.30	J		0.28	U		0.28	U	
Chlorobenzene	NV	100	NV	NV	0.20	U		0.20	U		0.20	U		0.20	U		0.20	U	
Chloroform	100	NV	NV	NV	0.25	U		0.25	U		1.5			0.48	J		0.25	U	
Carbon disulfide	NV	NV	NV	NV	0.40	U		0.40	U		0.40	U		0.40	U		0.40	U	
1,2-Dichloroethane	10	5	NV	NV	0.33	U		0.33	U		0.33	U		0.33	U		0.33	U	
1,2-Dichloropropane	NV	5	NV	NV	0.27	U		0.27	U		0.27	U		0.27	U		0.27	U	
o-Dichlorobenzene	NV	600	NV	NV	0.26	U		0.26	U		0.26	U		0.26	U		0.26	U	
Toluene	750	1,000	NV	NV	0.20	U		0.20	U		0.20	U		0.20	U		0.20	U	
Semi-Volatile Organic Compounds (8270C)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L		
All SVOCs	NV	NV	NV	NV	ND			ND			ND			ND			ND		
Total Petroleum Hydrocarbons (8015 M)	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L			mg/L			mg/L			mg/L		
Gasoline Range Organics (C6-C10)	50.0 [6]	NV	NV	NV	0.050	U		0.050	U		0.050	U		0.050	U		0.050	U	
Diesel Range Organics (C10-C22)	50.0 [6]	NV	NV	NV	0.586	J		0.634			0.111	J		0.095	U		0.396		
Oil Range Organics (>C22-C36)	50.0 [6]	NV	NV	NV	1.67			1.94			0.152	J		0.095	U		0.992		
PCBs (8082)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L		
All PCBs	NV	NV	NV	NV	ND			ND			ND			ND			ND		
Pesticides (8081A)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L		
All Pesticides	NV	NV	NV	NV	ND			ND			ND			ND			ND		
TAL Metals Analysis (200.7/245.1)	µg/L	µg/L	µg/L	µg/L	µg/L			µg/L			µg/L			µg/L			µg/L		
Aluminum	5,000	50 [7]	54	54	25	U		25	U		25.0	J		**870**			43.0	J	
Antimony	NV	6	6	10	2.0	U		2.0	U		2.0	U		2.0	U		2.0	U	
Arsenic	100	10	10	28.53	2.0	U		2.0	U		2.0	U		3.2	J		3.4	J	
Barium	1,000	2,000	30.2	30.13	44.8	J		40.1	J		25.9	J		42.2	J		28.8	J	
Calcium	NV	NV	1,151,302	1,151,301.20	622,000			582,000			481,000			548,000			595,000		
Chromium	50	100	2.5	2.5	2.0	U		2.0	U		1.0	U		2.1	J		2.0	U	
Cobalt	50	NV	2.6	2.6	2.5	J	J	1.4	J	J	1.5	J		1.0	J		1.7	J	
Copper	1,000	1,300	22	57.46	6.5	J		6.1	J		6.0	J		6.2	J		6.3	J	
Iron	1,000	300 [7]	65.6	65.56	94.6	J		95.9	J		188	J		**667**			60.1	J	
Magnesium	NV	NV	3,630,927	3,630,926.70	39,600			36,600			419,000			177,000			166,000		
Manganese	200	50 [7]	50	118.65	**146**			**131**			**220**			**229**			**722**		
Nickel	200	NV	15.9	15.89	4.7	J	J	2.3	J	J	6.7	J		5.6	J		5.0	J	
Potassium	NV	NV	120,480	120,479.98	10,800			10,100			7,930	J		13,500			5,010	J	
Selenium	50	50	25.3	25.26	4.0	U		4.0	U		8.0	J		4.9	J		4.0	U	
Sodium	NV	NV	19,972,499	19,972,499.00	154,000			154,000			553,000			308,000			327,000		
Vanadium	NV	NV	73.8	73.73	8.6	J		8.2	J		33.8	J		61.0			58.5		
General Chemistry (2540C)	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L			mg/L			mg/L			mg/L		
Solids, Total Dissolved	1,000	500 [7]	NV	65,956.58 [8]	**1,860**			**2,530**			**3,780**			**4,800**			**4,190**		

Notes:

NMWQCC = New Mexico Water Quality Control Commission
USEPA = United States Environmental Protection Agency
NMED = New Mexico Environment Department
MCL = Maximum Contaminant Level
UTL = Upper Tolerance Limit
TAL = Target Analyte List
PCB = Polychlorinated Biphenyls
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Qualifiers
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[1] Standards for Groundwater, if 10,000 mg/L Total Dissolved Solids (TDS) Concentration or Less, New Mexico Administrative Code 20.6.2.3103
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[7] USEPA Secondary Drinking Water Standard
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Bold value indicates analytes above the New Mexico Groundwater Quality Standards, the USEPA MCLs, or the NMED TPH Screening Guidelines
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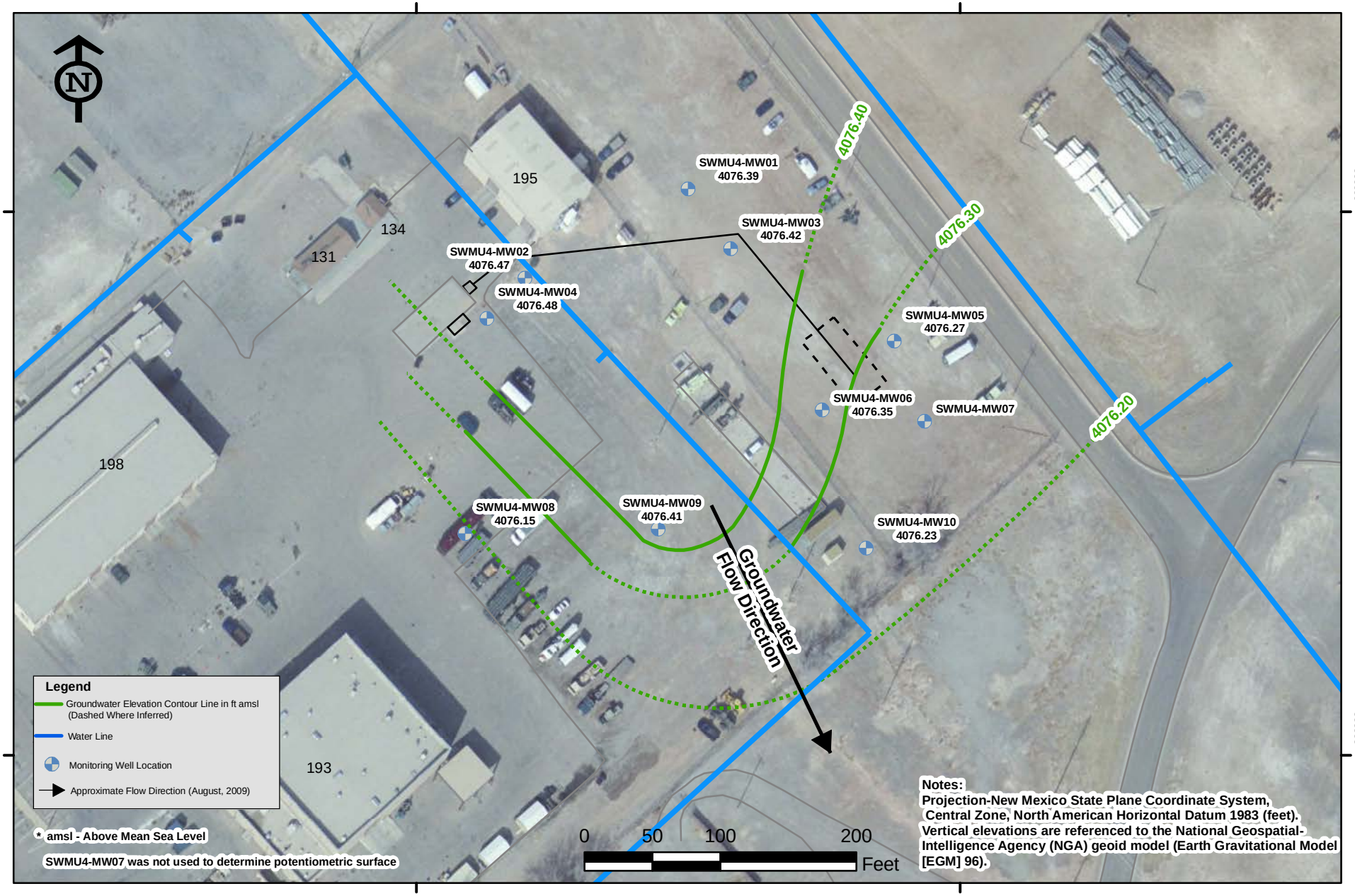
Client Sample Nomenclature
SWMU4 = Solid Waste Management Unit #4
MW = Monitoring Well
A = Sample suffix denoting a field duplicate sample



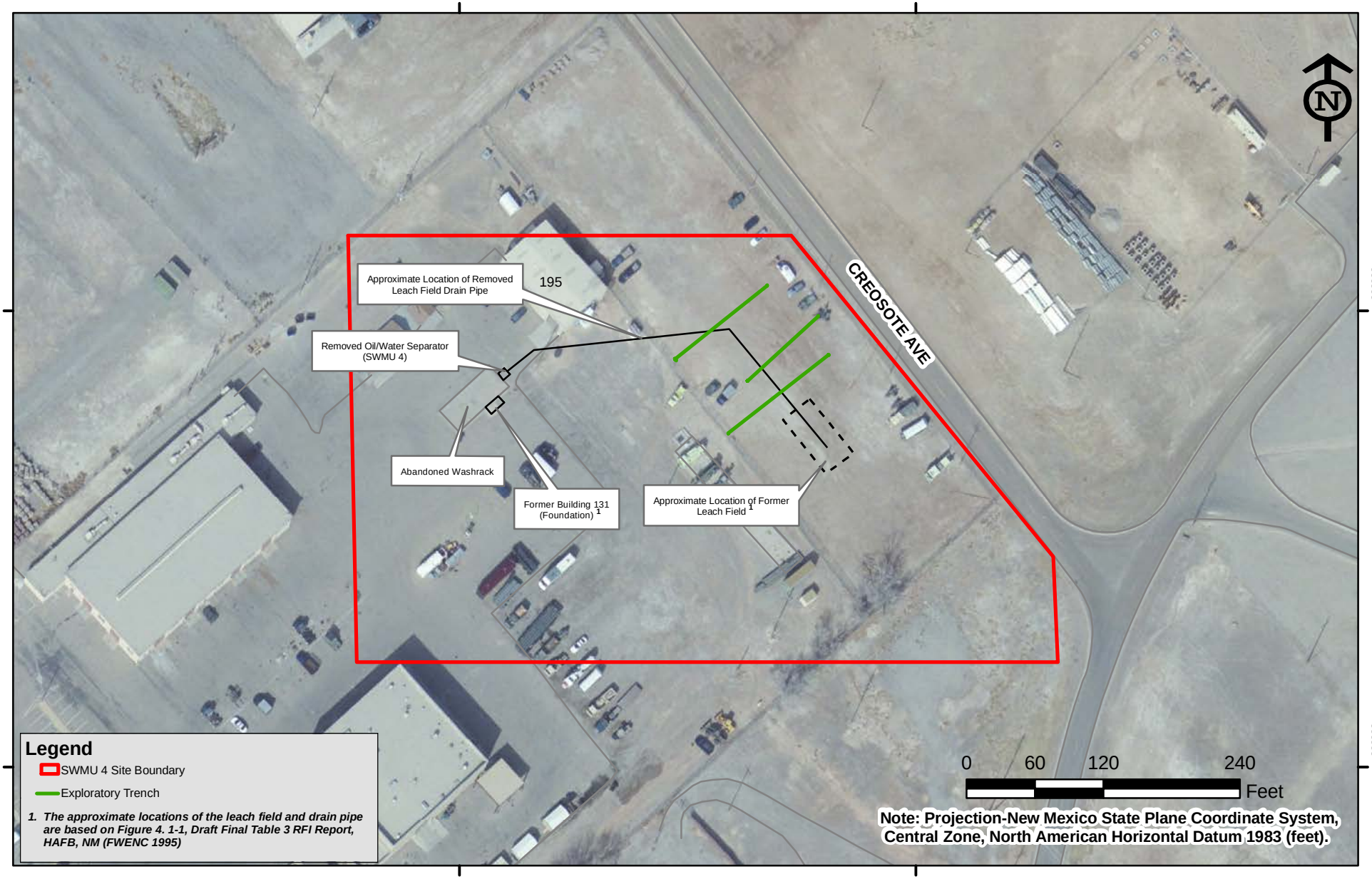
NATIONVIEW

SWMU 4
Potentiometric Surface Map

PROJECT NO.	SCALE	DATE	DRAWN BY:	cm
8090008	1"=100'	4/30/12	DRAWING NO:	Figure 3-8

SWMU 4
Accelerated Corrective Measures
Completion Report
Holloman AFB, New Mexico

Figure 3-8



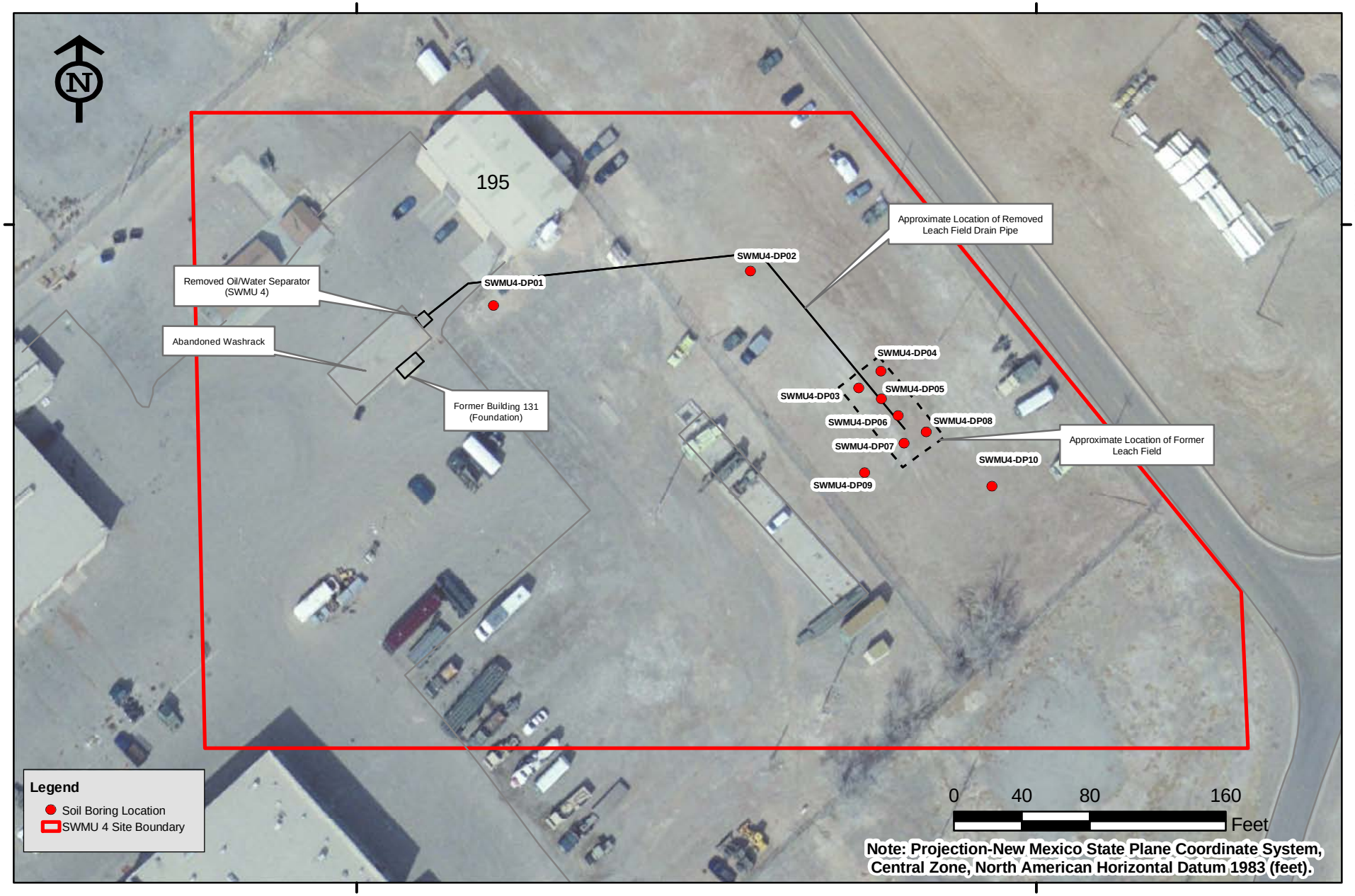
NATIONVIEW

SWMU 4
Exploratory Trenches

PROJECT NO.	SCALE	DATE	DRAWN BY:
8090008	1"=120'	8/27/10	cm
			DRAWING NO: Figure 5-1

SWMU 4
Accelerated Corrective Measures
Completion Report
Holloman AFB, New Mexico

Figure 5-1



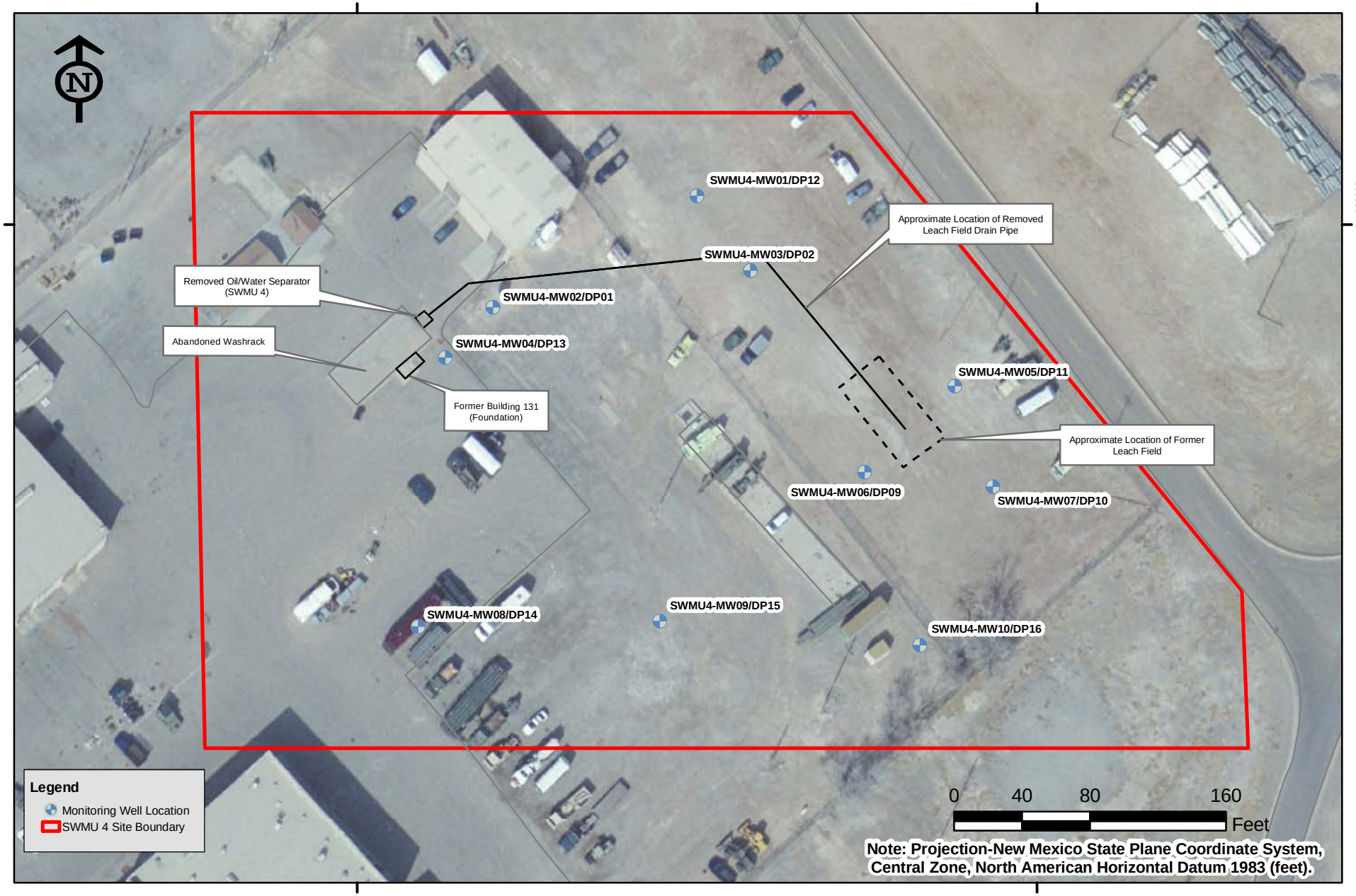
NATIONVIEW

SWMU 4
Soil Boring Locations

PROJECT NO.	SCALE	DATE	DRAWN BY: cm
8090008	1"=80'	8/27/10	DRAWING NO: Figure 5-2

SWMU 4
Accelerated Corrective Measures
Completion Report
Holloman AFB, New Mexico

