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

10 June 2016

ADAM M. KUSMAK, GS-13, USAF
Chief, Installation Management Flight (49 CES/CEI)
49th Civil Engineer Squadron (49 CES)
Holloman Air Force Base, NM

RECEIVED
JUL 5 2016
NMED
Hazardous Waste Bureau

New Mexico Environment Department
Attn: Mr. John Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6063

Re: **Final Technical Memorandum, Former T-38 Test Cell Oil/Water Separators: SWMU 19 (OW968) and SWMU 20 (OW967),**
EPA ID# NM6572124422, HAFB-15-005
Holloman Air Force Base, Alamogordo, NM
Contract No. FA8903-13-C-0008

Dear Mr. Kieling,

Attached is the *Final Technical Memorandum* for the former oil/water separators also known as Solid Waste Management Unit (SWMU 19) and SWMU 20 at Holloman Air Force Base (AFB). This report is submitted in response to the NMED's 8 January 2016 Approval with Modifications letter for the *Technical Memorandum, T-38 Summary Report (2004-2014)* and provides information specific to the above referenced SWMUs, which were located at the Holloman AFB T-38 Test Cell. The report is also provided on the enclosed CD, with native and PDF files.

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 regarding this submittal, please contact me at (575) 572-6675 or by email at adam.kusmak@us.af.mil.

Sincerely,

Digitally signed by KUSMAK.ADAM.M.1263331806
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=KUSMAK.ADAM.M.1263331806
Date: 2016.06.28 16:59:16 -06'00'

ADAM M. KUSMAK, GS-13, USAF

Attachment(s): *Final Technical Memorandum*. Hard copy and CD.

cc: Mr. Dave Strasser, NMED HWB (w/Atch)
Mr. Cornelius Amindyas, NMED HWB (w/o Atch)
Mr. Chuck Hendrickson, USEPA (w/CD)
Ms. DeAnna Rothhaupt, HAFB (w/Atch)
Mr. Charles Schick, HAFB (w/Atch)
Mr. Brian Renaghan, AFCEC (w/CD)
Mr. Wayne Bittner, Kirtland AFB (1 CD)

FINAL
TECHNICAL MEMORANDUM

Former T-38 Test Cell Oil/Water Separators:

SWMU 19 (OW968) and SWMU 20 (OW967)

Holloman Air Force Base, New Mexico

Prepared for
Air Force Civil Engineer Center
2261 Hughes Ave, Suite 155
Joint Base San Antonio Lackland, Texas 78236-9853

Contract No.: FA8903-13-C-0008

URS Group, Inc.
Greenwood Village, Colorado

June 2016

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LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AOC	Area of Concern
AST	aboveground storage tank
bgs	below ground surface
CAC	Corrective Action Complete
CNFA	Conditional No Further Action
CSM	Conceptual Site Model
CY	cubic yard
DERA	Defense Environmental Restoration Account
DGI	Data Gap Investigation
DoD	Department of Defense
ft	foot/feet
IC	Institutional Controls
IRP	Installation Restoration Program
LIF	laser induced fluorescence
LNAPL	light non-aqueous phase liquid
LTM	long-term management
LUC	land use control
MIP	membrane interface probe
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligrams per liter
NFA	No Further Action
NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
OES	Optimized Exit Strategy
OWS	oil/water separator
PCS	petroleum contaminated soil
PBR	Performance Based Remediation
POL	petroleum, oil and lubricants
RA-O	Remedial Actions - Operations
RC	Response Complete
RCRA	Resource Conservation and Recovery Act

RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RIP	Remedy in Place
RSL	Regional Screening Level
SC	Site Closeout
SSL	soil screening levels
SVOC	Semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TDS	total dissolved solids
Tech Memo	Technical Memorandum
TPH	total petroleum hydrocarbons
TRPH	total recoverable hydrocarbons
UE	unlimited exposure
URS	URS Group, Inc.
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UU	unlimited use
VCM	Voluntary Corrective Measure
VOC	volatile organic compound

EXECUTIVE SUMMARY

This Technical Memorandum presents a reevaluation of relevant information for two former oil/water separators (OWSs) at Holloman Air Force Base (AFB) performed by FPM Remediations, Inc. (FPM)/URS Group, Inc. (URS). This work has been conducted on behalf of the United States Air Force Civil Engineer Center (AFCEC) under contract number FA8903-13-C-0008.

Installation Restoration Program (IRP) sites OW967 and OW968 are associated with two former OWSs, which were previously located at the T-38 Test Cell on the Holloman AFB airfield. OW967 and OW968 are currently listed as Solid Waste Management Unit (SWMU) 20 and SWMU 19, respectively, on Table A (SWMUs requiring corrective action) of the Holloman AFB Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit No. NM6572124422 (NMED 2004, 2013).

Both OWSs were removed in 1997 after being out of service for several years; however, the sites are collocated with SWMU 229 (IRP Site SS059), and all investigation and remediation work conducted in the vicinity of these sites since the early 2000s has been focused on this larger, overlapping Jet Propellant 4 (JP-4) spill site. SWMU 19 (OW968) and SWMU 20 (OW967) were both recommended for site closure in a 1995 RCRA Facility Investigation (ACC 1995) and, since the time of that report, soil surrounding the former OWSs has been excavated as part of Voluntary Corrective Measures (VCMs) conducted at SWMU 229 (Bhate 2005, NationView 2015).

Based on a review of the available historical data, and additional data collected during 2014, 2015, and 2016 field mobilizations for SWMU 229:

- No contamination associated with SWMU 20 has ever been identified;
- Any historical petroleum hydrocarbons potentially associated with SWMU 19 have been removed by excavation in 1997 and again between 2011 and 2013;
- The TDS concentrations found at the T-38 Sites are greater than the New Mexico Water Quality Control Commission (NMWQCC) threshold for potable water (10,000 mg/L); and
- No complete exposure pathways exist for human health or environmental risk at either former OWS site.

It is therefore recommended that SWMUs 19 and 20 be granted Corrective Action Complete (CAC) *without* Controls status and moved from Table A to Table B of the Holloman AFB RCRA Hazardous Waste Facility Permit, in accordance with the Permit's No Further Action (NFA) Criterion 5.

1.0 INTRODUCTION

This document presents a reevaluation of relevant information for two Solid Waste Management Units (SWMUs) formerly located at the T-38 Test Cell on Holloman Air Force Base (AFB) near Alamogordo, New Mexico (**Figure 1-1**). These SWMUs are former oil/water separators (OWSs) that were removed and over-excavated in 1997, but are collocated with another existing environmental site (SWMU 229 [SS059]). These sites are part of the United States Air Force's (USAF's) Installation Restoration Program (IRP) and are formally identified as:

- SWMU 20 (IRP Site OW967, previously OW-C526 - Building 639 Oil/Water Separator)
- SWMU 19 (IRP Site OW968, previously OW-C527 - Building 638 Oil/Water Separator)

URS Group, Inc. (URS), as a subcontractor to FPM Remediations, Inc., has prepared this Technical Memorandum (Tech Memo) as part of the Performance Based Remediation (PBR) at Holloman AFB. This work is being conducted under Air Force Civil Engineer Center (AFCEC) Contract Number FA8903-13-C-0008.

1.1 Regulatory Setting

The former OWSs previously associated with Buildings 638 and 639 are listed as SWMUs 19 and 20, respectively, on Table A (SWMUs requiring corrective action) of the Holloman AFB Resource Conservation and Recovery Act (RCRA) Hazardous Waste Facility Permit Number NM6572124422 (NMED 2004, 2013).

Pursuant to the Holloman AFB RCRA Hazardous Waste Facility Permit (NMED 2004, 2013), and with guidance provided by the New Mexico Environment Department (NMED), cleanup levels for impacted soil discussed in this Tech Memo are from the latest revision of the NMED Residential Soil Screening Levels (SSLs) presented in the Risk Assessment Guidance for Site Investigations and Remediation (NMED 2015) and, if no NMED SSL had been identified for a specific compound, the United States Environmental Protection Agency (USEPA) Regional Screening Level (RSL) (USEPA 2015). The RCRA Hazardous Waste Facility Permit requires groundwater cleanup levels to be set at the more conservative of those specified by the New Mexico Water Quality Control Commission (NMWQCC) as protective of human health (New Mexico Administrative Code [NMAC] 20.6.2.3103) and USEPA's Maximum Contaminant Levels (MCLs) (USEPA 2015).

1.2 Purpose and Scope

The purpose of this Tech Memo is to provide a review of available information for SWMUs 19 and 20 at Holloman AFB. The ultimate goal is to move both of these sites from Table A (SWMUs Requiring Corrective Action) to Table B (Corrective Action Complete [CAC] *without* Controls) of the Holloman RCRA Hazardous Waste Facility Permit (NMED 2004, 2013), and achieve Site Closeout (SC). Any request for CAC must demonstrate that each SWMU meets one of the NMED's five (5) criteria for no further action (NFA), as listed in Appendix 4-B of the Permit (NMED 2004).

This document presents site background information, along with a reevaluation of historical data conducted in conjunction with recent work at the overlapping SS059 IRP Site (SWMU 229), as

detailed in the *Data Gap Investigation (DGI) Report* (URS 2016). This Tech Memo proposes the rationale for granting SWMUs 19 and 20 CAC *without* Controls status.

1.3 Tech Memo Organization

This Tech Memo is divided into six (6) sections:

- **Section 1 –** Introduction: regulatory setting, purpose, scope, and organization
- **Section 2 –** Site Background: description and operational history of SWMUs 19 and 20, previous investigations, and historical remediation efforts
- **Section 3 –** DGI Summary: overview of the investigation that is discussed in further detail in the *DGI Report* (URS 2016) as it pertains to SWMUs 19 and 20
- **Section 4 –** Conceptual Site Model (CSM): geographic and environmental setting including land use, geology and hydrogeology, sources of contamination, nature and extent, release mechanisms, receptors, exposure pathways, and the current site status
- **Section 5** – Conclusions and Recommendations: relevant decision making criteria and recommendations for the disposition of SWMUs 19 and 20
- **Section 6 –** References: documents referenced in this Tech Memo

2.0 SITE BACKGROUND

This section provides a description of Holloman AFB, as well as site descriptions and operational history of SWMUs 19 and 20, including previous investigations and historical remediation efforts.

2.1 General Background Information

2.1.1 Physical Setting

Holloman AFB (**Figure 1-1**) is situated in south central New Mexico, in the west-central part of Otero County, approximately 75 miles north–northeast of El Paso, Texas (USAF 2013). Holloman AFB has a population of approximately 3,054 (U.S. Census 2010) and occupies approximately 59,639 acres in the northeast quarter of Section 1, Township 17 South, Range 8 East. The White Sands Missile Range (WSMR) testing facilities occupy additional land extending northward and westward from the Base. Privately and publicly owned lands border the remainder of Holloman AFB. The major highway servicing Holloman AFB is U.S. Highway 70, which runs southwest from the town of Alamogordo, New Mexico, and separates Holloman AFB from publicly owned lands to the south. Alamogordo, which has a population of 30,401 (U.S. Census 2010), is approximately 7 miles east of the Base.

SWMUs 19 and 20 are at the T-38 Test Cell (Buildings 638 and 639) on the southeastern portion of the Holloman AFB airfield, directly across (north of) Taxiway A from the Main Ramp area (**Figure 2-1**). SWMU 229 is also located at the T-38 Test Cell, and these sites are often collectively referred to as the "T-38 Sites." The Test Cell and adjacent concrete and asphalt power check pad have been used to test T-38 aircraft engines since the 1970s. The concrete pad on the site was used as an F-4 trim pad from 1966 to 1977, as well as an F-4 engine test cell from approximately 1973 to 1977 (ACC 1993, EBASCO 1994).

2.1.2 Holloman AFB History

Holloman AFB was first established in 1942 as Alamogordo Army Air Field. From 1942 through 1945, Alamogordo Army Air Field served as the training grounds for more than 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 that the air field would be its primary site for the testing and development of unmanned aircraft, guided missiles, and other research programs. On 13 January 1948, the Alamogordo installation was renamed in honor of the late Colonel George V. Holloman, a pioneer in guided missile research. In 1968, the 49th Tactical Fighter Wing arrived at Holloman AFB and has remained since. Today, Holloman AFB also serves as the training center for the German Air Force's Tactical Training Center (USAF 2013).

