KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION KAFB-106248 TO KAFB-106252 AND KAFB-106S10 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106/SS-111

October 2021

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Prepared for
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14. ABSTRACT

This Investigation Report for the installation of monitoring wells KAFB-106248 to KAFB-106252, and KAFB-106S10 is provided by Kirtland Air Force Base (AFB). It pertains to the Kirtland AFB Bulk Fuels Facility site at Solid Waste Management Units ST-106/SS-111, located in Albuquerque, New Mexico. This report was prepared in accordance with the corrective action provisions in Part 6 of the Resource Conservation and Recovery Act permit issued to Kirtland AFB by the New Mexico Environment Department (U.S. Environmental Protection Agency Identification Number NM 9570024423) and in accordance with applicable federal, state, and local laws and regulations. The objective of the report is to describe groundwater monitoring (GWM) well installation activities to address existing data gaps and to collect data to further the understanding of the contaminant migration pathway beneath the source area. Details on the installation of new wells and incorporation of those wells into the GWM program are provided in this report. The report was prepared under Kirtland AFB and U.S. Army Corps of Engineers review.

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KIRTLAND AIR FORCE BASE
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PREFACE

This Investigation Report for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 and KAFB-106S10 has been prepared by EA Engineering, Science, and Technology, Inc., PBC (EA) for Kirtland Air Force Base (AFB) under the U.S. Army Corps of Engineers Contract Number W9128F-13-D-0006, Delivery Order DM02. It pertains to the Kirtland AFB Bulk Fuels Facility site at Solid Waste Management Units ST-106/SS-111, located in Albuquerque, New Mexico. This Investigation Report was prepared in accordance with the Resource Conservation and Recovery Act permit issued to Kirtland AFB and applicable federal, state, and local laws and regulations.

This report contains data collected by EA itself as well as from other entities/sources that are not under EA's direct control (collectively "non-EA data"). All non-EA data reported herein are displayed in the form they were received from their source entity, and EA assumes no liability for the accuracy of any non-EA data in this report.

The objective of this report is to describe the activities associated with the installation of groundwater monitoring wells and a soil vapor monitoring well. The additional monitoring wells were installed to address data gaps and to further the understanding of the contaminant migration pathway beneath the source area.

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ACRONYMS AND ABBREVIATIONS

µg/L	microgram(s) per liter
µg/m³	microgram(s) per cubic meter
%	percent
AFB	Air Force Base
ARCH	air rotary casing hammer
BFF	Bulk Fuels Facility
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
DL	detection limit
DoD	Department of Defense
DRO	diesel range organics
EDB	1,2-dibromoethene or ethylene dibromide
EPA	U.S. Environmental Protection Agency
FFOR	Former Fuel Offloading Rack
ft	feet
GRO	gasoline range organics
GWM	groundwater monitoring
ID	inside diameter
IDW	investigation-derived waste
in.	inch(es)
J	estimated detect
KAFB	Kirtland Air Force Base
LNAPL	light non-aqueous phase liquid
LOD	limit of detection
LOQ	limit of quantitation
MCL	maximum contaminant level
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per liter
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer

ORO	oil range organics
PID	photoionization detector
ppmv	part(s) per million by volume
PVC	polyvinyl chloride
Q2	second quarter
Q4	fourth quarter
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RCRA permit	Hazardous Waste Treatment Facility Operating Permit EPA Identification Number NM 9570024423
RFI	RCRA Facility Investigation
Ridgecrest	Ridgecrest Drive S.E.
S.E.	Southeast
SSL	soil screening level
SVE	soil vapor extraction
SVM	soil vapor monitoring
SVMP	soil vapor monitoring point
SWMU	Solid Waste Management Unit
TPH	total petroleum hydrocarbon
U	non-detect
UJ	estimated non-detect
USACE	U.S. Army Corps of Engineers
UV	ultraviolet
VISL	vapor intrusion screening level
VOC	volatile organic compound
Work Plan	Work Plan for Data Gap Monitoring Well Installation
WQCC	Water Quality Control Commission

EXECUTIVE SUMMARY

This Investigation Report for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 and KAFB-106S10 has been prepared to describe the activities associated with the installation of five groundwater monitoring (GWM) wells and a soil vapor monitoring (SVM) well at Solid Waste Management Units ST-106/SS-111, Kirtland Air Force Base (AFB), New Mexico. The Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 (Kirtland AFB, 2019a), was approved with conditions by the New Mexico Environment Department (NMED) in a letter dated July 14, 2020 (NMED, 2020a). Per the approval conditions, a revised Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 and KAFB-106S10 (Kirtland AFB, 2020a) was submitted to NMED in September 2020. The activities presented in this report were performed in accordance with the revised approved Work Plan.

This report documents activities performed to provide additional data for the characterization and identification of contaminant migration pathways beneath the source area and address data gaps in the GWM network. This report was written to meet the requirements of Part 6.2.4.3 of the Kirtland AFB Resource Conservation and Recovery Act Permit U.S. Environmental Protection Agency Identification Number NM 9570024423 (NMED, 2010).

Activities performed during this investigation included soil coring and sampling, well installation and development, groundwater gauging and sampling, and soil vapor sampling for the newly installed wells. The work completed is presented under each of the tasks listed below:

- Two source area data gap wells were installed (KAFB-106S10 and KAFB-106V3). These wells were installed for two purposes: establish if the upper and lower clay layers were present between 250 and 300 feet (ft) below ground surface (bgs) in this area and further assess the lithology and contaminant concentrations in the source area. The source area data gap wells were cored and sampled from a depth of 230 ft bgs to total depth. Coring was performed to attempt to identify if a vertical offset was present that could create a preferential pathway to vertical migration of contaminants and to facilitate the collection of soil samples. One soil coring location was completed as a GWM well and a second soil coring location was completed as an SVM well based on the Work Plan Approval Letter (NMED, 2020a). The GWM location was completed with two nested wells to account for the rising water table. The inside diameter of the GWM wells is large enough to allow these wells to be actively pumped. The SVM well was completed with three well screens to monitor soil gas at 272, 15, and 7 ft bgs.

- The following four data gap GWM wells were installed: one north of Bullhead Park (KAFB-106248) and three located south and east of the source area (KAFB-106249 through KAFB-106251). These GWM wells were installed to address a data gap caused by the rising water table to monitor volatile organic compounds in the shallow groundwater.

- One extraction assessment well (KAFB-106252) was installed near extraction well KAFB-106234. This well was installed to assess the performance of the extraction well, monitor a gravel layer that is present at depth, and assess capture of 1,2-dibromoethane (ethylene dibromide or EDB) concentrations in the vicinity of the extraction well.

The lithology in each of the boreholes was logged by an experienced geologist. In general, soils observed within the data gap GWM and extraction assessment wells were consistent with previous investigations. The soils observed in KAFB-106V3 and KAFB-106S10 were also generally consistent with previously recorded site lithology observed in the source area. The lower clay unit was observed from 270 to

281 ft bgs in KAFB-106V3 and KAFB-106S10. Based on cross sections included in this report, the thickness of this clay unit varies at each borehole but was consistently present over the Bulk Fuels Facility (BFF) and north of the BFF. This clay unit ultimately pinched out completely to the north (e.g., absent near the Base boundary and north of the Base boundary).

Field screening data obtained from soil samples collected from the source area data gap wells were also generally consistent with data collected from previous boreholes. Elevated photoionization detector (PID) readings (greater than 100 parts per million by volume [ppmv]) were observed to be present above and within the clay unit found at 270–281 ft bgs in KAFB-106V3 and KAFB-106S10. In addition, high PID readings (greater than 1,000 ppmv) were associated with local historic water levels at KAFB-106S10. Field screening data collected from the data gap and extraction assessment wells did not indicate the presence of significant hydrocarbon concentrations in samples collected from wells KAFB-106248 through KAFB-106252.

The highest benzene concentration (1.6 milligrams per kilogram [mg/kg]) and total benzene, toluene, ethylbenzene, and total xylenes (9.12 mg/kg) in soil samples was found at a depth of 480 ft bgs in KAFB-106S10. The highest total petroleum hydrocarbon (135 mg/kg) concentration in soil samples was observed at a depth of 470 ft bgs in KAFB-106S10.

Soil vapor concentrations of EDB and benzene exceeded the residential vapor intrusion screening levels (VISLs) in each of the well screens in KAFB-106V3. Concentrations of EDB were 6.8, 12, and 17 micrograms per cubic meter ($\mu g/m^3$) in well screens at 7, 15, and 272 ft bgs, respectively (NMED residential VISL for EDB is 1.56 $\mu g/m^3$). Concentrations of benzene were 260, 160, and 200 $\mu g/m^3$ in well screens at 7, 15, and 272 ft bgs, respectively (NMED residential VISL for benzene is 120 $\mu g/m^3$). No other soil vapor concentrations exceeded the residential VISL.

This SVM location is located on-Base within the BFF; therefore, the soil vapor concentrations exceeding the residential VISL were also compared to the industrial VISLs. Benzene concentrations were below the industrial VISL of 588 $\mu g/m^3$ and the EDB concertation at 7 ft bgs was below the industrial VISL of 7.65 $\mu g/m^3$. VISLs are intended to be screened against soil vapor samples collected from below building foundations (sub slab samples). Screening VISLs to the concentrations measured in the shallow (7 and 15 ft bgs) soil vapor monitoring points (SVMPs) is more applicable to the intended use of VISLs than screening levels for the deeper SVMP located at 272 ft bgs. It is likely that the elevated concentrations observed in the shallow SVMPs are due to subsurface vapor disturbance caused by the air rotary drilling used to install the SVM well. These points will continue to be sampled during the regular semi-annual monitoring events.

Groundwater concentrations observed from samples collected in KAFB-106S10 were consistent with nearby source area wells. Benzene concentrations in KAFB-106250 slightly exceeded the project screening level (5 micrograms per liter) at 8.1 micrograms per liter. Concentrations of volatile organic compounds from other wells installed during this investigation were below their respective project screening levels.

The data collected during this investigation have provided additional lithologic information in the source area and filled data gaps associated with rising groundwater levels. In addition, the source area lithology, soil, soil vapor, and groundwater concentration data collected from this investigation are consistent with data collected from previous investigations. Based on this, it appears that additional soil coring or geophysical data collected in the source area would not provide any new information.

The source area lithology, soil vapor, and groundwater data collected from this investigation are consistent with data collected from previous investigations. Based on this, the investigation phase of this project is coming to an end. The nature and extent of contamination have been defined to the extent necessary to perform the Corrective Measures Evaluation. It is recommended that no additional investigations be performed in the source area and to begin drafting the Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Phase II Report. The Phase II RFI Report will summarize the ending of the investigation phase and demonstrate that the nature and extent of contamination are defined to the extent necessary to inform the Corrective Measures Evaluation. However, if there are additional data gaps identified from routine monitoring data evaluation or from changing site conditions, those additional data gaps will be addressed as part of the corrective action process.

1. INTRODUCTION

This Investigation Report for Data Gap Monitoring Well Installation has been prepared to describe the activities associated with the installation of groundwater monitoring (GWM) wells and a soil vapor monitoring (SVM) well at Bulk Fuels Facility (BFF) Release Site Solid Waste Management Units (SWMUs) ST-106/SS-111. SWMUs ST-106/SS-111 are located at Kirtland Air Force Base (AFB) in Bernalillo County, New Mexico (Figure 1-1). Kirtland AFB is located southeast of, and adjacent to, the City of Albuquerque and the Albuquerque International Sunport (airport). The approximate area of the base is 52,287 acres. The BFF (Site) is in the northwestern portion of Kirtland AFB (Figure 1-1).

Environmental restoration efforts at the BFF are being performed pursuant to the corrective action provisions in Part 6 of the Resource Conservation and Recovery Act (RCRA) Permit Number NM9570024423 (RCRA Permit). The New Mexico Environment Department (NMED) is the lead regulatory agency (NMED, 2010).

This report documents activities performed to provide additional data for the characterization and identification of contaminant migration pathways beneath the source area and to address data gaps in the GWM network. The Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 (Kirtland AFB, 2019a [Work Plan]) was approved with conditions by NMED in a letter dated July 14, 2020 (NMED, 2020a). Per the approval conditions, a revised Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 and KAFB-106S10 was submitted to NMED in September 2020 (Kirtland AFB, 2020a). The activities presented in this report were performed in accordance with the revised approved Work Plan. A discussion of work plan revisions and approvals can be found in Section 3.2.

Activities performed during this investigation included soil coring and sampling, well installation and development, groundwater gauging and sampling, and soil vapor sampling for the newly installed wells. The work completed is presented under each of the tasks listed below:

- Two source area data gap wells were installed (KAFB-106S10 and KAFB-106V3). These wells were installed for two purposes: establish if the upper and lower clay layers were present between 250 and 300 feet (ft) below ground surface (bgs) in this area and further assess the lithology and contaminant concentrations in the source area. The source area data gap wells were cored and sampled from a depth of 230 ft bgs to total depth. Coring was performed to attempt to identify if a vertical offset was present that could create a preferential pathway to vertical migration of contaminants and to facilitate the collection of soil samples. One soil coring location was completed as a GWM well and a second soil coring location was completed as an SVM well based on the Work Plan Approval Letter (NMED, 2020a). The GWM location was completed with two nested wells to account for the rising water table. The inside diameter (ID) of the GWM wells is large enough to allow these wells to be actively pumped. The SVM well was completed with three well screens to monitor soil gas at 272, 15, and 7 ft bgs.

- The following four data gap GWM wells were installed (Figure 1-2): one north of Bullhead Park (KAFB-106248) and three located south and east of the source area (KAFB-106249 through KAFB-106251). These GWM wells were installed to monitor volatile organic compounds (VOCs) in groundwater at the water table.

- One extraction assessment well (KAFB-106252) was installed near extraction well KAFB-106234 (Figure 1-2). This well was installed to assess the performance of the extraction well, monitor a gravel layer that is present at depth, and assess capture of 1,2-dibromoethane (ethylene dibromide or EDB) concentrations in the vicinity of the extraction well.

1.1 Document Purpose and Scope

This report was prepared to meet the requirements of Part 6.2.4.3 of the RCRA Permit, "Investigation Reports" for SWMUs ST-106/SS-111 located at Kirtland AFB. This report follows the format and other requirements as set forth in the NMED letter dated September 2, 2020 (NMED, 2020b). Activities outlined in this report include drilling, sampling, and installing six new GWM wells and one SVM well in the source area and managing investigation-derived waste (IDW). The investigation was performed to further characterize the subsurface in the source area and to install data gap GWM wells.

2. BACKGROUND INFORMATION

2.1 Bulk Fuels Facility Operational History

The BFF at Kirtland AFB became operational in 1953, and has been used over time for the storage of aviation gasoline, jet propellant-4, jet propellant-8, and smaller amounts of diesel fuel and unleaded gasoline. Jet fuel was offloaded from railcars or tanker trucks to the Former Fuel Offloading Rack (FFOR), pumped through underground pipelines to the pump house, and then to large fuel storage tanks at the BFF. Releases were discovered in November 1999 when fuel staining was observed on the ground surface at the FFOR. Based on the chemical composition of the fuels stored and used at the BFF, the releases are estimated to have begun prior to 1975, when the BFF transitioned from aviation gasoline to jet propellant-4. Of the fuels stored and used at the BFF, only aviation gasoline contained EDB as an additive. When the fuel release was discovered in November 1999, the FFOR was closed, and a temporary fuel offloading area was constructed and used during the construction of aboveground infrastructure. Replacement of the infrastructure was finished in March 2011 and includes aboveground storage tanks and pipeline with leak detection and containment measures (Kirtland AFB, 2018). The current and former infrastructure for the BFF is shown on Figure 2-1.

2.2 Previous Investigations and Interim Measures

Vadose zone activities and interim measures began with an excavation in November 1999 to remove contaminated surface soil and a soil investigation at the FFOR area in early 2000 to investigate the nature and extent of shallow and deep soil contamination. Vadose zone investigation activities included additional source area investigations, installing, and sampling SVM and soil vapor extraction (SVE) locations and implementing SVE systems as an interim measure.

GWM activities have been ongoing at the site since 2000. In this document, fuel contamination that is not dissolved in groundwater is referred to as light non-aqueous phase liquid (LNAPL). In February 2007, an approximately 1.4-ft-thick layer of LNAPL was discovered on the water table at GWM well KAFB-106005 located to the northeast of the source area. Following this discovery, additional interim measures were implemented concurrent to the continued investigation of the nature and extent of contamination. These interim measures included expanding the SVE system, additional soil investigations, and other LNAPL and groundwater interim measures. Kirtland AFB learned through these characterization actions that the released fuel had reached the groundwater beneath or very near the source area and that the dissolved-phase fuel contamination had migrated north and northeast of Kirtland AFB. A skimmer system was installed in well KAFB-106005 and was operational from June 2007 through August 2008. During the skimmer operations, approximately 280 gallons of LNAPL was accumulated in the storage vessels at the site and periodically transported and disposed of offsite. To achieve more efficient LNAPL removal, the skimmer system was replaced by modified bioslurping systems with internal combustion engine vacuum extraction units to further the removal of LNAPL from the water table (Kirtland AFB, 2018).

Bioslurping employs vacuum removal systems, differing from SVE in that a small diameter drop pipe is installed to just above the water table to volatilize LNAPL directly from the water table (Kirtland AFB, 2018). Kirtland AFB implemented individual bioslurping systems at KAFB-106005 (August 2008) and at KAFB-106006 and KAFB-106008 (March 2009). The three bioslurping systems were operational at these locations until the third quarter 2011. Approximately 225,000 equivalent gallons of LNAPL was removed by these systems during their operation from vacuum extraction and biodegradation combined. These units were subsequently moved to other wells to perform SVE activities. SVE activities were halted in 2016 due to declining emissions and the equipment was decommissioned.

As of the second quarter (Q2) 2021, the GWM network consisted of 173 wells. Select wells were identified for more frequent monitoring of risk-driving constituents (Kirtland AFB, 2019b). GWM data are evaluated in quarterly periodic monitoring reports, which describe current site conditions and assess the performance of interim measures.

Interim measures have been implemented in accordance with Part 6.2.2.2.12 of the RCRA Permit for both groundwater and soil, including a groundwater treatment system, which was constructed in 2015. The goal of this interim measure was to protect drinking water supply wells and collapse the distal, dissolved-phase EDB plume north of Ridgecrest Drive Southeast (S.E.) (Ridgecrest) in the Interim Measure Operational Area. The source area plume is located south of Ridgecrest. (Figure 1-2). EDB is the only constituent regularly detected above its maximum contaminant level (MCL) north of Ridgecrest. South of Ridgecrest, fuel constituents in addition to EDB are detected in exceedance of their respective MCLs.

A Data Gap Investigation was performed in 2018 that included the installation of six GWM wells. These wells were located to fill data gaps in the GWM network due to the submergence of existing well screens caused by the rising water table. Each nested well (KAFB-106241 through KAFB-106245) was constructed with one well screened across the water table and one contingency well to function in the future with the rising groundwater elevations. A completion report for the installation of these wells was submitted to NMED in September 2020 (Kirtland AFB, 2020b).

The Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling was submitted to NMED in December 2017 to address the data gaps of the horizontal and vertical extent of LNAPL caused by the fluctuating water table (Section 1.0 of Kirtland AFB, 2017). The Source Zone Characterization Report Revision 1 was submitted to NMED in April 2021 (Kirtland AFB, 2021). A total of 11 continuous core locations (including one background location) were advanced to characterize hydrocarbon concentrations within the vadose and saturated zones. These coring locations were all advanced south of Ridgecrest in the source area where LNAPL had historically been measured associated with SWMUs ST-106/SS-111 (Figure 1-2).