Figure 5-2



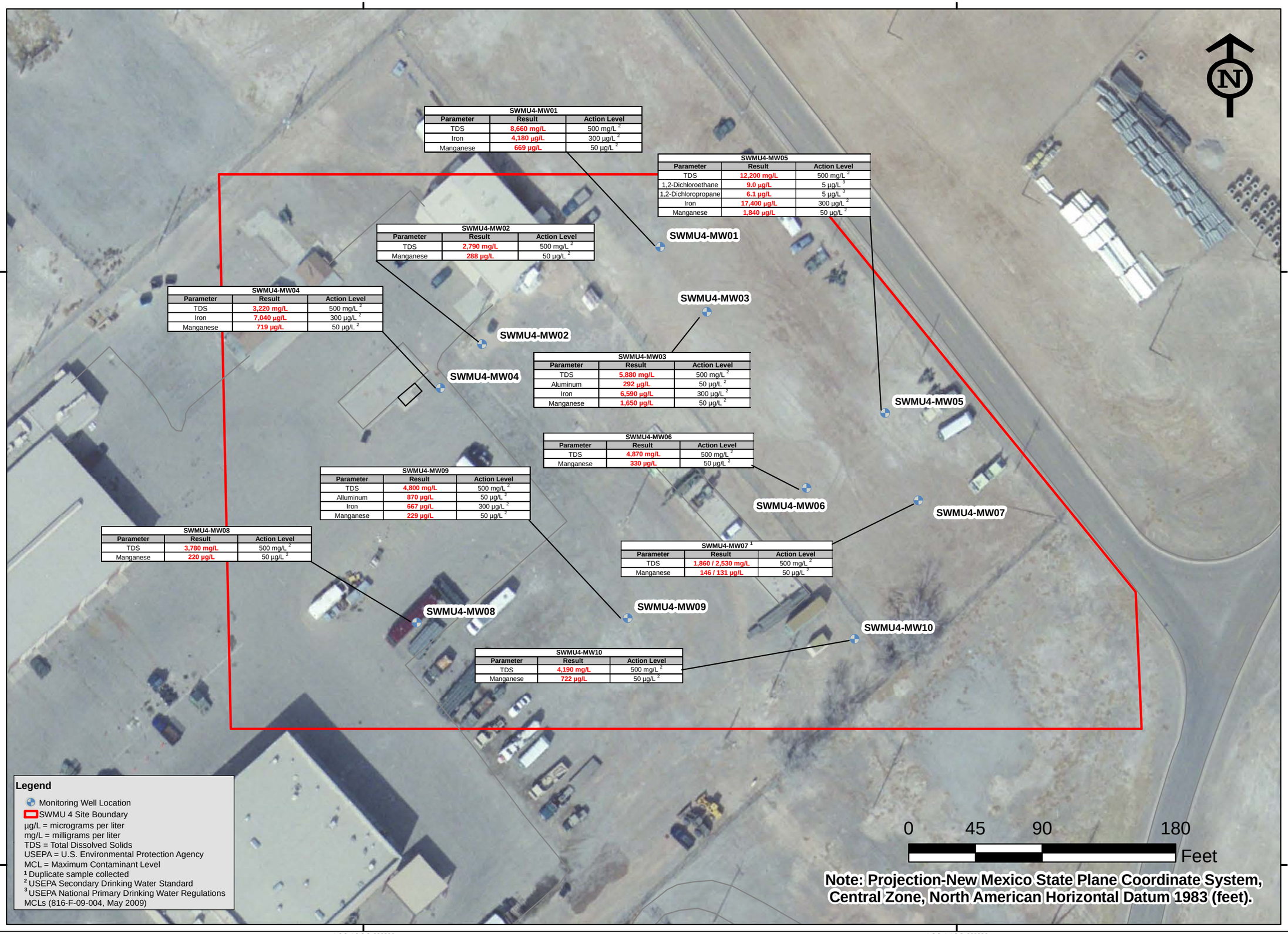
NATIONVIEW

SWMU 4
Monitoring Well Locations

PROJECT NO.	SCALE	DATE	DRAWN BY:	cm
8090008	1"=80'	4/30/12	DRAWING NO:	Figure 5-3

SWMU 4
Accelerated Corrective Measures
Completion Report
Holloman AFB, New Mexico

Figure 5-3



SWMU4-MW01

Parameter	Result	Action Level
TDS	8,660 mg/L	500 mg/L [2]
Iron	4,180 µg/L	300 µg/L [2]
Manganese	669 µg/L	50 µg/L [2]

SWMU4-MW02

Parameter	Result	Action Level
TDS	2,790 mg/L	500 mg/L [2]
Manganese	288 µg/L	50 µg/L [2]

SWMU4-MW03

Parameter	Result	Action Level
TDS	5,880 mg/L	500 mg/L [2]
Aluminum	292 µg/L	50 µg/L [2]
Iron	6,590 µg/L	300 µg/L [2]
Manganese	1,650 µg/L	50 µg/L [2]

SWMU4-MW04

Parameter	Result	Action Level
TDS	3,220 mg/L	500 mg/L [2]
Iron	7,040 µg/L	300 µg/L [2]
Manganese	719 µg/L	50 µg/L [2]

SWMU4-MW05

Parameter	Result	Action Level
TDS	12,200 mg/L	500 mg/L [2]
1,2-Dichloroethane	9.0 µg/L	5 µg/L [3]
1,2-Dichloropropane	6.1 µg/L	5 µg/L [3]
Iron	17,400 µg/L	300 µg/L [2]
Manganese	1,840 µg/L	50 µg/L [2]

SWMU4-MW06

Parameter	Result	Action Level
TDS	4,870 mg/L	500 mg/L [2]
Manganese	330 µg/L	50 µg/L [2]

SWMU4-MW07 [1]

Parameter	Result	Action Level
TDS	1,860 / 2,530 mg/L	500 mg/L [2]
Manganese	146 / 131 µg/L	50 µg/L [2]

SWMU4-MW08

Parameter	Result	Action Level
TDS	3,780 mg/L	500 mg/L [2]
Manganese	220 µg/L	50 µg/L [2]

SWMU4-MW09

Parameter	Result	Action Level
TDS	4,800 mg/L	500 mg/L [2]
Alluminum	870 µg/L	50 µg/L [2]
Iron	667 µg/L	300 µg/L [2]
Manganese	229 µg/L	50 µg/L [2]

SWMU4-MW10

Parameter	Result	Action Level
TDS	4,190 mg/L	500 mg/L [2]
Manganese	722 µg/L	50 µg/L [2]

SWMU 4
Accelerated Corrective Measures
Completion Report
Holloman AFB, New Mexico

Figure 7-1

ACM Groundwater Analytical Results Above Action Levels

PROJECT NO.	SCALE	DATE	DRAWN BY:	DRAWING NO:
8090008	1"=60'	6/5/12	cm	Figure 7-1

NATIONVIEW

APPENDIX B

SWMU 8 HISTORICAL DATA FROM PREVIOUS INVESTIGATIONS

Appendix B-1

Portions of: *Closure Report for Remediation of POL – Contaminated Sites and Oil/Water Separator Removals, Holloman Air Force Base, New Mexico, July – November 1995*

EBASCO Services, Inc., and Groundwater Technology Government Services, Inc., November 1995

CLOSURE REPORT FOR REMEDIATION OF POL - CONTAMINATED SITES AND OIL/WATER SEPARATOR REMOVALS HOLLOMAN AIR FORCE BASE, NEW MEXICO JULY - NOVEMBER 1995

Prepared for:

49 CES/CEV
Holloman Air Force Base, New Mexico

AND

HQ ACC/ESVR
Langley Air Force Base, Virginia

Prepared by:

EBASCO Services, Inc., dba
Foster Wheeler Environmental Corporation
143 Union Blvd., Suite 1010
Lakewood, Colorado 80228-1824

and

Groundwater Technology
Government Services, Inc.
2501 Yale Blvd., S.E.
Albuquerque, New Mexico 87106

Under Contract No. DACW-45-94 D0003
Delivery Order 6, Work Authorization Directive 13 and
Delivery Order 8, Work Authorization Directive 33

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

November 1995

HAFB-12/OW-CLOS.RPT

TABLE 10-2
SUMMARY OF NATIVE SOIL CONFIRMATION ANALYTICAL RESULTS AT SWMU 8 - BUILDING 231 HOLLOMAN AFB, NEW MEXICO AUGUST 1995

Sample No. SWMU-8	-01-7	-02-7	-03-7	-04-7	-05-7
Sample Location	West Corner	S. Corner	East Corner	N. Corner	Center
Date Sampled	8/8/95	8/8/95	8/8/95	8/8/95	8/8/95
TRPH by 418.1 (mg/kg)	23,000	31,000	6,500	1,200	940
VOCS by 8240 (µg/kg)					
Acetone	<100	<100	<2,000	<2,000	<2,000
Carbon disulfide	37	<25	<500	<500	<500
Benzene	<25	<25	<500	<500	<500
Tetrachloroethene	480	190	<500	<500	<500
Toluene	170	<25	<500	<500	<500
Ethylbenzene	460	84	<500	<500	<500
Xylenes	6,200	32	<500	<500	<500
1,2-Dichlorobenzene	710	3,500	<1,000	<1,000	<1,000
1,3-Dichlorobenzene	1,100	4,800	<1,000	<1,000	<1,000
1,4-Dichlorobenzene	750	3,300	<1,000	<1,000	<1,000
SEMI VOCS by 8270 (ug/kg)					
Naphthalene	27,000	<6,600	<1,300	<990	3,500
2-Methylnaphthalene	7,900	8,900	1,400	<990	<1,300
TAL METALS by 6000/7000 series (mg/kg)					
Aluminum	3,200	2,600	2,100	1,600	2,400
Arsenic	1.1	1.2	1.3	<1.0	<1.0
Barium	95	<40	<40	<40	<40
Calcium	140,000	150,000	140,000	150,000	170,000
Chromium	<6.0	<6.0	<6.0	<6.0	<6.0
Copper	11	<5.0	5.3	<5.0	<5.0

TABLE 10-2 (continued)
SUMMARY OF NATIVE SOIL CONFIRMATION ANALYTICAL RESULTS AT SWMU 8 - BUILDING 231 HOLLOMAN AFB, NEW MEXICO AUGUST 1995

Sample No. SWMU-8	-01-7	-02-7	-03-7	-04-7	-05-7
Sample Location	West Corner	S. Corner	East Corner	N. Corner	Center
Date Sampled	8/8/95	8/8/95	8/8/95	8/8/95	8/8/95
Iron	3,800	2,700	3,500	1,700	2,700
Lead	47	26	17	8.4	34
Magnesium	3,100	2,900	1,600	1,100	1,700
Manganese	61	38	49	34	48
Potassium	1,100	<1,000	<1,000	<1,000	<1,000
Zinc	35	11	18	8.8	11

Notes: < = Constituent not detected above laboratory quantitation limit

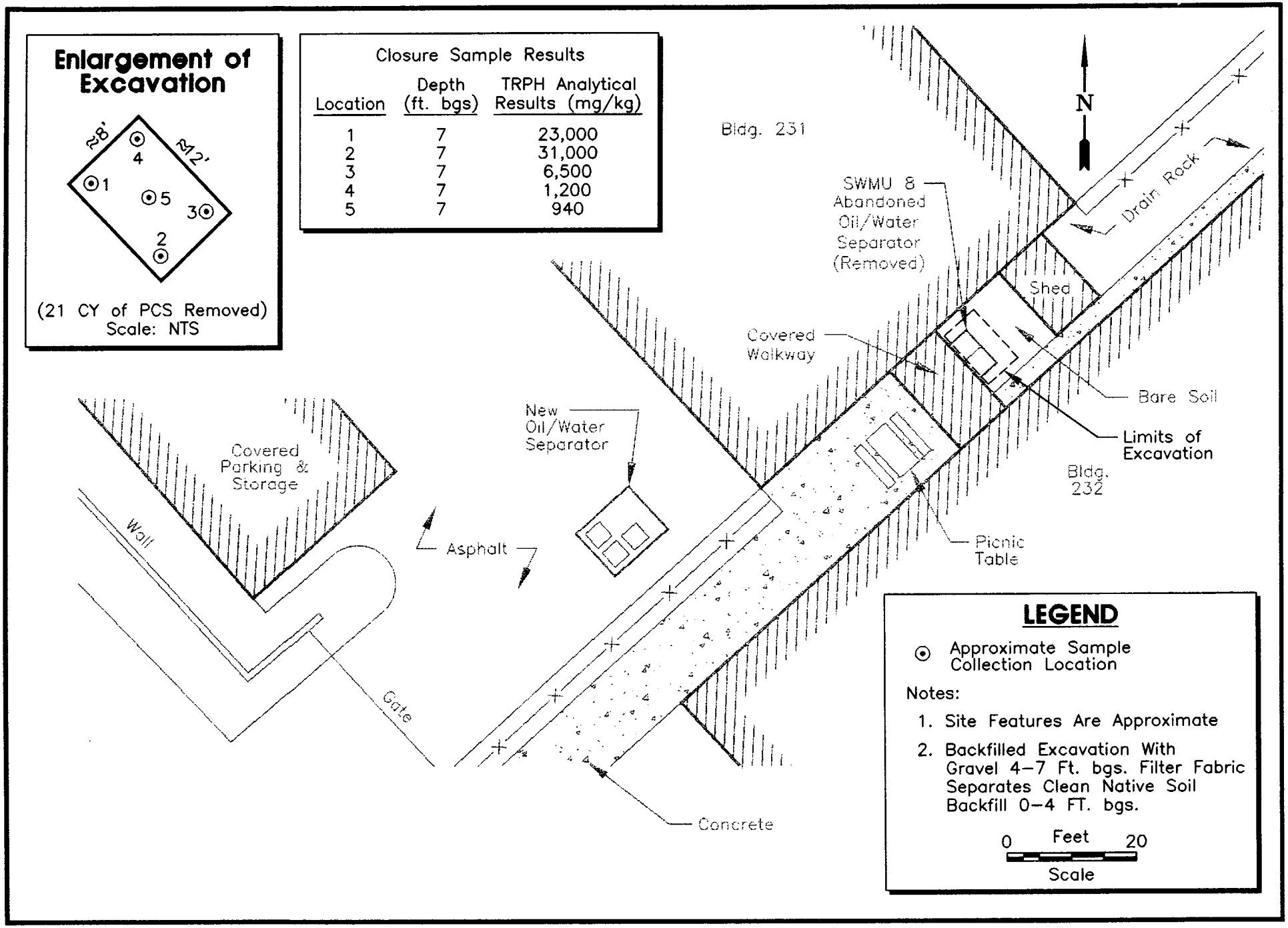
TABLE 10-3
SUMMARY OF STOCKPILE SOIL ANALYTICAL RESULTS
AT SWMU 8 - BUILDING 231
HOLLOMAN AFB, NEW MEXICO
SEPTEMBER 1995

Sample No. SWMU-8	-SP
Sample Type	Composite
Date Sampled	9/27/95
TRPH by 418.1 (mg/kg)	1,500
Aromatic Volatiles by 8021A (mg/kg)	Results
Benzene	<0.05
Toluene	<0.10
Ethylbenzene	<0.10
Xylenes	<0.20
BTEX Total	--
TPH as Gasoline	370
Lead by 7421 (mg/kg)	24
TCLP Volatiles by 1311/8240 (mg/l)	
Benzene	<0.05
Carbon tetrachloride	<0.05
Chlorobenzene	<0.05
Chloroform	<0.05
1,4-Dichlorobenzene	<0.05
1,2-Dichloroethane	<0.05
1,1-Dichloroethene	<0.05
2-Butanone	<0.02
Tetrachloroethene	<0.05
Trichloroethene	<0.05
Vinyl Chloride	<0.1
Miscellaneous Waste Characterization Analysis	
Closed Cup Flashpoint by ASTM D-93 (°F)	>220
Paint Filter by EPA 9095	No Liquids

TABLE 10-3 (continued)
SUMMARY OF STOCKPILE SOIL ANALYTICAL RESULTS
AT SWMU 8 - BUILDING 231
HOLLOMAN AFB, NEW MEXICO
SEPTEMBER 1995

Sample No. SWMU-8	-SP
Sample Type	Composite
Date Sampled	9/27/95
pH by EPA 9045A	7.1
Total Cyanide by EPA 9010A (mg/kg)	<2.0
Reactivity Sulfide by SW 846 7.3.4.2 (mg/kg)	<25
TCLP Semivolatiles by 8270A(mg/l)	
o-Cresol	<0.033
m+p-Cresol	<0.033
1,4-Dichlorobenzene	<0.033
2,4-Dinitrotoluene	<0.033
Hexachloro-1,3-butadiene	<0.033
Hexachlorobenzene	<0.033
Hexachloroethane	<0.033
Nitrobenzene	<0.033
Pentachlorophenol	<0.17
Pyridine	<0.033
2,4,5-Trichlorophenol	<0.033
2,4,6-Trichlorophenol	<0.033
TCLP Metals by 6000/7000 Series (mg/l)	
Arsenic	<0.40
Barium	<4.0
Cadmium	<0.080
Chromium	<0.080
Lead	<0.040
Mercury	<0.0080
Selenium	<0.16
Silver	<0.080

Notes: < = Constituents not detected above laboratory quantitiation limit
NA = Not Analyzed



A1154-7 (1:20)

Figure 10-1: Site Map
SWMU 8, Building 231 OWS

[redacted] STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 530 112

Name of Shipper

Origin of Shipment _____ Destination of Shipment _____

72ARO

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed Hugo Barbosa Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10 4/75 B/L No. _____ Ron Ponce (Driver's Signature)

HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1 550-112

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

SWMU #19

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services--DF-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone 505-392-449
B. Transporter's Phone
C. Facility's Phone 505-392-485

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARREN NEFF
Signature: Warren Neff
Month Day Year: Oct 9 95

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Ron Perez
Signature: Ron Perez
Month Day Year: Oct 4 95

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR

TRANSPORTER

FACILITY

GENERATOR'S COPY

STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Alaine

Vehicle Identification 330

Name of Shipper

Origin of Shipment Destination of Shipment

78700

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary jacks, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Ray [illegible]
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 10-[illegible] B/L No.

Ron Lowe (Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 1

GENERATOR

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No.
DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

Sunny 1

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
Rhino Environmental Services- DF-994
1 mile North of Newman, NM
Newman, NM

10. US EPA ID Number

A. Transporter's Phone
B. Transporter's Phone 505-392-44
C. Facility's Phone 505-392-48

11. Waste Shipping Name and Description	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon contaminated soils from POL and Oil/Water Separators			Bulk	
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARNER NEFF
Signature: Warner Neff
Month 10 Day 04 Year 91

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Ray Perry
Signature
Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name
Signature
Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name
Signature
Month Day Year

GENERATOR'S COPY

OTERO/LINCOLN COUNTY
REGIONAL LANDFILL

TRANSACTION #: 012692

CO. NAME: Rhino Environmental

ADDRESS: P.O. Box 2327

CITY & STATE: Hobbs, NM

DATE: 10-05-95 TIME: 15:38

TRUCK NO.: 15-H

GROSS WEIGHT: 34140 INB

TARE WEIGHT: 14620

NET TONS: 9.76

COST $: 214.72

5% TAX $: 10.74

TOTAL DUE $: 225.46

WASTE #: 5

WASTE DESC.: Construction Debris

WASTE ORIGIN: H.A.F.B.