2.2 SWMU 19 (OW968)

2.2.1 Site Description

A RCRA Facility Assessment (RFA) conducted in 1988 identified OWSs associated with both OW967 and OW968 as SWMUs (Kearney 1988). The *RFA Report* described SWMU 19 as a

400-gallon, underground, steel OWS located 40 feet from the Building 638 engine test cell for the purpose of collecting oily wastewater from the test cell. The wastewater effluent was discharged to the Holloman AFB Wastewater Treatment Plant (SWMUs 142 to 156), and the accumulated oil was removed and transferred to the Building 638 Waste Accumulation Area (SWMU 53) (Kearney 1988).

The *RFA Report* noted that the OWS at SWMU 19 had been active since 1977, and that it was equipped with release controls, including: liners, level controls, and cover (Kearney 1988). No current or past releases were noted as of the time of the RFA, and the potential for releases was considered to be low (Kearney 1988).

The OWS associated with SWMU 19 was converted to a sediment trap when a new OWS was installed in 1991. The original OWS was subsequently removed in 1997, during activities associated with remediation of SS059 (URS 2009).

2.2.2 Previous Investigations and Corrective Actions

In 1995, the Table 3 RCRA Facility Investigation (RFI) was conducted and addressed SWMUs 19 and 20 (ACC 1995). That investigation was conducted in conjunction with investigation of the T-38 Test Cell Fuel Spill (SWMU 229). At SWMU 19, eleven (11) soil samples were collected around the old OWS, old leaching tank, excavated soil pile, and surrounding area (**Figure 2-2**).

The *RFI Report* noted that waste managed at SWMU 19 was predominantly fuel and concluded that "results from deeper than 3 feet are either indistinguishable from or likely to be the result of the T-38 Test Cell Fuel Spill" (ACC 1995).

Based on the analytical results of the soil sampling program carried out during the Table 3 RFI (**Figure 2-2 and Table 2-1**), it was concluded that there had likely been a historic overflow release from SWMU 19. Specifically, two shallow subsurface soil sample locations contained concentrations of total recoverable petroleum hydrocarbons (TRPH) that exceeded the release screening criterion of 100 mg/kg in use at the time (location 19-02: 1,230 mg/kg at 1.5 to 2 ft bgs, and 324 mg/kg at 2 to 4 ft bgs; and location 19-07: 125 mg/kg at 0 to 2 ft bgs, and 292 mg/kg at 2 to 4 ft bgs). All other samples that exceeded the release criterion were collected entirely from depths greater than 3.5 ft bgs and the elevated petroleum hydrocarbons were attributed to SWMU 229 (ACC 1995).

Recommendations in the *RFI Report* included, "SWMU 19 is recommended for CNFA" *{sic, Conditional No Further Action}*. The condition for NFA presented in the *RFI Report* was the remediation of petroleum hydrocarbons in conjunction with corrective actions for SWMU 229 (ACC 1995). Since the publication of the *RFI Report*, NMED has discontinued the use of the term "Conditional No Further Action" (CNFA) and replaced it with the analogous term "CAC *with* Controls."

Following the identification of this potential release in 1995, the OWS associated with SWMU 19 was removed in 1997, and the area surrounding it was again excavated between 2011 and 2013 (NationView 2015, URS 2009 and 2016).

In 2009, SWMU 19 was evaluated for Defense Environmental Restoration Account (DERA) IRP eligibility; however, no sampling activities were completed as part of the DERA evaluation. The *DERA Eligibility Report* (URS 2009) notes a release of petroleum, oil, and lubricant (POL) at the

site, but provides no source for this information. The report also notes that the overlapping natures of SWMUs 19 and 229 make identifying any specific releases from SWMU 19 difficult based on the proximity to the SWMU 229 Jet Propellant 4 (JP-4) release.

The position of SWMU 19 in relation to the SWMU 229 VCM excavation is shown on **Figures 2-1 and 2-4**.

2.3 SWMU 20 (OW967)

2.3.1 Site Description

As noted above, the RFA conducted in 1988 identified OWSs associated with both OW967 and OW968 as SWMUs (Kearney 1988). The *RFA Report* describes SWMU 20 as a 500-gallon, underground, concrete OWS located 5 feet from the engine test cell pad for the purpose of collecting wastewater from the engine test area sound suppressors. The wastewater effluent was discharged to the Holloman AFB Wastewater Treatment Plant (SWMUs 142 to 156), and the accumulated oil was removed and transferred to the Defense Reutilization and Marketing Office (DRMO) Non-Hazardous Storage Area (SWMU 76) (Kearney 1988).

The *RFA Report* noted that the OWS at SWMU 20 was inactive but present at the time, and that it was equipped with release controls, including: level controls, sewer connection, and cover (Kearney 1988). No current or past releases were noted as of the time of the RFA, and the potential for releases was considered to be low (Kearney 1988).

The OWS associated with SWMU 20 was taken out of service and abandoned in place in 1994 (ACC 1995). It was subsequently removed in 1997, during activities associated with remediation of SS059 (URS 2009).

2.3.2 Previous Investigations and Corrective Actions

In 1995, the Table 3 RFI was conducted and addressed SWMUs 19 and 20 (ACC 1995). That investigation was conducted in conjunction with investigation of the T-38 Test Cell Fuel Spill (SS059). At SWMU 20, soil samples were collected from four locations, one on each side of the OWS (**Figure 2-3**). No samples were collected below 4 feet because of the known impacts of the SWMU 229 fuel spill.

The *RFI Report* concluded that, "No release was detected from the SWMU 20 O/WS *{sic}*. All TRPH results were below the 100 mg/kg release criterion *{in use at the time}*, and there was no visible evidence of an overflow or leak from the SWMU." The *RFI Report* analytical results are included as **Figure 2-3 and Table 2-2**. Recommendations in the *RFI Report* included, "SWMU 20 is recommended for NFA *{sic, No Further Action}*. To achieve NFA status, a Class 3 permit modification request will be completed by Holloman AFB." Since the publication of the *RFI Report*, NMED has discontinued the use of the term "No Further Action" and replaced it with the analogous term "CAC *without* Controls."

The OWS associated with SWMU 20 was removed in 1997, and the area surrounding it was again excavated between 2011 and 2013 (NationView 2015, URS 2009 and 2016).

In 2009, SWMU 20 was evaluated for DERA IRP eligibility; however, no sampling activities were completed as part of the DERA evaluation (URS 2009). The *DERA Eligibility Report* (URS 2009) noted a release of POL at the site, but provides no source for this information. The report

also notes that the overlapping natures of SWMUs 20 and 229 make identifying any specific releases from SWMU 20 difficult based on the proximity to the SWMU 229 JP-4 release.

The position of SWMU 20 in relation to the SWMU 229 VCM excavation is shown on **Figure 2-1**.

2.4 SWMU 229 (SS059)

SWMU 229 (IRP Site SS059) is a 10-acre site, also located at the T-38 Test Cell, and encompasses both SWMU 19 and SWMU 20 (**Figure 2-4**). SWMU 229 was initially contaminated with approximately one million gallons of JP-4 from leaking underground supply lines. After discovery of the JP-4 leak, all underground fuel lines at the site were replaced with aboveground lines (Woodward-Clyde 1993, 1994). The aboveground storage tank (AST) and aboveground lines remain in service and are currently evident at the site, although the fuel contents are currently Jet A, and not JP-4 (URS 2016).

SWMU 229 is listed on Table A (SWMUs requiring corrective action) of Holloman AFB's RCRA Hazardous Waste Facility Permit (NMED 2004, 2013) and has been the subject of various investigations and remedial actions since the early 1990s, when an initial RFI identified light non-aqueous phase liquid (LNAPL) in monitoring wells (Woodward-Clyde 1993).

Since approximately 2004, VCM at SWMU 229, including the excavation of soil down into the saturated zone, have removed the majority of petroleum contaminated soil (PCS) and LNAPL at the T-38 Sites (NationView 2015, URS 2016). Between 2004 and 2013, 512,032 cubic yards (cy) of soil were excavated and the impacted soil treated at the adjacent 10-acre T-38 landfarm (NMED Discharge Permit #DP1479) under the *Revised Work Plan - Voluntary Corrective Measures T-38 Test Cell Fuel Spill Site* (Bhate 2005), as approved by NMED in an *Approval Letter* dated March 22, 2005 (NMED 2005). During the course of the excavation work, the previous on-site treatment facilities (e.g., separators, holding tank, oxidizer, etc.) and all monitoring and extraction wells within the excavation footprint were decommissioned and removed, and an interceptor trench was installed surrounding the Test Cell in close proximity to the former locations of both SWMU 19 and SWMU 20 (**Figure 2-1**) (Bhate 2005, NationView 2015, URS 2016).

In the fall of 2014, spring and summer of 2015, and spring of 2016 additional site investigations including an extensive subsurface investigation were conducted to delineate the LNAPL, PCS, and dissolved phase plume associated with SWMU 229. In addition to a laser-induced fluorescence (LIF) and membrane interface probe (MIP) survey, three (3) new monitoring wells were installed; a total of one-hundred-thirty-five (135) soil samples from ten (10) locations and twenty-five (25) groundwater samples were analyzed to delineate the extent of impacted soil and groundwater; the distribution of LNAPL depth and thickness were measured; LNAPL samples were taken to determine its physical properties; baildown tests were carried out to measure LNAPL transmissivity; borehole gas was analyzed; and the existing remedial infrastructure associated with the interceptor trench was evaluated. The results of these additional investigations are documented in the *DGI Report* (URS 2016), and pertinent information regarding SWMUs 19 and 20 is summarized in **Section 3** of this Tech Memo.

NMED's *Approval Letter* (NMED 2005) for the *Revised Work Plan* (Bhate 2005) states that NMED will review the *Summary Report* (NationView 2015) and "make a determination on whether the site appears appropriate for no further action (i.e., CAC status)." The *DGI Report*

(URS 2016) was developed to supplement data provided in the *T-38 Summary Report* (NationView 2015), and provide rationale for moving SWMU 229 to CAC *with* Controls status.

In an *Approval with Modifications Letter* dated 8 January 2016 (NMED 2016a), NMED granted partial approval to the *T-38 Summary Report* (NationView 2015), and requested further delineation of the lateral extent of PCS and that groundwater monitoring be conducted in association with SWMU 229. The letter stated that NMED would consider the data to be presented in the *DGI Report* (URS 2016) during review of the requested delineation and monitoring work plan; however, no specific mention was made of requirements for SWMUs 19 or 20.

3.0 DATA GAP INVESTIGATION SUMMARY

Additional site investigations at overlapping SWMU 229 were conducted in the fall of 2014, spring and summer of 2015, and spring of 2016 to characterize the nature and extent of the free phase LNAPL and PCS beneath and surrounding the T-38 Test Cell, as well as the dissolved-phase plume within and surrounding previously remediated areas. The methods and results of these site investigations are detailed in the *DGI Report* (URS 2016), and pertinent information regarding SWMUs 19 and 20 is summarized below.

3.1 Groundwater Monitoring

Figure 3-1 and Table 3-1 show that hydraulic gradient in the area surrounding SWMUs 19 and 20 is relatively low (0.006), that groundwater generally flows to the southwest, and that there was little elevation difference within the vicinity of the SWMUs between the fall of 2014 and spring or summer of 2015, consistent with other observations at Holloman AFB (URS 2016).

Of particular importance is the presence of elevated total dissolved solids (TDS) concentrations in this area. As shown on **Figure 3-2** and in **Table 3-2**, TDS is elevated across the entirety of the T-38 Sites (including SWMUs 19 and 20), with results from only one monitoring well (i.e., SS059-MW5 at 6,200 mg/L TDS; cross-gradient from the former OWSs) below the 10,000 mg/L TDS threshold established by the NMWQCC (20.6.2.3101 NMAC). The NMWQCC standards for maximum allowable concentrations of contaminants are to be applied only to groundwater below this threshold (NMED 2016a).

The average TDS concentration across all T-38 Sites wells is approximately 19,500 mg/L, and the maximum TDS concentration was found in SS059-MW14 (31,000 mg/L). The groundwater TDS concentrations, and lack of interconnectedness with other aquifers, result in classification of this aquifer by USEPA guidelines as a Class III B aquifer—unsuitable for human consumption and not a potential source of drinking water.

3.2 Remediation System Infrastructure

During site work conducted in 2014 and 2015, no indication of either former OWS was observed.

An interceptor trench was installed for SWMU 229 in 2011, in close proximity to SWMUs 19 and 20. During the installation of the trench, most of the area surrounding the former OWSs was excavated to accommodate the trench system infrastructure, and the trench itself was backfilled with gravel, while the excavated soils were treated at the adjacent T-38 landfarm treatment unit. It is reasonable to conclude that the former locations of both OWSs were once again over-excavated during installation of the trench, or in conjunction with other remedial excavation conducted under VCM in 2013, as detailed in the *T-38 Summary Report* (NationView 2015).