Following soil sampling, nine boreholes were converted to two-well nested GWM wells, and two locations were constructed as six-screen SVM well locations (Figure 1-2). The identifiers for these wells are KAFB-106S1 through KAFB-106S5, KAFB-106S7 through KAFB-106S9, and KAFB-106247. The Source Zone Characterization Report Revision 1 (Kirtland AFB, 2021), currently in review by NMED, describes the complete suite of analyses performed to characterize LNAPL in the soil cores collected from these boreholes.

The data from the Source Zone Characterization Report Revision 1 (Kirtland AFB, 2021) indicates that the fuel migrated vertically through mostly permeable non-cohesive soil by gravity drainage from the release point to a clay layer encountered around 260–270 ft bgs. Upon encountering the clay layer, the fuel saturated the soil above the clay, resulting in increased hydraulic head that eventually overcame the capillary pressure of pore water in the clay porosity. Once this pressure was overcome, LNAPL migrated into and through the clay layer (ITRC-3, 2018). Not only did the hydraulic head that built up drive the LNAPL into and through the clay, it spread LNAPL laterally on the clay layer as a saturated fluid. Laterally, LNAPL may have pooled with sufficient hydraulic head to penetrate the clay elsewhere. Once the LNAPL entered the clay, structural changes to the clay facilitated greater permeability and ability to transmit the LNAPL through the clay to the underlying permeable soil. This mechanism is contrary to the concept that the clay formed an impermeable layer to the LNAPL, LNAPL migrated vertically through the clay, and laterally through the clay by capillarity. A “hole” or other discontinuity in the clay layer is not required to explain the deeper migration of LNAPL to the water table.

Vertical downward migration appears to have continued until the LNAPL intercepted the groundwater table. Dissolved-phase EDB and benzene plumes then developed and migrated northward according to the local historical groundwater gradient. The LNAPL migrated as far north as USS Bullhead Memorial Park. As the groundwater decreased in elevation, transport would have followed the LNAPL gradient created by the continued drainage and favored the groundwater gradient.

2.3 Site Hydrogeology

In general, the site is underlain by approximately 200 ft of relatively fine-grained alluvial fan deposits, with some alternating and laterally discontinuous coarse-grained zones. Underlying these easterly derived alluvial fan deposits are relatively coarse-grained Ancestral Rio Grande deposits, with few laterally discontinuous fine-grained zones (Kirtland AFB, 2018).

Coarse-grained, Ancestral Rio Grande deposits with northeast-southwest oriented channel axis are interbedded with fine-grained silt and clay units. These deposits have been structurally tilted to the east due to generally down-to-the east faulting along the Sandia Mountains. Braided deposits at the site are more restrictive in the transverse axis of the deposition channel (east-west), and less restrictive in the longitudinal axis (north-south). However, this geologic control is secondary to hydrologic controls on groundwater flow direction.

Two fine-grained clay-rich layers called A1 and A2 are present with the axial Ancestral Rio Grande fluvial deposits throughout the Albuquerque area (Kirtland AFB, 2018). The A1 and A2 clay-rich layers are present at the site as laterally continuous fine-grained zones. The thicknesses of A1 and A2 range from approximately 50 to 200 ft and are observed across the site, extending north of the Ridgecrest well field. These A1 and A2 layers create confining conditions within the aquifer and, beneath these clays, groundwater occurs under confined conditions. Though these confining beds play a key role in the transport of dissolved-phased contaminants, flow direction of the dissolved-phase groundwater plumes is largely influenced by the hydraulic gradient introduced by operation of the production wells.

3. REGULATORY CRITERIA

This investigation of the Kirtland AFB BFF release was implemented pursuant to the corrective action provisions in Kirtland AFB's RCRA Permit (NMED, 2010). This permit is enforced by NMED's Hazardous Waste Bureau, which is authorized to administer the RCRA Permit by the U.S. Environmental Protection Agency (EPA). This investigation was conducted in accordance with the approved documents discussed in Section 1. Relevant regulatory correspondence for this Investigation Report is provided in Appendix A-1. A crosswalk table between the RCRA Permit reporting requirements and this Investigation Report is provided as Appendix A-2.

3.1 Regulatory Standards and Project Screening Levels

The following applicable regulatory standards and project screening levels are applied to assess the data collected during this investigation conducted at SWMUs ST-106/SS-111:

- Table 6-2 of the NMED Risk Assessment Guidance for Site Investigations and Remediation, Volume 1 Screening Guidance for Human Health Risk Assessments (NMED, 2019a) provides residential screening levels for soil total petroleum hydrocarbons (TPH) gasoline range organics (GRO) (100 milligrams per kilogram [mg/kg]), TPH-diesel range organics (DRO) (1,000 mg/kg), and TPH motor oil (1,000 mg/kg). Table A-1 of the guidance provides residential soil screening levels for benzene (17.8 mg/kg), toluene (5,230 mg/kg), ethylbenzene (75.1 mg/kg), total xylenes (871 mg/kg), and EDB (0.672 mg/kg). The approved Work Plan (Kirtland AFB, 2020a) required that soil samples be collected for TPH and compared to NMED soil screening levels (SSLs). VOCs were not required to be analyzed for soil samples by the approved Work Plan (Kirtland AFB, 2020a), but were analyzed to provide data consistent with the Source Zone Characterization Report Revision 1 (Kirtland AFB, 2021) (see Section 4.1.4 Deviations to the Work Plan below).

  A comparison to NMED SSLs of the above listed constituents is included within this report for consistency with the requirements of the approved Work Plan (Kirtland AFB, 2020a). However, the SSLs presented are not applicable because site conditions depart substantially from the conceptual model used to derive the soil leaching to groundwater SSLs. The depth of the soil samples collected in this investigation makes the soil leachate pathway the appropriate SSL; however, limitations in Section 4.5 of NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2019a) are not all satisfied, including: (1) the significant vadose zone thickness provides potential significant attenuation for leaching, and (2) LNAPL is present. Development of site-specific SSLs for the protection of groundwater may be developed in accordance with Section 4.7 (NMED, 2019a) during the Corrective Measure Evaluation. Due to this, the SSLs are being presented for comparison purposes only. In addition, only SSLs for contaminants of potential concern (benzene, toluene, ethylbenzene, and total xylenes [BTEX] and EDB) and TPH as required by the approved Work Plan (Kirtland AFB, 2020a) are provided.

- As stated in NMED Comment #4 Quarterly Monitoring Report for April-June 2019, dated July 2020 (NMED, 2020c), the Permittee must provide a comparison of detected concentrations to a regulatory standard for the purpose of assessing the presence and location of contaminants of potential concern. NMED's Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2019a) vapor intrusion screening levels (VISLs) must be used as a first-tier screening assessment. NMED VISLs were calculated using EPA default attenuation factors, which are based on conservative assumptions and empirical data. VISLs are intended to be used to screen against soil vapor samples collected from below building foundations (sub-slab samples). Due to this, the VISLs have been provided for soil vapor samples collected from KAFB-106V3 at depths of 7 and 15 ft bgs. NMED VISLs are not appropriate screening levels for deeper soil vapor monitoring points (SVMPs) and are provided in this report for comparison purposes only. Kirtland AFB is currently in coordination with the U.S. Army Corps of Engineers (USACE)–Albuquerque District to determine the most appropriate screening criteria for evaluating soil vapor at depth at the Kirtland BFF. Pending resolution, data will be screened in the agreed-upon manner in future reports.

- For groundwater samples collected quarterly from GWM wells, concentrations are screened against the cleanup levels for contaminants in groundwater as provided in Part 6.2.3.1 of the RCRA Permit (NMED, 2010):
    - The lowest of the:
        - New Mexico Water Quality Control Commission (WQCC) standard for Groundwater of 10,000 milligrams per liter [mg/L]) Total Dissolved Solids Concentration or Less (New Mexico Administrative Code [NMAC], Title 20, Chapter 6, Part 2, Section 3103 (20.6.2.3103 NMAC). For metals, the New Mexico WQCC standard applies to dissolved metals.
        - The most up-to-date EPA primary drinking water regulations (40 Code of Federal Regulations [CFR] Part 141, 1975) and secondary drinking water regulations (40 CFR Part 143, 1979) adopted by EPA under the Safe Drinking Water Act (42 U.S. Code §300f et seq., 1974).
        - If no Federal MCL or New Mexico WQCC standard exists for an analyte, the project screening level used is the EPA Residential Tap Water Regional Screening Level (EPA, 2020).

3.2 Regulatory Correspondence and Permit Requirements

A meeting was held between the U.S. Air Force and NMED on September 26, 2019, to discuss the potential to use some of the proposed wells for multiple purposes to address other data gaps and further characterize the source area migration pathway through the vadose zone east of the FFOR. Based on this meeting, NMED issued a requirement to submit a well installation work plan in a letter dated November 4, 2019 (NMED, 2019b). A work plan for data gap monitoring well installation was submitted to NMED in December 2019 (Kirtland AFB, 2019a).

The U.S. Air Force and NMED met on May 28, 2020, to discuss relocating wells closer to the source area and NMED described the changes in the scope of work via email on June 1, 2020 (NMED, 2020d). The work plan was approved with modifications on July 14, 2020 (NMED, 2020a). A revised work plan, based on the approval with modifications letter, was submitted to NMED on September 2, 2020 (Kirtland AFB, 2020a).

NMED provided several comments to the draft Source Zone Characterization Report (Kirtland AFB, 2021) requesting revised geologic cross sections and additional discussion regarding the presence of the clay layers located within the subsurface of the site. The response to these comments was deferred to this report so that the data obtained could provide a more comprehensive response. A crosswalk table for these comments and the location of these data can be found in Appendix A-2.

3.3 Analytical Reporting Limits

To satisfy Department of Defense (DoD) contractual project requirements, groundwater and soil vapor sample analyses were performed in accordance with DoD Quality Systems Manual (QSM) Version 5.3 (DoD and Department of Energy, 2019) per contract requirements and as applicable to the analytical method. DoD QSM reporting limit requirements include (1) detection limit (DL), (2) limit of detection (LOD), and (3) limit of quantitation (LOQ). The DoD DL is commonly associated with the EPA method DL and is the lowest concentration at which an analyte can be detected per the analytical method. The DoD LOD is commonly associated with the EPA sample-specific reporting limit, the limit at which the detected analyte is reported with 99 percent (%) confidence. The DoD LOQ is associated with the EPA practical quantitation limit, the limit at which an analyte can be reported with 100% confidence and according to the method precision and accuracy. Per DoD QSM reporting requirements, sample results below the LOQ and above the DL are reported with a “J” qualifier, signifying estimated data; however, the “J” qualifier may be used for analytical results above the LOQ that are estimated for other reasons. Non-detect sample results are reported with a “U” qualifier at the LOD.

4. SCOPE OF ACTIVITIES

This section discusses the work tasks associated with drilling, soil sampling, GWM well installation, SVM well installation, baseline water quality sampling, and baseline soil vapor sampling for newly installed wells KAFB-106248 to KAFB-106252, KAFB-106S10, and KAFB-106V3. This section also describes the IDW and deviations from the Work Plan. The locations of the wells installed during this investigation are shown on Figure 1-2. A description of the field methods used during this investigation is provided in Appendix B.

Drilling, sampling, and well construction were performed from November 8, 2020, to March 22, 2021. Well development was performed from December 24, 2020, to March 26, 2021. Well sampling was performed from December 30, 2020, to April 5, 2021. The initial soil vapor samples from KAFB-106V3 were collected on April 20, 2021. Wells installed as part of this investigation included source area data gap wells (KAFB-106S10 and KAFB-106V3), GWM data gap wells (KAFB-106248 to KAFB-106251), and an extraction assessment well (KAFB-106252). Source area data gap wells were installed for two purposes. The first was to establish if the upper and lower clay layers were present between 250 and 300 ft bgs. Directly below the FFOR, the clay occurs as a single layer at approximately 275–300 ft bgs (lower clay). East-southeast of the FFOR, the clay occurs as a single layer at a depth of approximately 250 ft bgs (upper clay). The source area data gap wells were cored from a depth of 230 ft bgs to total depth to identify if a vertical offset was present that could create a preferential pathway to vertical migration of contaminants. The second purpose of the source area data gap wells was to further assess the lithology and contaminant concentrations in the source area.

GWM data gap wells were installed to provide EDB concentration data at the water table as groundwater elevations continue to rise. The extraction assessment well was installed to assess the performance of extraction well KAFB-106234 for semiannual plume capture evaluation of the EDB plume north of Ridgecrest as well as to inform the Corrective Measures Evaluation.

Soil and groundwater samples that were collected for this investigation were analyzed for TPH using EPA Method SW8015D. Soil samples were analyzed by Eurofins TestAmerica and groundwater samples were analyzed by Eurofins Lancaster Laboratories Environmental. TPH was reported as GRO with a carbon range of C6-C10, and DRO with a carbon range of C10-C28 for both soil and water sample analyses. In addition to reporting GRO and DRO, TPH-motor oil with a carbon range of C20-C38 was reported for soil samples, and oil range organics (ORO) with a carbon range of C28-C40 for groundwater samples (see Section 4.1.4 Deviations from Work Plan) were also reported. Laboratories report the extended hydrocarbon range past DRO using various carbon ranges and with laboratory-specific parameter designations to signify the oil range.

TPH-motor oil and ORO are both terms used to report the extended range of hydrocarbons beyond the DRO carbon range although the TPH-motor oil range overlaps slightly with the TPH-DRO carbon range. The data reported from both the TPH-motor oil and TPH-ORO can be considered comparable for reporting the TPH oil range extending past DRO range. However, for this report, the term “TPH-Motor Oil” refers to the extended TPH range in soil and the term “ORO” refers to the extended TPH range in groundwater. These terms are consistent with the terms used by the respective laboratories.

4.1 Source Area Data Gap Wells (KAFB-106V3 and KAFB-106S10)

Source area data gap wells KAFB-106V3 and KAFB-106S10 were installed in accordance with the approved Work Plan (Kirtland AFB, 2020a) and subsequent direction from NMED (Figure 1-2). Daily Quality Control Reports were completed and are provided in Appendix C. The Work Plan called for one borehole to be advanced to 300 ft bgs to determine the depth of the clay layer located between 250 and 300 ft bgs. A NMED representative was present at the Site when sonic coring occurred at these depths to review the soil cores. Based on the depth of the upper and lower clay layers, a second borehole (KAFB-106S10) was advanced as requested by NMED. The following scope of activities was completed for the source area data gap wells:

- The boreholes were advanced to a depth of approximately 230 ft bgs using the air rotary casing hammer (ARCH) drilling method. Once a depth of 230 ft was reached, the remainder of the borehole was cored using the sonic drilling method to the total depth of the borehole.

- The first borehole (originally called KAFB-106S10 and later renamed KAFB-106V3) was advanced to 300 ft bgs to determine the depth of the clay layer located between 250 and 300 ft bgs and the lithologic log for the borehole was provided to NMED for their review. Based on finding the lower clay layer at 270.5–280 ft bgs, a second borehole was required by NMED to be drilled and the first borehole was completed as a nested SVM well with three individual SVMPs to monitor depths from 267 to 272 ft bgs, from 13 to 15 ft bgs, and from 5 to 7 ft bgs. The deepest SVMP (267–272 ft bgs) was installed across the clay layer to allow for periodically checking for the presence of fluids across the top of the clay. Approximately 6 inches (in.) of water was observed in the sump following the installation of this SVMP that was gauged on November 20, 2020 (Appendix C). This SVMP will be periodically gauged in the future and the data reported in the periodic monitoring reports.

- The location of the second borehole (Figure 1-2) was provided by NMED on a figure in an email dated November 16, 2020 (NMED, 2020e). The second borehole was originally identified as KAFB-106S10A during the fieldwork and later renamed KAFB-106S10. During drilling of the second borehole (KAFB-106S10), the lower clay layer was encountered at depths of 274–280 ft bgs. This borehole was cored and advanced to a depth of 10 ft below a heated headspace field screening reading that was less than 10 parts per million by volume (ppmv [total depth of 517 ft bgs]) as per the approved Work Plan (Kirtland AFB, 2020a). The borehole was converted to a nested GWM well including a lower water table well and a higher contingency well.

- Lithologic logging was performed in accordance with ASTM International D5434-12. A lithologic log for each borehole is provided in Appendix D. Lithology was logged from drill cuttings at a minimum of every 5 ft in borehole intervals advanced with ARCH drilling and continuously from core samples in borehole intervals advanced with sonic coring.

- The temperature of the core was monitored and recorded (see Appendix E for core temperature logs) and the core was photographed (see Appendix F for core photographs).

- Field screening (Appendix B-1.5) for the presence of hydrocarbons in soil cuttings and cores was performed at a minimum of every 10 ft during drilling using the heated headspace method (see Section 6.2 below).

- Soil samples were collected from the core every 10 ft and analyzed for TPH-GRO, TPH-DRO, and TPH-motor oil range by EPA Method 8015D and for VOCs by EPA Method 8260B/C.

- Upon completion of the wells, they were geophysically logged using Dual Induction, Gamma Ray, and Neutron downhole logging tools.

- Baseline soil gas samples were collected from the SVM well and analyzed for VOCs by Method TO-15.

- Baseline groundwater samples were collected from KAFB-106S10 and analyzed for VOCs by EPA Method 8260B/C, EDB by EPA Method 8011, TPH by EPA Method 8015D, metals by EPA Method 6010C and 6020A, anions by EPA Method 300.0 and 353.2, and alkalinity by EPA Method 2320B. Seven additional baseline events will be performed in the future as part of the quarterly Periodic Monitoring events. Data from these events will be included in the corresponding Periodic Monitoring Report.

4.1.1 Groundwater Monitoring Data Gap Wells (KAFB-106248 to KAFB-106251)

GWM data gap well locations are displayed on Figure 1-2. KAFB-106248 was installed to the north of U.S.S. Bullhead Memorial Park. This location was selected to provide contaminant data at the water table to the east of the EDB plume. KAFB-106249 was installed in the parking lot of the Air National Guard adjacent to existing well KAFB-106046. This well was installed to provide water table EDB and benzene data to the east of the source area. KAFB-106250 was also installed on Air National Guard property to provide water table EDB and benzene data to the southeast of the source area. GWM well KAFB-106251 was installed south of the former fuel tanks in the BFF to provide water table data for the southern EDB and benzene plume extents. The following scope of activities was completed for the GWM data gap wells:

- The GWM data gap boreholes were advanced using the ARCH drilling method.

- Lithologic logging was performed in accordance with ASTM International D5434-12 (Appendix D). Lithology was logged from cyclone cuttings at a minimum of every 5 ft.

- Field screening for the presence of hydrocarbons in soil cuttings and cores was performed at a minimum of every 10 ft during drilling using the heated headspace method (see Section 6.2 below).

- The GWM data gap wells were constructed as a nested monitoring well including a lower water table well and a higher contingency well. The diameter of the wells was selected to be large enough to allow these wells to be sampled using a downhole pump.

- Baseline groundwater samples were collected and analyzed for VOCs by EPA Method 8260B/C, EDB by EPA Method 8011, TPH by EPA Method 8015D, metals by EPA Methods 6010C and 6020A, anions by EPA Methods 300.0 and 353.2, and alkalinity by EPA Method 2320B. Seven additional baseline events will be performed in the future as part of the quarterly Periodic Monitoring events. Data from these events will be included in the corresponding Periodic Monitoring Report.