DRIVER: GL Buck

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of 451

3. Generator's Name and Mailing Address
Holloman Air Force Base
Holloman Air Force Base, NM

Contract No. DACW45-94-D-003/006

4. Generator's Phone ( )

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

SWM

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address
~~Rhino Env. Services-DP-9940W~~
~~1 mile North of Newman, NM~~
~~Newman, NM~~
Otero Landfill

US EPA ID Number

A. Transporter's Phone 505-392-4498

B. Transporter's Phone

C. Facility's Phone 505-392-4898

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Concrete Debrie			90.76 BULK	tons
b.				
c.				
d.				

D. Additional Descriptions for Materials Listed Above

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WARNER NEFF — Signature: Warner Neff — Month 10 Day 05 Year 95

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Glen Buehler — Signature: Gl Buehler — Month 10 Day 05 Year 95

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

GENERATOR

TRANSPORTER

FACILITY

ORIGINAL – RETURN TO GENERATOR

Appendix B-2

Portions of: *Additional Characterization of POL-Contaminated Sites SWMU-3, SWMU-8, SWMU-36, SWMU-123 and OT-44, Holloman Air Force Base, New Mexico*

Groundwater Technology Government Services, Inc., February 29, 1996

FILE 17-G
j.m.

GROUNDWATER
TECHNOLOGY
GOVERNMENT SERVICES

Groundwater Technology Government Services, Inc.
2501 Yale Boulevard SE, Suite 204 Albuquerque, NM 87106 USA
Tel: (505) 242-3113 Fax: (505) 242-1103

February 29, 1996

Job No. 830012211.01.030

Mr. Mark Mercier
Omaha District
U.S. Army Corps of Engineers
ATTN: CEMRO-ED-EA
215 North 17th Street
Omaha, Nebraska 68102

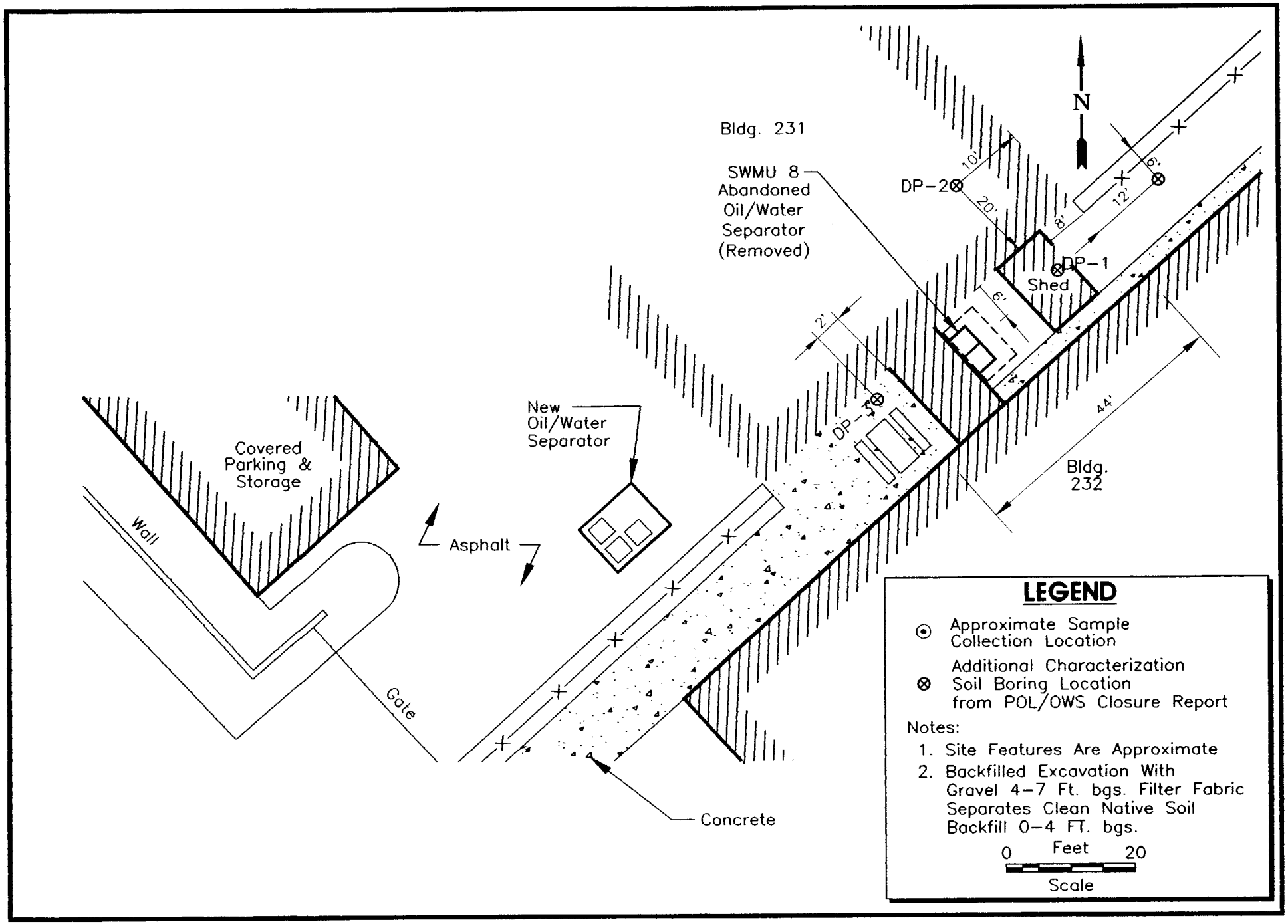
Re: ADDITIONAL CHARACTERIZATION OF POL-CONTAMINATED SITES SWMU-3, SWMU-8, SWMU-36, SWMU-123 AND OT-44 HOLLOMAN AIR FORCE BASE, NEW MEXICO
Delivery Order 11 Work Authorization Directive 1
Under Contract No. DACW45-94-D-0003

Dear Mr. Mercier:

Introduction

Additional characterization to support remedial design efforts for four Solid Waste Management Unit Sites (SWMUs) and one Installation Restoration Program (IRP) site was conducted between January 29, 1996 and February 2, 1996. The characterization was performed to determine the extent of soil in excess of 1,000 parts per million (ppm) at these sites. To accomplish this, soil samples were collected and analyzed at SWMU 3, SWMU 8, SWMU 36, SWMU 123, and Site OT-44 (AOC-P). Figure 1 is a map of the base indicating the locations of the five sites.

Soil samples were collected from each site using a direct push technology (DPT) soil sampling device, field screened for volatile organics constituents, and analyzed for total petroleum hydrocarbons (TPH) (gasoline and diesel range), total recoverable petroleum hydrocarbons (TRPH), and benzene, toluene, ethylbenzene and xylenes (BTEX). These data will be used to determine the approximate mass of petroleum-contaminated soil



2-2FEB96, 2/29/96 (1:20)

Figure 3: Site Map
SWMU 8, Building 231 OWS and Additional Characterization Sampling Locations

TABLE 3
SUMMARY OF SOIL ANALYTICAL RESULTS
SWMU -8 BUILDING 231 OWS
HOLLOMAN AFB, NM
Delivery Order 11 Work Authorization Directive 1
February, 1996

SAMPLE NO. AND DEPTH (FEET)	SWMU-8-DP-1--3 (3' TO 4')	SWMU-8-DP-1--5 (5' TO 6')	SWMU-8-DP-2--4 (4' TO 5')	SWMU-8-DP-2--9 (9' TO 10')	SWMU-8-DP-3-5&6 (5' TO 7')	SWMU-8-DP-3 3 &4 (3' TO 5')	SWMU-8-DP-5--3 (3' TO 4')	SWMU-8-DP-5--6 (6' TO 7')
PARAMETER								
Method 418.1 TRPH (mg/kg)	<20	<20	<20	<20	<20	<20	<20	<20

< = constituent not detected

Appendix B-3

Portions of: *Final Closure Report Addendum for Phase II Remediation of POL-Contaminated Sites and Oil/Water Separator and Waste Oil Tank Removals, Holloman Air Force Base, New Mexico*

Foster Wheeler Environmental Corporation, December 1997

FINAL CLOSURE REPORT ADDENDUM
FOR PHASE II
REMEDIATION OF POL-CONTAMINATED SITES AND
OIL/WATER SEPARATOR AND WASTE OIL TANK REMOVALS
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:
49 CES/CEVR
Holloman Air Force Base, NM
and
HQ ACC/CEVC
Langley Air Force Base, VA

Prepared by:
Foster Wheeler Environmental Corporation
143 Union Boulevard, Suite 1010
Lakewood, Colorado 80228-1824

Under Contract No. DACW45-94-D0003

Delivery Order 11, Work Authorization Directive 3

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

December 1997

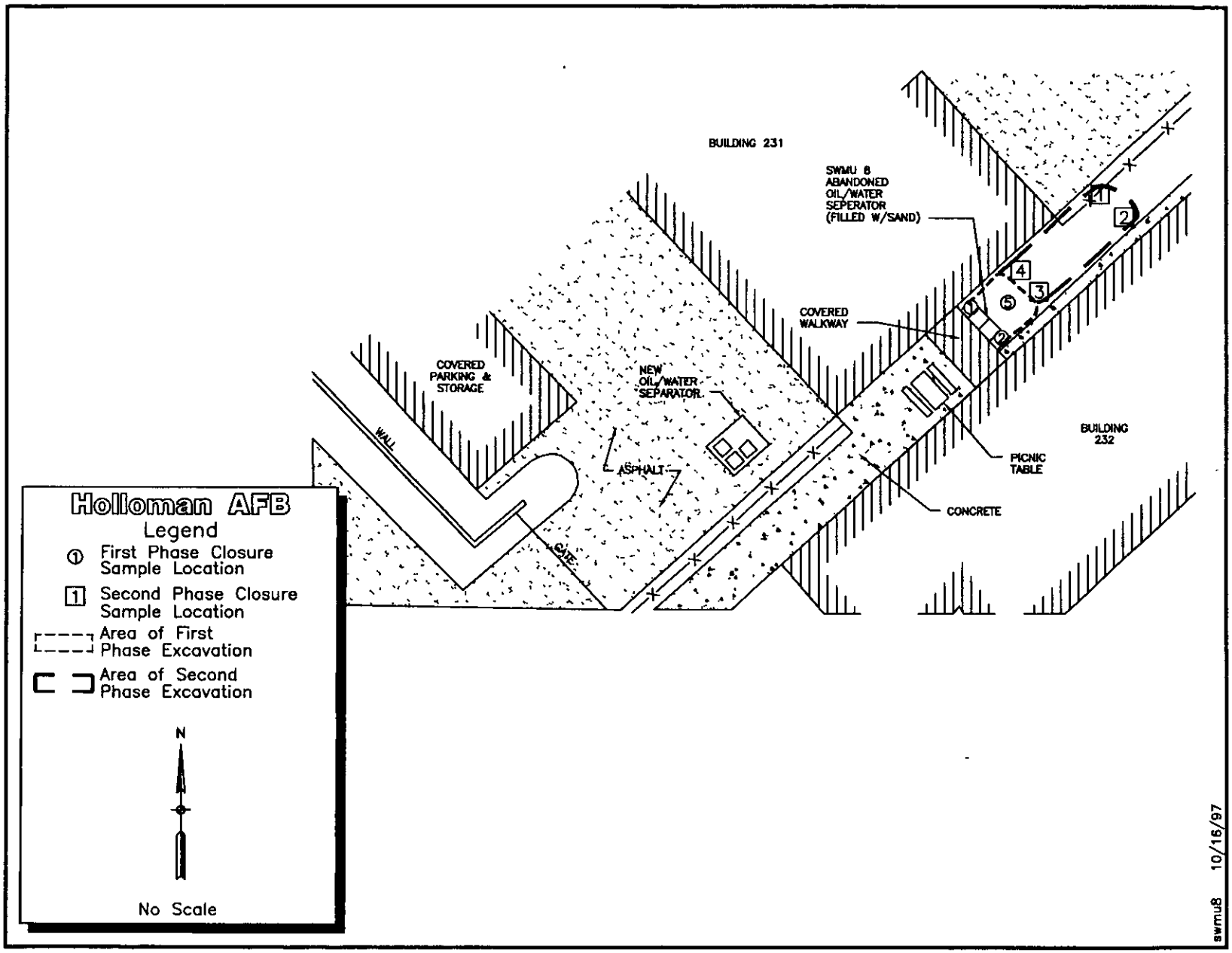


Figure 4–1. SWMU 8, Building 231 O/WS Site Map

Table 4-1
Summary of Site Closure and Stockpile Sample Analytical Results for Soil at SWMU 8, Building 231 O/WS
Page 1 of 2

Sample I.D.				SWMU08-01-06	SWMU08-02-06	SWMU08-03-06	SWMU08-04-06	SWMU8-SPI*
Figure I.D	1	2	5	1	2	3	4	—
Date Sampled	8/8/95	8/8/95	8/8/95	4/9/97	4/9/97	4/9/97	4/9/97	4/9/97
TRPH by Method 418.1 (mg/kg)	23,000	31,000	940	78	<20	58	25	36
VOCs by Method 1311/8240 (mg/L)	NA	NA	NA	NA	NA	NA	NA	ND
SVOCs by Method 1311/8270B (mg/L)	NA	NA	NA	NA	NA	NA	NA	ND
VOCs by Method 8240B (µg/kg)	NA	NA	NA	ND	ND	ND	ND	NA
SVOCs by Method 8270B (µg/kg)	NA	NA	NA	ND	ND	ND	ND	NA
VOCs by Method 8021A Benzene (mg/kg)	NA	NA	NA	<0 05	<0 05	<0.05	<0.05	<0.05
Toluene (mg/kg)	NA	NA	NA	<0 10	<0.10	<0.10	<0 10	<0 10
Ethylbenzene (mg/kg)	NA	NA	NA	<0.10	<0.10	<0.10	<0 10	<0 10
Xylenes (total) (mg/kg)	NA	NA	NA	<0.20	<0 20	<0.20	<0.20	<0.20
Metals by Method 7421 Lead (2,000 mg/kg)	NA	NA	NA	NA	NA	NA	NA	2.1
Metals by Method 9010A Total Cyanide (mg/kg)	NA	NA	NA	NA	NA	NA	NA	<2.0
Metals by Method 6010A (mg/kg)								
Aluminum[1] (77,000)	NA	NA	NA	2,200	1,800	3,600	3,400	NA
Barium[1] (5,300)	NA	NA	NA	29	20	71	62	27
Chromium[2] (230)	NA	NA	NA	<3 0	<3 0	4.1	4.0	<3.0
Copper (63,000)	NA	NA	NA	<2 5	<2.5	3 1	5 2	NA
Manganese (8,300)	NA	NA	NA	26	30	74	65	NA
Vanadium (12,000)	NA	NA	NA	6.2	6.6	9.2	11	NA
Zinc[1] (23,000)	NA	NA	NA	8 2	5.9	12	17	NA
Lead (2,000)	NA	NA	NA	5 4	<0 40	4.6	4.6	NA
Paint Filter by Method 9095	NA	NA	NA	NA	NA	NA	NA	NP

Table 4-1
Summary of Site Closure and Stockpile Sample Analytical Results for Soil at SWMU 8, Building 231 O/W
Page 2 of 2

Sample I.D.				SWMU08-01-06	SWMU08-02-06	SWMU08-03-06	SWMU08-04-06	SWMU8-SPI*
Figure I.D.	1	2	5	1	2	3	4	—
Date Sampled	8/8/95	8/8/95	8/8/95	4/9/97	4/9/97	4/9/97	4/9/97	4/9/97
Flash Point by Method ASTM D93 (°F)	NA	NA	NA	NA	NA	NA	NA	>200
pH by Method 9045A	NA	NA	NA	NA	NA	NA	NA	7.5
Reactive Sulfide by SW846 Ch#7 (mg/kg)	NA	NA	NA	NA	NA	NA	NA	<2 5

Notes.
Shading denotes site closure samples
* = Soil stockpile sample
< = Constituent not detected above laboratory quantitation limit
() = EPA Region VI risk-based criteria for industrial land use
ND = Not detected
NA = Not analyzed
NP = Not present
1 = Risk-based value above expected saturation point, value shown is residential land use risk-based concentration
2 = Represents risk-based concentration for chromium VI

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 0739

2. Page 1 of

Truck No 550111

Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB, NM

[redacted] Summer - 8

4. Generator's Phone ( ) 505-475-5305

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

7. Transporter 2 Company Name:

8. US EPA ID Number:

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM

10. US EPA ID Number: DF1051

A. Transporter's Phone

B. Transporter's Phone

C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1	BULK	16,200	
b.				
c.				
d.				

GENERATOR

Additional Descriptions for Materials Listed Above: NON-Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information: CELL M

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste

Printed/Typed Name: WARREN NEFF — Signature: Warren Neff — Month 4 Day 7 Year 97

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Swan 550-111 — Signature: [illegible] — Month 4 Day 7 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name: — Signature: — Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19

Printed/Typed Name: [illegible] — Signature: [illegible] — Month Day Year

GENERATOR'S COPY

[illegible] Rev

N: 013210 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment Destination of Shipment

69530

YGP

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon.

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment

lbs. Net — Net weight of the shipment.

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 19
AS AMENDED EFFECTIVE JUNE 1, 1970

Signed M. Patwanda
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M. ✓
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

Chg 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-24-97 B/L No.

Michael (Driver's Signature)

N: 013193 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment Destination of Shipment

35730

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment.

lbs. Net — Net weight of the shipment.

TH[illegible] PRESCRIBED BY INTERSTATE C[illegible] COMMISSION
E[illegible] MC - 19
AS [illegible]DED EFFECTIVE JUNE 1, 1970

Signed M. Patwanda
Weighmaster

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M /	US 70 W Alamogordo, N M
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M /	US 70 W Alamogordo, N. M. ✓

As shown by attached weight ticket(s) prepared by the weighmaster.

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

Chg 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE 4-21-97 B/L No.

(Driver's Signature)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 05-40

2. Page 1 of

Truck #2 SS0111

Scum 8

3. Generator's Name and Mailing Address: Holloman Air Force Base, 49 CES/CEV, Holloman AFB, NM

4. Generator's Phone ( ) 505-475-5395

5. Transporter 1 Company Name: Rhino Environmental Services

6. US EPA ID Number: N/A

7. Transporter 2 Company Name

8. US EPA ID Number

9. Designated Facility Name and Site Address: Rhino Environmental Services, 2 mile NW of Newman, Otero County, NM

10. US EPA ID Number: DP1051

A. Transporter's Phone

B. Transporter's Phone

C. Facility's Phone

11. Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a. Hydrocarbon Contaminated Soils	1	BULK	48830	
b.				
c.				
d.				

Additional Descriptions for Materials Listed Above: NON-Hazardous Materials

E. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information: CELL 4

16. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Printed/Typed Name: WAYNE NEFF — Signature: Wayne Neff — Month 4 Day 27 Year 97

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Michael Sillano SS0-111 — Signature: Michael Sillano — Month 4 Day 27 Year 97

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Month Day Year

19. Discrepancy Indication Space

Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in Item 19.

Printed/Typed Name — Signature — Month Day Year

GENERATOR'S COPY

N: 013208 STATE CERTIFICATE OF WEIGHTS AND MEASURES

DRIVER'S WEIGHT CERTIFICATE

NAME OF CARRIER (BEKINS MOVING & STGE.) (BEKINS VAN LINES)

OTHER CARRIER Rhino

Vehicle Identification 550-111

Name of Shipper

Origin of Shipment

Destination of Shipment

560

lbs. Gross — Gross weight of loaded vehicle, with driver only, thereon

lbs. Tare — Tare weight of vehicle, with driver only, thereon, including full gasoline tank and all necessary pads, chains, dollies, hand trucks, and other equipment

lbs Net — Net weight of the shipment

Signed M. Patrenude
Weighmaster

THIS FORM PRESCRIBED BY INTERSTATE COMMERCE COMMISSION
EX PARTE - MC - 15
AS AMENDED EFFECTIVE JUNE 1 1970

The gross and tare weights were obtained at scales

NMDA APPROVED

GROSS	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.
TARE	NAME OF SCALE OWNER	(BEKINS M & S) /	(BEKINS MOVING & STGE.)
	LOCATION	2315 S. Valley Dr. Las Cruces, N. M. /	US 70 W Alamogordo, N. M.