Figure 2-1 shows the approximate location of the SWMU 229 interceptor trench and excavation in relation to the former SWMU 19 and SWMU 20 OWS locations.

4.0 CONCEPTUAL SITE MODEL

This section presents an overview of the current site conditions for SWMUs 19 and 20, including land use, geology and hydrogeology, sources of contamination, nature and extent, release mechanisms, receptors, exposure pathways, and the current site status.

4.1 Site Hydrogeology

Hydrogeological data indicate low to moderate hydraulic conductivity (0.79×10^{-4} to 2.9×10^{-4} centimeters per second [cm/s]; or, approximately 0.22 to 0.82 ft/day), and little gradient (0.006 ft/ft typical outside of the area influenced by the interceptor trench) at the T-38 Sites (NationView 2015 and URS 2016). Assuming an effective porosity of 0.18, the seepage velocity [(hydraulic conductivity x gradient) / porosity] ranges from approximately 2 to 10 ft per year. This estimate applies to soil under the concrete pad's footprint. Outside of this footprint, much of the shallow saturated zone has been excavated and backfilled since the CMS was performed, and the hydraulic properties of the post-excavation site soil have not been evaluated.

Based on recent groundwater observations, the depth to water in the immediate vicinity of the T-38 Test Cell area varies from approximately 7 ft bgs (MW12, 5/22/2015 – 9.24 ft below top of casing [bTOC], TOC approximately 2 ft above grade) to 16 ft bgs (M1, 5/22/2015 – 16.17 ft bTOC, TOC at approximately ground surface), depending on surface topography and operational status of the groundwater depression pump within the interceptor trench (**Table 3-1** and NationView 2013, 2015). Seasonal water table fluctuations at the site were not historically determined (Woodward-Clyde 1994), but recent data (**Table 3-1,** NationView 2015 and URS 2016) indicate seasonal fluctuations up to 4 ft are possible.

Figure 3-1 presents potentiometric surface contours for the T-38 Sites from November 2015, showing groundwater flow to the southwest.

4.2 Current and Future Land Use

The land surrounding Holloman AFB consists of residential areas starting 5 miles to the east (upgradient) and northeast (City of Alamogordo), rangeland to the south, White Sands National Monument 4 miles to the west, and WSMR to the north and west. The desert terrain immediately surrounding Holloman AFB has limited development: Mesa Verde Ranch operates along the eastern border, and there are no residential communities or large industrial operations located adjacent to the Base. Holloman AFB is an active military installation and is expected to remain active for the foreseeable future. No transfer of military property to the public is anticipated, and public access to the Base is restricted. Future land use is not expected to differ significantly from current land use practices (Foster Wheeler 2002).

SWMUs 19 and 20 are located at the T-38 Test Cell (Buildings 638 and 639, respectively) on the southeastern side of the Holloman AFB airfield, directly across Taxiway A from the Main Ramp area (**Figures 2-1 and 2-4**). No buildings or structures are present at the sites other than those associated with the Test Cell. Due to the location of these sites within the Holloman AFB airfield Controlled Area, and the presence of overlapping SWMU 229, future land use at these sites is not expected to change.

4.2.1 Current and Future Water Use

There are no potable supplies of groundwater or surface water located on the Base (Foster Wheeler 2002). Holloman AFB obtains its water supply from the city of Alamogordo and Holloman AFB wells in the Boles, San Andres, and Douglas well fields at the base of the Sacramento Mountains. No water supply wells are located on or near the Base because of poor groundwater quality, with TDS concentrations often greater than 10,000 mg/L. There are no potable or irrigation wells near or immediately downgradient of the Base (New Mexico Office of the State Engineer 2015).

4.3 Nature and Extent

4.3.1 Sources of Contamination

The former OWSs associated with SWMUs 19 and 20 collected wastewater potentially containing oil, grease, fuel, and exhaust emissions from T-38 Test Cell facility activities at the indoor hush house (Building 638, SWMU 19) and the exterior aircraft sound suppressor (South of Building 639, SWMU 20).

The potential release at SWMU 19 was noted as being "insignificant compared with the T-38 test cell release" (ACC 1995). The OWS at SWMU 19 was removed in 1997, and the area surrounding its former location has been excavated in association with the 2004-2013 VCM conducted for SWMU 229 (Bhate 2005, NationView 2015, URS 2009 and 2016). Any PCS remaining at, or around, the former SWMU 19 site is attributed to the SWMU 229 JP-4 spill.

No contamination related to the former OWS associated with SWMU 20 has ever been identified. The OWS at SWMU 20 was removed in 1997, and the area surrounding its former location has been excavated in association with the 2004-2013 VCM conducted for SWMU 229 (ACC 1995, Bhate 2005, NationView 2015, URS 2009 and 2016).

4.3.2 Release Mechanism

The *RFA Report* identified overflow conditions as the most likely potential release mechanism at both SWMU 19 and SWMU 20, and estimated that the risk of historic or future releases from the OWSs was low (Kearney 1988). The *RFI Report* did not identify evidence of any release or elevated total petroleum hydrocarbons (TPH) concentrations attributed to SWMU 20, but did note a potential historic overflow release from the OWS associated with SWMU 19 (ACC 1995).

4.4 Receptors

As part of the SS059 (SWMU 229) DGI, receptors and exposure pathways were reviewed and a revised receptor-exposure CSM was developed. Potential receptors for the petroleum hydrocarbons identified at the T-38 Sites (including SWMUs 19 and 20) are limited to site workers and potential future construction workers (URS 2016).

Since the area is located on an active military airfield, future land use is not expected to change and other future receptors are considered unlikely due to the low potential for future construction of buildings or residential homes at these sites. Due to the location of the site within the

Controlled Area of the Holloman AFB airfield and USAF security procedures, trespassers are not considered a potential receptor category (URS 2016).

The T-38 Test Cell facilities are not in use on most days, and when they are, it is generally only for part of the day. Site workers are only expected to be present on the T-38 Test Cell concrete/asphalt pad and associated buildings. They do not perform any duties in non-paved areas, such as the former locations of the SWMU 19 and SWMU 20 OWSs (URS 2016).

4.5 Exposure Pathways

Contamination related to SWMU 20 has never been identified, and no exposure pathway can exist for that site. Although potential receptors (site workers and future construction workers) do exist for contamination that may have been historically linked to soil at SWMU 19, the source has since been removed. Therefore, no exposure pathway can exist for that site, either.

4.6 Current Site Status

The former OWSs associated with SWMUs 19 and 20 were removed in 1997. Previously impacted soils that were potentially associated with the former OWS at SWMU 19 have been excavated, treated by landfarming, and backfilled between 2011 and 2013, during VCMs conducted for the SWMU 229 site. These locations are also hydraulically controlled by the SWMU 229 interceptor trench installed in 2011 (**Figure 2-1**).

All contamination known to currently exist at the T-38 Test Cell is directly attributed to SWMU 229, and not to SWMUs 19 or 20. Recent investigation and remediation activities at SWMU 229 have demonstrated that PCS and LNAPL are still present beneath the T-38 Test Cell (NationView 2015, URS 2016), but those hydrocarbons are related to SWMU 229 and not to SWMUs 19 or 20. Refer to the *DGI Report* (URS 2016) for information on exposure pathways associated with SWMU 229.

There are no monitoring wells present at the T-38 Test Cell facility that are assigned to either SWMU 19 or SWMU 20. Multiple wells assigned to SWMU 229 (SS059) are present and used for investigation and monitoring activities associated with that site (URS 2016). All monitoring wells currently present, as well as those proposed for future use at the T-38 Test Cell facility, are to be retained for additional monitoring or corrective actions associated with the overlapping SWMU 229. No abandonment of SWMU 229 monitoring wells is currently anticipated.

5.0 CONCLUSIONS AND RECOMENDATIONS

This section presents an evaluation of the current site conditions and provides relevant decision making criteria.

5.1 Conclusions

5.1.1 SWMU 19 (OW968)

Although potential receptors (site workers and future construction workers) do exist for contamination that may have been historically linked to soil at SWMU 19, the source has been removed. Therefore, no exposure pathway exists for this site.

SWMU 19 (OW968) was recommended for the equivalent of CAC *with* Controls in 1995 (ACC 1995); however, SWMU 19 was never removed from Table A of the Holloman AFB RCRA Hazardous Waste Facility Permit (NMED 2004, 2013). This SWMU is presumed to have been retained on the Permit due to the likely historic overflow indicated by soil analytical results published in the *RFI Report* (ACC 1995), in addition to the continued presence and use of the OWS at the T-38 Test Cell facility.

The *RFI Report* identified two shallow subsurface soil sample locations at SWMU 19 that contained concentrations of TRPH in excess of the release screening criterion. This led to the conclusion that a historic release had likely occurred (ACC 1995). Further evaluation of the RFI analytical data demonstrate that only one shallow subsurface soil sample contained concentrations of TRPH above the current 1,000 mg/kg NMED residential SSL (NMED 2015) for TPH (i.e., sample location 19-02: 1,230 mg/kg at 1.5-2 ft bgs) (**Table 2-1** and ACC 1995).

All other surface and shallow subsurface soil samples obtained during the RFI at SWMU 19 contained concentrations of TRPH well below the current TPH SSL (**Table 2-1**). Subsurface samples collected from deeper intervals during that investigation did contain elevated TRPH concentrations above the current residential SSL for TPH (**Table 2-1**); however, the *RFI Report* attributes all elevated TRPH at these depths to the underlying SWMU 229 contamination, and not to the OWS (ACC 1995).

Since the publication of the previous recommendation for site closure in the *RFI Report*, the former OWS associated with SWMU 19 was first converted to use as a sediment trap and later removed, and the area surrounding it (including potentially impacted shallow and deep subsurface soils) has been over-excavated (NationView 2015, URS 2009 and 2016). The removal and over-excavation of the former OWS have been confirmed by recent investigations at the T-38 Test Cell facility, which have shown no indication of the current or past presence of the OWS.

5.1.2 SWMU 20 (OW967)

Contamination related to SWMU 20 has never been identified (**Table 2-2**), and no exposure pathway exists for this site.

SWMU 20 (OW967) was recommended for the equivalent of CAC *without* Controls in 1995 (ACC 1995); however, SWMU 20 was never removed from Table A of the Holloman AFB RCRA Hazardous Waste Facility Permit (NMED 2004, 2013). Despite being inactive since at

least 1988, this SWMU is presumed to have been retained on the Permit due to the continued presence of the OWS at the T-38 Test Cell facility.

Since the publication of the previous recommendation for site closure in the *RFI Report*, the former OWS associated with SWMU 20 has been removed, and the area surrounding it has been over-excavated (NationView 2015, URS 2009 and 2016). The removal and over-excavation of the former OWS have been confirmed by recent investigations at the T-38 Test Cell facility, which have shown no indication of the current or past presence of the OWS.

5.2 Recommendations

After assessing available data collected between 1988 and 2016, it is recommended that both SWMU 19 (IRP Site OW968) and SWMU 20 (IRP Site OW967) at Holloman AFB be considered for CAC *without* Controls status, and be moved from Table A (SWMUs Requiring Corrective Action) to Table B (CAC *without* Controls) of the Holloman RCRA Hazardous Waste Facility Permit No. NM6572124422, in accordance with NFA Criterion 5 (NMED 2004, 2013). This recommendation is based on the following:

- No contamination associated with SWMU 20 has ever been identified.
- The presumed source area for historical petroleum hydrocarbons potentially associated with SWMU 19 has been removed by excavation in 1997 and again between 2011 and 2013.
- Any residual contamination present at these sites is attributed to SWMU 229 and is managed accordingly in the RCRA program for SWMU 229.
- The TDS concentrations found at the T-38 Sites are greater than the NMWQCC threshold for potable water (10,000 mg/L) and thus, the groundwater is unfit for human consumption and the ingestion pathway for human health risk assessment is incomplete. Furthermore, since TDS concentrations exceed the specified threshold, the NMWQCC standards for maximum allowable concentrations of contaminants do not apply at the T-38 Sites, including SWMUs 19 and 20.
- No complete exposure pathways exist for human health or environmental risk at either former OWS site.
- SWMU 19 (OW968) and SWMU 20 (OW967) have been characterized and remediated in accordance with current applicable state and federal regulations, and the available data indicate that contaminants pose an acceptable level of risk under current and projected future land use. (i.e., NFA Criterion 5, NMED 2004).