4.1.2 Extraction Assessment Well (KAFB-106252)

KAFB-106252 was installed to serve as an additional data point to assess the performance of extraction well KAFB-106234 (Figure 1-2). Specifically, this location was selected to refine the assessment of residual mass of EDB around extraction well KAFB-106234 as well as better define the cone of depression. These data will be used for semiannual plume capture evaluation of the EDB plume north of

Ridgecrest and the corrective measures evaluation. The following scope of activities was completed for the extraction assessment well:

- The extraction assessment boreholes were advanced using the ARCH drilling method.
- Lithologic logging was performed in accordance with ASTM International D5434-12 (Appendix D). Lithology was logged from cyclone cuttings at a minimum of every 5 ft.
- Field screening for the presence of hydrocarbons in soil cuttings and cores was performed at a minimum of every 10 ft during drilling using the heated headspace method (see Section 6.2 below).
- The extraction assessment well was constructed as a nested monitoring well including a lower water table well and a higher contingency well, and an additional piezometer to assess the effect of a gravel layer that is believed to be influencing the groundwater elevation at GWM well KAFB-106225.
- A baseline groundwater sample was collected and analyzed for VOCs by EPA Method 8260B/C, EDB by EPA Method 8011, TPH by EPA Method 8015D, metals by EPA Methods 6010C and 6020A, anions by EPA Methods 300.0 and 353.2, and alkalinity by EPA Method 2320B.

4.1.3 Investigation-Derived Waste

Waste generated from drilling, development, and sampling activities included non-hazardous liquids, hazardous waste, special waste solids, and non-hazardous solids. Information regarding IDW accumulation, utilization of the Kirtland AFB groundwater treatment system, and other IDW processes are described in Appendix G.

4.1.4 Deviations to the Work Plan

Subsurface conditions encountered while drilling the initial borehole for well KAFB-106251 caused the drill casing to be stuck in the subsurface, which could then not be retrieved. The boring in this location was plugged in accordance with New Mexico Office of the State Engineer's (NMOSE's) requirements and a new borehole was drilled for the installation of KAFB-106251. Further discussion of this plugging and abandonment is provided in Section 5.5.5.

Although not required by the work plan, the soil samples collected from KAFB-106S10 and KAFB-106V3 were also analyzed for VOCs by EPA Method 8260B/C.

Soil coring was to be completed within set temperature parameters (less than or equal to 20 degrees Celsius). However, due to the inherent nature of the sonic drilling method to create heat while coring, some of the samples exceeded this temperature parameter. Remedial efforts included cooling the core barrel with dry ice, limiting the coring run length, changing the vibration and rotation speed of the coring, and adding minimal amounts of water as required by the Work Plan Approval Letter (NMED, 2020a).

While not specifically required by the approved Work Plan (Kirtland AFB, 2020a), groundwater samples were analyzed for ORO TPH in wells located only in the vicinity of the benzene plume, (GWM wells KAFB-106249 through KAFB-106251 and KAFB-106S10 [Section 6.6]).

It is not anticipated that any of these deviations have affected the quality of the data collected for this investigation. Soil sample handling procedures (see Section 5.2.1.2, below) included collecting the soil samples in laboratory-provided containers immediately after the core sleeve was opened to minimize the loss of VOCs and storing the samples on ice and shipping the samples to the analytical laboratory on ice. These sample handling procedures were performed to minimize the impact of heat on samples that were collected with temperatures exceeding 20 degrees Celsius.

4.1.5 Well Nomenclature

Note that when discussing monitoring well borings or locations, the well number is used (e.g., KAFB-106248). However, when discussing a specific well screen within that well, the depth below ground surface to the top of the well screen is added after the well number (e.g., well screen KAFB-106248-453). The hyphenated number represents the top of the well screen in GWM wells and the bottom of the well screen in SVM wells.

5. FIELD INVESTIGATION RESULTS

Tasks performed for this investigation included drilling, soil sampling, geophysical logging, installing six GWM wells, installing one new SVM well, collecting groundwater and soil vapor samples, and management of IDW. The following summarizes the field investigation results.

5.1 Surface Conditions

The topography within the BFF and GWM network is predominantly flat. Surfaces consist of gravel, soil, and paved roads. There are currently two aboveground storage tanks and various buildings for operation of the BFF. Off-Base wells are located on the Raymond G. Murphy Veterans Affairs Medical Center property, within U.S.S. Bullhead Park, and within City of Albuquerque streets in residential areas.

5.2 Exploratory Drilling Investigation

Source area data gap wells (KAFB-106S10 and KAFB-106V3) were advanced to the top of the approved coring interval (230 ft bgs) with the ARCH drilling method using 9-5/8-in. casing. The sonic drilling method was then employed using 6-in. diameter sonic casing and a 4-in. diameter core barrel. Coring was performed to the total depth of each borehole. Following coring of KAFB-106V3, the 9-5/8-in. casing was advanced to total depth to facilitate well construction. Following coring of KAFB-106S10, the 9-5/8-in. diameter casing was removed from the borehole and 13-3/8-in. casing was advanced to a depth of approximately 200 ft bgs using the ARCH drilling method. Following the placement of the 13-3/8-in. diameter casing, 11-¾ -in. casing was advanced to the total depth of the borehole (517 ft bgs) to facilitate construction of the nested well.

The GWM data gap wells (KAFB-106248 to KAFB-106251) and extraction assessment well (KAFB-106252) were installed using the ARCH drilling method. Boreholes for each well were advanced using 13-3/8-in. casing diameter to approximately 200 ft bgs, depending on site conditions; thereafter, 11-¾ -in. casing diameter was advanced to the total depth of each borehole. The sample depths for each boring are provided on Table 5-1.

5.2.1 Field Screening and Soil Sampling

5.2.1.1 Field Screening Procedure and Results

During ARCH drilling, field screening soil samples were taken every 10 ft from soil cuttings collected from the cyclone separator and bagged. For soil intervals that were continuously cored (during sonic drilling), field screening soil samples were collected and recorded at least every 5 ft from the start of coring to total depth. A photoionization detector (PID) was used for field screening of hydrocarbons (headspace measurements) in soil cuttings and cores during drilling. The PID was calibrated and tested each day that it was used (calibration logs are provided in Appendix H). A discussion of the field screening process is presented in Field Methods (Appendix B).

Field screening results obtained from the data gap and extraction assessment wells (KAFB-106248 to KAFB-106252) did not indicate the presence of petroleum hydrocarbon concentrations in the subsurface soils of these wells (Table 5-2). Elevated petroleum hydrocarbon concentrations (greater than 100 ppmv) were observed in headspace measurements from the source area data gap wells (KAFB-106V3 and KAFB-106S10) (Table 5-2). In KAFB-106V3, elevated PID readings were observed from 255 to 280 ft bgs (except for the 275-ft interval) with the highest PID reading (1,444 ppmv) obtained at a depth of 260 ft bgs. These elevated PID readings corresponded to clayey, poorly, and well graded sands overlying a clay unit and within the lower clay unit located at a depth of 271–281 ft bgs (Appendix D). PID readings decreased to below 100 ppmv below the clay unit (281 ft bgs).

In KAFB-106S10, there appears to be two depth intervals (415–420 ft bgs and 470–490 ft bgs) that have high PID readings (greater than 1,000 ppmv). The highest PID readings measured in KAFB-106S10 were measured at depths of 415 and 480 ft bgs (5,903 and 5,900 ppmv, respectively). The lithology at these depths was predominantly sandy soils with a 1-ft-thick clay unit at a depth of approximately 417 ft bgs. The PID readings measured from 415 to 420 ft bgs appear to coincide with the historic high groundwater elevation that occurred in 1970 (Table 5-2). The high PID readings (greater than 1,000 ppmv) observed from 465 to 490 ft bgs appear to be associated with the lowest historic water level that occurred in 2009 (Table 5-2).

Elevated PID readings (greater than 100 ppmv) were also observed in soil collected from the borehole from KAFB-106S10 at various depth intervals; most notably from depths of 250–275 ft bgs, located directly above the clay unit observed from 274 to approximately 281 ft bgs (Appendix D). Other elevated PID readings were observed at depths of 355, 365–375, 400, 425–460, and 500 ft bgs.

5.2.1.2 Soil Sampling

Core from sonic drilling was extruded into plastic core sleeves in generally 2- to 2.5-ft-long increments. The temperature of each core was measured with a National Institutes of Standards and Technology Traceable® digital thermometer. Temperature data were recorded on the core sleeves and field forms. Specifics regarding core handling are discussed in Appendix B Field Methods. Core temperature data are provided on Table 5-3, on boring logs in Appendix D, and in Appendix E. Following temperature collection, core sleeves were labeled with the well number, depth interval, collection date, temperature, and core orientation.

Due to the ability of LNAPL to fluoresce in the presence of ultraviolet (UV) light, a UV flashlight was used to screen for its presence. Following collection, soil cores were placed within a darkened workspace and screened for the presence of areas that may fluoresce. During screening, a UV light (Spectronics Optimax 365 UVA Inspection Flashlight) was shown on the core sample. The presence of LNAPL was not observed in any of the soil cores.

Soil samples were collected at a minimum of every 10 ft of the soil interval that was sampled using sonic coring in accordance with the approved Work Plan (Kirtland AFB, 2020a). Soil samples were collected in laboratory-provided containers immediately after the core sleeve was opened to minimize the loss of VOCs. Soil samples were stored on ice and shipped to the analytical laboratory on ice under chain-of-custody documentation. A total of 42 soil samples were collected from KAFB-106V3 and KAFB-106S10 and submitted for laboratory analysis of VOCs by EPA Method 8260B/C and TPH-GRO/DRO/motor oil range by EPA Method 8015D. EDB was analyzed as part of the EPA Method 8260B/C VOC analysis but was not analyzed by EPA Method 8011. As a result, the DLs provided by EPA Method 8260B/C are higher than those that would have been provided by EPA Method 8011. A discussion of the soil sample analytical results is presented in Section 6.3 below.

5.2.2 Borehole Logging

Soil or core samples collected from each drilling method were logged in accordance with the Unified Soil Classification System by an experienced field geologist (ASTM International D5434-12 [ASTM International, 2012]) and as discussed in Appendix B Field Methods. Information described in each lithologic log included the Unified Soil Classification System classification; color as compared against the Munsell Soil Color Chart; sand, silt, or clay content; stiffness and plasticity of encountered clays; moisture content; percent gravel; minerology; and odor (if noted by the experienced field geologist). Additional information detailed in each lithologic log included heated headspace results, core run length, and locations where the core was identified as disturbed. A discussion of the observed soil lithology is presented in Section 5.4 below. Lithologic borehole logs are provided in Appendix D.

5.2.3 Core Photography

Individual cores were placed in a standard core box to allow for efficient cataloging, storage, and assistance with core photography. Photographing of the core was performed using an onsite, high resolution digital camera (Nikon Coolpix B500). Each photograph was logged on a field form, noting the borehole number, depth, date, and time. Core photographs are provided in Appendix F.

5.3 Geophysical Logging

Geophysical logging was performed at wells KAFB-106S10 and KAFB-106V3 within the 3-in. ID casing of KAFB-106V3 and the deepest 4-in. ID casing of KAFB-106S10. The wells were geophysically logged using Dual Induction, Gamma Ray, and Neutron downhole logging tools. Logging was performed to the total depth of each well. Each run was performed twice to assess reproducibility. A copy of the quality assurance/quality control and calibration procedures are provided in Appendix I-1. An electronic copy of raw and processed data is provided in Appendix I-2. A Geophysical Logging Report provided by the geophysical logging company is presented in Appendix I-3. The geophysical logs for each well are displayed with the lithologic log for comparison purposes on Figure 5-1.

The Gamma Ray and Neutron logs work well to provide information regarding changes in the well and annular materials locations within the subsurface. However, these tools generally do not provide good lithologic information when run within a cased borehole. The Induction tool was used to provide information regarding soil types and lithologic contacts. In general, the lithologic logs indicated the following information:

- The Gamma Ray and Neutron logs appear to confirm the placement of the annular materials.

- The Induction log generally correlates with the lithologic logs.

- The Induction log for KAFB-106V3 correlates with the depth of the top of the clay layer located at 270 ft bgs. However, the bottom of the polyvinyl chloride (PVC) casing was not deep enough to assess the location of the bottom of this clay layer.

- The Induction log for KAFB-106S10 correlates with the depth of the top and bottom of the clay layer observed at 270-280 ft bgs.

Geophysical logs measure both physical and chemical properties and can be influenced by the composition or volume of the casing, screen, and annular fill materials. The casing and screen can also attenuate certain log responses and, therefore, may not match directly with the logged lithology. In addition, differences in depths may occur in soil intervals drilled by air rotary method due to lag or differential time in cutting coming up the borehole.

5.4 Subsurface Conditions

Lithologic information obtained from ARCH and sonic drilling was used to create boring logs. The sonic coring data obtained in the source area data gap wells were used to provide higher lithologic resolution by continuously coring (sonic coring) as opposed to collecting soil samples every 5 ft from disturbed cuttings (ARCH drilling).

Boring logs obtained from this investigation and the Source Zone Characterization Report (Kirtland AFB, 2021) were used to construct cross sections of the subsurface lithology in the area south of Ridgecrest Boulevard (Figures 5-2, 5-3, and 5-4). The borings used to create the cross sections were selected to maintain consistency between sampling methods and the geologists who performed the lithologic logging. Cross sections using these data as well as data from previous investigations will be created to describe the nature and extent of subsurface contaminants (including LNAPL) in the Phase II RCRA Facility Investigation (RFI) Report.

Based on the boring logs (Appendix D) and cross sections (Figures 5-2, 5-3, and 5-4), the lithology in KAFB-106S10 and KAFB-106V3 was dominated by lower permeability units (silt and clay) interbedded with lesser amounts of higher permeability units (sand) from ground surface to 160 ft bgs. Below 160 ft bgs, fine to coarse gravelly sand dominated to a depth of approximately 270 ft bgs in KAFB-106V3 and 240 ft bgs in KAFB-106S10. Interbedded silts, clays, and sands were observed in KAFB-106S10 to a depth of approximately 274 ft bgs. The soils observed in KAFB-106V3 and KAFB-106S10 were generally consistent with previously recorded site lithology.

An upper clay unit was observed at a depth of 255–256 ft bgs in KAFB-106V3 and at a depth of 250 -254 ft bgs in KAFB-106S10. The lower clay was observed in both wells at depths of 270.5 and 274 ft bgs in KAFB-106V3 and KAFB-106S10, respectively. The bottom of the lower clay unit was observed at approximately 280.5 ft bgs in both borings. This clay was classified in the field as very stiff to hard and contained no silt fraction. Below 300 ft bgs, a fine to coarse gravelly sand dominated with minor interbedding (<10 ft) of lower permeability material to the total depth of drilling (517 ft bgs at KAFB-106S10). Due to the presence of this clay in KAFB-106V3, NMED required the sampling and installation of KAFB-106S10.

The general lithology in the source area consists of silt and clay units with interbedded sandy units present to a depth of approximately 160 ft bgs. Below 160 ft bgs, fine to coarse gravelly sand is generally present to a depth of approximately 250 ft bgs. The stratigraphy from 250 to 270 ft bgs consists of interbedded silt, clay, and sands. Based on the cross sections (Figures 5-2, 5-3, and 5-4), the thickness of this clay unit varies at each borehole. This clay unit ultimately pinched out completely to the north (e.g., absent at KAFB-106S4 and KAFB-106S5). The lithology below the clay layer generally consists of interbedded sands, clayey sands, and silty sands.

The lithology observed in the data gap and extraction performance wells was generally consistent with monitoring wells located near these wells (Appendix D).

5.5 Monitoring Well Construction and Boring Abandonment

Following advancement of the borehole to total depth, proposed well completion diagrams were submitted to NMED for approval and nested monitoring wells were installed in the boreholes. The GWM wells included one well with a screen interval that intersected the current water table and a contingency well located above the water table. Both wells were co-located within the same borehole. The contingency well was installed to function in the future with anticipated rising groundwater elevations.

The GWM wells were designed and constructed to allow these wells to be actively pumped. The following describes how wells were constructed and how boreholes were abandoned.

5.5.1 Soil Vapor Monitoring Well KAFB-106V3

Once the lower clay layer was encountered, the borehole for KAFB-106V3 was terminated at 300 ft bgs as requested by NMED. The borehole was completed as a nested SVM well with three individual SVMPs with screen intervals at 267-272, 13-15, and 5-7 ft bgs. The deeper well screen (267 ft bgs) was constructed to intersect the upper portion of the clay found at 270 ft bgs.

The bottom portion of the borehole was backfilled with natural slough from 285 to 300 ft bgs, 10/20 silica sand from 281.1 to 285 ft bgs, and bentonite chips from 272 to 281.1 ft bgs (Appendix D). The lower SVMP (KAFB-106V3-272) was constructed with a 5-ft long, 3-in. ID Schedule 80 PVC 0.010 slot well screen. This well screen was installed from 267 to 272 ft bgs with a 2-ft long 3-in ID Schedule 80 PVC well sump below the well screen from 272 to 274 ft bgs. The sand pack for the screen consisted of 10/20 silica sand from 262.7 to 273 ft bgs.

A lower seal of hydrated bentonite chips was placed within the borehole annulus from 235.2 to 262.7 ft bgs. A seal of high-solids bentonite grout was placed from 27.8 to 235.2 ft bgs. Additional hydrated bentonite chips were placed from 17 to 27.8 ft bgs.

Two additional soil vapor points were installed within the upper 15 ft of the ground surface to monitor for the presence of shallow soil vapors. Both shallow SVMPs were constructed with a 2-ft long, 0.75-in. ID Schedule 80 PVC 0.010 slot screens with no sump. KAFB-106V3-15 (the "-15" indicates the depth of the bottom of the screen) was screened from 13 to 15 ft bgs, and KAFB-106V3-7 was screened from 5 to 7 ft bgs. Sand packs for each screen consisted of 10/20 silica sand placed from 12 to 17 and from 4 to 9.1 ft bgs, respectively. A hydrated bentonite chip seal was placed between the two screens from 9.1 to 12 ft bgs. A surface seal was installed that consisted of hydrated bentonite chips placed from 2 to 4 ft bgs and neat cement placed from 2 ft bgs to ground surface.

KAFB-106V3 was completed with an aboveground surface completion consisting of a 12-in. diameter steel surface casing placed to approximately 3 ft above ground surface to protect the inner well casings. The aboveground well completion was placed within a 4-ft by 4-ft by 4-in. thick concrete pad with four protective steel bollards installed at the corners of the pad. Well construction details for KAFB-106V3 are presented in Table 5-4 and a well construction diagram is presented in Appendix D.

5.5.2 Source Area Data Gap Well KAFB-106S10

Source area data gap well KAFB-106S10 was completed as a nested monitoring well including a lower water table well and a higher contingency well. The total depth of the borehole was 517 ft bgs.

The bottom portion of the borehole was backfilled with natural slough and 10/20 silica sand from 485 to 517 ft bgs (Appendix D). Both the lower (water table) and contingency wells were constructed using 4.0-in. ID Schedule 80 PVC casing. The water table well was installed with a 40-ft long, 4.0-in. ID Schedule 80 PVC 0.010 machine slot well screen. The screen was placed with approximately 15 ft of screen below the groundwater table. The contingency well was completed with a 25-ft long, 4.0-in. ID Schedule 80 PVC 0.010 machine slot well screen. Both wells were installed with a 2-ft long sump below the screen.

Following placement of the well casings, a 10/20 silica sand filter pack was placed in the borehole annulus from 485 ft bgs to approximately 2 ft above the deep well screen (440.8 ft bgs). A 5-ft thick hydrated bentonite chip seal was placed above the sand pack from 440.8 to 436.2 ft bgs. A 10/20 silica sand filter pack was placed within the borehole annulus from the top of the hydrated bentonite chip seal (436.2 ft bgs) to approximately 2 ft above the contingency well screen (405.5 ft bgs). Approximately 30 ft of bentonite chips was placed within the borehole annulus above the upper silica sand filter pack from 405.5 to 373.6 ft bgs. The bentonite chip seal was hydrated in lifts using a potable water source.