As shown by attached weight ticket(s) prepared by the weighmaster

(Attach only gross weight ticket if tare weight is obtained from a weight ticket on shipments listed below.)

DRIVER ON ☐ OFF ☒

Chg 500

(LIST OF SHIPMENTS, IF ANY, ON VEHICLE AT TIME ABOVE WEIGHTS WERE OBTAINED)

SHIPPER	NET WEIGHT

I CERTIFY THE ABOVE ENTRIES ARE TRUE AND CORRECT.

DATE H-21-97 B/L No.

(Driver's Signature)

Appendix B-4

Portions of: *Technical Memorandum Letter Report for SWMU 8 Soil and Groundwater Sampling and Analysis, Holloman AFB, New Mexico*

Bhate Environmental Associates, Inc., August 2, 2006

TECHNICAL MEMORANDUM
LETTER REPORT
FOR
SWMU 8 SOIL AND GROUNDWATER
SAMPLING AND ANALYSIS
HOLLOMAN AFB, NEW MEXICO

DATE: August 2, 2006

FROM: Jim Moore, Bhate Environmental Associates, Inc.

TO: Dave Griffin, 49 CES/CEV, Holloman Air Force Base, NM

SUBJECT: SWMU 8 SOIL AND GROUNDWATER SAMPLING AND ANALYSIS

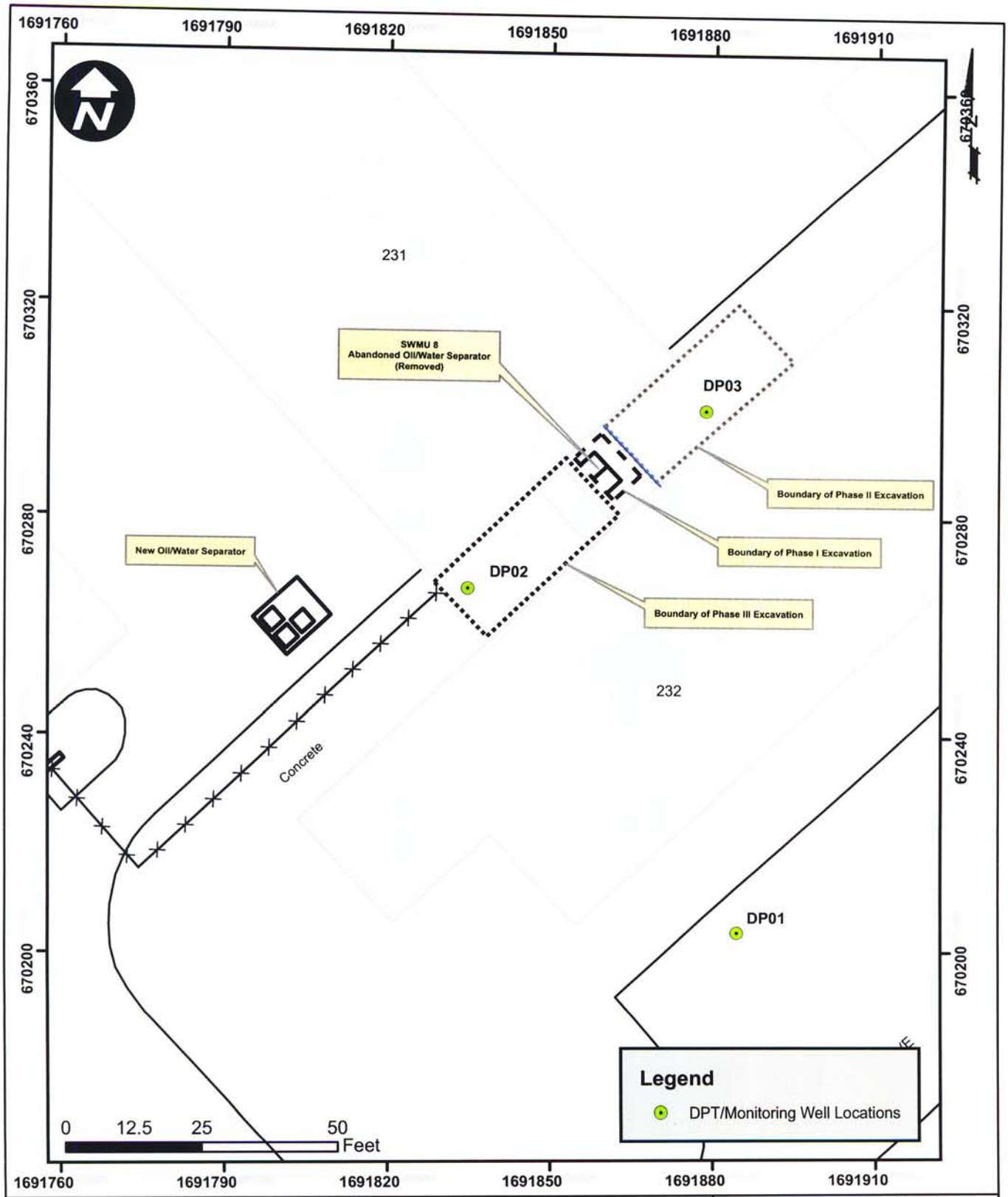
1.0 INTRODUCTION

This technical memorandum was prepared by Bhate Environmental Associates, Inc. (Bhate) for the Environmental Flight 49th CES/CEV, Holloman Air Force Base (HAFB), New Mexico. This letter report contains the results of the subsurface soil and groundwater water samples that were collected at SWMU 8 (former Oil/Water Separator located at Building 231) in May 2006. This sampling event was conducted in accordance with the *Memorandum Scope of Work for Soil and Groundwater Sampling and Analysis* (Bhate, May 2006). This Scope of Work was performed through the U.S. Army Corps of Engineers (USACE), under contract DACA45-03-D-0023, Task Order No. 017.

The scope of work for SWMU 8 was prepared to meet the requirements for additional soil and groundwater characterization as requested by the New Mexico Environment Department (NMED). General comment No. 1 in the NMED Notice of Deficiency (NOD) letter to Holloman AFB dated April 14, 2006 (Appendix A) requested that additional subsurface soil samples should be collected to characterize the remaining soil contamination at the site (that is not underneath the adjacent structures) and that at least two temporary groundwater monitoring wells be installed and sampled at the site before the Phase III soil excavation can commence.

2.0 SITE LOCATION, DESCRIPTION AND BACKGROUND

SWMU 8 is the former underground Oil/Water Separator (OWS) that was located on the south side of Building 231. Building 231 (Auto Hobby Center) is located on the main base at Holloman at 642 West Connecticut Avenue. The OWS was



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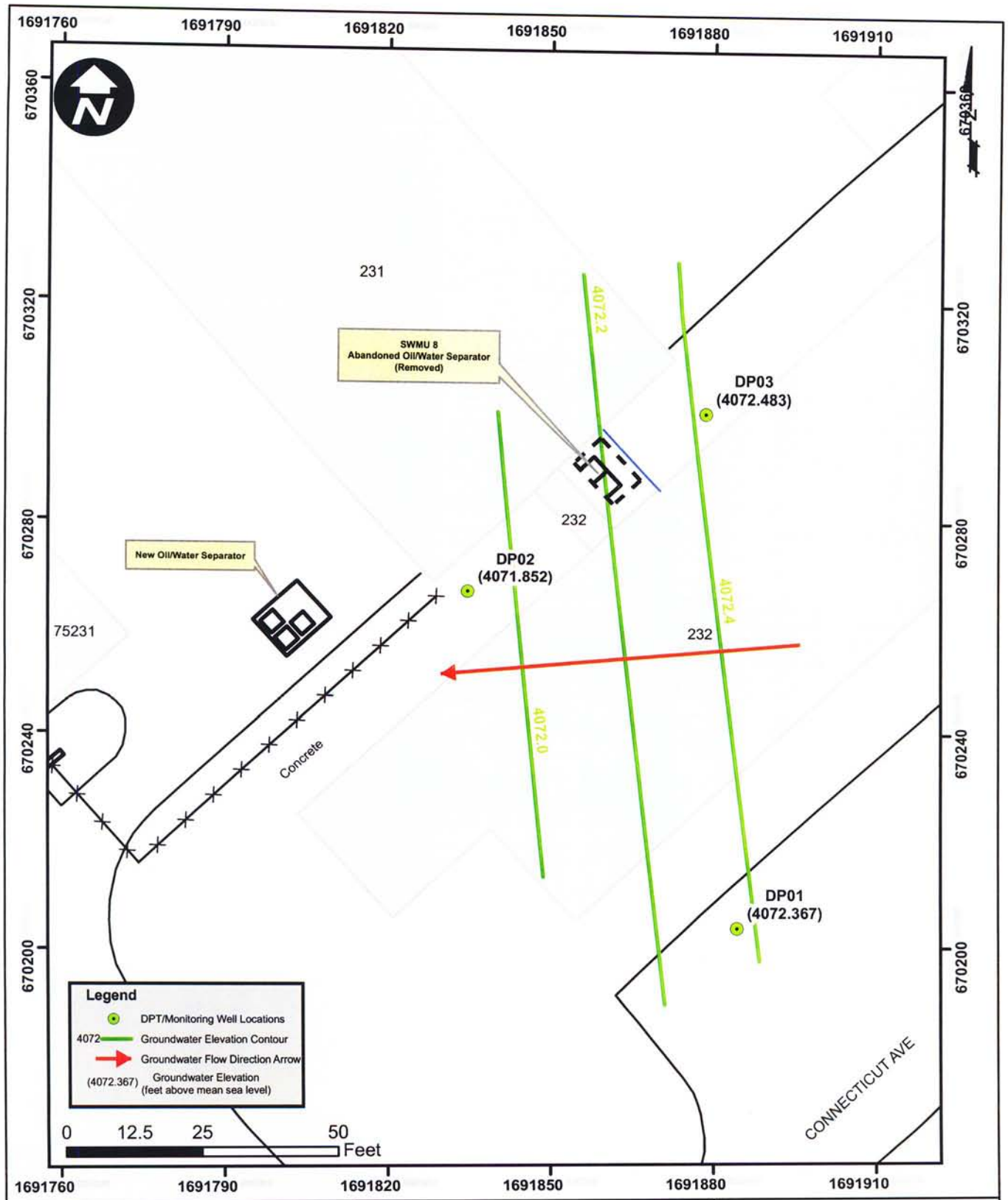
SWMU 8 Soil Boring and Monitoring Well Locations

PROJECT NO.	SCALE	DATE	DRAWN BY:
9050291	1"=25'	7/28/06	cm
			DRAWING NO: fig1

Remedial Action
Holloman Air Force Base
New Mexico

Figure 1



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SWMU 8 Potentiometric Surface Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
9050291	1"=25'	7/28/06	cm
			DRAWING NO. fig2

Remedial Action
Holloman Air Force Base
New Mexico

Figure 2

Table 1. Groundwater Elevation Summary
SWMU8
Holloman AFB, NM
Bhate Project No. 9050291.01.01

Well	Northing	Easting	Elevation TOC (ft above msl)	DTW from TOC (ft below TOC)	Groundwater Elevation July 2006 (ft above msl)
DP01	670203.701	1691884.472	4074.827	2.46	4072.367
DP02	670266.812	1691834.779	4076.042	4.19	4071.852
DP03	670300.290	1691878.600	4075.883	3.40	4072.483

NOTES: TOC = Top of Casing; DTW = Depth to Water; ft = feet; msl = mean seal level

Table 2.
Soil Analytical Data (June 2006)
SWMU-8
Holloman Air Force Base, New Mexico

Client Sample ID:	Soil Screening Levels	SWMU08DP01-5		SWMU08DP02-9		SWMU08DP02-9A		TRIP BLANK	
Lab Sample ID:	NMED	F40927-3		F40927-1		F40927-2		F40927-4	
Date Sampled:	Residential[1]	5/22/2006		5/22/2006		5/22/2006		5/22/2006	
Analyte		Result[2]	Q	Result[2]	Q	Result[2]	Q	Result[2]	Q
Volatile Organic Compounds	**mg/kg**	**µg/kg**		**µg/kg**		**µg/kg**		**µg/kg**	
Naphthalene	79.5	2.7	JB	2.9	U	2.7	U	2.0	U
TAL Metals Analysis	**mg/kg**	**mg/kg**		**mg/kg**		**mg/kg**		**mg/kg**	
Aluminum	77800	482		3590		3160		NA	
Antimony	31.3	1.2	J	0.75	U	0.75	U	NA	
Arsenic	3.9	0.82	J	0.95	J	0.56	J	NA	
Barium	15600	13.2	J	31.8		26.8	J	NA	
Beryllium	156	0.058	J	0.16	J	0.21	J	NA	
Calcium	NV	257000		171000		192000		NA	
Chromium	234	0.45	J	3.4		3.3		NA	
Cobalt	1520	0.42	J	0.90	J	0.94	J	NA	
Copper	3130	0.72	J	0.61	J	0.50	J	NA	
Iron	23500	349		3560		3330		NA	
Magnesium	NV	2090		1620		1640		NA	
Manganese	3590	5.7		33.9		30.4		NA	
Mercury	6.11	0.0078	U	0.016	J	0.0084	U	NA	
Nickel	1560	0.69	J	2.4	J	2.2	J	NA	
Potassium	NV	145	J	895	J	847	J	NA	
Selenium	391	0.61	J	0.28	U	0.31	J	NA	
Sodium	NV	175	J	249	J	167	J	NA	
Vanadium	78.2	2.4	J	7.1		7.1		NA	
Zinc	23500	3.7	J	7.7		8.2		NA	
General Chemistry		**%**		**%**		**%**		**%**	
Solids, Percent	NV	75.0		70.3		70.8		NA	

Notes:
NMED = New Mexico Environmental Department
TPH = Total Petroleum Hydrocarbons
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
NV = No Value
NA = Not Analyzed
Q = Qualifier
U = Not detected
J = Estimated result. Result is between the Method Detection Limit (MDL) and the Reporting Limit (RL), and/or qualified by the validating chemist (see Appendix H).
[1]NMED, June 2006. Technical Background Document for Development of Soil Screening Levels, Revision 4.0. (Residential Soil)
[2] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[3] NMED, October 2006. TPH Screening Guidelines (Diesel #2/crankcase oil, Residential Direct Exposure)
Bold value indicate analytes above NMED Soil Screening Levels (Rev 4.0, Jun 2006) or combined TPH results above NMED TPH Screening Guidelines for Diesel #2/crankcase oil (Table 2b , Oct 2006)

Table 3.
Groundwater Analytical Data (June 2006)
SWMU-8
Holloman Air Force Base, New Mexico

Client Sample ID:	Groundwater Screening Levels		SWMU-08-DP01		SWMU-08-DP01FD		SWMU-08-DP02		TRIP BLANK		SWMU-08-DP03	
Lab Sample ID:	NMWQCC[1]	EPA MCL	F41336-1		F41336-2		F41372-1		F41372-2		F41371-1	
Date Sampled:			6/7/2006		6/7/2006		6/8/2006		6/8/2006		6/8/2006	
Analyte			Result[2]	Q	Result[2]	Q	Result[2]	Q	Result[2]	Q	Result[2]	Q
Volatile Organic Compounds	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L	
Bromodichloromethane	NV	NV	9.2		9.7		0.50	U	2.0	U	0.50	U
Chloroform	100	NV	21.0		23.7		0.50	U	2.0	U	1.7	
Dibromochloromethane	NV	NV	1.2		1.2	J	0.40	U	2.0	U	0.40	U
o-Dichlorobenzene	NV	600	0.50	U	0.50	U	0.53	J	2.0	U	0.50	U
TAL Metals Analysis	µg/L	µg/L	µg/L		µg/L		µg/L		µg/L		µg/L	
Aluminum	NV	NV	68.6	J	59.7	J	6820		NV		3450	
Arsenic	100	10	11.3		11.8		7.1	J	NV		6.6	J
Barium	1000	2000	21.6	J	22.2	J	84.3	J	NV		72.2	J
Beryllium	NV	4	2.5	J	2.3	J	4.8	J	NV		4.8	J
Calcium	NV	NV	656000		723000		822000		NV		738000	
Cobalt	50	NV	0.86	J	0.86	J	3.1	J	NV		1.2	J
Magnesium	NV	NV	81600		84100		64300		NV		57300	
Manganese	200	NV	119		227		259		NV		173	
Nickel	200	NV	5.1	J	23.8	J	8.9	J	NV		3.9	J
Potassium	NV	NV	9940	J	10200		15200		NV		6520	J
Selenium	50	50	3.8	J	3.9	J	3.8	J	NV		2.8	U
Sodium	NV	NV	78200		69000		71700		NV		72300	
Vanadium	NV	NV	108		101		29.3	J	NV		7.9	J
Zinc	10000	NV	3.4	J	1.6	U	54.3		NV		27.5	
General Chemistry	mg/L	mg/L	mg/L		mg/L		mg/L		mg/L		mg/L	
Solids, Total Dissolved	1000	NV	3190		2600		3060		NV		2910	

Notes:
NMWQCC = New Mexico Water Quality Control Commission
EPA = Environmetal Protection Agency
MCL = Maximum Contaminant Level
UTL = Upper Tolerance Limit
µg/L = micrograms per liter
mg/L = milligrams per liter
NV = No Value
Q = Qualifier
U = Not detected
J = Indicates an estimated value
[1]Standards for Groundwater, if 10,000 mg/l TDS Concentration or Less, New Mexico Administrative Code 20.6.2.3103
[2] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
Bold value indicate analytes above New Mexico Groundwater Quality Standard

Appendix B-5

Portions of: *Final RCRA Final Investigation Work Plan, SWMU 8, Holloman Air Force Base, New Mexico*

NationView, LLC, March 2010

FINAL
RCRA FACILITY INVESTIGATION WORK PLAN
SWMU 8
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEA
Holloman Air Force Base
New Mexico

Under Contract to:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435
USACE Albuquerque District Project No. KWRD076044

Prepared by:

NationView, LLC
1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205
NationView Project No. 8080014.03.01

Contract No. W912PL-07-D-0050
Delivery Order No. DM01

March 2010

Table 1
Soil Analytical Data Hits Only (October 2008)
SWMU 8 Voluntary Corrective Measures, Soil Remediation
Holloman Air Force Base, New Mexico