6.0 REFERENCES

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Tables

Table 2-1
TRPH Screening Results for Soil at SWMU 19 (October 1994)

Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result (mg/kg)	Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result (mg/kg)
19-01	0	2	25.5	19-06	0	2	36.3
	3.25	4	15.2 (109)		3.5	4	2160
19-02	1.5	2	1230	19-07	0	2	125
	2	4	324		2	4	292
19-03	0	2	5.2	19-08	0	2	59.9
	3	4	8.6		3.5	4	4330
19-04	0	2	74.5	19-09	0	2	30.1
	3.5	4	648		8	10	>11800
19-05	0	2	17.5	19-10	0.5	1.5	25.6
	4	6	2110/2500	19-11	0.5	1.5	220 (160)
	8	10	>4670				

Notes:
TRPH = Total Recoverable Petroleum Hydrocarbons
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
Normal and duplicate results are separated by a "/".
( ) = Result from fixed analytical laboratory.
> = Result greater than value. Additional dilutions not performed.

New Mexico Environment Depart Soil Screening Levels for Total Petroleum Hydrocarbons are (NMED 2015):

Residential :	1000	mg/kg
Industrial/Occupational :	3000	mg/kg

Reference:
Air Combat Command. 1995. Draft Final RFI Report - Table 3 RCRA Facility Investigation, Holloman Air Force Base. Prepared by Foster Wheeler and Radian. July. [Report Table 4.3-1]
Column headings were not legible on source document and have been inferred.

Table 2-2
TRPH Screening Results for Soil at SWMU 20 (October 1994)

Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result (mg/kg)	Sample ID	Top Depth (ft bgs)	Bottom Depth (ft bgs)	Result (mg/kg)
20-01	0	2	14.8	20-03	0	2	9.1
	2	4	22		2	4	10.1
20-02	0	2	27.2/29.4 (49.8)	20-04	0	2	77
	2	4	53		2	4	18.2

Notes:
TRPH = Total Recoverable Petroleum Hydrocarbons
ft bgs = feet below ground surface
mg/kg = milligrams per kilogram
Normal and duplicate results are separated by a "/".
( ) = Result from fixed analytical laboratory.
> = Result greater than value. Additional dilutions not performed.

New Mexico Environment Depart Soil Screening Levels for Total Petroleum Hydrocarbons are (NMED 2015):

Residential :	1000	mg/kg
Industrial/Occupational :	3000	mg/kg

Reference:
Air Combat Command. 1995. Draft Final RFI Report - Table 3 RCRA Facility Investigation, Holloman Air Force Base. Prepared by Foster Wheeler and Radian. July. [Report Table 4.4-1]
Column headings were not legible on source document and have been inferred.

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-A16	03/31/16	4,074.94	**11.22**	11.05	0.17	4,063.85
SS059-A16	11/09/15	4,074.94	**11.15**	--	--	4,063.79
SS059-A16	07/24/15	4,074.94	**11.29**	11.15	0.14	4,063.76
SS059-A16	05/22/15	4,074.94	**12.87**	12.46	0.41	4,062.39
SS059-A16	04/28/15	4,074.94	**12.71**	12.21	0.50	4,062.62
SS059-A18	03/31/16	4,074.74	**11.78**	10.80	0.98	4,063.72
SS059-A18	11/09/15	4,074.74	**10.69**	--	--	4,064.05
SS059-A18	07/24/15	4,074.74	**10.77**	10.75	0.02	4,063.99
SS059-A18	04/28/15	4,074.74	**12.14**	11.97	0.17	4,062.73
SS059-A19	03/31/16	4,075.19	**11.70**	11.50	0.20	4,063.65
SS059-A19	11/09/15	4,075.19	**11.52**	11.48	0.04	4,063.70
SS059-A19	07/24/15	4,075.19	**11.59**	11.56	0.03	4,063.62
SS059-A19	04/28/15	4,075.19	**13.40**	12.65	0.75	4,062.37
SS059-A20	03/31/16	4,074.82	**11.03**	10.90	0.13	4,063.89
SS059-A20	11/09/15	4,074.82	**10.86**	--	--	4,063.96
SS059-A20	07/24/15	4,074.82	**10.94**	10.92	0.02	4,063.90
SS059-A20	04/28/15	4,074.82	**12.59**	11.78	0.81	4,062.86
SS059-A21	03/31/16	4,074.43	**10.25**	10.15	0.10	4,064.26
SS059-A21	11/09/15	4,074.43	**10.06**	10.05	0.01	4,064.38
SS059-A21	07/24/15	4,074.43	**9.98**	9.98	0.00	4,064.45
SS059-A21	04/28/15	4,074.43	**10.98**	10.50	0.48	4,063.82
SS059-A22	03/31/16	4,074.76	**10.87**	10.70	0.17	4,064.02
SS059-A22	11/09/15	4,074.76	**10.57**	10.53	0.04	4,064.22
SS059-A22	07/24/15	4,074.76	**10.50**	10.48	0.02	4,064.28
SS059-A22	04/28/15	4,074.76	**11.20**	11.12	0.08	4,063.62
SS059-B-12	03/31/16	4,074.27	**11.69**	10.90	0.79	4,063.20
SS059-B-12	11/10/15	4,074.27	**10.90**	--	--	4,063.37
SS059-B-12	07/24/15	4,074.27	**11.14**	--	--	4,063.13
SS059-B-13	03/31/16	4,074.31	**11.20**	10.96	0.24	4,063.30
SS059-B-13	11/10/15	4,074.31	**11.05**	--	--	4,063.26
SS059-B-13	07/24/15	4,074.31	**11.59**	11.24	0.35	4,063.00
SS059-B-15	03/31/16	4,075.96	**12.78**	--	--	4,063.18
SS059-B-15	11/10/15	4,075.96	**12.89**	--	--	4,063.07
SS059-B-15	07/24/15	4,075.96	**13.11**	--	--	4,062.85
SS059-B-15	04/28/15	4,075.96	**14.26**	--	--	4,061.70
SS059-B-16	03/31/16	4,074.43	**11.85**	11.02	0.83	4,063.23
SS059-B-16	11/10/15	4,074.43	**11.11**	11.10	0.01	4,063.33
SS059-B-16	07/24/15	4,074.43	**11.26**	--	--	4,063.17
SS059-EXT-2	03/31/16	4,073.82	**11.15**	9.75	1.40	4,063.76
SS059-EXT-2	11/10/15	4,073.82	**10.63**	10.62	0.01	4,063.20

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-EXT-2	07/24/15	4,073.82	**10.80**	--	--	4,063.02
SS059-EXT-2	04/28/15	4,073.82	**13.14**	13.13	0.01	4,060.69
SS059-EXT-3	03/31/16	4,074.43	**11.49**	11.16	0.33	4,063.19
SS059-EXT-3	11/09/15	4,074.43	**11.13**	11.12	0.01	4,063.30
SS059-EXT-3	07/24/15	4,074.43	**11.25**	11.20	0.05	4,063.21
SS059-EXT-3	05/22/15	4,074.43	**14.58**	13.13	1.45	4,060.98
SS059-EXT-3	04/28/15	4,074.43	**15.08**	13.08	2.00	4,060.91
SS059-EXT-4	03/31/16	4,074.20	**11.17**	10.71	0.46	4,063.39
SS059-EXT-4	11/09/15	4,074.20	**10.83**	10.81	0.02	4,063.39
SS059-EXT-4	07/24/15	4,074.20	**11.03**	11.03	0.00	4,063.17
SS059-EXT-4	05/22/15	4,074.20	**13.46**	12.81	0.65	4,061.25
SS059-EXT-4	04/28/15	4,074.20	**14.06**	12.62	1.44	4,061.26
SS059-EXT-7	03/31/16	4,074.33	**11.11**	10.86	0.25	4,063.42
SS059-EXT-7	11/09/15	4,074.33	**10.94**	10.91	0.03	4,063.41
SS059-EXT-7	07/24/15	4,074.33	**11.48**	11.08	0.40	4,063.16
SS059-EXT-7	05/22/15	4,074.33	**14.15**	13.07	1.08	4,061.02
SS059-EXT-7	04/28/15	4,074.33	**14.97**	12.87	2.10	4,061.00
SS059-EXT-7	10/26/14	4,074.33	**12.78**	--	--	4,061.55
SS059-EXT-8	03/31/16	4,074.51	**11.30**	10.98	0.32	4,063.46
SS059-EXT-8	11/09/15	4,074.51	**11.00**	10.99	0.01	4,063.52
SS059-EXT-8	07/24/15	4,074.51	**11.15**	11.15	0.00	4,063.36
SS059-EXT-8	05/22/15	4,074.51	**13.48**	13.05	0.43	4,061.36
SS059-EXT-8	04/28/15	4,074.51	**14.27**	12.81	1.46	4,061.38
SS059-EXT-9	03/31/16	4,074.97	**11.95**	11.28	0.67	4,063.54
SS059-EXT-9	04/28/15	4,074.97	**--**	--	--	--
SS059-GPS-1	03/31/16	4,076.10	**12.88**	--	--	4,063.22
SS059-GPS-1	11/10/15	4,076.10	**13.00**	--	--	4,063.10
SS059-GPS-1	11/09/15	4,076.10	**13.00**	--	--	4,063.10
SS059-GPS-1	07/24/15	4,076.10	**13.20**	--	--	4,062.90
SS059-GPS-1	05/22/15	4,076.10	**14.43**	--	--	4,061.67
SS059-GPS-1	04/28/15	4,076.10	**14.70**	--	--	4,061.40
SS059-LF-MW-01	03/31/16	4,074.43	**16.63**	--	--	4,057.80
SS059-LF-MW-01	11/09/15	4,074.43	**16.33**	--	--	4,058.10
SS059-LF-MW-01	07/24/15	4,074.43	**16.30**	--	--	4,058.13
SS059-LF-MW-01	04/28/15	4,074.43	**16.59**	--	--	4,057.84
SS059-LF-MW-01	11/11/14	4,074.43	**16.22**	--	--	4,058.21
SS059-LF-MW-01	10/26/14	4,074.43	**16.23**	--	--	4,058.20
SS059-LF-MW-02	03/31/16	4,076.60	**17.02**	--	--	4,059.58
SS059-LF-MW-02	11/09/15	4,076.60	**16.76**	--	--	4,059.84
SS059-LF-MW-02	07/24/15	4,076.60	**16.83**	--	--	4,059.77

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-LF-MW-02	04/28/15	4,076.60	**17.15**	--	--	4,059.45
SS059-LF-MW-02	11/11/14	4,076.60	**16.62**	--	--	4,059.98
SS059-LF-MW-02	10/26/14	4,076.60	**17.64**	--	--	4,058.96
SS059-LF-MW-02	10/26/14	4,076.60	**16.69**	--	--	4,059.91
SS059-LF-MW-03	03/31/16	4,071.20	**12.76**	--	--	4,058.44
SS059-LF-MW-03	11/09/15	4,071.20	**12.14**	--	--	4,059.06
SS059-LF-MW-03	07/24/15	4,071.20	**12.08**	--	--	4,059.12
SS059-LF-MW-03	04/28/15	4,071.20	**12.72**	--	--	4,058.48
SS059-LF-MW-03	11/11/14	4,071.20	**12.11**	--	--	4,059.09
SS059-LF-MW-03	10/26/14	4,071.20	**11.96**	--	--	4,059.24
SS059-LF-MW-04	03/31/16	4,076.01	**14.16**	--	--	4,061.85
SS059-LF-MW-04	11/09/15	4,076.01	**14.11**	--	--	4,061.90
SS059-LF-MW-04	07/24/15	4,076.01	**14.02**	--	--	4,061.99
SS059-LF-MW-04	04/28/15	4,076.01	**14.04**	--	--	4,061.97
SS059-LF-MW-04	11/11/14	4,076.01	**13.70**	--	--	4,062.31
SS059-LF-MW-04	10/26/14	4,076.01	**13.73**	--	--	4,062.28
SS059-M1	03/31/16	4,077.31	**14.08**	--	--	4,063.23
SS059-M1	11/10/15	4,077.31	**14.20**	--	--	4,063.11
SS059-M1	07/24/15	4,077.31	**14.40**	--	--	4,062.91
SS059-M1	05/22/15	4,077.31	**16.17**	--	--	4,061.14
SS059-M1	04/28/15	4,077.31	**16.14**	--	--	4,061.17
SS059-M2	03/31/16	4,075.85	**12.70**	--	--	4,063.15
SS059-M2	11/10/15	4,075.85	**12.77**	--	--	4,063.08
SS059-M2	07/24/15	4,075.85	**12.98**	--	--	4,062.87
SS059-M2	05/22/15	4,075.85	**15.76**	--	--	4,060.09
SS059-M2	04/28/15	4,075.85	**15.78**	--	--	4,060.07
SS059-M3	03/31/16	4,075.20	**11.98**	--	--	4,063.22
SS059-M3	11/10/15	4,075.20	**12.10**	--	--	4,063.10
SS059-M3	07/24/15	4,075.20	**12.30**	--	--	4,062.90
SS059-M3	05/22/15	4,075.20	**15.94**	--	--	4,059.26
SS059-M3	04/28/15	4,075.20	**15.92**	15.90	0.02	4,059.30
SS059-M5	03/31/16	4,076.83	**13.64**	--	--	4,063.19
SS059-M5	11/10/15	4,076.83	**13.75**	--	--	4,063.08
SS059-M5	07/24/15	4,076.83	**13.95**	--	--	4,062.88
SS059-M5	05/22/15	4,076.83	**15.14**	--	--	4,061.69
SS059-M5	04/28/15	4,076.83	**15.15**	--	--	4,061.68
SS059-MW02	03/31/16	4,079.28	**13.75**	--	--	4,065.53
SS059-MW02	11/09/15	4,079.28	**13.82**	--	--	4,065.46
SS059-MW02	07/24/15	4,079.28	**13.75**	--	--	4,065.53
SS059-MW02	04/28/15	4,079.28	**13.83**	--	--	4,065.45