A high-solids bentonite grout was placed in the annulus that extended from the upper bentonite chip seal to approximately 20 ft bgs. A neat cement surface seal was installed above the grout seal and extended vertically up the borehole annulus to ground surface.

KAFB-106S10 was completed with an aboveground surface completion consisting of a 12-in. diameter steel surface casing placed to approximately 3 ft above ground surface to protect the inner well casings. The aboveground well completion was placed within a 4-ft by 4-ft by 4-in. thick concrete pad with four protective steel bollards installed at the corners of the pad. Well construction details for KAFB-106S10 are presented in Table 5-5 and a well construction diagram is presented in Appendix D.

5.5.3 Groundwater Monitoring Data Gap Wells KAFB-106248 to KAFB-106251

The GWM data gap wells were constructed as nested monitoring wells consisting of a lower water table well and a higher contingency well. Both nested monitoring wells were constructed using 4.0 ID Schedule 80 PVC casing. The water table wells were installed with a 40-ft long, 4.0-in. ID Schedule 80 PVC 0.010 machine slot well screen. The screen was placed with approximately 15 ft of screen below the groundwater table. The contingency wells were completed with a 25-ft long, 4.0-in. ID PVC 0.010 machine slot well screen. The wells were installed with a 2-ft long sump below the screen. Well construction details for GWM wells are presented in Table 5-5 and Appendix D.

Following placement of the well casings, a 10/20 silica sand filter pack was placed in the borehole annulus from the bottom of the borehole to approximately 2 ft above the deep well screen. A 5-ft thick hydrated bentonite chip seal was placed above the sand pack. Additional 10/20 silica sand was placed within the borehole annulus from the bottom of the contingency well to approximately 2 ft above the well screen. Approximately 30 ft of bentonite chips was placed within the borehole annulus above the upper silica sand filter pack. The bentonite chip seal was hydrated in lifts using a potable water source.

A high-solids bentonite grout was placed in the annulus that extended from the upper bentonite chip seal to approximately 18–28 ft bgs. A neat cement surface seal was installed over the grout seal and extended vertically up the well annulus to approximately 1 ft bgs. Appendix D provides the well construction diagrams for each well for the specific depths of the annular material placement.

Wells KAFB-106249 and KAFB-106250 were each completed with a flush-mounted surface completion with an 18-in. diameter well vault surrounded by a 3-ft by 3-ft by 4-in. thick concrete pad at the ground surface. Well pads were sloped to direct rainwater away from the well. Wells KAFB-106248 and KAFB-106251 were completed with aboveground surface completions, each consisting of a 12-in. diameter steel surface casing placed to approximately 3 ft above ground surface to protect the inner well casings. Each aboveground well completion was placed within a 4-ft by 4-ft by 4-in. thick concrete pad with four protective steel bollards installed at the corners of the pad.

5.5.4 Extraction Assessment Well KAFB-106252

The extraction assessment well KAFB-106252 was completed as a nested monitoring well including a lower water table well and a higher contingency well, and an additional piezometer was placed below the water table well in the deep gravels to monitor head data in that interval. The total depth of the borehole was 538 ft bgs.

The bottom portion of the borehole was backfilled with 10/20 silica sand from 538 to 525 ft bgs (Appendix D). The piezometer was installed with a 2-in. ID Schedule 80 PVC 0.010-in. machine-slot well screen from 515 to 525 ft bgs. The remainder of the piezometer was constructed with 2-in. ID Schedule 80 PVC blank casing. A 10/20 silica sand filter pack was placed in the borehole annulus from 525 ft bgs of the borehole to 509.9 ft bgs. A hydrated bentonite pellet seal was placed above the filter pack from 504.8 to 509.9 ft bgs.

Both the lower and contingency well screens were constructed using 4.0-in. ID Schedule 80 PVC blank casing. The water table well was installed with a 40-ft long, 4.0-in. ID Schedule 80 PVC 0.010 machine slot well screen. The screen was placed with approximately 15 ft of screen below the groundwater table. The contingency well was completed with a 25-ft long, 4.0-in. ID PVC 0.010 machine slot well screen. Both wells were installed with a 2-ft long sump below the screen.

Following placement of the well casings, a 10/20 silica sand filter pack was placed in the borehole annulus from the top of the lower bentonite seal to approximately 2 ft above the water table screen. A 5-ft thick hydrated bentonite chip seal was placed above the sand pack of the water table screen. Additional 10/20 silica sand was placed within the borehole annulus from the top of the hydrated bentonite chip seal to approximately 2 ft above the contingency well screen. Approximately 30 ft of bentonite chips was placed within the borehole annulus above the upper silica sand filter pack. The bentonite chip seal was hydrated in lifts using a potable water source.

A high-solids bentonite grout was placed in the annulus that extended from the upper bentonite chip seal to approximately 34 ft bgs. Hydrated bentonite chips were placed from approximately 28 to 34 ft bgs. A neat cement surface seal was installed above the grout seal and extended vertically up the borehole annulus to ground surface.

The well was completed with a flush-mounted surface completion with an 18-in. diameter well vault surrounded by a 3-ft by 3-ft by 4-in. thick concrete pad at the ground surface. The well pad was sloped to direct rainwater away from the well. Well construction details for KAFB-106252 are presented in Table 5-5.

5.5.5 Original KAFB-106251 Borehole Abandonment

The original borehole for well KAFB-106251 was advanced in a similar manner to the previous boreholes. The borehole was drilled with ARCH and a 13-3/8-in. diameter casing string was advanced to a depth of 200 ft bgs. Following placement of the 13-3/8-in. diameter casing string, an 11-¾ -in. diameter casing string was telescoped to depth and advanced.

During advancement of the 11-¾-in. diameter casing string, the driller experienced significant tightening of the borehole at depths between approximately 380 and 395 ft bgs. At a depth of 395 ft bgs, the decision was made to switch from a tri-cone bit to an under-reamer bit to slightly increase the diameter of the borehole and reduce friction on the drive casing. Drilling proceeded to a depth of 435 ft bgs with the under-reamer bit. However, while using the under-reamer bit, the borehole was still tight against the drill casing. Casing jacks were employed to pull the inner casing back above the tight zone. After removing 90 ft of casing, a break occurred downhole. An attempt to free the stuck casing using the under-reamer bit resulted in the bit itself becoming lodged inside the casing. Attempts to remove the lodged casing, bottom hole assembly, and lower portion of the drill string were unsuccessful.

The decision was made to abandon the borehole and stuck tools. As groundwater had not yet been reached, no plugging plan was required by NMOSE (NMOSE, 2020a). Tools abandoned in the borehole included: 75 ft of 11-¾-in. diameter drive casing, 120 ft of 4-in. diameter drill rods, one 10 ft-long drill collar, one 1.5 ft-long bit sub, one 5.65-in. diameter stabilizer, one 4.15 ft-long hammer body and one 1.75 ft-long under-reamer bit.

Upon removal of all free tools, the bottom of the borehole was tagged at a depth of 102 ft. Sixty bags of bentonite chips were added to the borehole, and the bottom of the borehole was tagged at a depth of 96 ft. After consultation with NMOSE (NMOSE, 2020a), 575 gallons of bentonite grout was emplaced via tremie in three increments to a depth of 20 ft bgs. An additional seven bags of bentonite chips were added to the borehole, and the bottom of the borehole was tagged at a depth of 15 ft bgs. Approximately 120 gallons of Portland cement was added to the borehole to a depth of 2 ft bgs and allowed to cure overnight. The following morning, the borehole was topped off to surface with concrete and drilling commenced on the adjacent location.

The final location for KAFB-106251 was moved approximately 20 ft to the northwest of the abandoned borehole and is shown on Figure 1-2. Drilling proceeded at the new location under the existing WR-07 permit for RG-1579 POD 387 approved by NMOSE on October 14, 2020 (NMOSE 2020b).

5.5.6 Monitoring Well Survey

In accordance with the Work Plan (Kirtland AFB, 2020a), a registered New Mexico professional land surveyor surveyed the horizontal and vertical coordinates of the top of each monitoring well casing and the ground surface elevation. Horizontal coordinates were measured relative to the New Mexico State Plane Coordinate System, Central Zone, North American Datum of 1983. Horizontal positions were measured to the nearest 0.1 ft, and vertical elevations were measured to the nearest 0.01 ft. Monitoring well survey data are provided in Appendix J.

5.6 Monitoring Well Development

After well construction was completed, the GWM wells were developed in accordance with the Work Plan (Kirtland AFB, 2020a). Well development records and development completion dates are provided in Appendix K. Well development was initiated no sooner than 48 hours from setting well seals. Well development was performed as follows:

- Initial development consisted of swabbing and bailing until little, or no sediment entered the well. The well screen was swabbed using a swabbing tool to remove fines from the filter pack and adjacent formation. A bailer fitted with a toggle valve was lowered into the well and used to gently surge the screen interval to remove any sand, silt, and debris accumulated in the well bore. When the bailer was brought to the surface, an Imhoff cone was used to collect water from the first bailer run to evaluate the amount of silt and sediment in the water. This process was repeated after each cycle of surging development. Wells were bailed until the discharge water contained less than 2 milliliters of sediment per 1 liter of water, as measured using an Imhoff cone.

- The site geologist monitored field parameters including pH, temperature, turbidity, and specific conductance and recorded the results and other pertinent information on the Well Development Record Form (Appendix K).

- Following swabbing and bailing, the wells were pumped to reduce turbidity to less than 10 nephelometric turbidity units. Additional water was pumped from each well to remove the same amount of water that was introduced during drilling. A summary of the water introduced and removed is provided on Table 5-6.

- At the completion of well development, a sample of the water was collected and photographed to document the water quality. Photographs of the final water development water are provided in Appendix K.

Development water was contained in 55-gallon steel drums with water-tight lids and transferred to the EA IDW yard located on Kirtland AFB for waste management (Appendix G).

5.7 Groundwater Conditions

The depth to water at the time of drilling for the six monitoring wells installed during this investigation ranged from 440.62 ft bgs (KAFB-106248) to 474.95 ft bgs (KAFB-106249). Water was added to KAFB-106248 during drilling to control flowing sands that raised the water elevation in this well. Due to this, the depth to water in KAFB-106019, located to the west of KAFB-106248, was used for the design of the well. Following well development, the depth to water ranged from 452 ft bgs (KAFB-106252) to 480.46 ft bgs (KAFB-106248). The initial depths to water and the depths to water measured during May 2021 are provided on Table 5-7. These monitoring wells are screened in the regional water table. The gradient and groundwater flow direction are discussed in Section 2.3 Site Hydrogeology.

Initial groundwater samples were collected using the low-flow sampling method in accordance with the approved Work Plan (Kirtland AFB, 2020a) and the field methods discussed in Appendix B. Wells KAFB-106248, KAFB-106252, and KAFB-106S10 were collected using a portable downhole pumping system. Wells KAFB-106249 to KAFB-106251 were sampled using dedicated pneumatic bladder pump systems. Groundwater purge and sample collection logs are provided in Appendix L. Groundwater samples were shipped under chain-of-custody documentation via overnight delivery to Eurofins TestAmerica in Lancaster, Pennsylvania. The samples were analyzed for TPH-DRO and TPH-GRO by EPA Method 8015M, EDB by EPA Method 8011, VOCs by EPA Method 8260C, dissolved and total metals by EPA Methods 6010C/6020A, anions by Method E300a, nitrate/nitrite nitrogen by Method E353.2, and alkalinity by Method SM2320B.

5.8 Soil Vapor Conditions

SVM was performed in accordance with Part 6.5.16 of the RCRA Permit. Three SVMP field samples and one field duplicate were collected using certified clean pre-evacuated Summa® canisters fitted with a specialized pneumatic connector to allow only the vapor from the SVMP to enter the canister. After collecting each SVMP sample, the canister was placed in protective packaging and shipped to ALS Environmental in Simi Valley, California under chain-of-custody documentation. The samples were analyzed for VOCs by EPA Method TO-15. The sample collection methodology is described in

Appendix B. Purge data were recorded on purge logs that are presented in Appendix M. Horiba calibration and sample system leak tests were performed and documented on calibration logs and are also provided in Appendix M. Significant differences between the pre-purge and post-purge static pressure readings were not observed at any of the KAFB-106V3 sample ports. This indicates stable sampling conditions.

6. SITE CONTAMINATION

Contaminant data obtained during this investigation from field screening included PID and UV screening data. Soil, soil vapor, and groundwater laboratory analytical data were also obtained during this investigation. The following summarizes the field screening and laboratory analytical results.

6.1 Source Area Soil Sampling

A discussion of soil sampling is provided in Section 5.2.1 and in Field Methods in Appendix B. During ARCH drilling, soil cuttings were field screened every 10 ft and soil core collected during sonic drilling soil was field screened every 5 ft. Field screening was completed with a PID. Soil samples were collected every 10 ft of each cored interval. A total of 42 soil samples were collected from KAFB-106V3 and KAFB-106S10 and submitted for laboratory analysis of VOCs by EPA Method 8260B/C and TPH-GRO/DRO/motor oil range by EPA Method 8015D. EDB was analyzed as part of the EPA Method 8260B/C VOC analysis but was not analyzed by EPA Method 8011. As a result, the DLs provided by EPA Method 8260B/C are higher than those that would have been provided by EPA Method 8011.

6.2 Source Area Soil Sampling Laboratory Analytical Results

Analytical data for organic compounds are presented on Figures 6-1 and 6-2 and provided in Table 5-3. For the purposes of this report, only results for the primary contaminants of potential concern, BTEX, and TPH are discussed. The Data Quality Evaluation Report for the soil laboratory analysis is included as Appendix N-1. Level 2 laboratory analytical reports and a searchable and sortable file containing the analytical results in Microsoft Excel format are included in Appendix N-2. The Level 4 laboratory analytical reports are maintained by the U.S. Air Force and are available for NMED review upon request. To simplify the understanding of contaminant concentrations in the vadose and saturated zones, the data are presented separately for each zone below.

6.2.1 Source Area Vadose Zone Summary

The vadose zone extends from ground surface to the water table (approximately 472 ft bgs). The following summarizes the detected laboratory TPH and VOC concentration ranges in the vadose zone (KAFB-106V3 and KAFB-106S10) by constituent (not including non-detected constituents):

- There were 16 TPH-GRO detections in the vadose zone. Detected concentrations ranged from a low of 1.2J mg/kg (KAFB-106S10 at 240 ft bgs) to a high of 100 mg/kg (KAFB-106S10 at 470 ft bgs).

- There were nine TPH-DRO detections in the vadose zone. Detected concentrations ranged from a low of 3.6J mg/kg (KAFB-106V3 at 230 ft bgs) to a high of 35 mg/kg (KAFB-106S10 at 470 ft bgs).

- There were three TPH-motor oil detections in the vadose zone. Detected concentrations ranged from a low of 7.6J mg/kg (KAFB-106S10 at 415 ft bgs) to a high of 21J mg/kg (KAFB-106S10 at 400 ft bgs).

- There were seven EDB detections in the vadose zone. Detected concentrations ranged from a low of 0.0016J mg/kg (KAFB-106S10 at 245 ft bgs) to a high of 0.04J mg/kg (KAFB-106V3 at 271 ft bgs).

- There were 19 benzene detections in the vadose zone. Detected concentrations ranged from a low of 0.00056J mg/kg (KAFB-106S10 at 281 ft bgs) to a high of 1.6 mg/kg (KAFB-106S10 at 480 ft bgs).
- There were 30 toluene detections in the vadose zone. Detected concentrations ranged from a low of 0.00025J mg/kg (KAFB-106S10 at 350 ft bgs) to a high of 0.89 mg/kg (KAFB-106V3 at 271 ft bgs).
- There were 17 ethylbenzene detections in the vadose zone. Detected concentrations ranged from a low of 0.00034J mg/kg (KAFB-106V3 at 260 ft bgs) to a high of 0.15 mg/kg (KAFB-106S10 at 420 ft bgs).
- There were 20 total xylenes (sum of m-, p-, and 0-xylenes) detections in the vadose zone. Detected concentrations ranged from a low of 0.00042J mg/kg (KAFB-106S10 at 370 ft bgs) to a high of 0.75 mg/kg (KAFB-106S10 at 420 ft bgs).

The highest benzene concentration in the vadose zone was observed in KAFB-106S10 (Figure 6-1 and Table 5-3) at a depth of 480 ft bgs. The highest total BTEX and TPH concentrations were also found in KAFB-106S10 at a depth of 470 ft bgs, just above the water table (Figures 6-1, 6-2, and Table 5-3).

6.2.2 Source Area Saturated Zone Summary

The following summarizes the detected laboratory TPH and VOC concentration ranges in the saturated zone below the water table located at approximately 472 ft bgs by constituent (not including non-detected constituents). There were no detections of EDB within the saturated zone. The detected results are from KAFB-106S10 (KAFB-106V3 was not advanced to the water table):

- There were three TPH-GRO detections in the saturated zone. Detected concentrations ranged from a low of 1.7J mg/kg at 500 ft bgs to a high of 73J mg/kg at 480 ft bgs.
- There were two TPH-DRO detections and no TPH-motor oil detections in the saturated zone. Detected concentrations of TPH-DRO ranged from a low of 20 mg/kg at 480 ft bgs to a high of 31 mg/kg at 490 ft bgs.
- There were two benzene detections in the saturated zone. Detected concentrations ranged from a low of 0.11 mg/kg at 490 ft bgs to a high of 1.6 mg/kg at 490 ft bgs.
- There were five toluene detections in the saturated zone. Detected concentrations ranged from a low of 0.00041J mg/kg at 510 and 517 ft bgs to a high of 4.5 mg/kg at 480 ft bgs.
- There were two ethylbenzene detections in the saturated zone. Detected concentrations ranged from a low of 0.043J mg/kg at 490 ft bgs to a high of 0.16J mg/kg at 480 ft bgs.
- There were three total xylenes (sum of m-, p-, and o-xylenes) detections in the saturated zone. Detected total xylenes concentrations ranged from a low of 0.00043J mg/kg 500 ft bgs to a high of 2.86 mg/kg at 480 ft bgs.

The highest benzene, total BTEX, and TPH concentration in the saturated zone was observed in KAFB-106S10 at a depth of 480 ft bgs (Figures 6-1 and 6-2, Table 5-3). None of the detected soil concentrations exceeded the project screening levels.

6.2.3 Source Area Soil Laboratory Analytical Data Review and Usability

Chemical analytical data for the source area soil samples underwent EPA Stage 3 data validation on 100% of the sample data by a third-party subcontractor, Environmental Data Services, Inc., Florida. The following quality control criteria were included in the EPA Stage 3 validation per the Quality Assurance Project Plan, as applicable to the analytical method to evaluate precision, accuracy, representativeness, comparability, completeness, and sensitivity for the data set:

- Sample preservation and extraction and analysis holding times
- Laboratory method blank contamination
- Surrogate spike and internal standard recoveries
- Laboratory control sample and duplicate recoveries
- Matrix spike and matrix spike duplicate recoveries
- Initial and continuing calibrations
- Trip, and rinse blank results
- Field duplicate sample precision

Data quality exceedances that resulted in data qualification during validation include: (1) blank contamination for one VOC (acetone), (2) surrogate recoveries for VOCs and TPH-GRO above the control limit, (3) matrix spike recovery exceedances for VOCs and TPH-GRO, and (4) calibration criteria exceedance for VOCs. Data were qualified as estimated detect (J), estimated non-detect (UJ), and non-detect (U). Estimated sample data are usable to achieve project objectives. The 95% technical completeness goal was achieved for all analytical methods for the source area coring sampling event. Data are determined to be usable to achieve the project data quality objectives as qualified based on validation. Details regarding the analytical data validation and data usability are provided in Appendix N-1 – Data Quality Evaluation Report.