Client Sample ID:	Soil Screening Levels	Basewide Background	SWMU-08-SW1	SWMU-08-SW2	SWMU-08-SW3	SWMU-08-SW4	SWMU-08-SW5	SWMU-08-SW6	SWMU-08-SW6-DUP	SWMU-08-SW7
Lab Sample ID:	NMED Residential[1]	95% UTL for Combined Soil[2]	LR221292	LR221292	LR221292	LR221436	LR221436	LR221436	LR221436	LR221436
Date Sampled:			10/08/2008	10/08/2008	10/08/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008
Analyte			Result	Result	Result	Result	Result	Result	Result	Result
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Gasoline Range Organics (C6 -C10)	800 [3]	NV	ND	ND	ND	12	ND	ND	ND	ND
Diesel Range Organics (C10-C22)	800 [3]	NV	**1,110**	**1,150**	**1,040**	**1,120**	11	ND	ND	ND
Oil Range Organics (>C22-C36)	800 [3]	NV	536	363	570	224	18	ND	ND	4.6 J
Volatile Organic Compounds	**mg/kg**	**mg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Chloroform	5.72	NV	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	6.99	NV	ND	ND	174 J	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds	**mg/kg**	**mg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Butylbenzylphthalate	260 [4]	NV	ND	ND	550	ND	ND	ND	ND	ND
Di-n-butylphthalate	6,110	NV	ND	170 J	450	180 J	ND	ND	ND	ND
Diethylphthalate	48,900	NV	99 J	81 J	ND	ND	ND	ND	ND	ND
Pyrene	1,720	NV	ND	ND	85 J	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	347	NV	610	ND	1,500	300	ND	ND	ND	ND
Polychlorinated Biphenyls	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
PCB-1248	2.22	NV	0.21	0.11	0.15	0.099	ND	ND	NA	ND
PCB-1254	1.12	NV	0.18	0.15	0.22	0.17	ND	ND	NA	ND
Target Analyte List Metals	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum	78,100	13,722.27	4,850	2,860	2,520	2,380	1,870	1,940	1,780	1,690
Arsenic	3.9	3.66	ND	ND	ND	ND	ND	ND	ND	ND
Barium	15,600	169.25	56.8	28.6	25.5	20.6	15.3	13.4	13.0	13.5
Beryllium	156	1.53	ND	ND	ND	ND	ND	ND	ND	ND
Boron	15,600	NV	ND	ND	ND	0.609 J	1.30 J	0.821 J	2.47 J	ND
Cadmium	77.9	0.28	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	NV [5]	317,331.59	61,200	128,000	126,000	131,000	123,000	108,000	117,000	78,200
Chromium	219	24.95	7.66	3.48	4.03	2.51	2.04	2.11	2.07	1.79
Cobalt	23 [4]	7.70	1.55	1.24	1.10	0.815	0.603	0.709	0.881	0.579
Copper	3,130	12.96	7.53	7.25	8.95	1.27	0.402 J	0.727 J	0.801 J	0.425 J
Iron	54,800	23,049.48	5,620	3,100	4,280	2,120	1,920	2,170	2,090	1,610
Lead	400	10.87	12.4	18.5	21	0.663	1.38	1.31	ND	2.59
Magnesium	NV [5]	16,990.65	1,800	1,910	1,530	1,090	831	1,030	1,030	1,080
Manganese	10,700	393.47	70.6	43.4	38.5	23.4	19.0	22.2	21.6	24.2
Molybdenum	391	NV	3.27	2.0	2.0	2.29	2.38	2.15	0.523 J	2.21
Nickel	1,560	17.34	2.87	2.06	2.42	1.55	1.11 J	1.28 J	1.32 J	1.18 J
Potassium	NV [5]	5,077.12	1,080	775	644	643	485	454	470	447
Silver	391	65	ND	ND	ND	ND	0.436 J	0.420 J	ND	ND
Sodium	NV [4]	5,195.97	82.8	135	108	129	105	109	98.5	92.4
Vanadium	391	42.53	22.6	6.40	5.78	3.15	4.21	4.51	4.37	3.54
Zinc	23,500	54.53	13.4	15.4	16.2	5.40	5.49	4.83 J	5.57	4.66 J
General Chemistry	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Percent Moisture	NV	NV	28.30	24.89	28.22	27.15	28.43	29.08	28.56	29.80

Notes:

NMED = New Mexico Environment Department
USEPA = U.S. Environmental Protection Agency
UTL = Upper Tolerance Limit
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
ORO = Oil Range Organics
SSL = Soil Screening Level
SW = Sidewall Sample

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
B = Analyte found in associated method blank
J = Indicates an estimated value
ND = Not Detected
NV = No Value
NA = Not Analyzed

[1] NMED, December 2009. Technical Background Document for Development of Soil Screening Levels (SSL), Revision 5.0.
[2] Established in the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView/Bhate JV III, October 2009)
[3] NMED, October 2006. TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure, Table 2b.)
[4] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (December, 2009)
[5] No Value established for NMED Residential SSL (December, 2009) and USEPA RSL (December, 2009)

Bold value indicates analytes above NMED SSLs (Rev 5.0, Dec. 2009) or TPH results above NMED TPH Screening Guidelines (Oct., 2006)
Indicates combined TPH-GRO/DRO/ORO results exceed NMED TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure)

Table 1
Soil Analytical Data Hits Only (October 2008)
SWMU 8 Voluntary Corrective Measures, Soil Remediation
Holloman Air Force Base, New Mexico

Client Sample ID:	Soil Screening Levels	Basewide Background	SWMU-08-SW8	SWMU-08-SW9	SWMU-08-SW10	SWMU-08-SW11	SWMU-08-SW12	SWMU-08-SW12-DUP	SWMU-08-SW13	SWMU-08-SW14
Lab Sample ID:	NMED Residential[1]	95% UTL for Combined Soil[2]	LR221436	LR221436	LR221436	LR221436	LR221436	LR221436	LR221436	LR221435
Date Sampled:			10/10/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008	10/10/2008
Analyte			Result	Result	Result	Result	Result	Result	Result	Result
Total Petroleum Hydrocarbons	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Gasoline Range Organics (C6 -C10)	800 [3]	NV	ND	ND	6.8	ND	9.4	ND	9.4	5.3
Diesel Range Organics (C10-C22)	800 [3]	NV	ND	106	**1,560**	3.0	**2,380**	**954**	**1,520**	141
Oil Range Organics (>C22-C36)	800 [3]	NV	ND	213	358	2.1 J	743	700	426	148
Volatile Organic Compounds	**mg/kg**	**mg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Chloroform	5.72	NV	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene	6.99	NV	ND	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds	**mg/kg**	**mg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**	**µg/kg**
Butylbenzylphthalate	260 [4]	NV	ND	ND	ND	ND	ND	ND	140 J	ND
Di-n-butylphthalate	6,110	NV	ND	ND	ND	ND	ND	150 J	170 J	ND
Diethylphthalate	48,900	NV	ND	ND	ND	ND	ND	190 J	ND	ND
Pyrene	1,720	NV	ND	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	347	NV	ND	ND	330	ND	430	410	700	ND
Polychlorinated Biphenyls	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
PCB-1248	2.22	NV	ND	ND	0.18	ND	0.34	NA	0.64	0.078 J
PCB-1254	1.12	NV	ND	0.31	0.22	ND	0.47	NA	0.71	0.16
Target Analyte List Metals	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum	78,100	13,722.27	2,020	2,320	2,000	1,670	2,160	2,370	2,500	2,310
Arsenic	3.9	3.66	ND	ND	ND	ND	ND	ND	ND	ND
Barium	15,600	169.25	14.4	22.8	22.0	12.8	22.2	21.5	22.2	22.2
Beryllium	156	1.53	ND	ND	ND	ND	ND	ND	ND	ND
Boron	15,600	NV	ND	ND	0.333 J	ND	ND	2.58 J	ND	2.09 J
Cadmium	77.9	0.28	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	NV [5]	317,331.59	74,100	106,000	99,300	97,400	109,000	117,000	128,000	114,000
Chromium	219	24.95	2.10	2.87	2.74	1.89	2.72	2.79	3.19	2.57
Cobalt	23 [4]	7.70	0.733	0.846	0.944	0.608	1.04	1.05	1.09	0.841
Copper	3,130	12.96	0.408 J	3.19	1.65	ND	ND	2.00	1.42	1.44
Iron	54,800	23,049.48	1,870	2,200	2,350	1,790	2,500	2,820	3,070	2,170
Lead	400	10.87	0.659	13.9	7.45	0.415 J	49.3	3.15	8.55	ND
Magnesium	NV [5]	16,990.65	1,230	1,590	2,560	877	1,530	1,760	2,850	1,140
Manganese	10,700	393.47	27.0	27.1	45.8	21.2	32.6	40.8	59.1	24.7
Molybdenum	391	NV	1.21	1.84	1.91	2.08	2.87	0.555 J	2.04	0.613 J
Nickel	1,560	17.34	1.32 J	1.56	1.84	1.01 J	1.78	2.01	2.28	1.57
Potassium	NV [5]	5,077.12	453	580	517	456	579	636	746	657
Silver	391	65	ND	ND	0.660	ND	ND	0.162 J	ND	ND
Sodium	NV [4]	5,195.97	82.1	113	113	94.3	191	102	221	98.2
Vanadium	391	42.53	2.86	8.00	5.67	2.93	4.77	5.86	6.33	3.76
Zinc	23,500	54.53	4.72 J	13.8	8.47	4.25 J	8.92	9.31	11.2	8.70
General Chemistry	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**	**%**
Percent Moisture	NV	NV	28.37	27.35	29.59	28.23	28.89	25.06	25.50	26.26

Notes:

NMED = New Mexico Environment Department
USEPA = U.S. Environmental Protection Agency
UTL = Upper Tolerance Limit
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
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SSL = Soil Screening Level
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[3] NMED, October 2006. TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure, Table 2b.)
[4] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (December, 2009)
[5] No Value established for NMED Residential SSL (December, 2009) and USEPA RSL (December, 2009)

Bold value indicates analytes above NMED SSLs (Rev 5.0, Dec. 2009) or TPH results above NMED TPH Screening Guidelines (Oct., 2006)
Indicates combined TPH-GRO/DRO/ORO results exceed NMED TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure)

Table 1
Soil Analytical Data Hits Only (October 2008)
SWMU 8 Voluntary Corrective Measures, Soil Remediation
Holloman Air Force Base, New Mexico

Client Sample ID:	Soil Screening Levels	Basewide Background	SWMU-08-SW15	SWMU-08-SW15OE	SWMU-08-SW16	SWMU-08-Bottom 1	SWMU-08-Bottom 2	SWMU-08-Bottom 3	SWMU-08-Bottom 4
Lab Sample ID:	NMED Residential[1]	95% UTL for Combined Soil[2]	LR221435	LR222342	LR221435	LR221292	LR221292	LR221435	LR221435
Date Sampled:			10/10/2008	10/27/2008	10/10/2008	10/08/2008	10/08/2008	10/08/2008	10/08/2008
Analyte			Result	Result	Result	Result	Result	Result	Result
Total Petroleum Hydrocarbons	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Gasoline Range Organics (C6 -C10)	800 [3]	NV	7.3	ND	ND	ND	ND	ND	ND
Diesel Range Organics (C10-C22)	800 [3]	NV	**2,340**	ND	0.80 J	0.55 J	ND	ND	ND
Oil Range Organics (>C22-C36)	800 [3]	NV	642	6.0	12	3.0 J	ND	ND	3.3 J
Volatile Organic Compounds	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Chloroform	5.72	NV	ND	ND	ND	1.4 J	1.7 J	ND	ND
Tetrachloroethene	6.99	NV	ND	ND	ND	ND	ND	ND	ND
Semi-Volatile Organic Compounds	mg/kg	mg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Butylbenzylphthalate	260 [4]	NV	ND	ND	ND	ND	ND	ND	ND
Di-n-butylphthalate	6,110	NV	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	48,900	NV	ND	ND	ND	ND	ND	ND	ND
Pyrene	1,720	NV	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	347	NV	380	ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
PCB-1248	2.22	NV	0.23	ND	ND	ND	ND	ND	ND
PCB-1254	1.12	NV	0.16	ND	ND	ND	ND	ND	ND
Target Analyte List Metals	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	78,100	13,722.27	1,800	5,100	3,980	2,980	2,690	2,840	2,780
Arsenic	3.9	3.66	ND	0.377 J	ND	ND	ND	ND	ND
Barium	15,600	169.25	11.1	42.9	53.6	18.1	20	20.0	20.0
Beryllium	156	1.53	ND	0.176 J	ND	ND	ND	ND	ND
Boron	15,600	NV	ND	7.24	1.08 J	ND	ND	0.318 J	0.346 J
Cadmium	77.9	0.28	ND	0.220 J	ND	ND	ND	ND	ND
Calcium	NV [5]	317,331.59	124,000	182,000	105,000	105,000	146,000	120,000	124,000
Chromium	219	24.95	2.03	8.37	3.61	3.17	2.78	2.92	3.07
Cobalt	23 [4]	7.70	0.767	2.90	1.34	0.95	0.80	0.816	1.03
Copper	3,130	12.96	7.45	3.69	9.48	4.33	4.24	6.09	5.46
Iron	54,800	23,049.48	1,770	6,390	3,430	2,580	2,520	2,720	3,000
Lead	400	10.87	1.71	23.0	1.13	2.35	1.34	2.11	0.715
Magnesium	NV [5]	16,990.65	1,010	6,750	1,470	1,700	1,320	1,460	1,800
Manganese	10,700	393.47	33.3	201	40.0	25.4	22.6	26.2	30.3
Molybdenum	391	NV	1.73	1.01	1.30	1.91	2.02	1.56	1.59
Nickel	1,560	17.34	1.28 J	6.07	2.35	1.84	1.61	1.54	1.67
Potassium	NV [5]	5,077.12	430	1,330	836	746	648	682	735
Silver	391	65	0.183 J	ND	0.484 J	ND	0.57	ND	0.440 J
Sodium	NV [4]	5,195.97	92.0	219	105	118	123	104	129
Vanadium	391	42.53	3.93	14.7	7.95	5.61	6.40	9.58	5.55
Zinc	23,500	54.53	5.68	26.9	9.78	8.34	5.83	7.35	8.86
General Chemistry	%	%	%	%	%	%	%	%	%
Percent Moisture	NV	NV	30.89	5.85	23.72	27.76	28.21	28.08	28.25

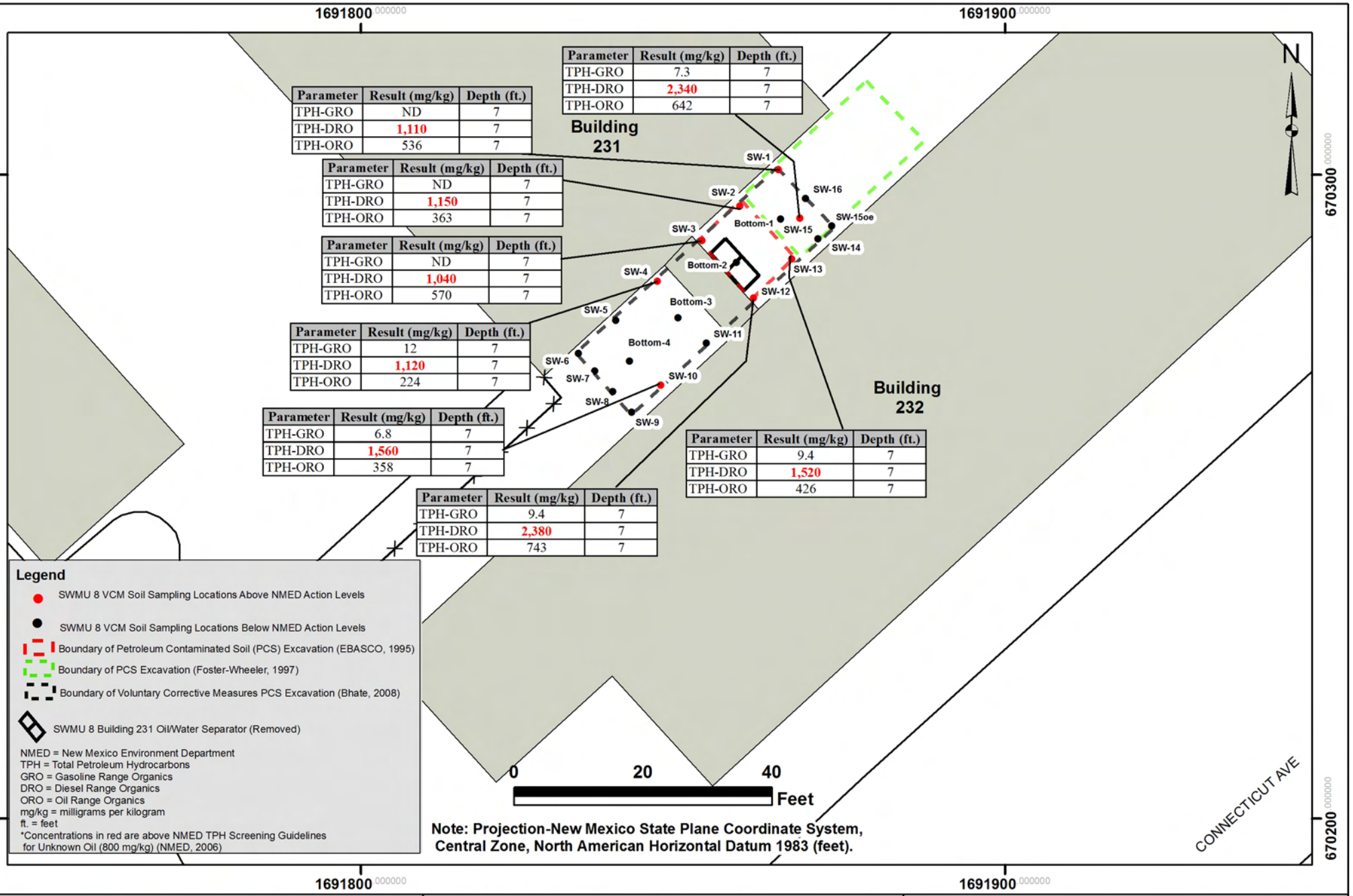
Notes:

NMED = New Mexico Environment Department
USEPA = U.S. Environmental Protection Agency
UTL = Upper Tolerance Limit
TPH = Total Petroleum Hydrocarbons
GRO = Gasoline Range Organics
DRO = Diesel Range Organics
ORO = Oil Range Organics
SSL = Soil Screening Level
SW = Sidewall Sample

µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
B = Analyte found in associated method blank
J = Indicates an estimated value
ND = Not Detected
NV = No Value
NA = Not Analyzed

[1] NMED, December 2009. Technical Background Document for Development of Soil Screening Levels (SSL), Revision 5.0.
[2] Established in the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView/Bhate JV III, October 2009)
[3] NMED, October 2006. TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure, Table 2b.)
[4] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (December, 2009)
[5] No Value established for NMED Residential SSL (December, 2009) and USEPA RSL (December, 2009)

Bold value indicates analytes above NMED SSLs (Rev 5.0, Dec. 2009) or TPH results above NMED TPH Screening Guidelines (Oct., 2006)
Indicates combined TPH-GRO/DRO/ORO results exceed NMED TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure)



Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	7.3	7
TPH-DRO	2,340	7
TPH-ORO	642	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	ND	7
TPH-DRO	1,110	7
TPH-ORO	536	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	ND	7
TPH-DRO	1,150	7
TPH-ORO	363	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	ND	7
TPH-DRO	1,040	7
TPH-ORO	570	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	12	7
TPH-DRO	1,120	7
TPH-ORO	224	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	6.8	7
TPH-DRO	1,560	7
TPH-ORO	358	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	9.4	7
TPH-DRO	2,380	7
TPH-ORO	743	7

Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	9.4	7
TPH-DRO	1,520	7
TPH-ORO	426	7

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ENGINEERING, SCIENCE AND CONSTRUCTION

SWMU 8 Voluntary Corrective Measures Soil Analytical Data Exceeding NMED Action Levels

PROJECT NO.	SCALE	DATE	DRAWN BY:
9050291	1"=20'	3/17/10	cm
			DRAWING NO: fig_1

SWMU 8 Voluntary Corrective Measures
Holloman AFB, New Mexico

Figure 1

Appendix B-6

Portions of: *Final RCRA Final Investigation Report SWMU 8, Holloman Air Force Base, New Mexico*

NationView, LLC, April 2012

FINAL
RCRA FACILITY INVESTIGATION REPORT
SWMU 8
HOLLOMAN AIR FORCE BASE, NEW MEXICO

Prepared for:

49 CES/CEAN
Holloman Air Force Base
New Mexico

Under Contract to:

U.S. Army Corps of Engineers-
Albuquerque District
HTRW Branch
4101 Jefferson Plaza NE
Albuquerque, New Mexico 87109-3435

Prepared by:

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1608 13th Avenue South, Suite 160
Birmingham, Alabama 35205
NationView Project No. 8080014

Contract No. W912PL-07-D-0050
Delivery Order No. DM01

April 2012

Table 3-2
Survey Data and Groundwater Elevation Summary (December 2010)
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Well	Northing (NAD 83)	Easting (NAD 83)	TOC Elevation (ft amsl)	DTW from TOC (ft below TOC)	Groundwater Elevation December 13, 2010 (ft amsl)
SWMU8-DP01	1691884.472	670203.701	4,072.31	5.36	4,066.95
SWMU8-DP02	1691834.779	670266.812	4,073.57	6.61	4,066.96
SWMU8-DP03	1691878.600	670300.290	4,073.67	6.21	4,067.46
SWMU8-DP05 [1]	1691849.226	670292.279	NA	6.80	NA
SWMU8-DP13 [1]	1691862.809	670270.519	NA	6.83	NA
SWMU8-DP17	1691835.085	670205.241	4,073.63	6.82	4,066.81

Notes:
NAD 83 = North American Datum 1983
TOC = Top of Casing
DTW = Depth to Water
ft = feet
amsl = above mean sea level
NA = Not Available (Unable to obtain top of casing elevation due to building roof interference with global positioning system [GPS])
[1] Northing and Easting coordinates digitized from drawn-to-scale figure created in the field, and referenced to the State Plane Coordinate System, New Mexico Central (GPS interference).