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-MW02	11/11/14	4,079.28	**13.92**	--	--	4,065.36
SS059-MW02	10/26/14	4,079.28	**13.93**	--	--	4,065.35
SS059-MW-10	03/31/16	4,084.14	**22.11**	--	--	4,062.03
SS059-MW-10	11/09/15	4,084.14	**22.24**	--	--	4,061.90
SS059-MW-10	07/24/15	4,084.14	**22.45**	--	--	4,061.69
SS059-MW-10	04/28/15	4,084.14	**22.46**	--	--	4,061.68
SS059-MW-10	11/11/14	4,084.14	**22.35**	--	--	4,061.79
SS059-MW-10	10/26/14	4,084.14	**22.42**	--	--	4,061.72
SS059-MW-11	03/31/16	4,077.16	**--**	--	--	--
SS059-MW-11	11/09/15	4,077.16	**--**	--	--	--
SS059-MW-11	07/24/15	4,077.16	**--**	--	--	--
SS059-MW-11	04/28/15	4,077.16	**--**	--	--	--
SS059-MW-11	11/11/14	4,077.16	**12.97**	--	--	4,064.19
SS059-MW-11	10/26/14	4,077.16	**12.92**	--	--	4,064.24
SS059-MW-12	03/31/16	4,076.05	**--**	--	--	--
SS059-MW-12	11/10/15	4,076.05	**10.69**	--	--	4,065.36
SS059-MW-12	11/09/15	4,076.05	**10.67**	--	--	4,065.38
SS059-MW-12	07/24/15	4,076.05	**10.49**	--	--	4,065.56
SS059-MW-12	05/22/15	4,076.05	**9.24**	--	--	4,066.81
SS059-MW-12	04/28/15	4,076.05	**9.90**	--	--	4,066.15
SS059-MW-12	11/11/14	4,076.05	**10.64**	--	--	4,065.41
SS059-MW-12	10/26/14	4,076.05	**10.71**	--	--	4,065.34
SS059-MW-13	11/09/15	4,081.89	**20.36**	--	--	4,061.53
SS059-MW-13	07/24/15	4,081.89	**20.51**	--	--	4,061.38
SS059-MW-13	04/28/15	4,081.89	**20.52**	--	--	4,061.37
SS059-MW-13	11/11/14	4,081.89	**20.35**	--	--	4,061.54
SS059-MW-13	10/26/14	4,081.89	**20.48**	--	--	4,061.41
SS059-MW-14	03/31/16	4,080.99	**19.00**	--	--	4,061.99
SS059-MW-14	11/09/15	4,080.99	**19.06**	--	--	4,061.93
SS059-MW-14	07/24/15	4,080.99	**19.19**	--	--	4,061.80
SS059-MW-14	04/28/15	4,080.99	**19.19**	--	--	4,061.80
SS059-MW-14	11/11/14	4,080.99	**18.98**	--	--	4,062.01
SS059-MW-14	10/26/14	4,080.99	**19.10**	--	--	4,061.89
SS059-MW-17	03/31/16	4,081.45	**--**	--	--	--
SS059-MW-17	11/09/15	4,081.45	**--**	--	--	--
SS059-MW-17	07/24/15	4,081.45	**--**	--	--	--
SS059-MW-17	04/28/15	4,081.45	**--**	--	--	--
SS059-MW-17	11/11/14	4,081.45	**19.07**	--	--	4,062.38
SS059-MW-17	10/26/14	4,081.45	**19.19**	--	--	4,062.26
SS059-MW-25	03/31/16	4,077.73	**12.93**	--	--	4,064.80

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-MW-25	11/10/15	4,077.73	**12.80**	--	--	4,064.93
SS059-MW-25	11/09/15	4,077.73	**12.77**	--	--	4,064.96
SS059-MW-25	07/24/15	4,077.73	**12.82**	--	--	4,064.91
SS059-MW-25	05/22/15	4,077.73	**12.84**	--	--	4,064.89
SS059-MW-25	04/28/15	4,077.73	**12.90**	--	--	4,064.83
SS059-MW-25	11/11/14	4,077.73	**13.18**	--	--	4,064.55
SS059-MW-25	10/26/14	4,077.73	**13.15**	--	--	4,064.58
SS059-MW-3	03/31/16	4,076.09	**12.46**	12.45	0.01	4,063.64
SS059-MW-3	11/09/15	4,076.09	**12.52**	--	--	4,063.57
SS059-MW-3	07/24/15	4,076.09	**12.65**	--	--	4,063.44
SS059-MW-3	05/22/15	4,076.09	**14.18**	--	--	4,061.91
SS059-MW-3	04/28/15	4,076.09	**14.97**	14.06	0.91	4,061.83
SS059-MW-3	11/11/14	4,076.09	**14.11**	13.69	0.42	4,062.31
SS059-MW-3	10/26/14	4,076.09	**14.05**	--	--	4,062.04
SS059-MW-30	03/31/16	4,073.04	**10.95**	9.71	1.24	4,063.06
SS059-MW-30	11/09/15	4,073.04	**9.46**	--	--	4,063.58
SS059-MW-30	07/24/15	4,073.04	**9.46**	9.45	0.01	4,063.59
SS059-MW-30	04/28/15	4,073.04	**10.01**	10.00	0.01	4,063.04
SS059-MW-30	11/11/14	4,073.04	**9.97**	9.55	0.42	4,063.40
SS059-MW-30	10/26/14	4,073.04	**9.90**	--	--	4,063.14
SS059-MW-40	03/31/16	4,070.56	**9.31**	--	--	4,061.25
SS059-MW-40	11/09/15	4,070.56	**9.29**	--	--	4,061.27
SS059-MW-40	07/24/15	4,070.56	**9.29**	--	--	4,061.27
SS059-MW-40	04/28/15	4,070.56	**9.42**	--	--	4,061.14
SS059-MW-40	11/18/14	4,070.56	**9.69**	--	--	4,060.87
SS059-MW-40	11/11/14	4,070.56	**9.32**	--	--	4,061.24
SS059-MW-40	10/26/14	4,070.56	**11.30**	--	--	4,059.26
SS059-MW-5	03/31/16	4,071.46	**8.02**	--	--	4,063.44
SS059-MW-5	11/10/15	4,071.46	**7.64**	--	--	4,063.82
SS059-MW-5	07/24/15	4,071.46	**7.57**	--	--	4,063.89
SS059-MW-5	04/28/15	4,071.46	**7.98**	--	--	4,063.48
SS059-MW-5	11/11/14	4,071.46	**8.03**	--	--	4,063.43
SS059-MW-5	10/26/14	4,071.46	**7.94**	--	--	4,063.52
SS059-MW50	03/31/16	4,070.18	**11.63**	--	--	4,058.55
SS059-MW50	11/09/15	4,070.18	**11.59**	--	--	4,058.59
SS059-MW50	07/24/15	4,070.18	**11.40**	--	--	4,058.78
SS059-MW50	05/21/15	4,070.18	**11.51**	--	--	4,058.67
SS059-MW51	03/31/16	4,068.21	**9.98**	--	--	4,058.23
SS059-MW51	11/09/15	4,068.21	**9.57**	--	--	4,058.64
SS059-MW51	07/24/15	4,068.21	**9.34**	--	--	4,058.87

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-MW51	05/21/15	4,068.21	**9.81**	--	--	4,058.40
SS059-MW52	03/31/16	4,068.91	**9.40**	--	--	4,059.51
SS059-MW52	11/09/15	4,068.91	**9.28**	--	--	4,059.63
SS059-MW52	07/24/15	4,068.91	**9.19**	--	--	4,059.72
SS059-MW52	05/21/15	4,068.91	**9.27**	--	--	4,059.64
SS059-MW-9	03/31/16	4,076.44	**16.53**	--	--	4,059.91
SS059-MW-9	11/09/15	4,076.44	**16.57**	--	--	4,059.87
SS059-MW-9	07/24/15	4,076.44	**16.64**	--	--	4,059.80
SS059-MW-9	04/28/15	4,076.44	**16.64**	--	--	4,059.80
SS059-MW-9	11/11/14	4,076.44	**16.52**	--	--	4,059.92
SS059-MW-9	10/26/14	4,076.44	**16.57**	--	--	4,059.87
SS059-MW-9	10/24/14	4,076.44	**16.04**	--	--	4,060.40
SS059-S1	03/31/16	4,076.31	**12.65**	--	--	4,063.66
SS059-S1	11/10/15	4,076.31	**12.77**	--	--	4,063.54
SS059-S1	07/24/15	4,076.31	**12.95**	--	--	4,063.36
SS059-S10	03/31/16	4,076.02	**12.82**	--	--	4,063.20
SS059-S10	11/10/15	4,076.02	**12.94**	--	--	4,063.08
SS059-S10	07/24/15	4,076.02	**13.14**	--	--	4,062.88
SS059-S10	04/28/15	4,076.02	**14.34**	--	--	4,061.68
SS059-S12	03/31/16	4,075.72	**12.53**	--	--	4,063.19
SS059-S12	11/10/15	4,075.72	**12.62**	--	--	4,063.10
SS059-S12	07/24/15	4,075.72	**12.83**	--	--	4,062.89
SS059-S12	04/28/15	4,075.72	**14.04**	--	--	4,061.68
SS059-S13	03/31/16	4,075.00	**11.51**	--	--	4,063.49
SS059-S13	11/10/15	4,075.00	**11.61**	--	--	4,063.39
SS059-S13	11/09/15	4,075.00	**11.61**	--	--	4,063.39
SS059-S13	07/24/15	4,075.00	**11.82**	--	--	4,063.18
SS059-S14	03/31/16	4,076.06	**12.52**	--	--	4,063.54
SS059-S14	11/10/15	4,076.06	**12.62**	--	--	4,063.44
SS059-S14	11/09/15	4,076.06	**12.62**	--	--	4,063.44
SS059-S14	07/24/15	4,076.06	**12.84**	--	--	4,063.22
SS059-S2	03/31/16	4,076.04	**12.89**	--	--	4,063.15
SS059-S2	11/10/15	4,076.04	**12.95**	--	--	4,063.09
SS059-S2	07/24/15	4,076.04	**13.15**	--	--	4,062.89
SS059-S3	03/31/16	4,076.25	**13.06**	--	--	4,063.19
SS059-S3	11/10/15	4,076.25	**13.18**	--	--	4,063.07
SS059-S3	11/09/15	4,076.25	**13.17**	--	--	4,063.08
SS059-S3	07/24/15	4,076.25	**13.38**	--	--	4,062.87
SS059-S4	03/31/16	4,075.80	**12.61**	--	--	4,063.19
SS059-S4	11/10/15	4,075.80	**12.69**	--	--	4,063.11