6.3 Source Area Soil Vapor Chemical Analytical Results

The initial SVM event at KAFB-106V3 was performed on April 20, 2021. The results from this initial monitoring event will also be used in the Q2 2021 semiannual SVM discussion. Table 6-1 summarizes the soil vapor results.

The Data Quality Evaluation Report for the soil vapor data is provided in Appendix N-1. The Level 2 analytical reports and a searchable and a sortable file containing the analytical results in Microsoft Excel format of the soil vapor data are provided in Appendix N-3.

6.3.1 Soil Vapor Laboratory Analytical Results

Using the Horiba, subsurface hydrocarbon concentrations were recorded at 8 ppmv within KAFB-106V3-007, 16 ppmv within KAFB-106V3-015, and 6 ppmv within KAFB-106V3-272. Subsurface oxygen concentrations were recorded at 19.97% within KAFB-106V3-007, 19.07% within KAFB-106V3-015, and 21.11% within KAFB-106V3-272. Subsurface carbon dioxide concentrations were recorded at 0.30% within KAFB-106V3-007, 1.04% within KAFB-106V3-015, and 0.04% within KAFB-106V3-272.

Soil vapor concentrations of EDB and benzene exceeding the residential VISLs (1.2 micrograms per cubic meter [$\mu g/m^3$] for EDB and 120 $\mu g/m^3$ for benzene) were observed in each of the well screens during this first sampling event. Concentrations of EDB were 6.8, 12, and 17 $\mu g/m^3$ in well screens at 7, 15, and 272 ft bgs, respectively. Concentrations of benzene were 260, 160, and 200 $\mu g/m^3$ in well screens at 7, 15, and 272 ft bgs, respectively. No other soil vapor concentrations exceeded the residential VISL. Soil vapor analytical results are provided in Table 6-1.

Since this SVM location is located on-Base within the BFF, soil vapor concentrations were also compared to the industrial VISLs. Benzene concentrations were below the industrial VISL of 588 $\mu g/m^3$ and the EDB concertation at 7 ft bgs was below the industrial VISL of 7.65 $\mu g/m^3$.

VISLs are intended to be screened against soil vapor samples collected from below building foundations (sub slab samples). Screening VISLs to the concentrations measured in the shallow (7 and 15 ft bgs) SVMPs is more applicable to the intended use of VISLS, than screening for the deeper SVMP located at 272 ft bgs. It is likely that the elevated concentrations observed in the shallow SVMPs are due to subsurface vapor disturbance caused by the air rotary drilling used to install the SVM well. These points will continue to be sampled during the regular semi-annual monitoring events.

6.3.2 Soil Vapor Laboratory Analytical Data Review and Usability

Environmental Data Services, Inc. performed EPA Stage 3 data validation on 100% of the soil vapor analytical data. Analytical results were qualified as estimated detect "J" and estimated non-detect data "UJ" based on exceedance of data quality indicator criteria for (1) laboratory control sample recovery above the control limit for ethyl acetate, and (2) field duplicate relative percent difference above 50% for two VOCs. The 95% technical completeness goal was achieved for the data gap well installation soil vapor sample data. Data are usable to achieve the project data quality objectives as qualified based on validation.

In addition, the EDB LOQ for three soil vapor samples and a field duplicate exceeded the project screening level (VISL) due to the elevated EDB sample concentrations requiring dilution during analysis. As per the analytical method, when samples require dilution to bring target analytes within the instrument calibration range, all analyte reporting limits become elevated in the sample.

6.4 Groundwater Sampling

Initial groundwater samples were collected from each GWM well following well development and submitted for laboratory analysis for the constituents specified in the approved Work Plan (Kirtland AFB, 2020a). Three groundwater samples, one field duplicate, and equipment rinse and trip blanks were collected in association with the sampling.

The Data Quality Evaluation Report for the groundwater analytical results is provided in Appendix N-1. The initial groundwater sampling analytical results for TPH, BTEX, EDB, dissolved iron, and dissolved manganese for each of the newly installed wells are presented below (only detected analytes are reported) and shown in Table 6-2. Level 2 laboratory reports for the initial sampling event and a searchable and sortable file containing the analytical results in Microsoft Excel format are provided in Appendix N-4.

6.4.1 Groundwater Laboratory Analytical Results

A map showing the EDB concentrations of the newly installed wells in relation to the fourth quarter (Q4) 2020 EDB plume is presented on Figure 6-3. A map showing the BTEX and TPH concentrations of the newly installed wells in relation to the Q4 2020 benzene plume is presented on Figure 6-4. A summary of the detected EDB, TPH, and VOC concentrations above the project screening level is presented below:

- A concentration of EDB above the project screening level of 0.05 µg/L was observed in well KAFB-106S10 (15 micrograms per liter [µg/L]).
- TPH-GRO concentrations above the project screening level of 550 µg/L were observed in KAFB-106S10 (61,000 µg/L) and KAFB-106250 (3,900 µg/L).
- TPH-DRO concentrations above the project screening level of 1,300 µg/L were observed in KAFB-106S10 (23,000 µg/L) and KAFB-106250 (21,000 µg/L).
- TPH ORO concentrations (C28 to C40) above the project screening level of 800 µg/L were observed in KAFB-106250 (8,200 µg/L).
- Benzene concentrations above the project screening level of 5 µg/L were observed in KAFB-106S10 (8,400 µg/L) and KAFB-106250 (8.1 µg/L).
- A concentration of ethylbenzene above the project screening level of 750 µg/L was observed in KAFB-106S10 (850 µg/L).
- A concentration of toluene above the project screening level of 1,000 µg/L was observed in KAFB-106S10 (16,000 µg/L).
- A concentration of total xylenes above the project screening level of 620 µg/L was observed in KAFB-106S10 (3,800 µg/L).

Of the inorganic constituents sampled, only manganese exceeded the project screening level of 0.2 mg/L in wells KAFB-106249 (0.38 mg/L), KAFB-106250 (2.4 mg/L), KAFB-106251 (0.41 mg/L), and KAFB-106S10 (0.6 mg/L). No other concentrations of contaminants of potential concern were observed to exceed the project screening levels (Table 6-2).

6.4.2 Groundwater Analytical Data Quality and Data Usability

Laboratory deliverables were generated, and a data review was conducted for groundwater data in accordance with Parts 6.5.18.2 and 6.5.18.3 of the RCRA Permit (NMED, 2010). The data gap well installation groundwater analytical data underwent 100% EPA Stage 2B data validation per the GWM requirements. Analytical results were qualified as estimated detect "J" and estimated non-detect data "UJ" based on exceedance of data quality indicator criteria for (1) matrix spike recovery for alkalinity, and (2) continuing calibration exceedance for VOCs. The 95% technical completeness goal was achieved for the data gap well installation groundwater sample data. Data are usable to achieve the project data quality objectives as qualified based on validation.

During the data gap well installation groundwater analyses, 12 detect and non-detect sample results for VOCs, EDB, and TPH-GRO were reported with LOQs that exceeded the project screening level. Five detections of EDB, benzene, TPH-GRO, and 1,2,3-trichloropropane above the project screening level exhibited elevated LOQs as a result of the high concentration of these analytes in the samples and, therefore, required sample dilution during analysis. Elevated concentrations of target analytes in a sample resulted in sample dilution during analysis to meet DoD QSM and EPA analytical method criteria. When samples require dilution, all analyte reporting limits become elevated by the amount of the dilution; thus resulting in the exceedances. Data validation guidelines determine these data to be usable and achieve project data quality objectives.

7. SUMMARY AND CONCLUSIONS

This report documents activities performed to provide additional data for the characterization and identification of contaminant migration pathways beneath the source area and to address data gaps in the GWM well network. Wells installed included source area data gap wells, GWM data gap wells, and an extraction assessment well. Source area data gap wells were installed for two purposes. The first was to look for a gap in the clay layer located between 250 and 300 ft bgs. The second was to further assess the lithology and contaminant concentrations in the source area. GWM data gap wells were installed to provide groundwater analytical data at the water table as groundwater elevations continue to rise. The extraction assessment well was installed to assess the performance of extraction well KAFB-106234 for semiannual plume capture evaluation of the EDB plume north of Ridgecrest.

The source area data gap wells included one GWM well (KAFB-106S10) and one SVM well (KAFB-106V3). The data gap wells included four GWM wells (KAFB-106249 to KAFB-106251) located south and east of the source area plume (Figure 1-2). The extraction assessment well (KAFB-106252) was located southwest of extraction well (KAFB-106234).

In general, soils observed within the data gap GWM and extraction assessment wells were consistent with previous investigations. The soils observed in KAFB-106V3 and KAFB-106S10 were also generally consistent with previously recorded site lithology observed in the source area. From the ground surface to 160 ft bgs, the lithology in KAFB-106S10 and KAFB-106V3 was dominated by lower permeability units (silt and clay) interbedded with lesser amounts of higher permeability units (sand). Below 160 ft bgs, fine to coarse gravelly sand dominated to a depth of approximately 240–270 ft bgs. Induction, Gamma Ray, and Neutron geophysical logs were run in wells KAFB-106S10 and KAFB-106V3 following their installation. The Gamma Ray and Neutron logs generally confirmed the well annular depths. The Induction logs generally confirmed the lithology and lithologic contact depths.

An upper clay unit was observed at a depth of 255–256 ft bgs in KAFB-106V3 and at a depth of 250–254 ft bgs in KAFB-106S10. The lower clay was observed in both wells at depths of 270.5 and 274 ft bgs in KAFB-106V3 and KAFB-106S10, respectively. The bottom of the lower clay unit was observed at approximately 280.5 ft bgs in both borings. This clay was classified in the field as very stiff to hard and contained no silt fraction. Below 300 ft bgs, a fine to coarse gravelly sand dominated with minor interbedding (<10 ft) of lower permeability material to the total depth of drilling (517 ft bgs at KAFB-106S10).

The clay unit from 270 to 281 ft bgs that was observed in KAFB-106V3 and KAFB-106S10 appears to be generally present across the BFF based on cross sections of the subsurface lithology (Figures 5-2, 5-3, and 5-4). The thickness of this clay unit varies at each borehole. This clay unit ultimately pinched out completely to the north (e.g., absent at KAFB-106S4 and KAFB-106S5).

PID readings were collected every 10 ft from ARCH-drilled intervals and every 5 ft from the sonic cored intervals to the total depth of each borehole. Field screening data obtained from soil samples collected from the source area data gap wells were also generally consistent with data collected from previous boreholes. Elevated PID readings (greater than 100 ppmv) were observed to be present above and within the clay unit found at 270–281 ft bgs in both boreholes. High PID readings (greater than 1,000 ppmv) associated with historic water levels were observed in KAFB-106S10 (Table 5-2). In general, the PID readings were consistent with other boreholes located within the source area (Figures 5-2 through 5-4). Field screening for source area boreholes also included using a UV flashlight to look for the presence of LNAPL in soil cores. The UV field screening did not indicate the presence of LNAPL in any of the cores.

Soil samples were collected from sonic-cored intervals every 10 ft of depth to the total depth of the borehole. Soil samples submitted for laboratory analysis were analyzed for VOCs by EPA Method 8260B/C and TPH by EPA Method 8015D. The highest TPH, EDB, benzene, and total BTEX concentrations in vadose zone soil samples were observed in KAFB-106S10 (Figures 6-1 and 6-2, Table 5-3) as follows:

- TPH (135 mg/kg) at a depth of 470 ft bgs
- Benzene (0.36 mg/kg) at a depth of 250 ft bgs
- Total BTEX (1.146 mg/kg) at a depth of 420 ft bgs

The highest EDB concentration (0.04 mg/kg) present in the vadose zone was observed in KAFB-106V3 at a depth of 271 ft bgs. Concentrations of EDB above the limit of detection were not observed in the saturated zone. The highest TPH (93 mg/kg), benzene (1.6 mg/kg), and total BTEX (9.12 mg/kg) concentrations in the saturated zone were observed in KAFB-106S10 at a depth of 480 ft bgs (Figures 6-1 and 6-2, Table 5-3). In general, soil laboratory analytical data were consistent with other boreholes located within the source area (Figures 5-2 through 5-4).

A nest of two wells capable of accepting a groundwater pump capable of low-flow sampling was installed in each of the GWM borings (KAFB-106S10, KAFB-106249 through KAFB-106252). Well construction approvals were received from NMED prior to construction of each well. Each nested well was constructed with a lower water table well (constructed with 15 ft of saturated thickness), and a contingency well to account for a rise in the water table.

The SVM well (KAFB-106V3) was constructed with a deeper SVMP that intersected the upper portion of the clay found at 270 ft bgs. This well also included two shallow SVMPs installed at 7 and 15 ft bgs. Soil vapor samples were collected from each screen of KAFB-106V3. Soil vapor concentrations of EDB and benzene exceeding the residential VISLs were observed in each of the well screens (Table 6-1). Concentrations of EDB were 6.8, 12, and 17 $\mu g/m^3$ in well screens at 7, 15, and 272 ft bgs, respectively. Concentrations of benzene were 260, 160, and 200 $\mu g/m^3$ in well screens at 7, 15, and 272 ft bgs, respectively. No other soil vapor concentrations exceeded the residential VISL.

Groundwater samples were collected from each of the GWM wells following their installation and development. Concentrations of EDB above the project screening level were observed in well KAFB-106S10 (15 µg/L [Table 6-2]). Benzene concentrations above the project screening level were observed in KAFB-106S10 (8,400 µg/L) and KAFB-106250 (8.1 µg/L). Concentrations of ethylbenzene (850 µg/L), toluene (16,000 µg/L), and total xylene (3,800 µg/L) above the project screening level were observed in well KAFB-106S10. Of the inorganic constituents sampled, only manganese exceeded the project screening levels in wells KAFB-106249 (0.38 µg/L), KAFB-106250 (2.4 µg/L), KAFB-106251 (0.41 µg/L), and KAFB-106S10 (0.6 µg/L). No other concentrations of contaminants of potential concern were observed to exceed the project screening levels.

8. RECOMMENDATIONS

The data collected during this investigation have provided additional lithologic information in the source area and filled data gaps associated with rising groundwater levels. This information, when incorporated with existing data collected from other investigations, will be presented in the Phase II RFI. The monitoring wells installed as part of this investigation will continue to be monitored quarterly and incorporated into the GWM program. Data obtained from this investigation support the following recommendations:

- Semiannual SVM and quarterly GWM are ongoing. It is recommended to continue monitoring of the subsurface to assess changes in the GWM and SVM well networks.

- The source area lithology, soil vapor, and groundwater data collected from this investigation are consistent with data collected from previous investigations. Based on this, the investigation phase of this project is coming to an end. The nature and extent of contamination have been defined to the extent necessary to perform the Corrective Measures Evaluation. It is recommended that no additional investigations be performed in the source area and to begin drafting the Phase II RFI Report. The Phase II RFI Report will summarize the ending of the investigation phase and demonstrate that the nature and extent of contamination is defined to the extent necessary to inform the Corrective Measures Evaluation. However, if there are additional data gaps identified from routine monitoring data evaluation or from changing site conditions, those additional data gaps will be addressed as part of the corrective action process.

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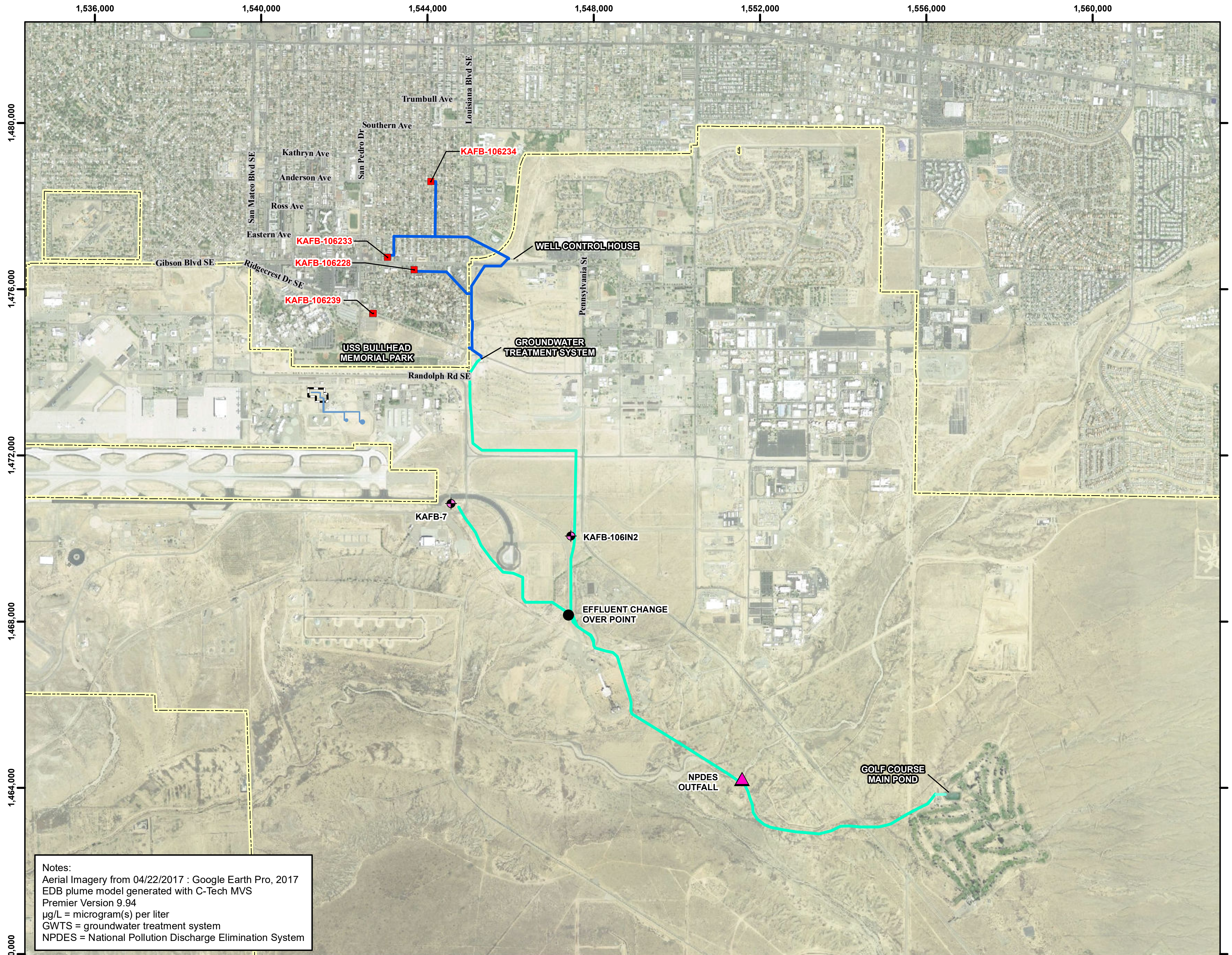
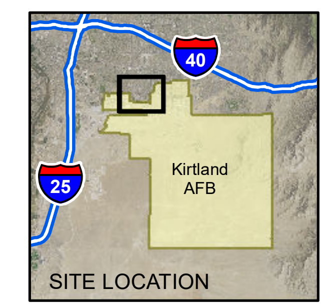
FIGURES



Notes:
Aerial Imagery from 04/22/2017 : Google Earth Pro, 2017
EDB plume model generated with C-Tech MVS
Premier Version 9.94
µg/L = microgram(s) per liter
GWTS = groundwater treatment system
NPDES = National Pollution Discharge Elimination System

Legend

- Extraction Well
- Existing Injection Well
- NPDES Outfall
- Former Aboveground Storage Tank
- Former Fuel Transfer Line
- GWTS Influent Piping
- GWTS Effluent Piping
- Installation Boundary
- Source Area



N
0 1,250 2,500 5,000
Feet
1 inch = 2,500 feet
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION KAFB-106248 TO KAFB-106252 AND KAFB-106S10 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNIT ST-106/SS-111 KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 1-1