Table 5-1
Summary of Soil Boring Locations and Sample Intervals
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Soil Boring Number	Location	Northing (NAD 83)	Easting (NAD 83)	Total Depth (ft)	Sample Depths for Analysis (ft bgs)	Laboratory Analysis
SWMU8-DP04 [1]	SWMU 8 (OWS Source Area)	1691839.923	670286.327	11	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP05 [1]	SWMU 8 (OWS Source Area)	1691849.226	670292.279	15	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP06 [1]	SWMU 8 (OWS Source Area)	1691854.994	670297.672	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP07 [1]	SWMU 8 (OWS Source Area)	1691862.436	670308.645	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP08 [1]	SWMU 8 (OWS Source Area)	1691844.016	670297.858	11	8	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP09 [1]	SWMU 8 (OWS Source Area)	1691830.061	670278.330	11	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP10 [1]	SWMU 8 (OWS Source Area)	1691837.132	670305.111	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP11 [1]	SWMU 8 (OWS Source Area)	1691841.597	670249.318	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP12 [1]	SWMU 8 (OWS Source Area)	1691852.389	670261.034	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP13 [1]	SWMU 8 (OWS Source Area)	1691862.809	670270.519	12	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP14 [1]	SWMU 8 (OWS Source Area)	1691868.763	670278.330	11	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP15 [1]	SWMU 8 (OWS Source Area)	1691884.392	670285.769	10	7	VOCs, SVOCs, TPH, PCBs, TAL Metals
SWMU8-DP16 [1]	SWMU 8 (Geotechnical)	1691873.414	670322.407	5	2-3, 3-4	% Solids, DBD, SG, FOC
SWMU8-DP17	SWMU 8 (Downgradient)	1691835.085	670205.241	15	None	None

Notes:
OWS = Oil/Water Separator
NAD 83 = North American Datum 1983
VOCs = Volatile Organic Compounds
SVOCs = Semi-Volatile Organic Compounds
TPH = Total Petroleum Hydrocarbons (Gasoline Range Organics, Diesel Range Organics, and Oil Range Organics)
PCBs = Polychlorinated Biphenyls
TAL = Target Analyte List
% Solids = Percent Solids
DBD = Dry Bulk Density
SG = Specific Gravity
FOC = Fractional Organic Carbon
ft bgs = feet below ground surface
[1] Northing and Easting coordinates digitized from drawn-to-scale figure created in the field, and referenced to the State Plane Coordinate System, New Mexico Central due to GPS interference.

Table 5-2
Monitoring Well Construction Details
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Well Identification	Installation Date	Sampled 2010	Diameter (inches)	Screen Interval (ft bgs)	Depth to Water (ft below TOC)	Total depth (ft bgs)	Status
SWMU8-DP01	5/22/2006	Yes	1	4.0 - 14.0	5.36	14.0	Active
SWMU8-DP02	5/22/2006	Yes	1	4.0 - 14.0	6.61	14.0	Active
SWMU8-DP03	5/23/2006	Yes	1	6.0 - 11.0	6.21	11.0	Active
SWMU8-DP05	10/8/2010	Yes	1	4.75 - 14.75	6.80	15.0	Active
SWMU8-DP13	10/10/2010	Yes	1	1.5 - 11.5	6.83	12.0	Active
SWMU8-DP17	10/11/2010	Yes	1	4.75 - 14.75	6.82	15.0	Active

Notes:
ft bgs = Feet below ground surface
ft below TOC = Feet below top of casing (based on December 2010 groundwater elevation)

Table 7-1
Soil Analytical Results (October 2010)
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background Levels		SWMU8-DP04-7			SWMU8-DP05-7			SWMU8-DP05-7A			SWMU8-DP06-7			SWMU8-DP07-7			SWMU8-DP08-8			SWMU8-DP09-7		
Lab Sample Identification:	NMED Residential[1]	NMED Approved Background Level[2]	Combined Soil Background Level [3]	F77191-3			F77191-1			F77191-2			F77191-4			F77190-1			F77190-2			F77190-3		
Date Sampled:				10/8/2010			10/8/2010			10/8/2010			10/8/2010			10/8/2010			10/8/2010			10/9/2010		
Analyte (Method)				Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1
Volatile Organic Compounds (8260B)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Benzene	15.5	NV	NV	68	U		80	U		68	U		69	U		1.1	J		70	U		2.0	J	
n-Butylbenzene	3,900 [5]	NV	NV	88	U		2,180			2,690			2,310			1.4	U		91	U		1.6	U	
sec-Butylbenzene	NV [6]	NV	NV	82	U		474			617			734			1.3	U		132	J		1.5	U	
m-Dichlorobenzene (1,3-Dichlorobenzene)	NV [6]	NV	NV	82	U		485			587			856			1.3	U		157	J		1.5	U	
o-Dichlorobenzene (1,2-Dichlorobenzene)	3,010	NV	NV	75	U		369	J		478			755			1.2	U		77	U		1.4	U	
p-Dichlorobenzene (1,4-Dichlorobenzene)	32.2	NV	NV	100	U		353	J		453			708			1.7	U		101	J		1.9	U	
Ethylbenzene	69.7	NV	NV	75	U		117	J		143	J		76	U		1.2	U		77	U		1.4	U	
p-Isopropyltoluene	NV [6]	NV	NV	68	U		570			397			69	U		1.1	U		70	U		1.3	U	
Methylene chloride	199	NV	NV	495	J		672	JB		708	B		994			5.5	U		1,310			9.6	JB	
n-Propylbenzene	3,400 [5]	NV	NV	100	U		141	J	J	303	J	J	100	U		1.7	U		100	U		1.9	U	
Toluene	5,570	NV	NV	82	U		95	U		82	U		83	U		1.3	U		84	U		1.8	J	
m,p-Xylene	NV [6]	NV	NV	82	U		144	J		82	U		83	U		1.3	U		84	U		1.5	U	
Semi-Volatile Organic Compounds (8270C)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
2,4-Dimethylphenol	1,220	NV	NV	190	U		666	J		390	U		240	U		48	U		50	U		56	U	
2-Nitrophenol	NV [6]	NV	NV	170	U		380	U		350	U		879	J		43	U		45	U		50	U	
1-Methylnaphthalene	22 [5]	NV	NV	170	U		531	J		646	J		403	J		43	U		45	U		50	U	
Total Petroleum Hydrocarbons (8015)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Gasoline Range Organics (C6-C10)	800 [7]	NV	NV	243			620			696			737			3.4	U		454			4.8	U	
Diesel Range Organics (C10-C22)	800 [7]	NV	NV	110			**821**			**862**			**898**			6.6	U		114			7.5	U	
Oil Range Organics (>C22-C36)	800 [7]	NV	NV	159			453			452			431			6.6	U		128			7.5	U	
Polychlorinated Biphenyls (8082)	**mg/kg**	**mg/kg**	**mg/kg**	**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**			**µg/kg**		
Aroclor 1232	1.76	NV	NV	39.7	J		86.4	J		76.9	J		57.9	J		18	U		41.0	J		20	U	
Aroclor 1254	1.12	NV	NV	16.0	J		40.2	J		37.1	J		26.7	J		11	U		17.7	J		13	U	
TAL Metals Analysis (6010B/7471A)	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**			**mg/kg**		
Aluminum	78,100	13,722	13,722.27	2,350			3,200			3,510			2,280			3,290			2,150			2,610		
Antimony	31.3	1.6	1.6	0.088	U		0.12	U		0.13	J		0.086	U		0.18	J		0.093	U		0.13	U	
Arsenic	3.9	3.7	3.66	1.0			0.89			0.63			0.74			0.63			0.93			0.45	J	
Barium	15,600	169.3	169.25	22.4			35.6			37.9			23.5			32.5			26.0			23.9		
Beryllium	156	1.6	1.53	0.092	J		0.12	J		0.14	J		0.073	J		0.11	J		0.070	J		0.094	J	
Cadmium	77.9	0.3	0.28	0.044	U		0.058	U		0.062	U		0.043	U		0.049	U		0.047	U		0.063	U	
Calcium	NV [6]	317,332	317,331.59	167,000			197,000			176,000			225,000			245,000			195,000			192,000		
Chromium	219	25	24.95	3.0	J		3.9	J		4.5	J		2.6	J		3.2	J		2.5	J		2.9	J	
Cobalt	23 [5]	7.7	7.70	0.85	J		1.1	J		1.1	J		0.89	J		1.3	J		0.87	J		0.79	J	
Copper	3,130	13	12.96	2.0	J		2.6	J		2.5	J		3.1	J		3.2	J		2.3	J		2.3	J	
Iron	54,800	23,049	23,049.48	2,620			2,670			3,170			1,890			2,250			1,790			2,250		
Lead	400	10.9	10.87	1.4	J		1.9	J		1.6	J		1.7	J		1.4	J		1.2	J		1.2	J	
Magnesium	NV [6]	16,991	16,990.65	1,010			1,370			1,390			1,040			1,340			939			1,420		
Manganese	10,700	393	393.47	37.3		J	29.1		J	28.0		J	54.6		J	55.6		J	40.2		J	54.4		J
Nickel	1,560	17.4	17.34	1.9	J		2.2	J		2.2	J		1.7	J		2.5	J		1.6	J		1.9	J	
Potassium	NV [6]	5,077	5,077.12	628			885			957			615			839			579			646		
Sodium	NV [6]	5,196	5,195.97	93.2	J		138	J		122	J		172	J		176	J		156	J		138	J	
Vanadium	391	42.6	42.53	5.8		J	5.5		J	6.1		J	4.5		J	4.2		J	4.6		J	4.5		J
Zinc	23,500	54.6	54.53	5.1	J		7.3	J		7.7	J		5.6	J		8.4	J		4.7	J		5.1	J	
General Chemistry (2540B)	**%**	**%**	**%**	**%**			**%**			**%**			**%**			**%**			**%**			**%**		
Solids, Percent	NV	NV	NV	77.5			68.6			75.1			76.4			75.5			73.4			65.6		

Notes:

NMED = New Mexico Environment Department

TAL = Target Analyte List

µg/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

% = percent

NV = No Value

Q = Laboratory Qualifier

Q1 = Validating Chemist Qualifier

Client Sample Nomenclature

SWMU8 = Solid Waste Management Unit 8

DP = Direct Push

A = Denotes a duplicate sample

Final digit(s) equal the sample interval depth below ground surface

[1] NMED, December 2009. Technical Background Document for Development of Soil Screening Levels (SSL), Revision 5.0.

[2] Table 1, Conditional Approval Letter, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)

[3] Table 5-18, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView|Bhate JV III, July 2011)

[4] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)

[5] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (November, 2011)

[6] No Value established for NMED Residential SSL (December 2009) and USEPA RSL (November 2011)

[7] NMED TPH Screening Guidelines for Unknown Oil, Residential Direct Exposure, Table 2b (October 2006)

Bold value indicates analytes above NMED SSLs (Rev 5.0, December 2009) or TPH results above NMED TPH Screening Guidelines (October 2006)

Indicates that the combined TPH-GRO/DRO/ORO results exceed the NMED TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure)

Indicates analytical results above the NMED Residential SSL, but below the NMED approved background levels (NMED, 2011)

Indicates analytical results above the NMED Approved background levels, but below the NMED Residential SSL

Qualifiers

U = Not detected

J = Indicates an estimated value

B = Indicates analyte found in the associated method blank

Table 7-1
Soil Analytical Results (October 2010)
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Soil Screening Levels	Basewide Background Levels		SWMU8-DP10-7			SWMU8-DP11-7			SWMU8-DP12-7			SWMU8-DP13-7			SWMU8-DP13-7A			SWMU8-DP14-7			SWMU8-DP15-7		
Lab Sample Identification:	NMED Residential[1]	NMED Approved Background Level[2]	Combined Soil Background Level [3]	F77189-1			F77189-2			F77189-3			F77187-3			F77187-4			F77187-1			F77187-2		
Date Sampled:				10/9/2010			10/9/2010			10/9/2010			10/10/2010			10/10/2010			10/10/2010			10/10/2010		
Analyte (Method)				Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1	Result [4]	Q	Q1
Volatile Organic Compounds (8260B)	mg/kg	mg/kg	mg/kg	µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg		
Benzene	15.5	NV	NV	6.0		J	1.4	U		1.4	U		2.6	J		2.2	J		5.6	J		0.88	U	
n-Butylbenzene	3,900 [5]	NV	NV	1.5	U		1.8	U		1.8	U		1.3	U		1.4	U		2.4	U		1.1	U	
sec-Butylbenzene	NV [6]	NV	NV	1.4	U		1.7	U		1.7	U		1.2	U		1.3	U		2.2	U		1.1	U	
m-Dichlorobenzene (1,3-Dichlorobenzene)	NV [6]	NV	NV	1.4	U		1.7	U		1.7	U		1.2	U		1.3	U		2.2	U		1.1	U	
o-Dichlorobenzene (1,2-Dichlorobenzene)	3,010	NV	NV	1.3	U		1.6	U		1.5	U		1.1	U		1.2	U		2.1	U		0.97	U	
p-Dichlorobenzene (1,4-Dichlorobenzene)	32.2	NV	NV	1.7	U		2.1	U		2.1	U		1.5	U		1.6	U		2.8	U		1.3	U	
Ethylbenzene	69.7	NV	NV	1.3	U		1.6	U		1.5	U		1.1	U		1.2	U		2.1	U		0.97	U	
p-Isopropyltoluene	NV [6]	NV	NV	1.1	U		1.4	U		1.4	U		1.0	U		1.1	U		1.9	U		0.88	U	
Methylene chloride	199	NV	NV	5.7	U		13.7	JB		17.7	B		5.1	U		5.4	U		9.3	U		4.4	U	
n-Propylbenzene	3,400 [5]	NV	NV	1.7	U		2.1	U		2.1	U		1.5	U		1.6	U		2.8	U		1.3	U	
Toluene	5,570	NV	NV	5.0	J	J	1.7	U		1.7	U		2.1	J		1.8	J		4.2	J		1.1	U	
m,p-Xylene	NV [6]	NV	NV	2.3	J	J	1.7	U		1.7	U		1.2	U		1.3	U		2.2	U		1.1	U	
Semi-Volatile Organic Compounds (8270C)	mg/kg	mg/kg	mg/kg	µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg		
2,4-Dimethylphenol	1,220	NV	NV	49	U		50	U		46	U		42	U		44	U		46	U		45	U	
2-Nitrophenol	NV [6]	NV	NV	45	U		45	U		42	U		38	U		40	U		42	U		41	U	
1-Methylnaphthalene	22 [5]	NV	NV	45	U		45	U		42	U		38	U		40	U		42	U		41	U	
Total Petroleum Hydrocarbons (8015)	mg/kg	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg			mg/kg			mg/kg			mg/kg		
Gasoline Range Organics (C6-C10)	800 [7]	NV	NV	3.7	U		4.2	U		3.4	U		3.0	U		3.2	U		3.3	U		3.0	U	
Diesel Range Organics (C10-C22)	800 [7]	NV	NV	6.8	U		6.7	U		6.2	U		5.7	U		6.0	U		6.2	U		6.1	U	
Oil Range Organics (>C22-C36)	800 [7]	NV	NV	6.8	U		6.7	U		6.2	U		5.7	U		6.0	U		6.2	U		6.1	U	
Polychlorinated Biphenyls (8082)	mg/kg	mg/kg	mg/kg	µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg			µg/kg		
Aroclor 1232	1.76	NV	NV	18	U		18	U		17	U		15	U		16	U		17	U		16	U	
Aroclor 1254	1.12	NV	NV	11	U		11	U		10	U		9.5	U		9.9	U		10	U		10	U	
TAL Metals Analysis (6010B/7471A)	mg/kg	mg/kg	mg/kg	mg/kg			mg/kg			mg/kg			mg/kg			mg/kg			mg/kg			mg/kg		
Aluminum	78,100	13,722	13,722.27	3,000			2,850			2,420			2,520			2,620			2,330			5,460		
Antimony	31.3	1.6	1.6	0.35	J		0.19	J		0.17	J		0.15	J		0.081	U		0.12	U		0.099	J	
Arsenic	3.9	3.7	3.66	0.75			0.83			0.76			0.88			1.1			0.45	J		2.1		
Barium	15,600	169.3	169.25	25.5			25.1			25.7			21.2			23.5			21.1			52.6		
Beryllium	156	1.6	1.53	0.14	J		0.13	J		0.10	J		0.093	J		0.10	J		0.085	J		0.23		
Cadmium	77.9	0.3	0.28	0.32			0.32			0.27			0.062	J		0.069	J		0.061	U		0.13	J	
Calcium	NV [6]	317,332	317,331.59	175,000			165,000			145,000			149,000			157,000			165,000			71,900		
Chromium	219	25	24.95	3.7	J		3.2	J		2.6	J		3.4	J		3.2	J		3.0	J		6.5		
Cobalt	23 [5]	7.7	7.70	1.2	J		1.2	J		1.0	J		0.88	J		0.94	J		0.99	J		3.1	J	
Copper	3,130	13	12.96	2.4	J		2.7	J		2.5	J		2.6	J		2.5	J		2.6	J		3.7	J	
Iron	54,800	23,049	23,049.48	2,510		J	2,350		J	2,060		J	2,010			2,160			2,020			4,000		
Lead	400	10.9	10.87	1.4	J		1.6	J		0.73	J		1.3	J		1.8	J		1.5	J		4.1		
Magnesium	NV [6]	16,991	16,990.65	1,540			1,640			1,030			1,200	J		1,330	J		1,120	J		2,100		
Manganese	10,700	393	393.47	31.8		J	101		J	51.1		J	24.9		J	25.8		J	41.2		J	90.4		J
Nickel	1,560	17.4	17.34	2.2	J		2.5	J		1.9	J		1.8	J		2.0	J		2.0	J		5.8	J	
Potassium	NV [6]	5,077	5,077.12	704			687			596			682			704			571	J		1,360		
Sodium	NV [6]	5,196	5,195.97	125	J	J	79.8	J	J	60.8	J	J	135	J	J	137	J	J	126	J	J	88.0	J	J
Vanadium	391	42.6	42.53	7.5		J	6.2		J	6.6		J	5.8			6.0			5.3			18.3		
Zinc	23,500	54.6	54.53	6.5	J		6.1	J		5.1	J		5.2	J		5.5	J		4.5	J		17.3		
General Chemistry (2540B)	%	%	%	%			%			%			%			%			%			%		
Solids, Percent	NV	NV	NV	73.5			73.8			79.2			86.0			82.7			79.6			81.0		

Notes:

NMED = New Mexico Environment Department
TAL = Target Analyte List
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
% = percent
NV = No Value
Q = Laboratory Qualifier
Q1 = Validating Chemist Qualifier

Client Sample Nomenclature
SWMU8 = Solid Waste Management Unit 8
DP = Direct Push
A = Denotes a duplicate sample
Final digit(s) equal the sample interval depth below ground surface

[1] NMED, December 2009. Technical Background Document for Development of Soil Screening Levels (SSL), Revision 5.0.
[2] Table 1, Conditional Approval Letter, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NMED, December 2011)
[3] Table 5-18, *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView|Bhate JV III, July 2011)
[4] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[5] USEPA Region 3, 6, and 9 Regional Screening Levels (RSLs) (November, 2011)
[6] No Value established for NMED Residential SSL (December 2009) and USEPA RSL (November 2011)
[7] NMED TPH Screening Guidelines for Unknown Oil, Residential Direct Exposure, Table 2b (October 2006)

Bold value indicates analytes above NMED SSLs (Rev 5.0, December 2009) or TPH results above NMED TPH Screening Guidelines (October 2006)
Indicates that the combined TPH-GRO/DRO/ORO results exceed the NMED TPH Screening Guidelines (Unknown Oil, Residential Direct Exposure)
Indicates analytical results above the NMED Residential SSL, but below the NMED approved background levels (NMED, 2011)
Indicates analytical results above the NMED Approved background levels, but below the NMED Residential SSL