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-S4	07/24/15	4,075.80	**12.92**	--	--	4,062.88
SS059-S5	03/31/16	4,074.80	**11.62**	--	--	4,063.18
SS059-S5	11/10/15	4,074.80	**11.73**	--	--	4,063.07
SS059-S5	07/24/15	4,074.80	**11.93**	--	--	4,062.87
SS059-S5	04/28/15	4,074.80	**16.08**	--	--	4,058.72
SS059-S5	11/11/14	4,074.80	**16.05**	--	--	4,058.75
SS059-S5	10/26/14	4,074.81	**16.05**	15.93	0.13	4,058.86
SS059-S6	03/31/16	4,075.38	**12.28**	--	--	4,063.10
SS059-S6	11/10/15	4,075.38	**12.32**	--	--	4,063.06
SS059-S6	07/24/15	4,075.38	**12.53**	--	--	4,062.85
SS059-S7	03/31/16	4,075.69	**12.50**	--	--	4,063.19
SS059-S7	11/10/15	4,075.69	**12.62**	--	--	4,063.07
SS059-S7	07/24/15	4,075.69	**12.81**	--	--	4,062.88
SS059-S8	03/31/16	4,074.89	**11.70**	--	--	4,063.19
SS059-S8	11/10/15	4,074.89	**11.81**	--	--	4,063.08
SS059-S8	07/24/15	4,074.89	**12.02**	--	--	4,062.87
SS059-S8	04/28/15	4,074.89	**13.73**	--	--	4,061.16
SS059-S9	03/31/16	4,075.71	**12.54**	--	--	4,063.17
SS059-S9	11/10/15	4,075.71	**12.64**	--	--	4,063.07
SS059-S9	07/24/15	4,075.71	**12.85**	--	--	4,062.86
SS059-S9	04/28/15	4,075.71	**14.56**	--	--	4,061.15
SS059-TMW14	03/31/16	4,078.67	**15.42**	--	--	4,063.25
SS059-TMW14	11/10/15	4,078.67	**15.53**	--	--	4,063.14
SS059-TMW14	07/24/15	4,078.67	**15.73**	--	--	4,062.94
SS059-TMW14	04/28/15	4,078.67	**18.62**	--	--	4,060.05
SS059-TMW19	11/14/14	4,075.65	**15.79**	--	--	4,059.86
SS059-TMW22	11/14/14		**16.00**	--	--	--
SS059-TMW23	11/14/14	4,076.42	**16.18**	--	--	4,060.24
SS059-TMW27	11/18/14	4,073.61	**12.02**	--	--	4,061.59
SS059-TMW32	03/31/16	4,078.75	**15.17**	--	--	4,063.58
SS059-TMW32	11/10/15	4,078.75	**14.96**	--	--	4,063.79
SS059-TMW32	07/24/15	4,078.75	**14.97**	--	--	4,063.78
SS059-TMW32	04/28/15	4,078.75	**15.60**	--	--	4,063.15
SS059-TMW51	03/31/16	4,078.22	**14.84**	--	--	4,063.38
SS059-TMW51	11/10/15	4,078.22	**14.95**	--	--	4,063.27
SS059-TMW51	07/24/15	4,078.22	**15.14**	--	--	4,063.08
SS059-TMW51	04/28/15	4,078.22	**17.46**	--	--	4,060.76
SS059-TMW51	11/18/14	4,078.22	**17.47**	--	--	4,060.75
SS059-TMW57	03/31/16	4,069.05	**11.90**	--	--	4,057.15
SS059-TMW57	11/09/15	4,069.05	**11.36**	--	--	4,057.69

Table 3-1
Groundwater Elevation Measurements (SWMU 229)
October 2014 through March 2016
Holloman AFB, New Mexico

Well Identification	Measurement Date	Measuring Point Elevation (feet amsl)	Depth to Water (feet btoc)	Depth to LNAPL (feet btoc)	LNAPL Thickness (feet)	Corrected Groundwater Elevation (feet amsl)
SS059-TMW57	07/24/15	4,069.05	**11.20**	--	--	4,057.85
SS059-TMW57	04/28/15	4,069.05	**11.83**	--	--	4,057.22
SS059-TMW58	03/31/16	4,068.88	**11.51**	--	--	4,057.37
SS059-TMW58	11/10/15	4,068.88	**11.53**	--	--	4,057.35
SS059-TMW58	07/24/15	4,068.88	**10.31**	--	--	4,058.57
SS059-TMW58	04/28/15	4,068.88	**11.69**	--	--	4,057.19
SS059-TMW59	11/18/14	4,073.96	**14.85**	--	--	4,059.11
SS059-TMW60	03/31/16	4,083.72	**22.77**	--	--	4,060.95
SS059-TMW60	11/18/14	4,083.72	**20.75**	--	--	4,062.97

amsl = Above mean sea level
btoc = Below top of casing (measuring point is top of casing)
-- = No data (dry well) or no LNAPL measurement

Table 3-2
Total Dissolved Solids Distribution (SWMU 229)
October 2014 through May 2015
Holloman AFB, New Mexico

		Location ID:	SS059-LF-MW-02	SS059-MW02	SS059-MW-10	SS059-MW-11	SS059-MW-12	SS059-MW-13	SS059-MW-14	SS059-MW-25
		Sample Date:	10/26/14	10/26/14	10/26/14	10/26/14	10/26/14	10/26/14	10/26/14	10/26/14
		Sample Type:	N	N	N	N	N	N	N	N
Parameter	Standard	**Units**								
Inorganic										
A2540C										
Total Dissolved Solids	10000[GN]	mg/L	***22000***	***28000***	***15000***	***24000***	***14000***	***25000***	***31000***	***19000***

		Location ID:	SS059-MW-5	SS059-MW50	SS059-MW51	SS059-MW52	SS059-MW52			
		Sample Date:	10/26/14	05/21/15	05/21/15	05/21/15	05/21/15			
		Sample Type:	N	N	N	N	FD			
Parameter	Standard	**Units**								
Inorganic										
A2540C										
Total Dissolved Solids	10000[GN]	mg/L	6200	***21000***	***15000***	***14000***	***15000***	---	---	---

Qualifiers:

---	=	Not analyzed or historic data not available
<	=	The result was less than the limit of detection
DNR	=	Do not report, reported by alternate method
F	=	The analyte was positively identified but the associated numerical value is between the limit of detection and the limit of quantitation
J	=	Result greater than or equal to method detection limit and less limit of detection
M	=	Potential matrix effect was present
NC	=	Not Calcuated, all constituents of the total were non-detected
NJ	=	Tentatively identified
R	=	The data are unusable. (note: Analyte may or may not be present)
U	=	The analyte was not detected above the limit of detection

Sample Type:

N	=	Normal Sample
FD	=	Field Duplicate

Units:

mg/L	=	milligrams per liter
ug/L	=	micrograms per liter

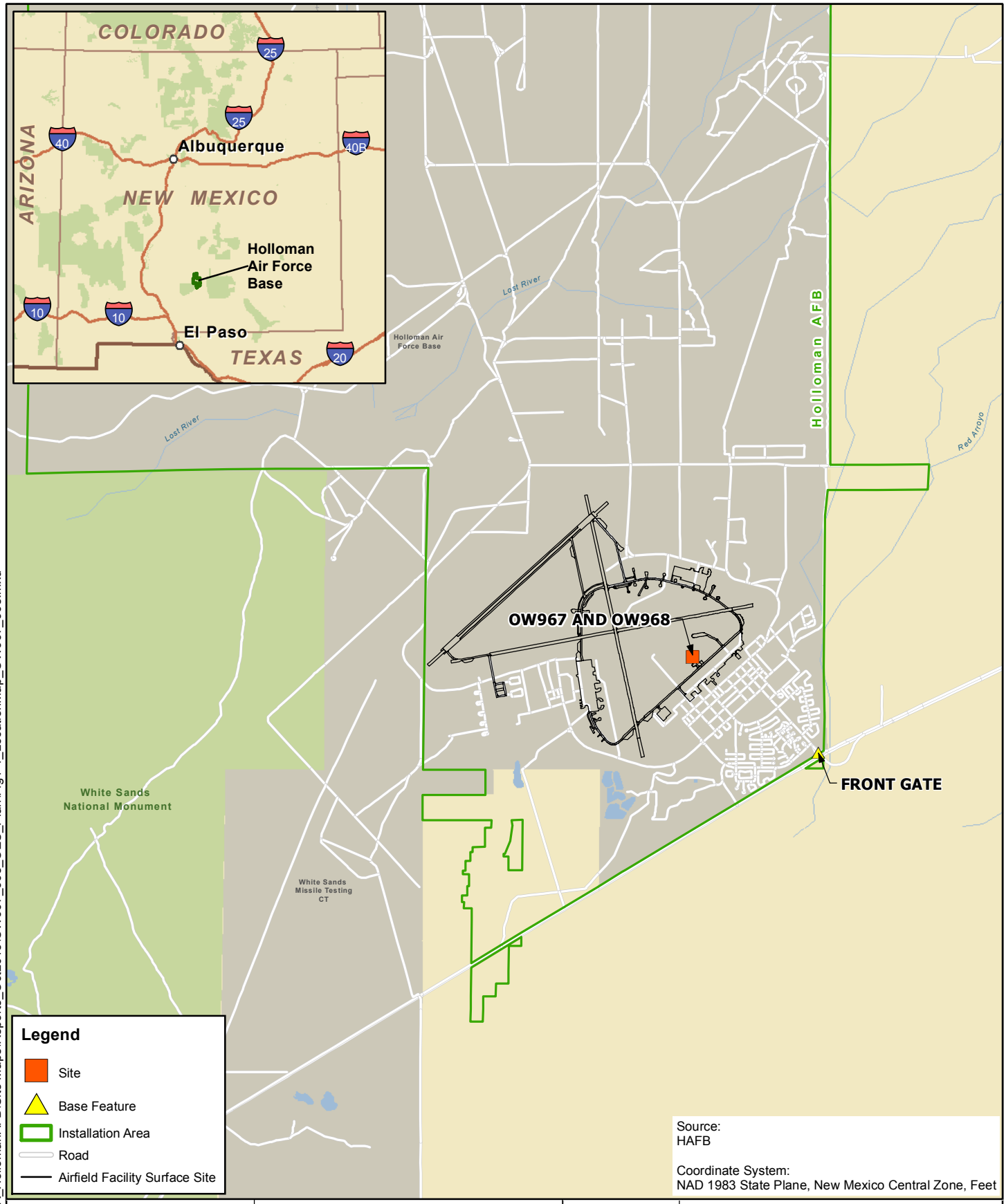
Standards

GN = Domestic & Agricultural water ; New Mexico Human Health Standards, Other Standards for Domestic Water Supply, and Agricultural Standards

Exceedance format

Bold = Standard exceedence

Figures



N
W E
S

0 7,000
Scale in Feet
1 inch = 7,000 feet

URS

Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

Figure 1-1

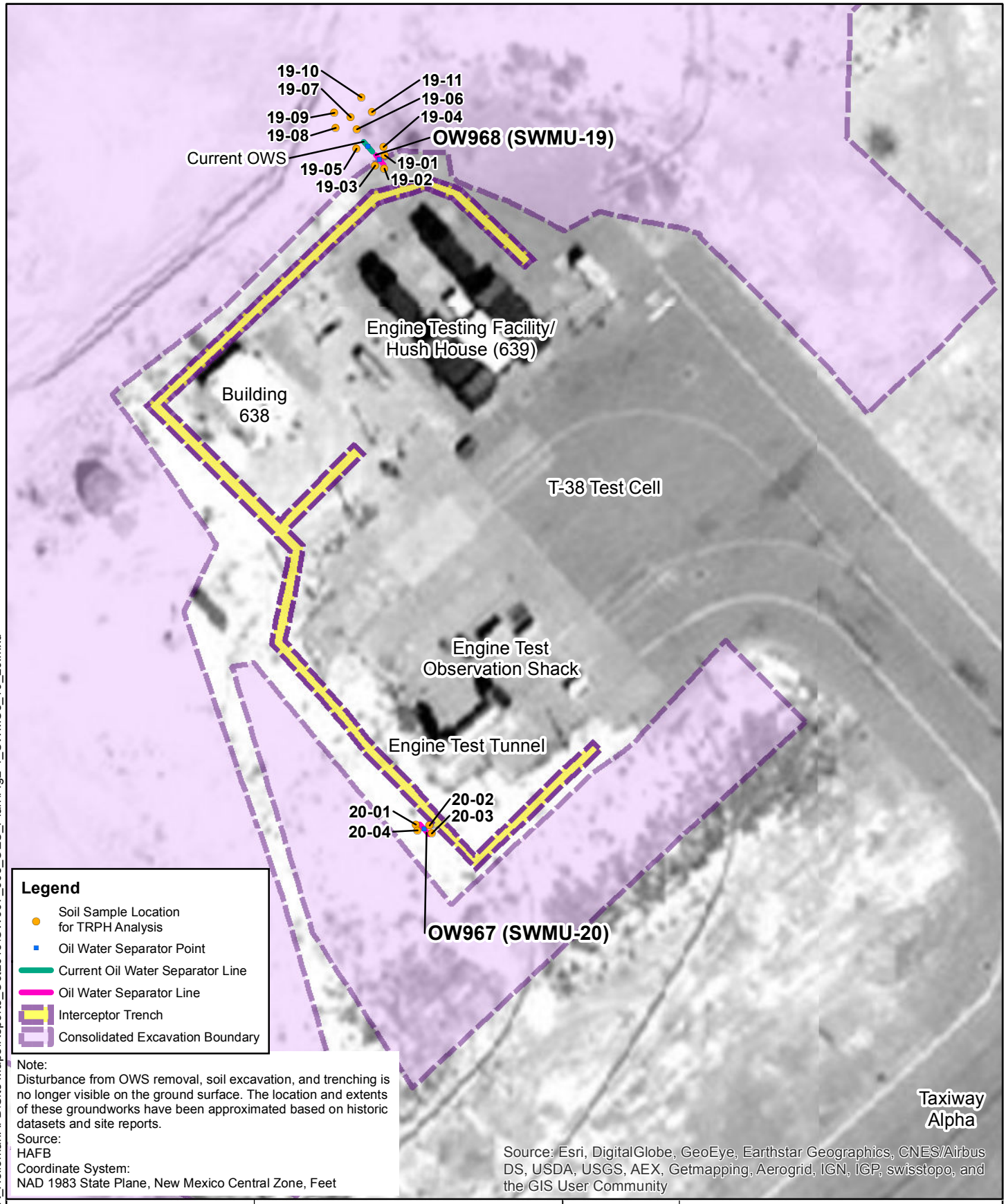
Location Map for Holloman Air Force Base and Sites OW967 and OW968