SITE MAP

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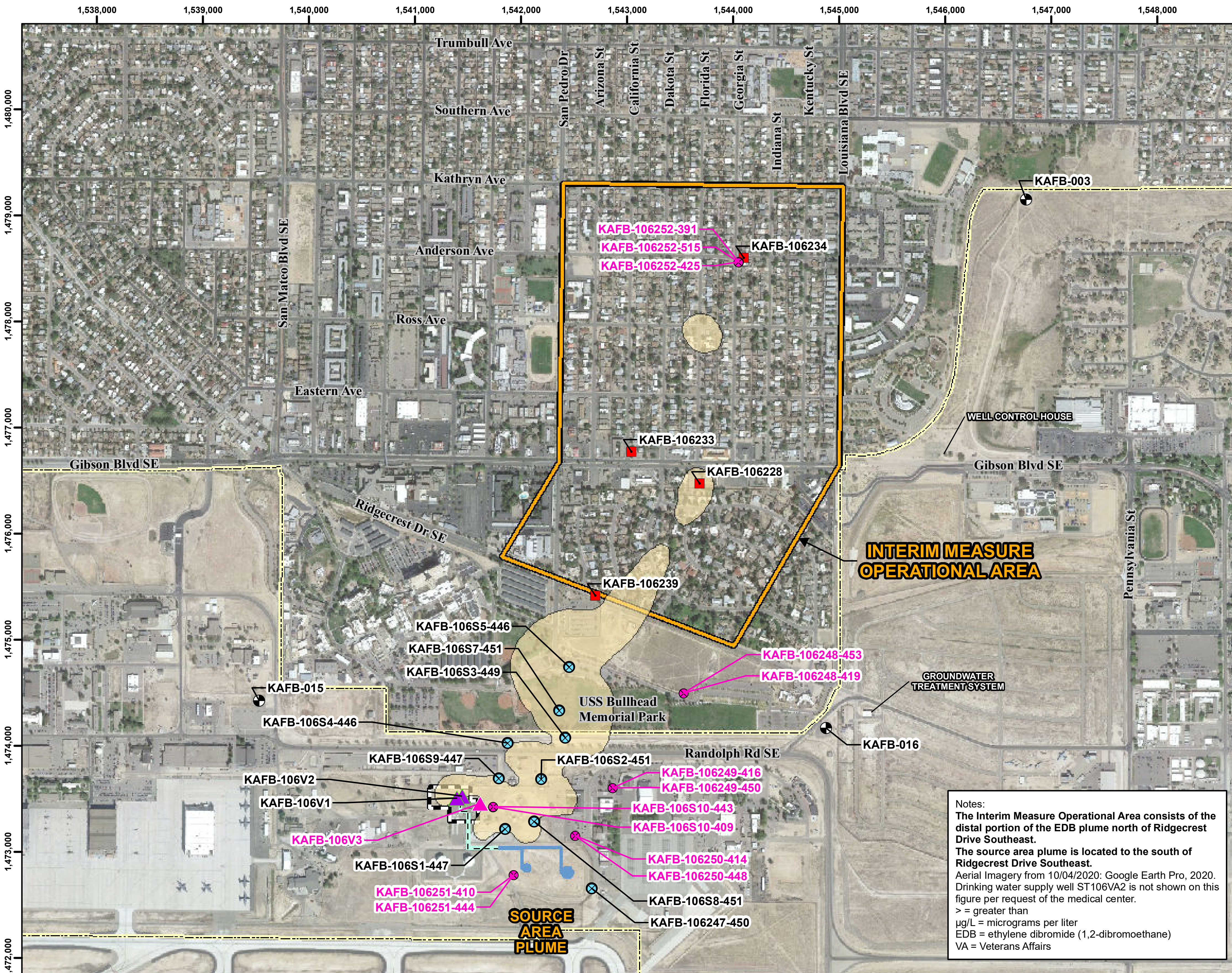
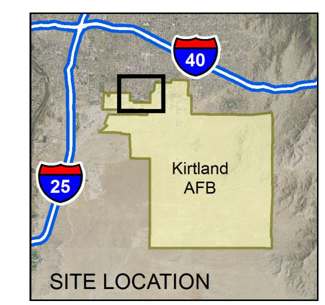


Notes:
The Interim Measure Operational Area consists of the distal portion of the EDB plume north of Ridgecrest Drive Southeast.
The source area plume is located to the south of Ridgecrest Drive Southeast.
Aerial Imagery from 10/04/2020: Google Earth Pro, 2020.
Drinking water supply well ST106VA2 is not shown on this figure per request of the medical center.
> = greater than
μg/L = micrograms per liter
EDB = ethylene dibromide (1,2-dibromoethane)
VA = Veterans Affairs

Legend

- Groundwater Monitoring Well
- Soil Vapor Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Monitoring Well Installed During the Investigation
- Soil Vapor Monitoring Well Installed During the Investigation
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Interim Measure Operational Area
- Installation Fence Boundary
- Source Area
- EDB Plume Q4 2020 (> 0.05 μg/L)



N
0 500 1,000 2,000
Feet
1 inch = 1,000 feet
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 1-2

MONITORING WELLS INSTALLED DURING THIS INVESTIGATION

P:\Projects\Kirtland\Figures\Data Gap Monitoring Wells\2020_Data_Gap_Well_Install\1-2_2020_2021_DATA_GAP_WELL_INSTALLED.mxd 7/28/2021 EA ecarpio

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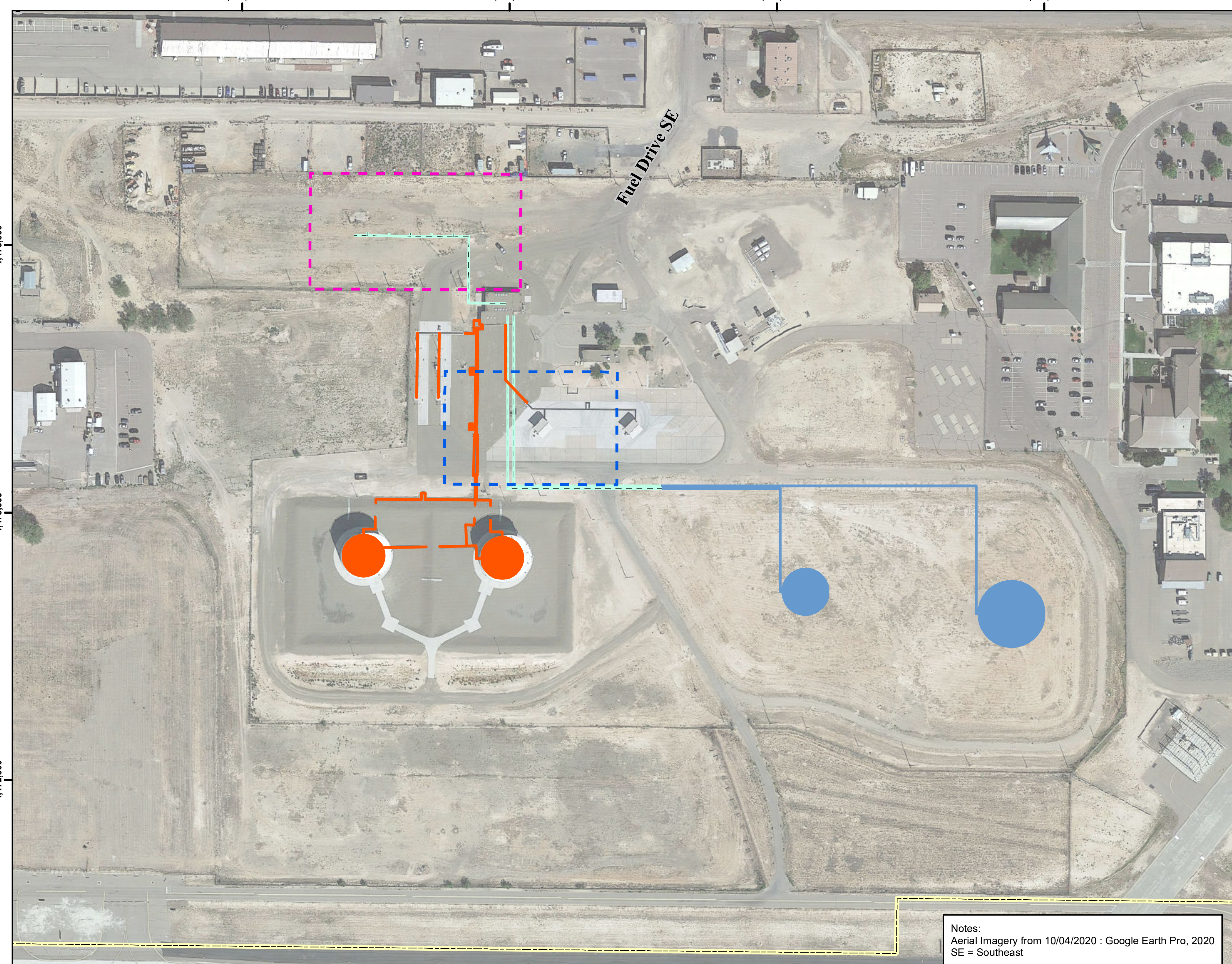
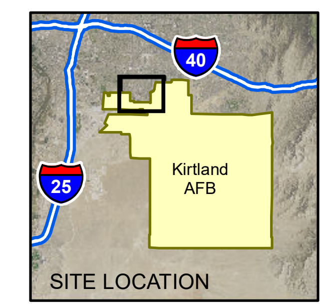


Legend

- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Former Fuel Offloading Rack
- Former Temporary Fueling Pad
- Current Above Ground Storage Tank
- Current Aboveground Fuel Transfer Line
- Installation Boundary



N

0 100 200 400

Feet

1 inch = 200 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

INVESTIGATION REPORT FOR DATA GAP
MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 2-1

CURRENT AND FORMER SITE INFRASTRUCTURE

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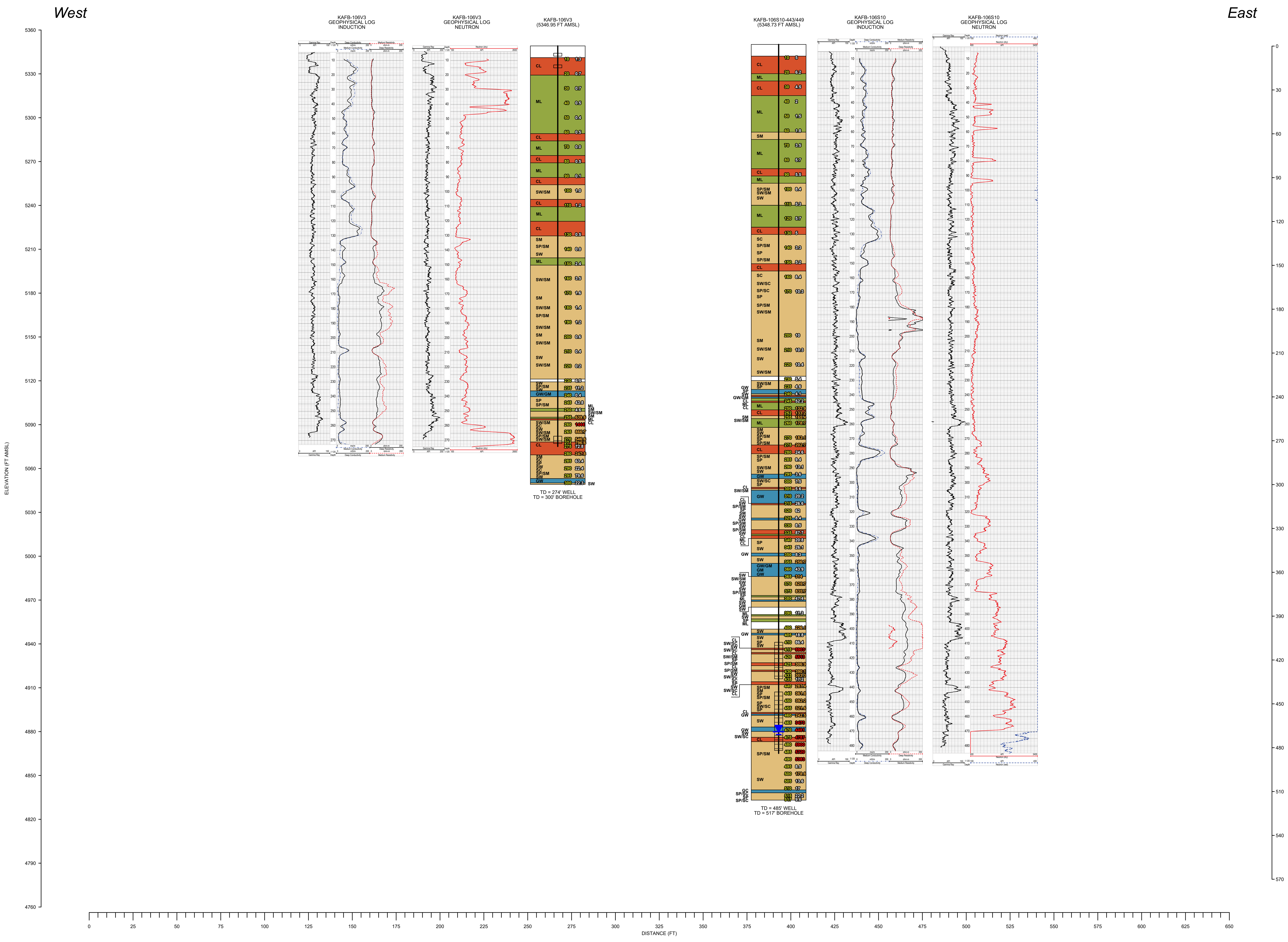
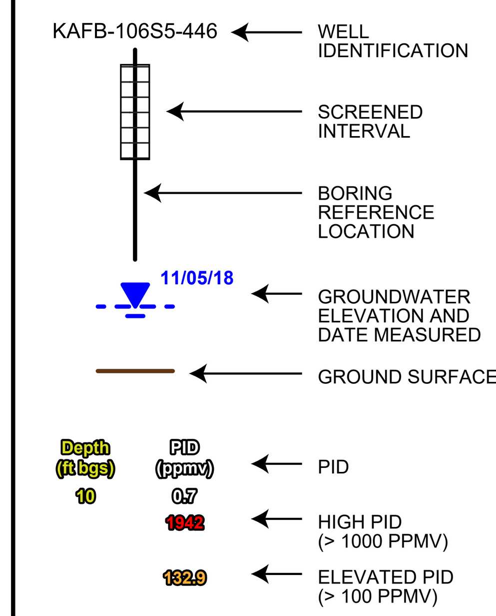


LEGEND



USCS SOIL CLASSIFICATION

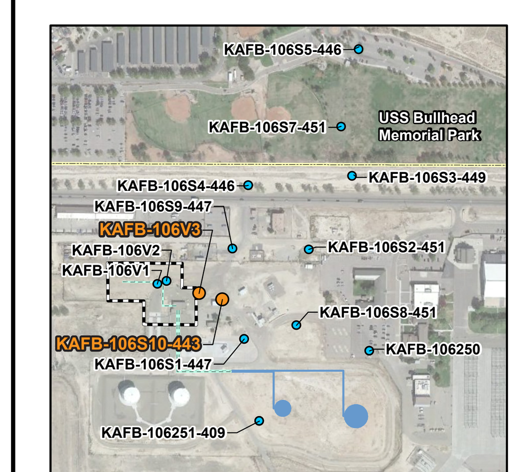
- CLAY (CL)
- GRAVEL (GC, GM, GW, GW/GM)
- SAND (SP, SW, SC, SM, SP/SC, SP/SM, SW/SC, SW/SM)
- SILT (ML)
- NOT LOGGED

ACRONYMS

> = GREATER THAN
AMSL - ABOVE MEAN SEA LEVEL
BGS - BELOW GROUND SURFACE
CL - CLAY (LIQUID LIMIT < 50)
FT OR ' - FEET
GC - CLAYEY GRAVEL WITH SAND
GM - SILTY GRAVEL
GW - WELL GRADED GRAVEL
GW/GC - WELL GRADED GRAVEL WITH CLAY
ML - SILT (LIQUID LIMIT < 50)
NS - NOT SAMPLED
PPMV - PARTS PER MILLION BY VOLUME
SC - CLAYEY SAND
SM - SILTY SAND
SP - POORLY GRADED SAND
SP/SC - POORLY GRADED SAND WITH CLAY
SP/SM - POORLY GRADED SAND WITH SILT
SW - WELL GRADED SAND
SW/SC - WELL GRADED SAND WITH CLAY
SW/SM - WELL GRADED SAND WITH SILT
USCS - UNIFIED SOIL CLASSIFICATION SYSTEM

NOTE:

DISTANCES BETWEEN BORINGS ARE MEASURED FROM THE BORING REFERENCE LOCATION.