Qualifiers
U = Not detected
J = Indicates an estimated value
B = Indicates analyte found in the associated method blank

Table 7-2
Soil Geotechnical Results (October 2010)
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Sample Identification	**Method**	**Unit**	**SWMU8-DP16-2**	**SWMU8-DP16-3**	**Average**
Depth (ft bgs)			**F77187-6**	**F77187-7**	
Date sampled			**10/10/2010**	**10/10/2010**	
Parameter					
Bulk Density (Dry Basis)	ASTM D2937-94 M	g/mL	1.2	1.5	1.35
Fractional Organic Carbon	ASTM D2974-87	%	17.6	8.7	13.15
Solids, Percent	SM19 2540B M	%	70.0	79.2	74.6
Specific Gravity	ASTM 1429		1.8	1.9	1.85

Notes:
ASTM - American Society for Testing and Materials
ft bgs - Feet below ground surface
g/mL - grams per milliliter
% - percent
SWMU8 = Solid Waste Management Unit 8
DP = Direct Push
Final digit(s) equal the sample interval depth in feet below ground surface

Table 7-3
Groundwater Analytical Results (December 2010)
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Client Sample Identification:	Groundwater Screening Levels		Basewide Background Levels		SWMU8-DP01			SWMU8-DP02			SWMU8-DP03			SWMU8-DP05			SWMU8-DP05-A			SWMU8-DP13			SWMU8-DP17		
Lab Sample Identification:	NMWQCC[1]	USEPA MCL [2]	NMED Approved Background Levels (Dissolved Constituents)[3]	Dissolved Metals in Groundwater UTL [4]	F78727-3			F78699-2			F78699-3			F78727-2			F78727-1			F78699-1			F78699-4		
Date Sampled:					12/13/2010			12/13/2010			12/13/2010			12/14/2010			12/14/2010			12/13/2010			12/13/2010		
Analyte (Method)					Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1	Result [5]	Q	Q1
Volatile Organic Compounds (8260B)	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**		
n-Butylbenzene	NV	NV	NV	NV	0.26	U		0.26	U		0.26	U		0.34	J	J	0.26	U		0.26	U		0.26	U	
sec-Butylbenzene	NV	NV	NV	NV	0.22	U		0.22	U		0.22	U		2.4	J	J	2.4	J	J	0.22	U		0.22	U	
Chloroform	100	NV	NV	NV	1.7			0.22	U		0.22	U		0.22	U		0.22	U		1.6			7.3		
Carbon disulfide	NV	NV	NV	NV	0.50	U		0.50	U		0.50	U		1.4	J		1.9	J		0.50	U		0.50	U	
m-Dichlorobenzene	NV	NV	NV	NV	0.20	U		0.20	U		0.20	U		3.2			3.1			0.20	U		0.20	U	
o-Dichlorobenzene	NV	600	NV	NV	0.25	U		0.25	U		0.25	U		2.1			2.0			0.25	U		0.25	U	
p-Dichlorobenzene	NV	75	NV	NV	0.23	U		0.23	U		0.23	U		2.1			2.1			0.23	U		0.23	U	
Toluene	750	1,000	NV	NV	0.20	U		0.20	U		0.20	U		0.20	U		0.25	J		0.20	U		0.20	U	
Semi-Volatile Organic Compounds (8270D)	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**		
1,2-Dichlorobenzene	NV	600	NV	NV	1.0	U		0.96	U		0.95	U		1.3	J		1.4	J		0.96	U		0.97	U	
1,3-Dichlorobenzene	NV	NV	NV	NV	1.0	U		0.96	U		0.95	U		1.9	J		2.0	J		0.96	U		0.97	U	
1,4-Dichlorobenzene	NV	75	NV	NV	1.0	U		0.96	U		0.95	U		1.3	J		1.3	J		0.96	U		0.97	U	
Diethyl phthalate	NV	NV	NV	NV	1.1	U		1.1	U		1.0	U		1.5	J		1.5	J		1.1	U		1.1	U	
Polychlorinated Biphenyls (8082A)	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**		
All PCBs	NV	NV	NV	NV	ND			ND			ND			ND			ND			ND			ND		
Total Petroleum Hydrocarbons (8015C)	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**		
Gasoline Range Organics (C6-C10)	50.0 [6]	NV	NV	NV	0.050	U		0.050	U		0.050	U		0.0551	J		0.0542	J		0.050	U		0.050	U	
Diesel Range Organics (C10-C22)	50.0 [6]	NV	NV	NV	0.10	U		0.095	U		0.095	U		0.550			0.579			0.096	U		0.097	U	
Oil Range Organics (>C22-C36)	50.0 [6]	NV	NV	NV	0.10	U		0.095	U		0.095	U		0.095	U		0.095	U		0.096	U		0.097	U	
TAL Metals Analysis (6010C/7470A)	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**			**µg/L**		
Aluminum	5,000	50 [7]	54	54	25	U		25	U		25	U		25	U		25	U		33.3	J		25	U	
Antimony	NV	6	6	10	2.1	J		3.8	J		2.0	U		2.0	U		4.3	J		2.5	J		4.3	J	
Arsenic	100	10	10	28.53	7.8	J		3.2	J		2.0	U		2.0	U		2.0	U		2.0	U		2.2	J	
Barium	1,000	2,000	30.2	30.13	15.3	J		16.1	J		30.2	J		28.1	J		29.9	J		20.4	J		27.7	J	
Calcium	NV	NV	1,151,302	1,151,301.20	567,000		J	578,000		J	571,000		J	550,000		J	585,000		J	550,000		J	573,000		J
Chromium	50	100	2.5	2.5	2.3	J		1.0	U		1.0	U		1.0	U		1.0	U		1.0	U		1.0	U	
Copper	1,000	1,300	22	57.46	3.6	J		3.7	J		4.5	J		2.9	J		3.4	J		3.9	J		3.3	J	
Iron	1,000	300 [7]	65.6	65.56	35	U		40.9	J		95.9	J		193	J	J	129	J	J	35	U		35	U	
Magnesium	NV	NV	3,630,927	3,630,926.70	77,500			55,200			56,600			49,600			53,100			48,200			79,100		
Manganese	200	50 [7]	50	118.65	1.0	U		9.6	J		16.6			**130**			**111**			19.8			**376**		
Nickel	200	NV	15.9	15.89	2.0	U		2.0	U		2.0	U		2.0	U		2.0	U		3.0	J		2.6	J	
Potassium	NV	NV	120,480	120,479.98	8,140	J		5,560	J		3,980	J		3,920	J		4,070	J		3,320	J		7,780	J	
Selenium	50	50	25.3	25.26	2.5	J		2.0	U		2.0	U		2.0	U		2.0	U		2.4	J		2.0	U	
Sodium	NV	NV	19,972,499	19,972,499.00	71,400			68,400			70,200			69,600			73,100			68,200			63,500		
Vanadium	NV	NV	73.8	73.73	83.6			34.6	J		18.7	J		1.0	U		1.0	U		21.3	J		34.2	J	
Zinc	10,000	5,000 [7]	23	56.28	15.9	J		17.0	J		17.3	J		13.5	J		17.7	J		14.0	J		8.2	J	
General Chemistry (2540C)	**mg/L**	**mg/L**	**mg/L**	**mg/L**	**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**			**mg/L**		
Solids, Total Dissolved	1,000	500 [7]	NV	65,956.58 [8]	**2,420**			**2,480**			**2,440**			**2,500**			**1,970**			**2,450**			241		

Notes:

NMWQCC = New Mexico Water Quality Control Commission
NMED = New Mexico Environment Department
USEPA = United States Environmental Protection Agency
MCL = Maximum Contaminant Level
UTL = Upper Tolerance Limit
TAL = Target Analyte List
µg/L = micrograms per liter
mg/L = milligrams per liter
NV = No Value
Q = Laboratory Qualifier
Q1 = Validating Chemist Qualifier

Qualifiers
U = Not detected
J = Indicates an estimated value

Client Sample Nomenclature
SWMU8 = Solid Waste Management Unit 8
DP = Direct Push
A = Denotes a duplicate sample

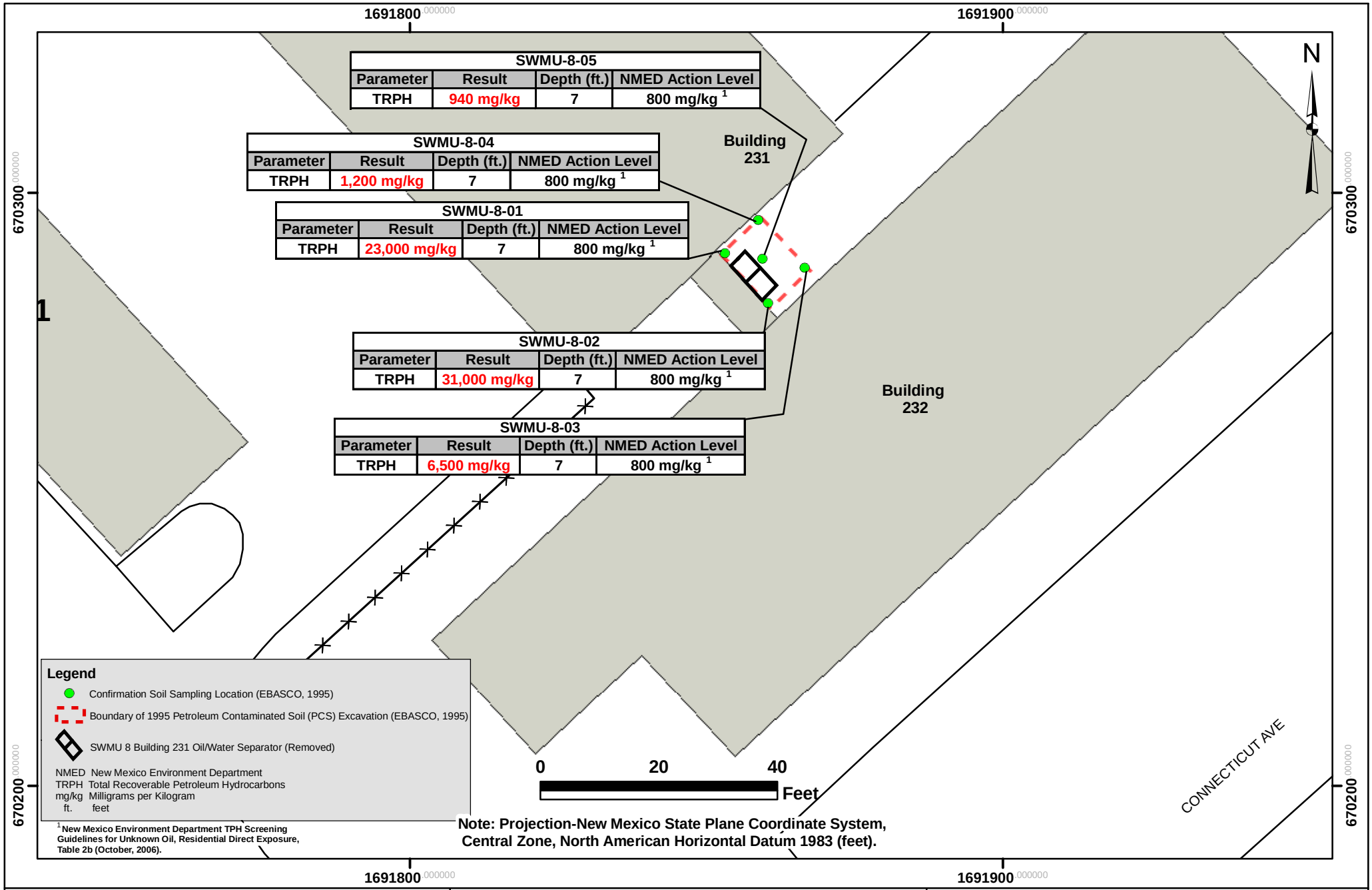
[1] Standards for Groundwater, if 10,000 mg/L Total Dissolved Solids (TDS) Concentration or Less, New Mexico Administrative Code 20.6.2.3103
[2] USEPA National Primary Drinking Water Regulations MCLs (816-F-09-004, May 2009)
[3] Table 3, Conditional Approval Letter, Basewide Background Study Report, Holloman Air Force Base, New Mexico (NMED, December 2011)
[4] Table 5-18 of the *Basewide Background Study Report, Holloman Air Force Base, New Mexico* (NationView|Bhate JV III, July 2011)
[5] If results are not detected (U) then the value is set at the Method Detection Limit (MDL)
[6] NMED TPH Screening Guidelines for Unknown Oil, Concentration in groundwater, Table 2b (October 2006)
[7] USEPA Secondary Drinking Water Standard
[8] Value established in the Basewide Background Study Report, HAFB, New Mexico (NationView/Bhate JV III, July 2011) and derived from the Total Groundwater UTL

Bold value indicates analytes above the New Mexico Groundwater Quality Standards, the USEPA MCLs, or the NMED TPH Screening Guidelines
Indicates combined TPH-GRO/DRO/ORO analytical results above the NMED TPH Screening Guideline for Unknown Oil, Concentration in Groundwater, Table 2b
Indicates analytical results above the NMED Approved Background Levels, but below established New Mexico Groundwater Quality Standards, or USEPA MCLs

Table 8-3
Chemicals of Potential Concern
SWMU 8 RCRA Facility Investigation Report
Holloman Air Force Base, New Mexico

Chemicals	Soil	Groundwater
n-Butylbenzene		X
sec-Butylbenzene		X
Carbon disulfide		X
m-Dichlorobenzene		X
Diethyl phthalate		X
TPHs (C10-C36)	X	
Manganese		X
Vanadium		X
Total No. of COPCs	**1**	**7**

Notes:
COPC = Chemical of potential concern
X = COPC based on maximum detected concentration greater than screening level or chemical without screening level



SWMU-8-05			
Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	940 mg/kg	7	800 mg/kg [1]

SWMU-8-04			
Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	1,200 mg/kg	7	800 mg/kg [1]

SWMU-8-01			
Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	23,000 mg/kg	7	800 mg/kg [1]

SWMU-8-02			
Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	31,000 mg/kg	7	800 mg/kg [1]

SWMU-8-03			
Parameter	Result	Depth (ft.)	NMED Action Level
TRPH	6,500 mg/kg	7	800 mg/kg [1]

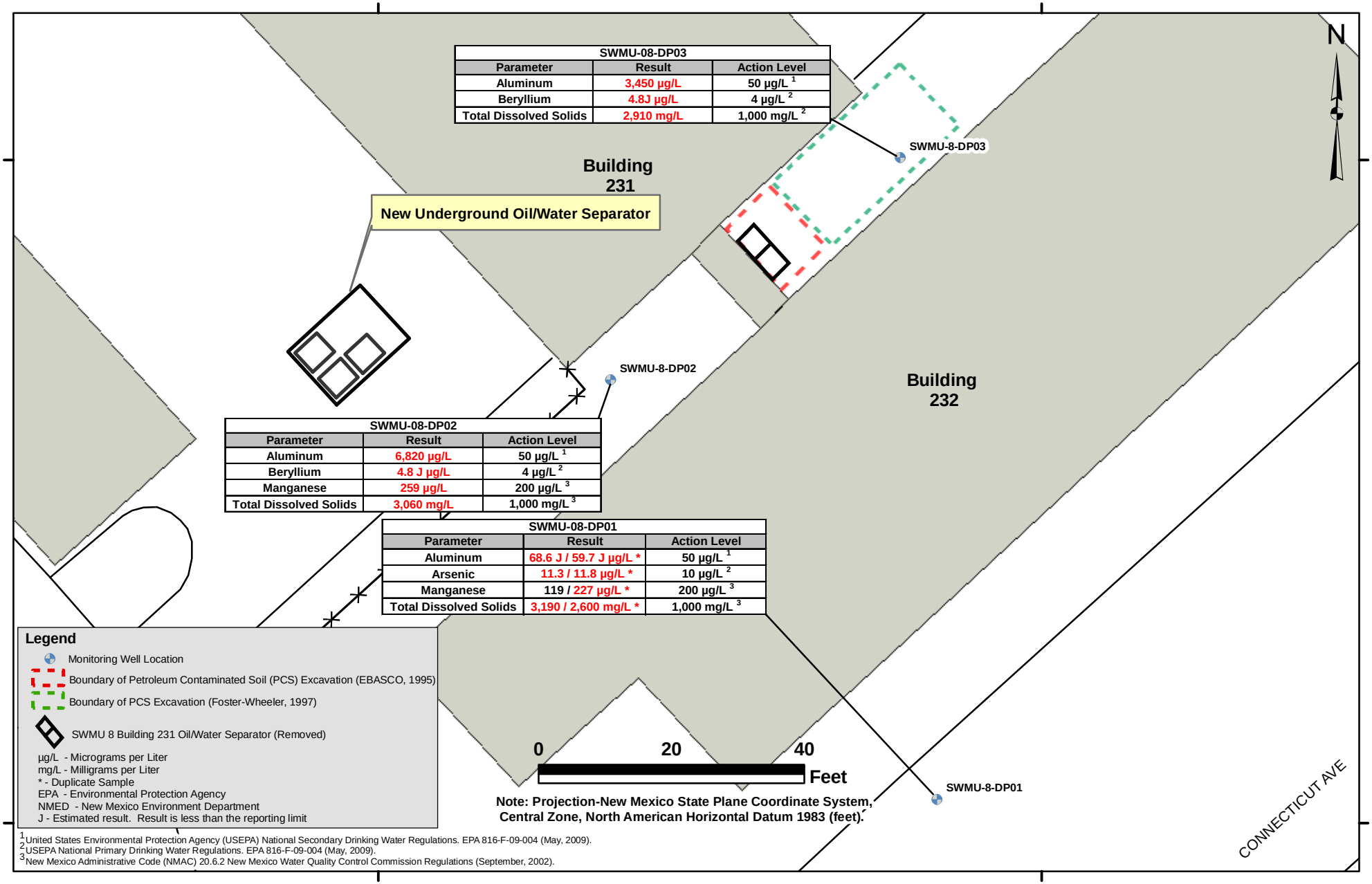
NATIONVIEW

SWMU 8
Soil Analytical Results Above NMED Action Levels (EBASCO, 1995)

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080014	1"=20'	12/3/10	cm
			DRAWING NO: fig_2-4

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 2-4



SWMU-08-DP03		
Parameter	Result	Action Level
Aluminum	3,450 µg/L	50 µg/L [1]
Beryllium	4.8J µg/L	4 µg/L [2]
Total Dissolved Solids	2,910 mg/L	1,000 mg/L [2]

SWMU-08-DP02		
Parameter	Result	Action Level
Aluminum	6,820 µg/L	50 µg/L [1]
Beryllium	4.8 J µg/L	4 µg/L [2]
Manganese	259 µg/L	200 µg/L [3]
Total Dissolved Solids	3,060 mg/L	1,000 mg/L [3]

SWMU-08-DP01		
Parameter	Result	Action Level
Aluminum	68.6 J / 59.7 J µg/L *	50 µg/L [1]
Arsenic	11.3 / 11.8 µg/L *	10 µg/L [2]
Manganese	119 / 227 µg/L *	200 µg/L [3]
Total Dissolved Solids	3,190 / 2,600 mg/L *	1,000 mg/L [3]

[1] United States Environmental Protection Agency (USEPA) National Secondary Drinking Water Regulations. EPA 816-F-09-004 (May, 2009).
[2] USEPA National Primary Drinking Water Regulations. EPA 816-F-09-004 (May, 2009).
[3] New Mexico Administrative Code (NMAC) 20.6.2 New Mexico Water Quality Control Commission Regulations (September, 2002).