Holloman Air Force Base

USAF

May 19, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig1-1_LocationMap_OW967_968.mxd



F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig2-1_SWMUs_19_20.mxd

N
W E
S

0 60
Scale in Feet
1 inch = 60 feet

URS

Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

Figure 2-1

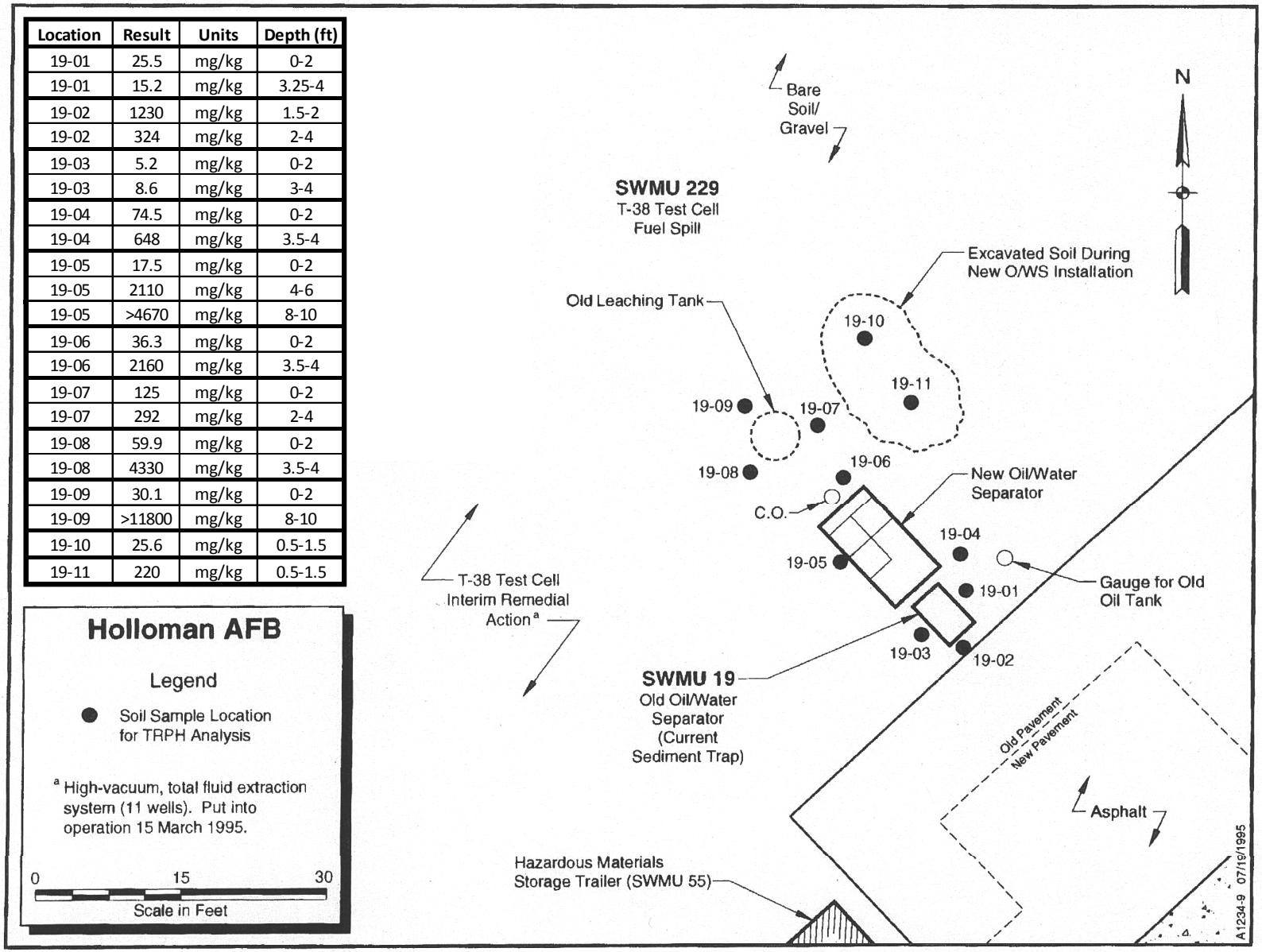
Site Layout Map for SWMUs 19 and 20

Holloman Air Force Base

USAF

April 28, 2016

Location	Result	Units	Depth (ft)
19-01	25.5	mg/kg	0-2
19-01	15.2	mg/kg	3.25-4
19-02	1230	mg/kg	1.5-2
19-02	324	mg/kg	2-4
19-03	5.2	mg/kg	0-2
19-03	8.6	mg/kg	3-4
19-04	74.5	mg/kg	0-2
19-04	648	mg/kg	3.5-4
19-05	17.5	mg/kg	0-2
19-05	2110	mg/kg	4-6
19-05	>4670	mg/kg	8-10
19-06	36.3	mg/kg	0-2
19-06	2160	mg/kg	3.5-4
19-07	125	mg/kg	0-2
19-07	292	mg/kg	2-4
19-08	59.9	mg/kg	0-2
19-08	4330	mg/kg	3.5-4
19-09	30.1	mg/kg	0-2
19-09	>11800	mg/kg	8-10
19-10	25.6	mg/kg	0.5-1.5
19-11	220	mg/kg	0.5-1.5



Source:
Table 3 RFI Report (ACC 1995)

URS

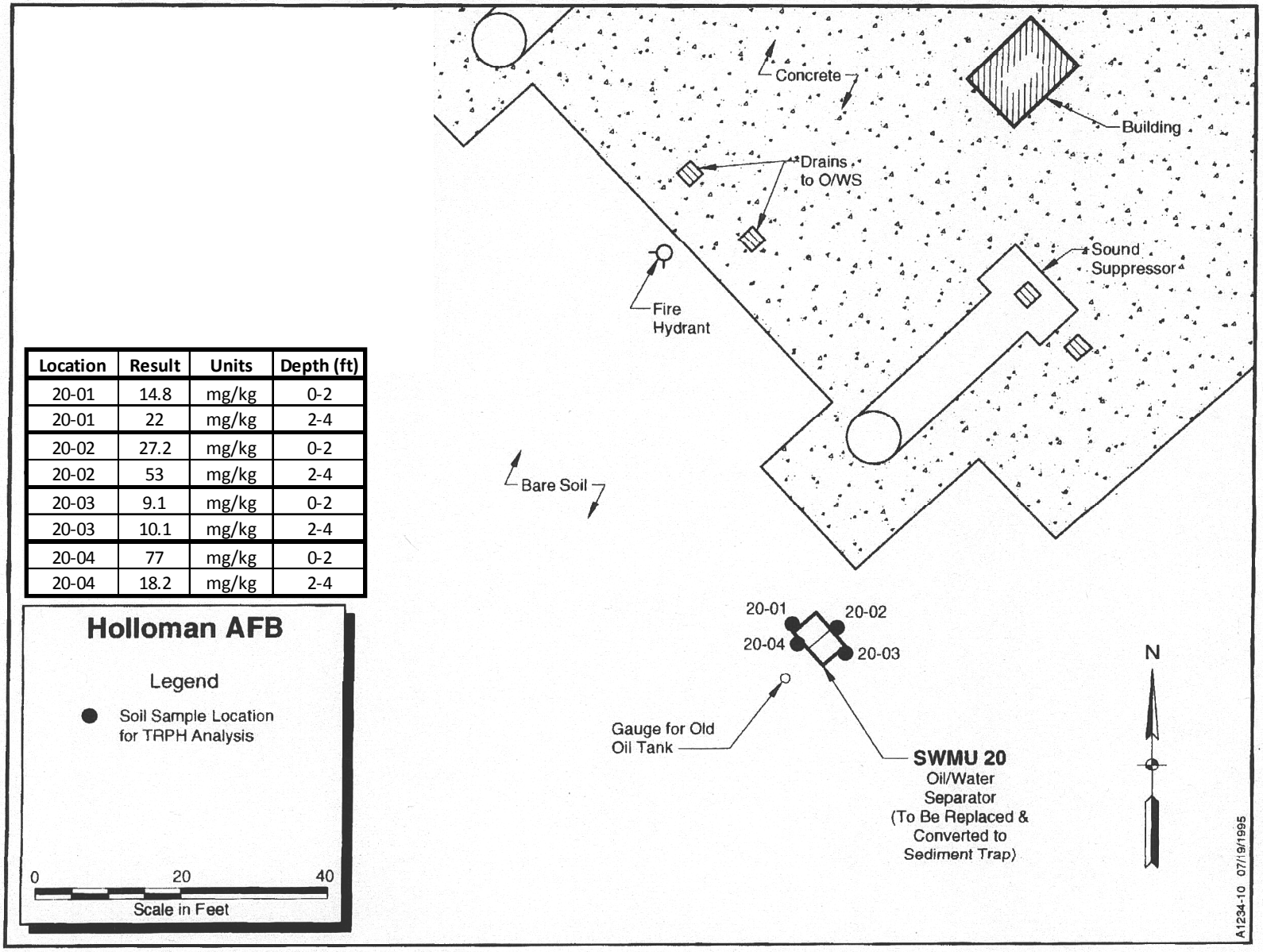
Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

Figure 2-2
SWMU 19
Soil Screening Results
(October 1994)

Holloman Air Force Base
USAF

April 1, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig2-2_SWMU19_results.mxd



Location	Result	Units	Depth (ft)
20-01	14.8	mg/kg	0-2
20-01	22	mg/kg	2-4
20-02	27.2	mg/kg	0-2
20-02	53	mg/kg	2-4
20-03	9.1	mg/kg	0-2
20-03	10.1	mg/kg	2-4
20-04	77	mg/kg	0-2
20-04	18.2	mg/kg	2-4

Source:
Table 3 RFI Report (ACC 1995)