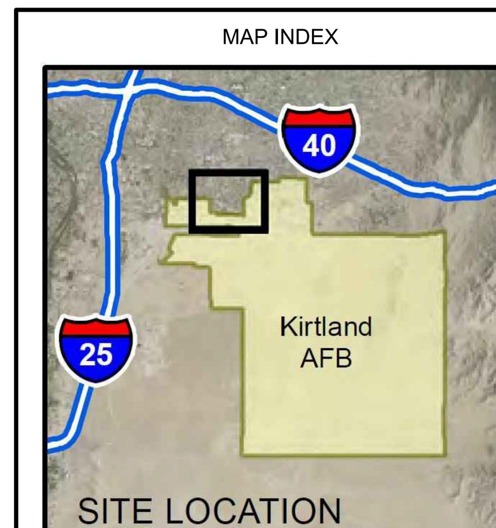


PLAN VIEW

HORIZONTAL SCALE IN FEET

VERTICAL SCALE IN FEET

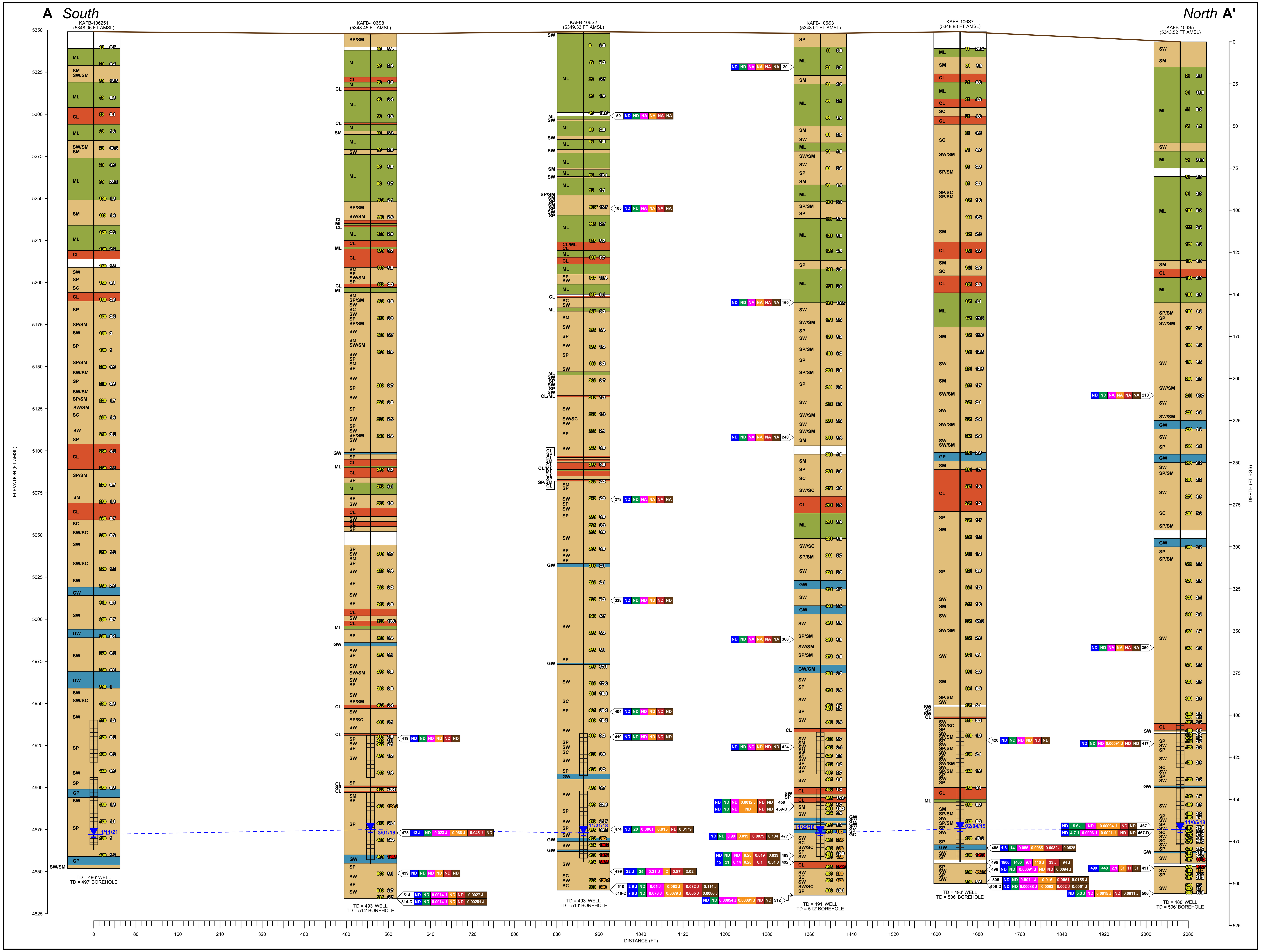
MAP INDEX



INVESTIGATION REPORT FOR DATA GAP
MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-1

COMPARISON OF LITHOLOGY AND GEOPHYSICAL LOGS OF KAFB-106S10 AND KAFB-106V3



LEGEND

KAFB-106S5-446 ← WELL IDENTIFICATION

← SCREENED INTERVAL

← BORING REFERENCE LOCATION

11/05/18 ← GROUNDWATER ELEVATION AND DATE MEASURED

← GROUND SURFACE

ND ND ND ND ND ND 102 ← SAMPLE DEPTH

XYLENES, ETHYLBENZENE, TOLUENE, BENZENE, TPH-DRO, TPH-GRO ← ANALYTE COLOR GUIDE

Depth (ft bgs) 10 — PID (ppmv) 0.7 ← PID

1942 ← HIGH PID (> 1000 PPMV)

132.9 ← ELEVATED PID (> 100 PPMV)

USCS SOIL CLASSIFICATION

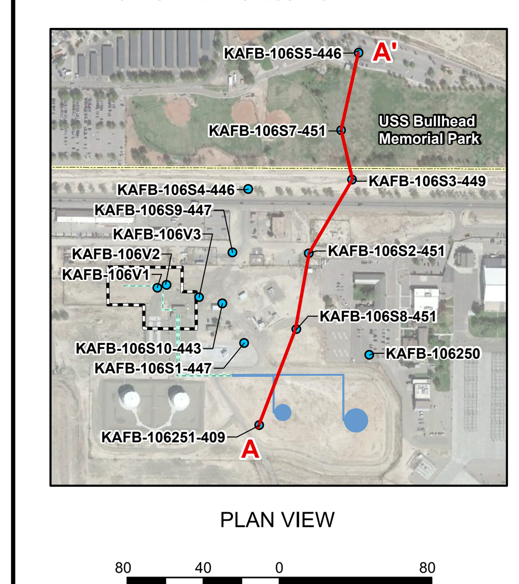
- CLAY (CL, CL/ML)
- GRAVEL (GP, GC, GW, GW/GM)
- SAND (SP, SW, SC, SM, SP/SC, SP/SM, SW/SC, SW/SM)
- SILT (ML)
- NOT LOGGED

ACRONYMS

> = GREATER THAN
AMSL - ABOVE MEAN SEA LEVEL
BGS - BELOW GROUND SURFACE
CL - CLAY (LIQUID LIMIT < 50)
CL/ML - CLAY WITH SILT
FT OR ' - FEET
GP - POORLY GRADED GRAVEL
GC - CLAYEY GRAVEL
GW - WELL GRADED GRAVEL
ML - SILT (LIQUID LIMIT < 50)
NL - NOT LOGGED
PPMV - PARTS PER MILLION BY VOLUME
SC - CLAYEY SAND
SM - SILTY SAND
SP - POORLY GRADED SAND
SP/SC - POORLY GRADED SAND WITH CLAY
SP/SM - POORLY GRADED SAND WITH SILT
SW - WELL GRADED SAND
SW/SC - WELL GRADED SAND WITH CLAY
SW/SM - WELL GRADED SAND WITH SILT
USCS - UNIFIED SOIL CLASSIFICATION SYSTEM

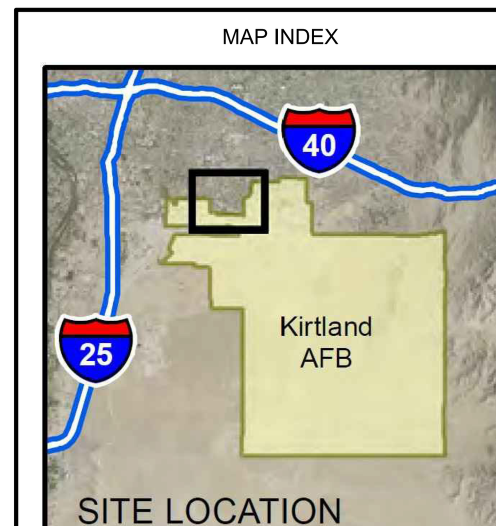
NOTE:

DISTANCES BETWEEN BORINGS ARE MEASURED FROM THE BORING REFERENCE LOCATION.



PLAN VIEW

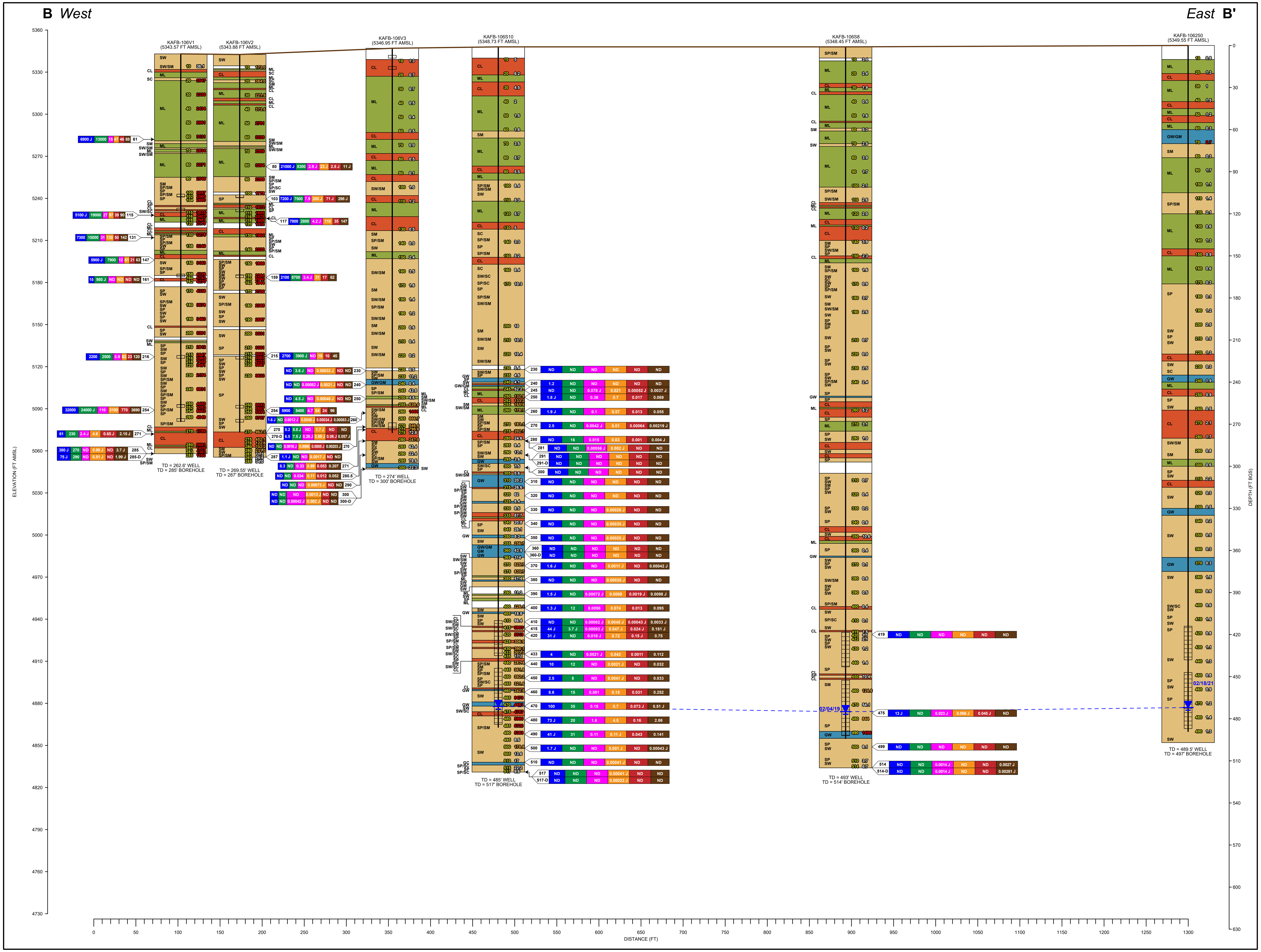
MAP INDEX



INVESTIGATION REPORT FOR DATA GAP
MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-2

GEOLOGIC FENCE DIAGRAM
A - A'



LEGEND

KAFB-106S5-446 ← WELL IDENTIFICATION

← SCREENED INTERVAL

← BORING REFERENCE LOCATION

11/05/18 ← GROUNDWATER ELEVATION AND DATE MEASURED

← GROUND SURFACE

ND ND ND ND ND ND 102 ← SAMPLE DEPTH

ANALYTE COLOR GUIDE: XYLENES, ETHYLBENZENE, TOLUENE, BENZENE, TPH-DRO, TPH-GRO

Depth (ft bgs) 10 — PID (ppmv) 0.7 ← PID

1942 ← HIGH PID (> 1000 PPMV)

132.9 ← ELEVATED PID (> 100 PPMV)

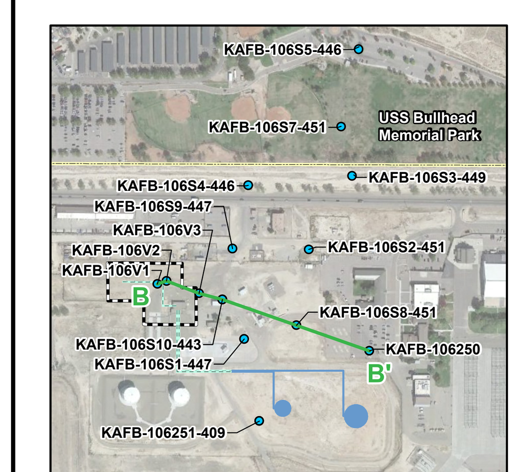
USCS SOIL CLASSIFICATION

- CLAY (CL)
- GRAVEL (GC, GM, GW, GW/GM)
- SAND (SP, SW, SC, SM, SP/SC, SP/SM, SW/SC, SW/SM)
- SILT (ML)
- NOT LOGGED

ACRONYMS

> = GREATER THAN
AMSL - ABOVE MEAN SEA LEVEL
BGS - BELOW GROUND SURFACE
CL - CLAY (LIQUID LIMIT < 50)
FT OR ' - FEET
GC - CLAYEY GRAVEL WITH SAND
GM - SILTY GRAVEL
GW - WELL GRADED GRAVEL
GW/GC - WELL GRADED GRAVEL WITH CLAY
ML - SILT (LIQUID LIMIT < 50)
NS - NOT SAMPLED
PPMV - PARTS PER MILLION BY VOLUME
SC - CLAYEY SAND
SM - SILTY SAND
SP - POORLY GRADED SAND
SP/SC - POORLY GRADED SAND WITH CLAY
SP/SM - POORLY GRADED SAND WITH SILT
SW - WELL GRADED SAND
SW/SC - WELL GRADED SAND WITH CLAY
SW/SM - WELL GRADED SAND WITH SILT
USCS - UNIFIED SOIL CLASSIFICATION SYSTEM

NOTE:
DISTANCES BETWEEN BORINGS ARE MEASURED FROM THE BORING REFERENCE LOCATION.

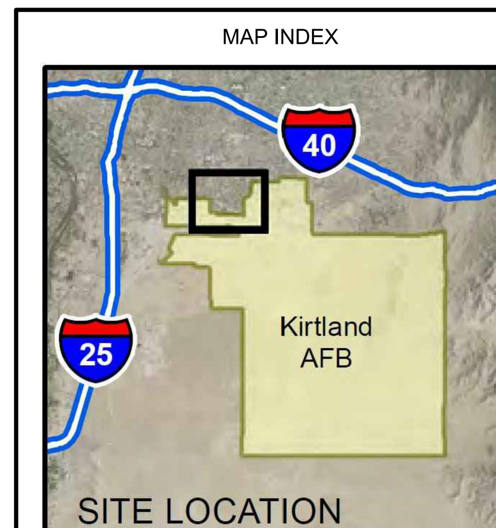


PLAN VIEW

HORIZONTAL SCALE IN FEET (50 25 0 50)

VERTICAL SCALE IN FEET (30 15 0 30)

MAP INDEX



INVESTIGATION REPORT FOR DATA GAP
MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
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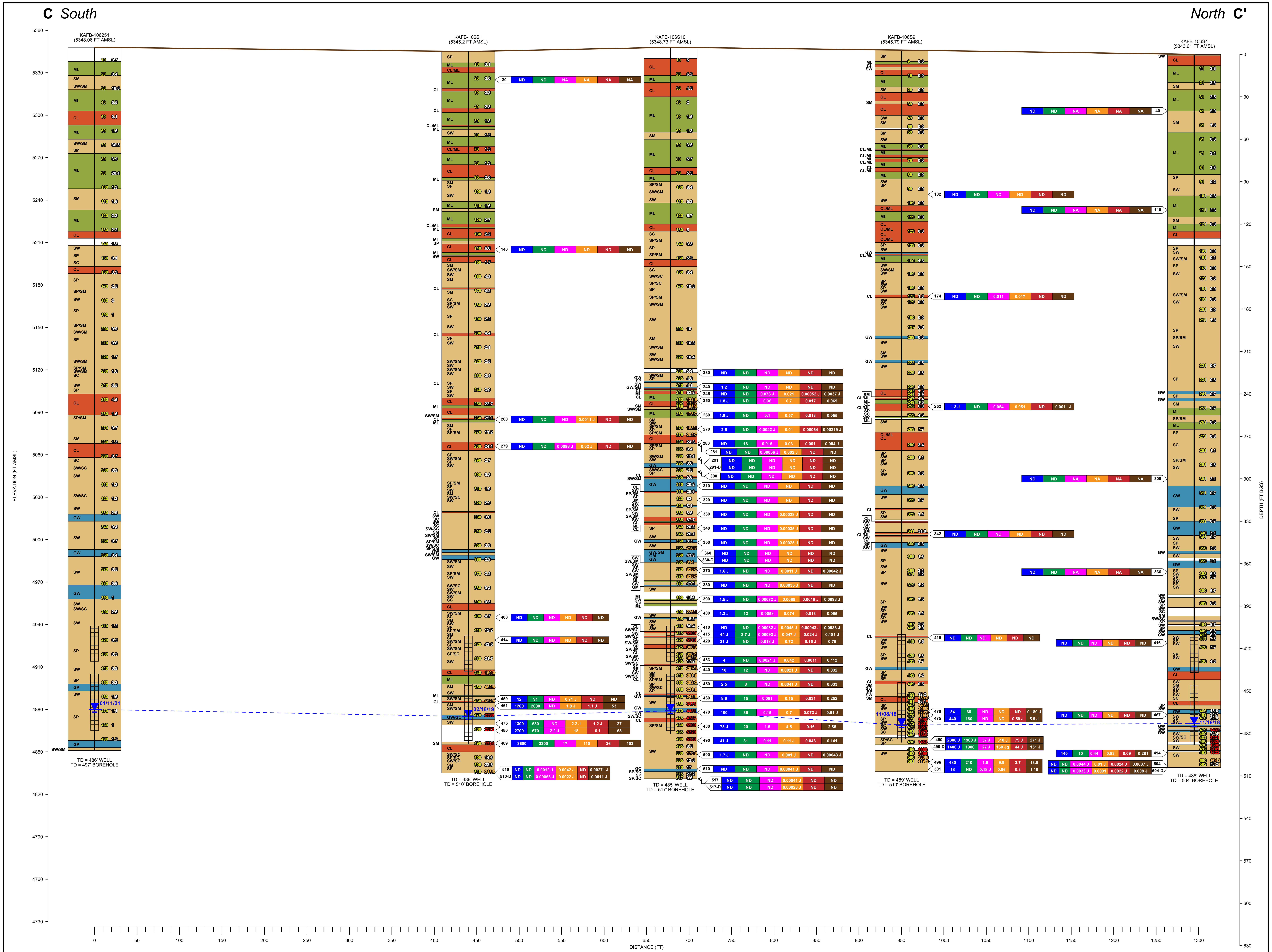
FIGURE 5-3

GEOLOGIC FENCE DIAGRAM
B - B'



LEGEND

KAFB-106S5-446 ← WELL IDENTIFICATION

← SCREENED INTERVAL

← BORING REFERENCE LOCATION

11/05/18 ← GROUNDWATER ELEVATION AND DATE MEASURED

← GROUND SURFACE

ND ND ND ND ND ND 102 ← SAMPLE DEPTH

ANALYTE COLOR GUIDE: XYLENES, ETHYLBENZENE, TOLUENE, BENZENE, TPH-DRO, TPH-GRO

Depth (ft bgs) 10 — PID (ppmv) 0.7 ← PID

1942 ← HIGH PID (> 1000 PPMV)

132.9 ← ELEVATED PID (> 100 PPMV)

USCS SOIL CLASSIFICATION

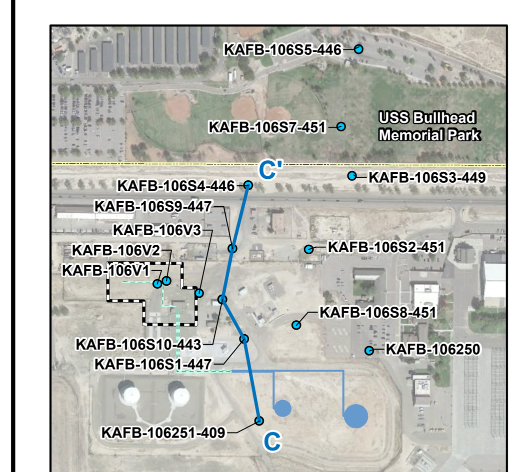
- CLAY (CL, CL/ML)
- GRAVEL (GP, GC, GW, GW/GC, GW/GM)
- SAND (SP, SW, SC, SM, SP/SC, SP/SM, SW/SC, SW/SM)
- SILT (ML)
- NOT LOGGED

ACRONYMS

> = GREATER THAN
AMSL - ABOVE MEAN SEA LEVEL
BGS - BELOW GROUND SURFACE
CL - CLAY (LIQUID LIMIT < 50)
CL/ML - SILTY CLAY
FT OR ' - FEET
GP - POORLY GRADED GRAVEL
GC - CLAYEY GRAVEL
GW - WELL GRADED GRAVEL
GW/GC - WELL GRADED GRAVEL WITH CLAY
ML - SILT (LIQUID LIMIT < 50)
NS - NOT SAMPLED
PPMV - PARTS PER MILLION BY VOLUME
SC - CLAYEY SAND
SM - SILTY SAND
SP - POORLY GRADED SAND
SP/SC - POORLY GRADED SAND WITH CLAY
SP/SM - POORLY GRADED SAND WITH SILT
SW - WELL GRADED SAND
SW/SC - WELL GRADED SAND WITH CLAY
SW/SM - WELL GRADED SAND WITH SILT
USCS - UNIFIED SOIL CLASSIFICATION SYSTEM

NOTE:

DISTANCES BETWEEN BORINGS ARE MEASURED FROM THE BORING REFERENCE LOCATION.