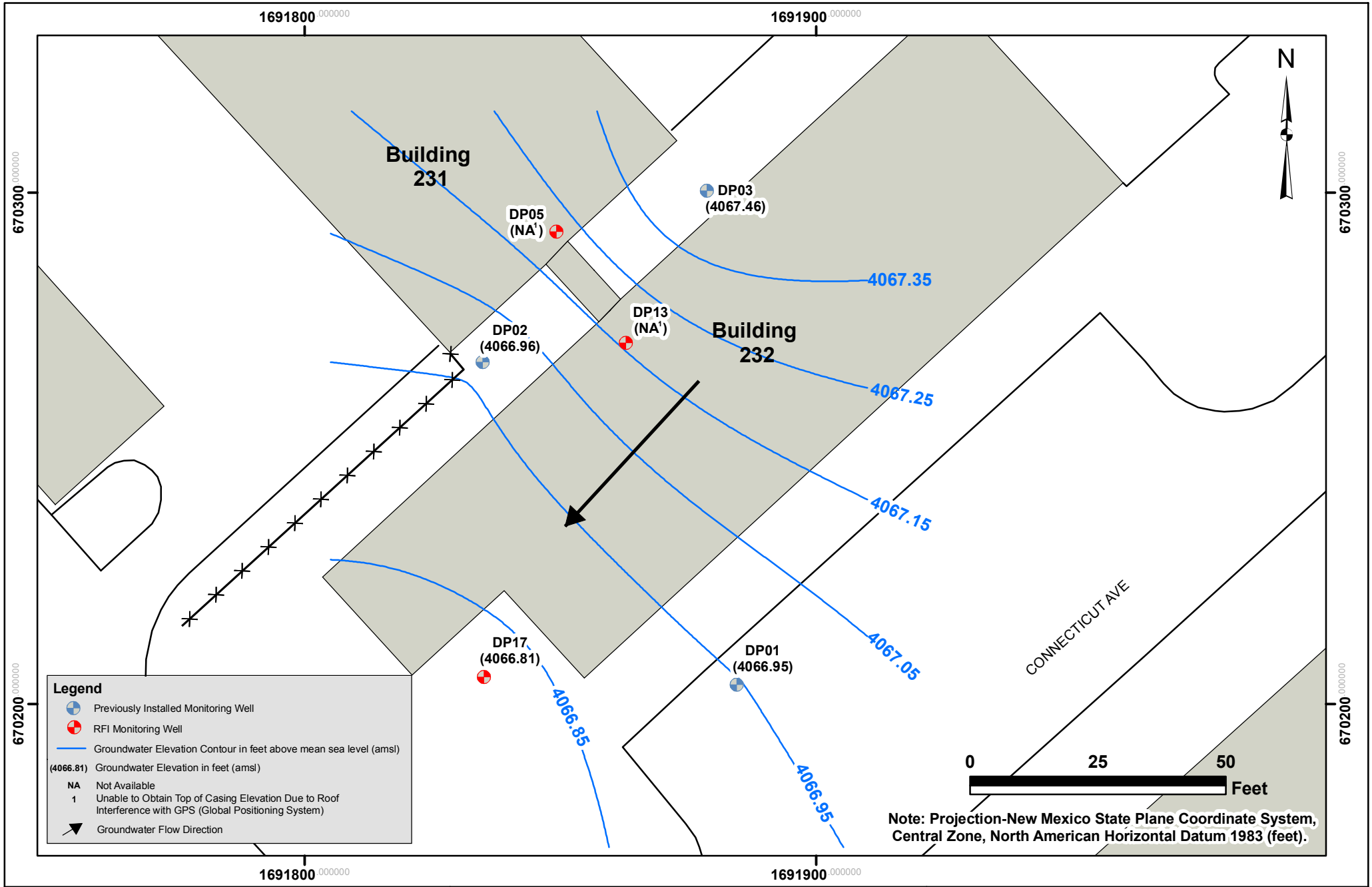
NATIONVIEW

SWMU 8
Groundwater Analytical Results Above EPA and NMED Action Levels (Bhate, 2006)

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080014	1"=20'	12/3/10	cm
			DRAWING NO: fig_2-5

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 2-5



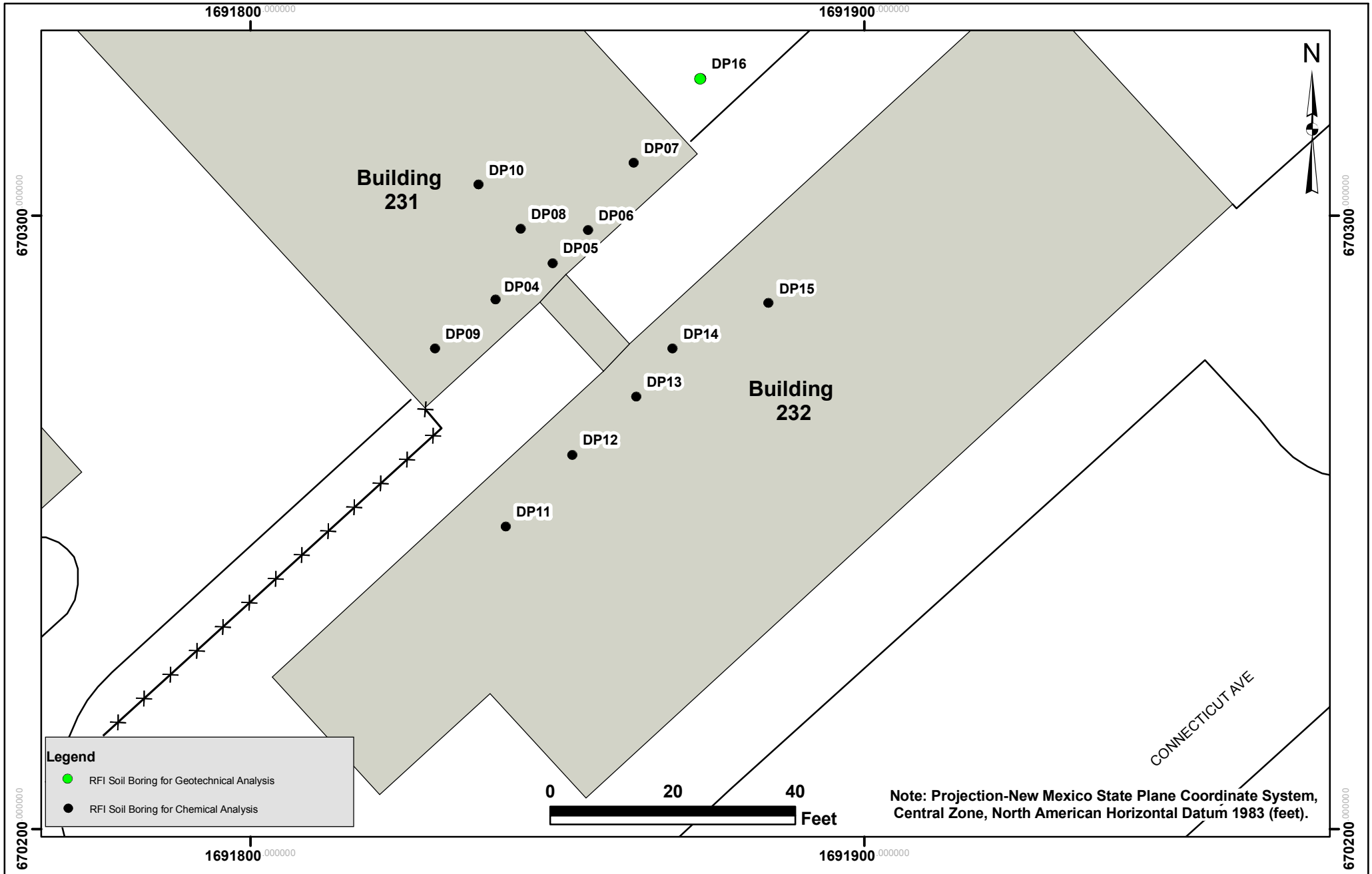
NATIONVIEW

SWMU 8
Potentiometric Surface Map
(December 2010)

PROJECT NO.	SCALE	DATE	DRAWN BY: cm
8080014	1"=25'	2/15/12	DRAWING NO: fig_3-8

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 3-8



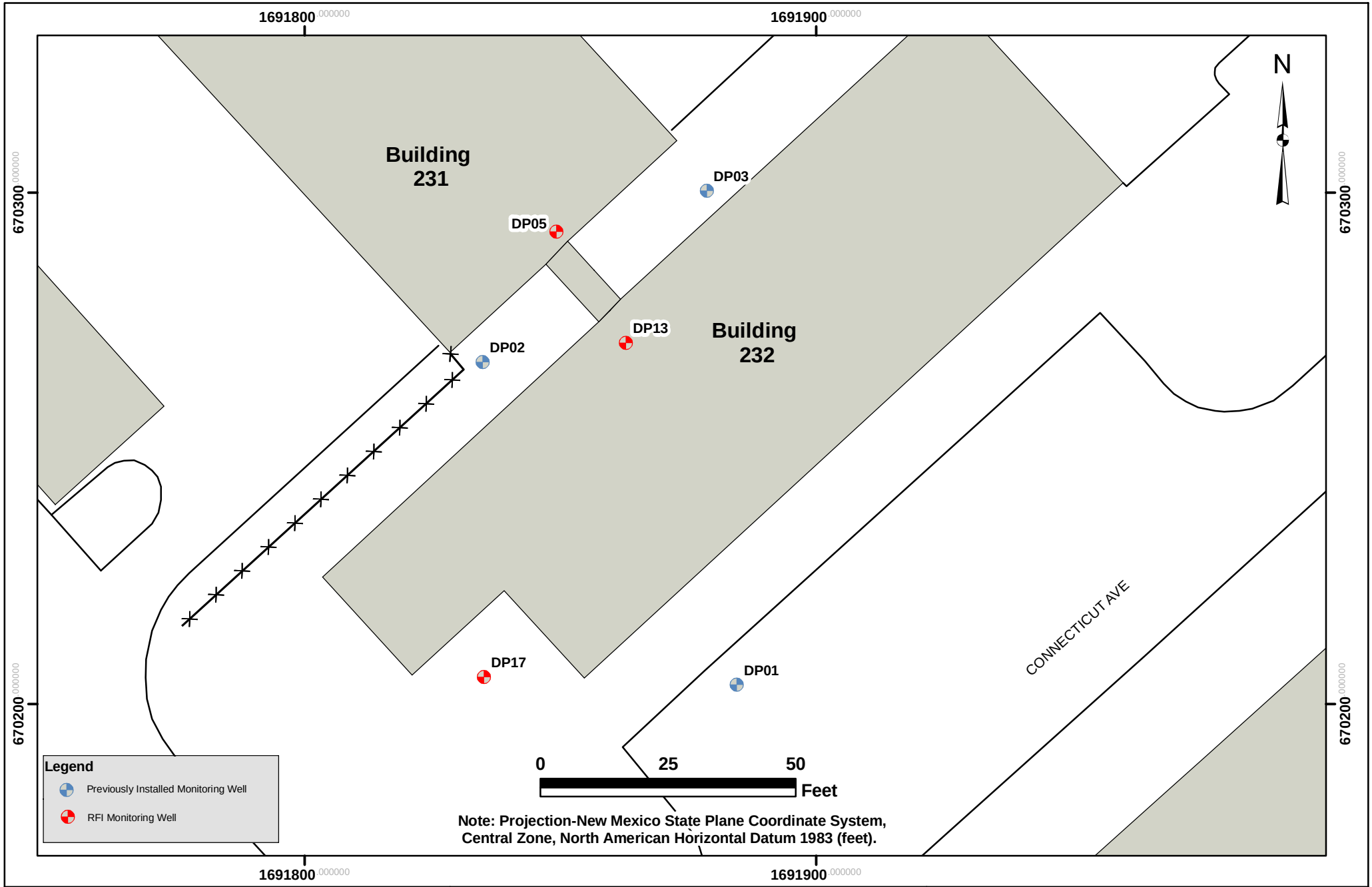
NATIONVIEW

SWMU 8
RFI Soil Boring Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080014	1"=20'	2/14/12	cm
			DRAWING NO: fig_5-1

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 5-1



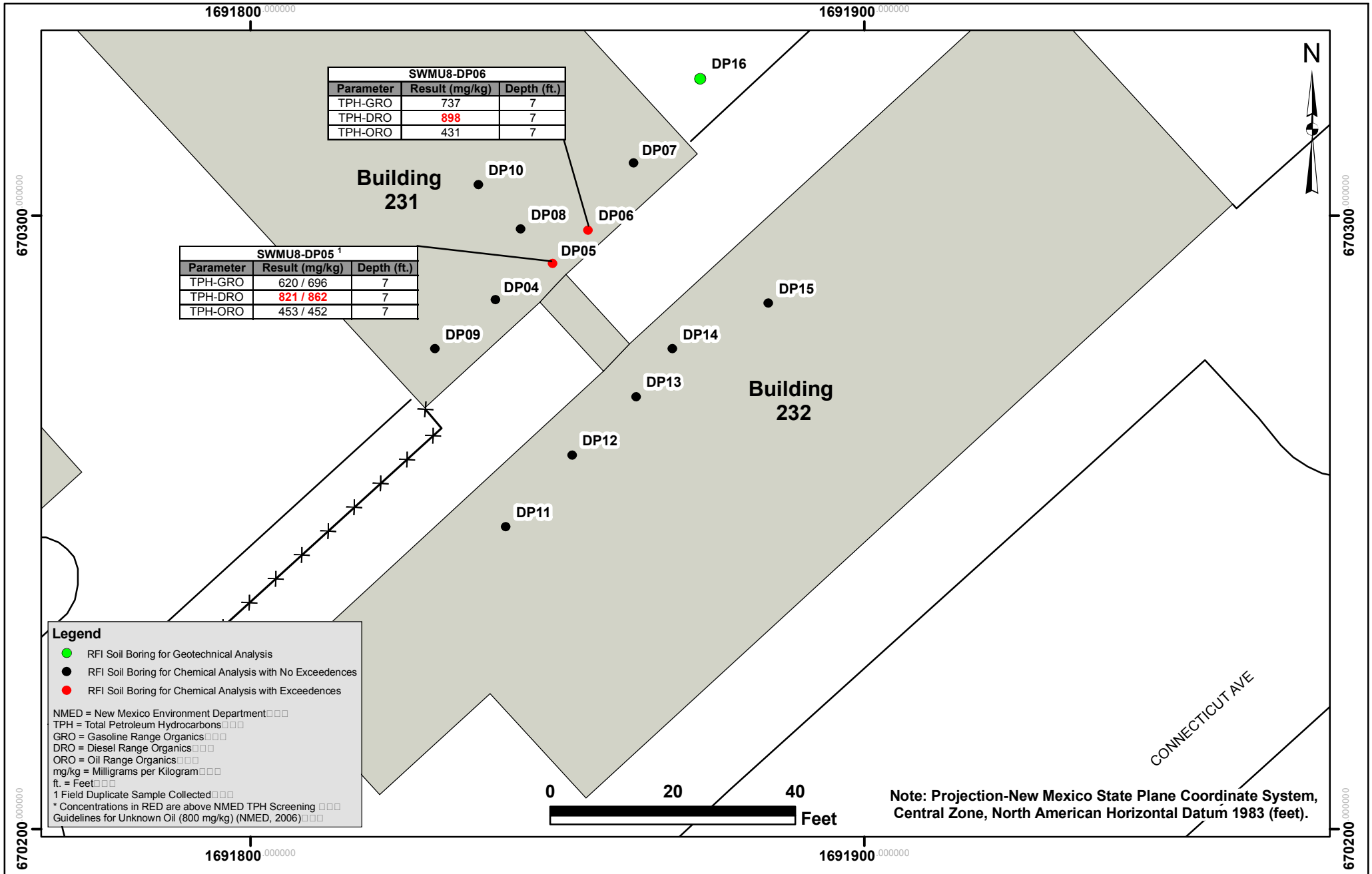
NATIONVIEW

SWMU 8
Monitoring Well Location Map

PROJECT NO.	SCALE	DATE	DRAWN BY: cm
8080014	1"=25'	1/5/11	DRAWING NO: fig_5-2

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 5-2



SWMU8-DP06		
Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	737	7
TPH-DRO	898	7
TPH-ORO	431	7

SWMU8-DP05 [1]		
Parameter	Result (mg/kg)	Depth (ft.)
TPH-GRO	620 / 696	7
TPH-DRO	821 / 862	7
TPH-ORO	453 / 452	7

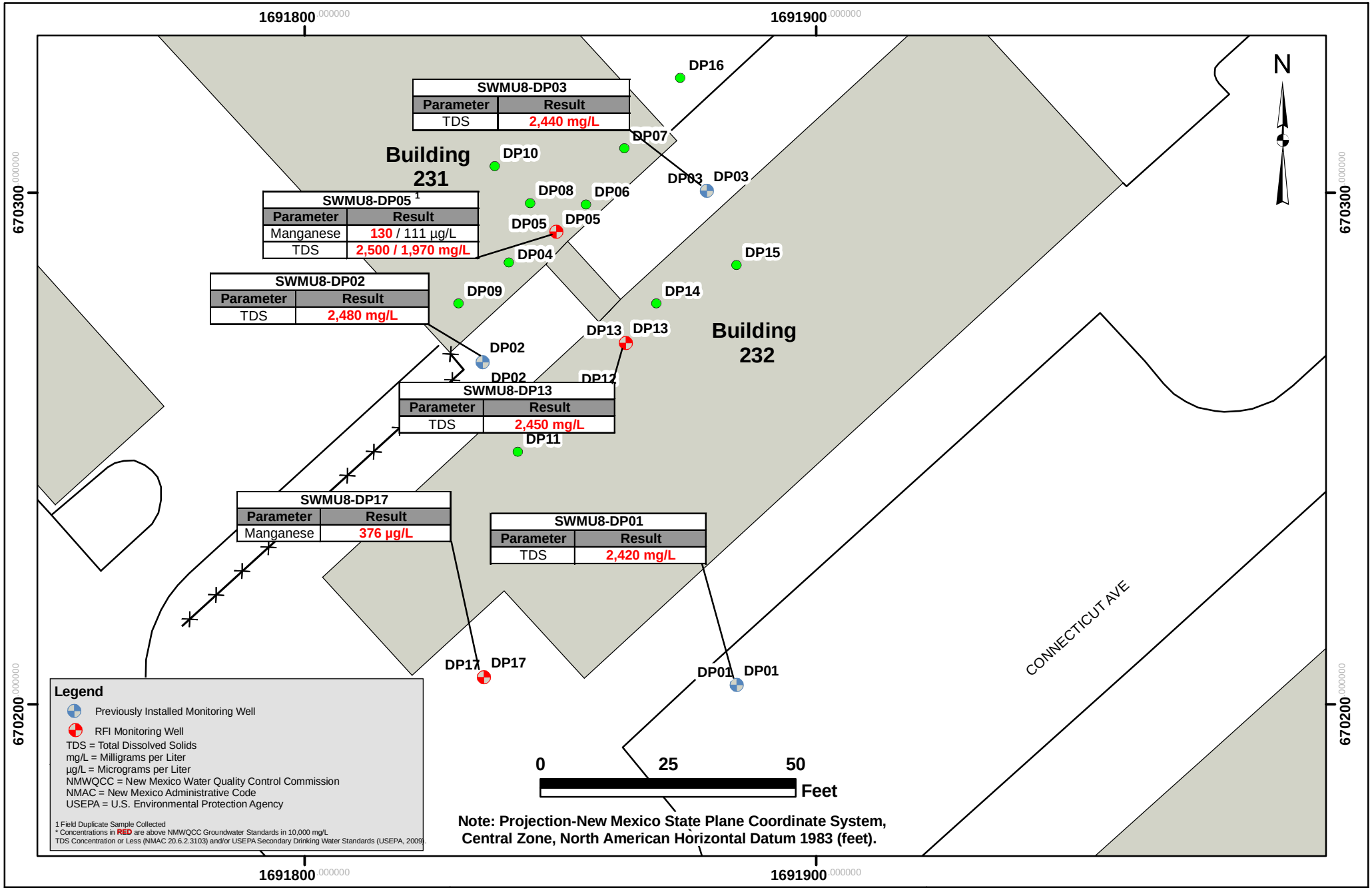
NATIONVIEW

SWMU 8
Soil Analytical Results Exceeding Action Levels (October 2010)

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080014	1"=20'	2/15/12	cm
			DRAWING NO: fig_7-1

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 7-1



NATIONVIEW

SWMU 8
Groundwater Analytical Results
Exceeding Action Levels
(December 2010)

PROJECT NO.	SCALE	DATE	DRAWN BY:
8080014	1"=25'	2/15/12	cm
			DRAWING NO: fig_7-2

SWMU 8
RCRA Facility Investigation Report
Holloman AFB, New Mexico

Figure 7-2