URS

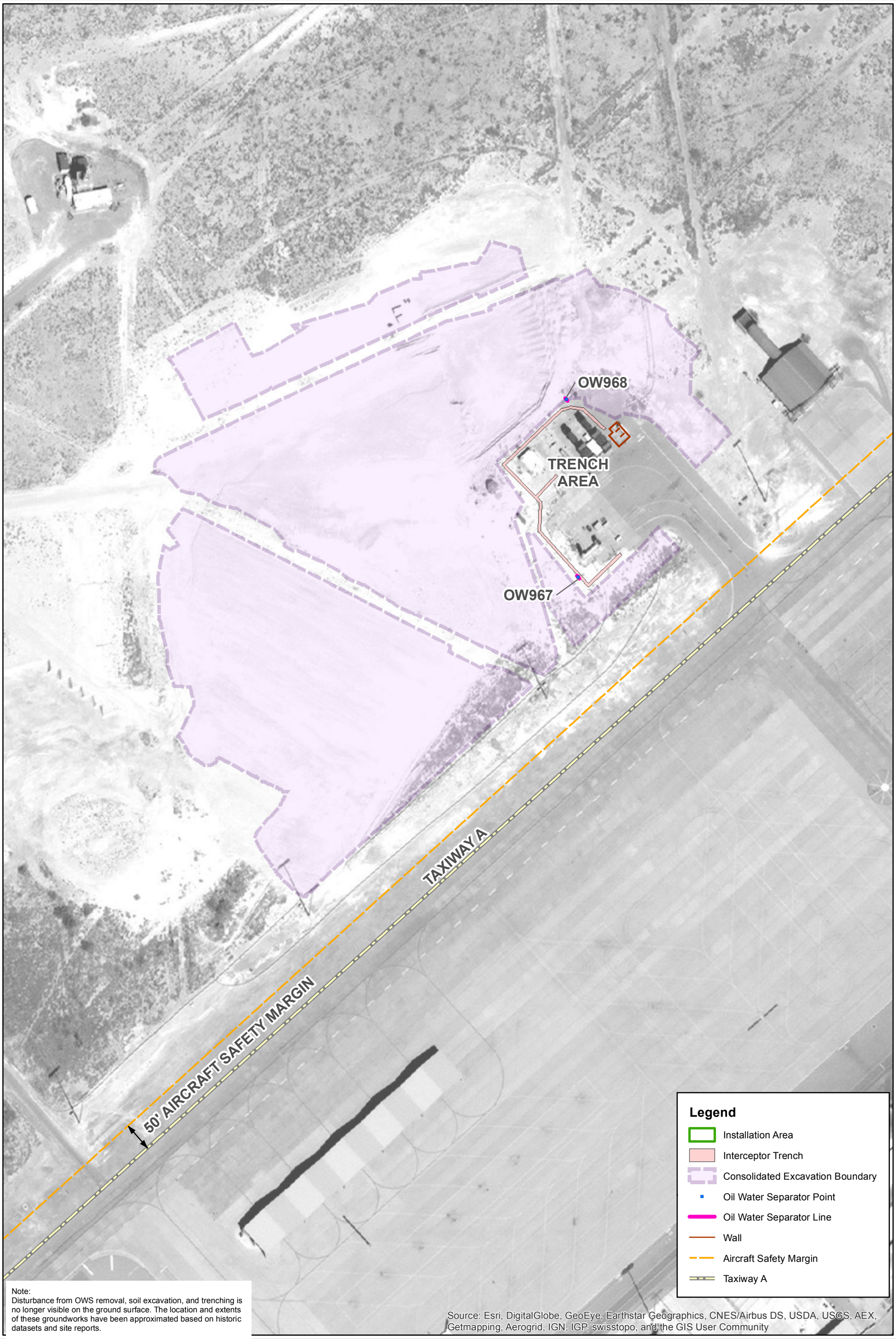
Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

Figure 2-3
SWMU 20
Soil Screening Results
(October 1994)

Holloman Air Force Base
USAF

April 1, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig2-3_SWMU20_results.mxd



Note:
Disturbance from OWS removal, soil excavation, and trenching is no longer visible on the ground surface. The location and extents of these groundworks have been approximated based on historic datasets and site reports.

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Source:
HAFB

Coordinate System:
NAD 1983 State Plane, New Mexico Central Zone, Feet
Vertical Datum: NAVD 1988

N W E S

0 150
Scale in Feet
1 inch = 150 feet

URS

Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

Figure 2-4

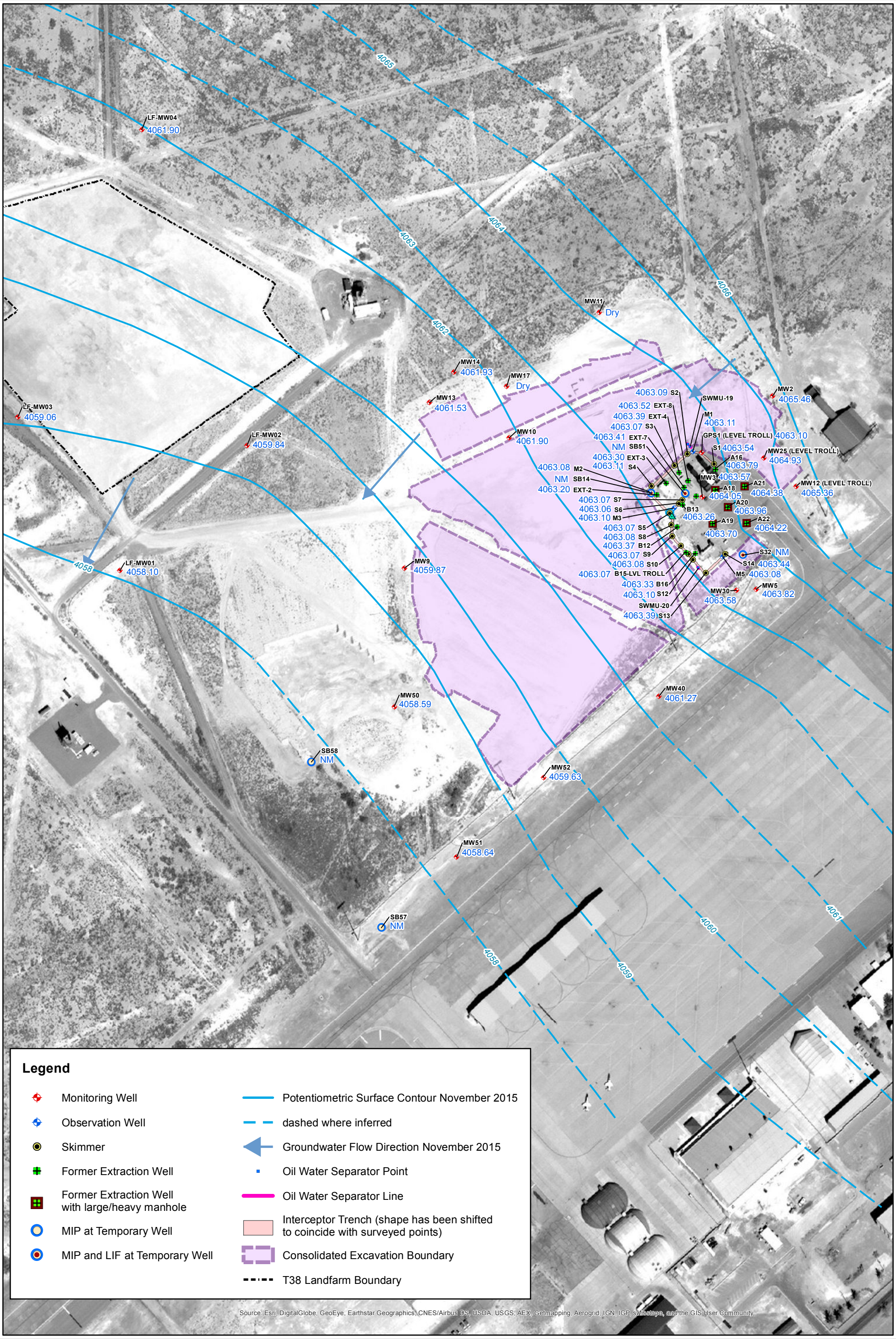
Site Reference Map for SWMU 229

Holloman Air Force Base

USAF

April 28, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig2-4_Site_Ref_Map_SWMU229.mxd



Note:
Disturbance from OWS removal, soil excavation, and trenching is no longer visible on the ground surface. The location and extents of these groundworks have been approximated based on historic datasets and site reports.

Sources:
HAFB

Coordinate System:
NAD 1983 State Plane,
New Mexico Central Zone, Feet
Vertical Datum: NAVD 1988

N W E S

0 110 220
Scale in Feet
1 inch = 220 feet

URS

Designed	JDM
Drawn	LED
Checked	DAE
Peer Review	DAE
Project Manager	BGP
Project Number	23446543

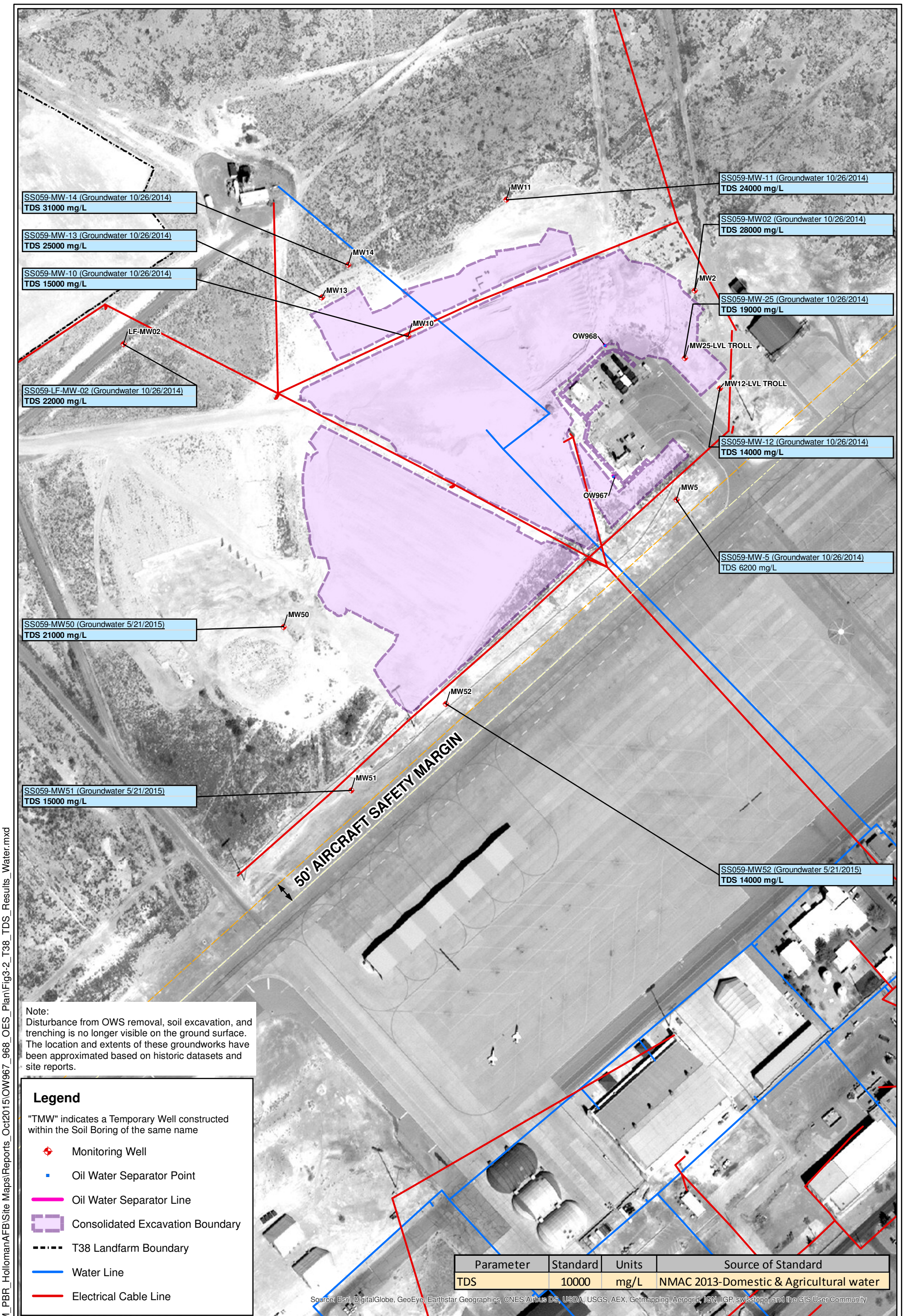
Figure 3-1

T-38 Test Cell Site (SS059)
Potentiometric Surface, November 2015

Holloman Air Force Base
USAF

April 22, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig3-1_T38_Potentiometric_Nov2015data.mxd



Parameter	Standard	Units	Source of Standard
TDS	10000	mg/L	NMAC 2013-Domestic & Agricultural water

TDS = Total Dissolved Solids
mg/L = milligrams per liter
NS = Not Sampled

Sources:
HAFB

Coordinate System:
NAD 1983 State Plane,
New Mexico Central Zone, Feet

N W E S

0 100 200
Scale in Feet
1 inch = 200 feet

URS

Designed	JDM
Drawn	LED
Checked	MEH
Peer Review	MEH
Project Manager	BGP
Project Number	23446543

Figure 3-2
SWMU 229
TDS Concentrations in Groundwater

Holloman Air Force Base
USAF

April 29, 2016

F:\GIS\Projects\AZNM_PBR_HollomanAFB\Site Maps\Reports_Oct2015\OW967_968_OES_Plan\Fig3-2_T38_TDS_Results_Water.mxd