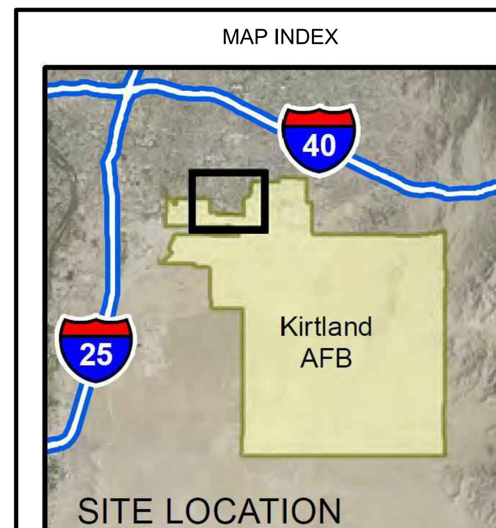


PLAN VIEW

HORIZONTAL SCALE IN FEET (50 25 0 50)

VERTICAL SCALE IN FEET (30 15 0 30)

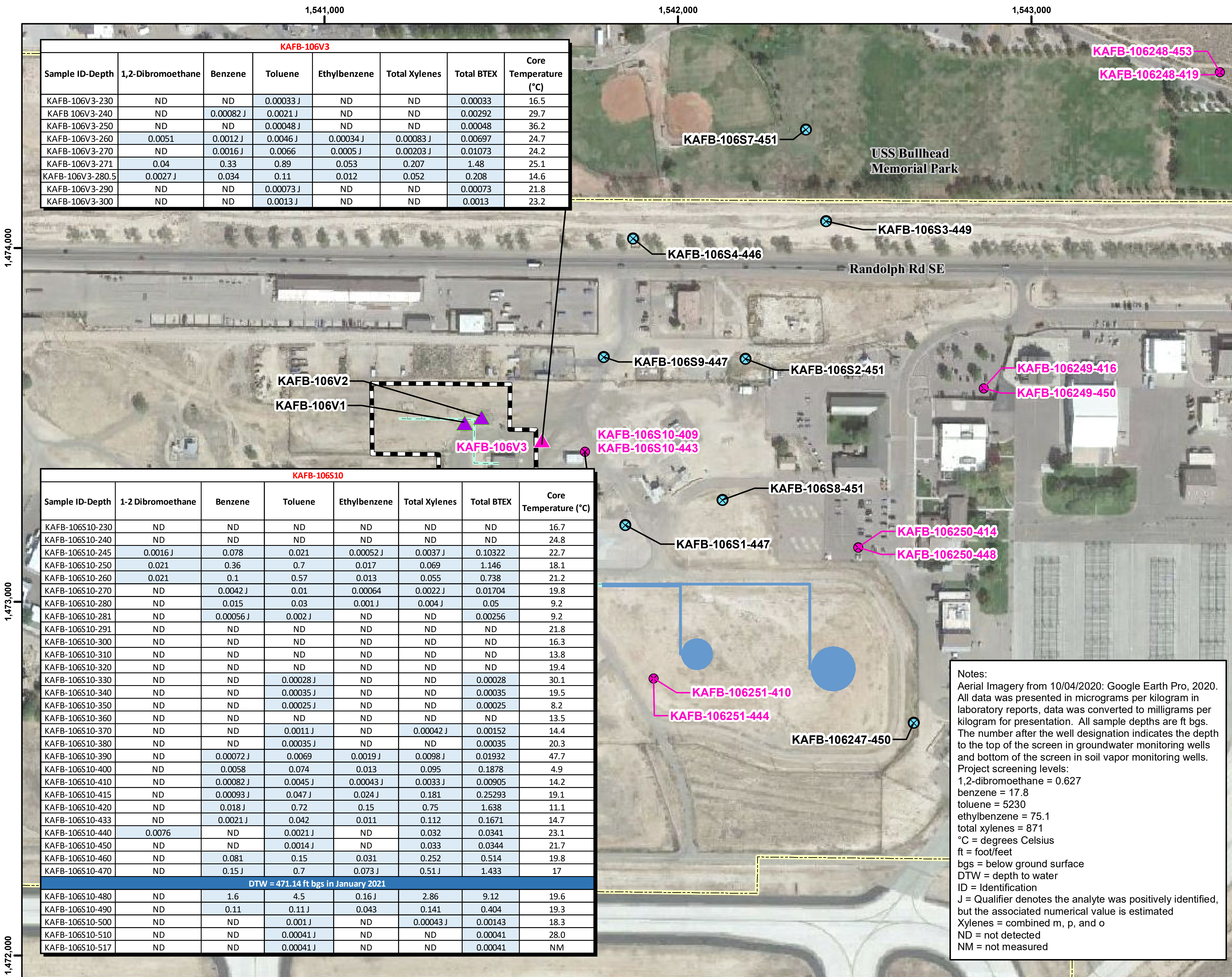
MAP INDEX



INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-4

GEOLOGIC FENCE DIAGRAM
C - C'



KAFB-106V3

Sample ID-Depth	1,2-Dibromoethane	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	Core Temperature (°C)
KAFB-106V3-230	ND	ND	0.00033 J	ND	ND	0.00033	16.5
KAFB 106V3-240	ND	0.00082 J	0.0021 J	ND	ND	0.00292	29.7
KAFB-106V3-250	ND	ND	0.00048 J	ND	ND	0.00048	36.2
KAFB-106V3-260	0.0051	0.0012 J	0.0046 J	0.00034 J	0.00083 J	0.00697	24.7
KAFB-106V3-270	ND	0.0016 J	0.0066	0.0005 J	0.00203 J	0.01073	24.2
KAFB-106V3-271	0.04	0.33	0.89	0.053	0.207	1.48	25.1
KAFB-106V3-280.5	0.0027 J	0.034	0.11	0.012	0.052	0.208	14.6
KAFB-106V3-290	ND	ND	0.00073 J	ND	ND	0.00073	21.8
KAFB-106V3-300	ND	ND	0.0013 J	ND	ND	0.0013	23.2

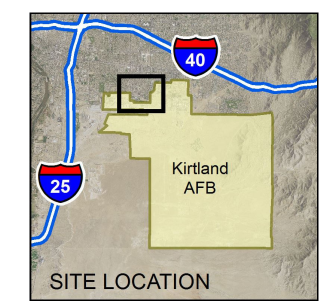
KAFB-106S10

Sample ID-Depth	1-2 Dibromoethane	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total BTEX	Core Temperature (°C)
KAFB-106S10-230	ND	ND	ND	ND	ND	ND	16.7
KAFB-106S10-240	ND	ND	ND	ND	ND	ND	24.8
KAFB-106S10-245	0.0016 J	0.078	0.021	0.00052 J	0.0037 J	0.10322	22.7
KAFB-106S10-250	0.021	0.36	0.7	0.017	0.069	1.146	18.1
KAFB-106S10-260	0.021	0.1	0.57	0.013	0.055	0.738	21.2
KAFB-106S10-270	ND	0.0042 J	0.01	0.00064	0.0022 J	0.01704	19.8
KAFB-106S10-280	ND	0.015	0.03	0.001 J	0.004 J	0.05	9.2
KAFB-106S10-281	ND	0.00056 J	0.002 J	ND	ND	0.00256	9.2
KAFB-106S10-291	ND	ND	ND	ND	ND	ND	21.8
KAFB-106S10-300	ND	ND	ND	ND	ND	ND	16.3
KAFB-106S10-310	ND	ND	ND	ND	ND	ND	13.8
KAFB-106S10-320	ND	ND	ND	ND	ND	ND	19.4
KAFB-106S10-330	ND	ND	0.00028 J	ND	ND	0.00028	30.1
KAFB-106S10-340	ND	ND	0.00035 J	ND	ND	0.00035	19.5
KAFB-106S10-350	ND	ND	0.00025 J	ND	ND	0.00025	8.2
KAFB-106S10-360	ND	ND	ND	ND	ND	ND	13.5
KAFB-106S10-370	ND	ND	0.0011 J	ND	0.00042 J	0.00152	14.4
KAFB-106S10-380	ND	ND	0.00035 J	ND	ND	0.00035	20.3
KAFB-106S10-390	ND	0.00072 J	0.0069	0.0019 J	0.0098 J	0.01932	47.7
KAFB-106S10-400	ND	0.0058	0.074	0.013	0.095	0.1878	4.9
KAFB-106S10-410	ND	0.00082 J	0.0045 J	0.00043 J	0.0033 J	0.00905	14.2
KAFB-106S10-415	ND	0.00093 J	0.047 J	0.024 J	0.181	0.25293	19.1
KAFB-106S10-420	ND	0.018 J	0.72	0.15	0.75	1.638	11.1
KAFB-106S10-433	ND	0.0021 J	0.042	0.011	0.112	0.1671	14.7
KAFB-106S10-440	0.0076	ND	0.0021 J	ND	0.032	0.0341	23.1
KAFB-106S10-450	ND	ND	0.0014 J	ND	0.033	0.0344	21.7
KAFB-106S10-460	ND	0.081	0.15	0.031	0.252	0.514	19.8
KAFB-106S10-470	ND	0.15 J	0.7	0.073 J	0.51 J	1.433	17
DTW = 471.14 ft bgs in January 2021							
KAFB-106S10-480	ND	1.6	4.5	0.16 J	2.86	9.12	19.6
KAFB-106S10-490	ND	0.11	0.11 J	0.043	0.141	0.404	19.3
KAFB-106S10-500	ND	ND	0.001 J	ND	0.00043 J	0.00143	18.3
KAFB-106S10-510	ND	ND	0.00041 J	ND	ND	0.00041	28.0
KAFB-106S10-517	ND	ND	0.00041 J	ND	ND	0.00041	NM

Notes:
Aerial Imagery from 10/04/2020: Google Earth Pro, 2020.
All data was presented in micrograms per kilogram in laboratory reports, data was converted to milligrams per kilogram for presentation. All sample depths are ft bgs.
The number after the well designation indicates the depth to the top of the screen in groundwater monitoring wells and bottom of the screen in soil vapor monitoring wells.
Project screening levels:
1,2-dibromoethane = 0.627
benzene = 17.8
toluene = 5230
ethylbenzene = 75.1
total xylenes = 871
°C = degrees Celsius
ft = foot/feet
bgs = below ground surface
DTW = depth to water
ID = Identification
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated
Xylenes = combined m, p, and o
ND = not detected
NM = not measured

Legend

- Groundwater Monitoring Well
- Soil Vapor Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Monitoring Well Installed During this Investigation
- Soil Vapor Monitoring Well Installed During this Investigation
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area
- 7.6 J = Detected Analyte



N
0 150 300 600
Feet
1 inch = 300 feet
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 6-1

1,2-DIBROMOETHANE, BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES CONCENTRATIONS IN SOIL

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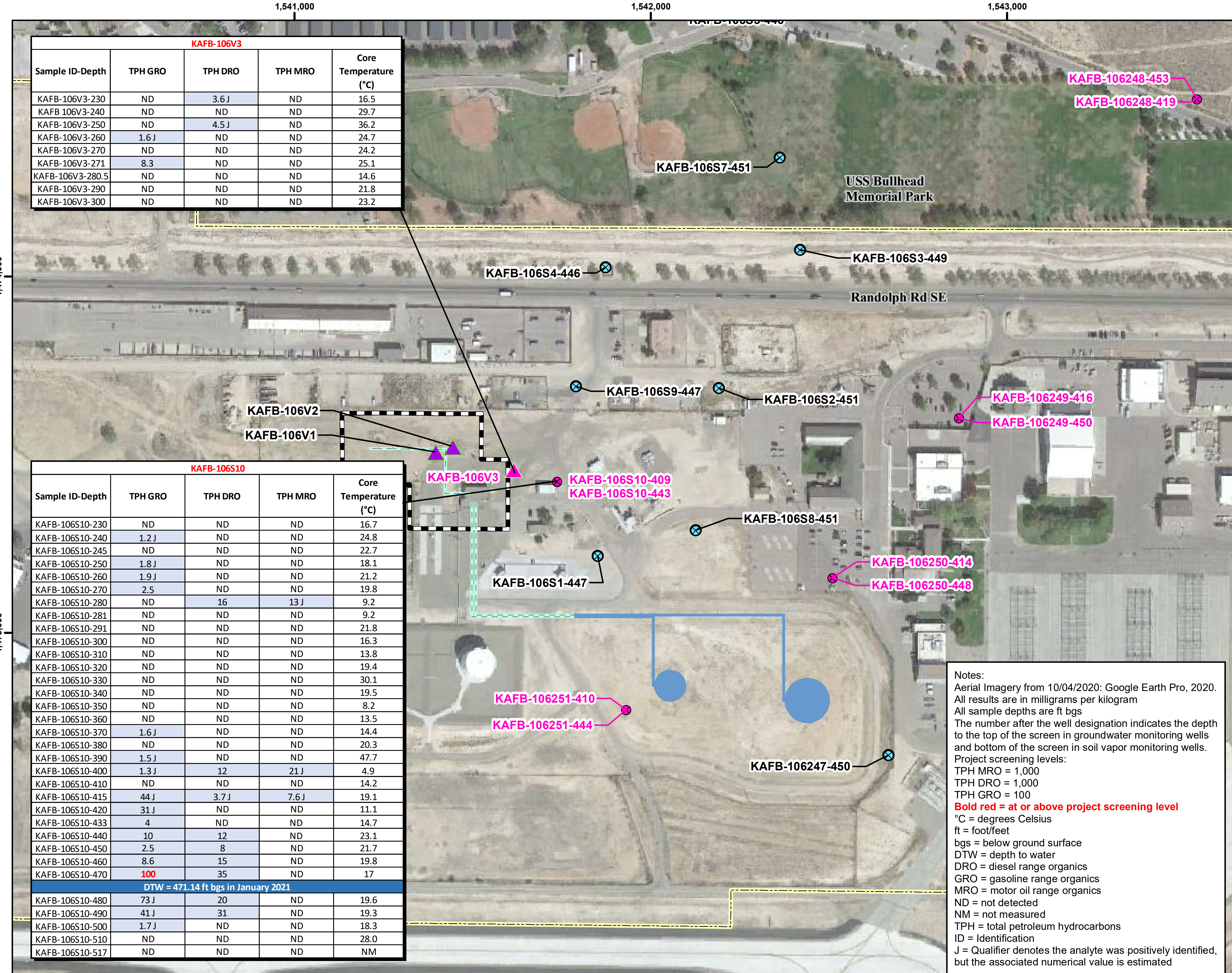


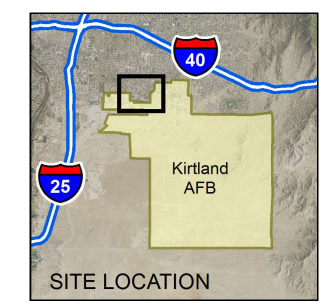
KAFB-106V3				
Sample ID-Depth	TPH GRO	TPH DRO	TPH MRO	Core Temperature (°C)
KAFB-106V3-230	ND	3.6 J	ND	16.5
KAFB 106V3-240	ND	ND	ND	29.7
KAFB-106V3-250	ND	4.5 J	ND	36.2
KAFB-106V3-260	1.6 J	ND	ND	24.7
KAFB-106V3-270	ND	ND	ND	24.2
KAFB-106V3-271	8.3	ND	ND	25.1
KAFB-106V3-280.5	ND	ND	ND	14.6
KAFB-106V3-290	ND	ND	ND	21.8
KAFB-106V3-300	ND	ND	ND	23.2

KAFB-106S10				
Sample ID-Depth	TPH GRO	TPH DRO	TPH MRO	Core Temperature (°C)
KAFB-106S10-230	ND	ND	ND	16.7
KAFB-106S10-240	1.2 J	ND	ND	24.8
KAFB-106S10-245	ND	ND	ND	22.7
KAFB-106S10-250	1.8 J	ND	ND	18.1
KAFB-106S10-260	1.9 J	ND	ND	21.2
KAFB-106S10-270	2.5	ND	ND	19.8
KAFB-106S10-280	ND	16	13 J	9.2
KAFB-106S10-281	ND	ND	ND	9.2
KAFB-106S10-291	ND	ND	ND	21.8
KAFB-106S10-300	ND	ND	ND	16.3
KAFB-106S10-310	ND	ND	ND	13.8
KAFB-106S10-320	ND	ND	ND	19.4
KAFB-106S10-330	ND	ND	ND	30.1
KAFB-106S10-340	ND	ND	ND	19.5
KAFB-106S10-350	ND	ND	ND	8.2
KAFB-106S10-360	ND	ND	ND	13.5
KAFB-106S10-370	1.6 J	ND	ND	14.4
KAFB-106S10-380	ND	ND	ND	20.3
KAFB-106S10-390	1.5 J	ND	ND	47.7
KAFB-106S10-400	1.3 J	12	21 J	4.9
KAFB-106S10-410	ND	ND	ND	14.2
KAFB-106S10-415	44 J	3.7 J	7.6 J	19.1
KAFB-106S10-420	31 J	ND	ND	11.1
KAFB-106S10-433	4	ND	ND	14.7
KAFB-106S10-440	10	12	ND	23.1
KAFB-106S10-450	2.5	8	ND	21.7
KAFB-106S10-460	8.6	15	ND	19.8
KAFB-106S10-470	**100**	35	ND	17
DTW = 471.14 ft bgs in January 2021				
KAFB-106S10-480	73 J	20	ND	19.6
KAFB-106S10-490	41 J	31	ND	19.3
KAFB-106S10-500	1.7 J	ND	ND	18.3
KAFB-106S10-510	ND	ND	ND	28.0
KAFB-106S10-517	ND	ND	ND	NM

Notes:
Aerial Imagery from 10/04/2020: Google Earth Pro, 2020.
All results are in milligrams per kilogram
All sample depths are ft bgs
The number after the well designation indicates the depth to the top of the screen in groundwater monitoring wells and bottom of the screen in soil vapor monitoring wells.
Project screening levels:
TPH MRO = 1,000
TPH DRO = 1,000
TPH GRO = 100
Bold red = at or above project screening level
°C = degrees Celsius
ft = foot/feet
bgs = below ground surface
DTW = depth to water
DRO = diesel range organics
GRO = gasoline range organics
MRO = motor oil range organics
ND = not detected
NM = not measured
TPH = total petroleum hydrocarbons
ID = Identification
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated

Legend

- Groundwater Monitoring Well
- Soil Vapor Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Monitoring Well Installed During this Investigation
- Soil Vapor Monitoring Well Installed During this Investigation
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area
- 7.6 J = Detected Analyte



N
0 150 300 600
Feet
1 inch = 300 feet
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 6-2

TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS IN SOIL

P:\Projects\Kirtland\Figures\Data Gap Monitoring Wells\2020_Data_Gap_Well_Install\6-2_2020_2021_DATA_GAP_WELL_TPH.mxd 7/28/2021 EA ecarpio

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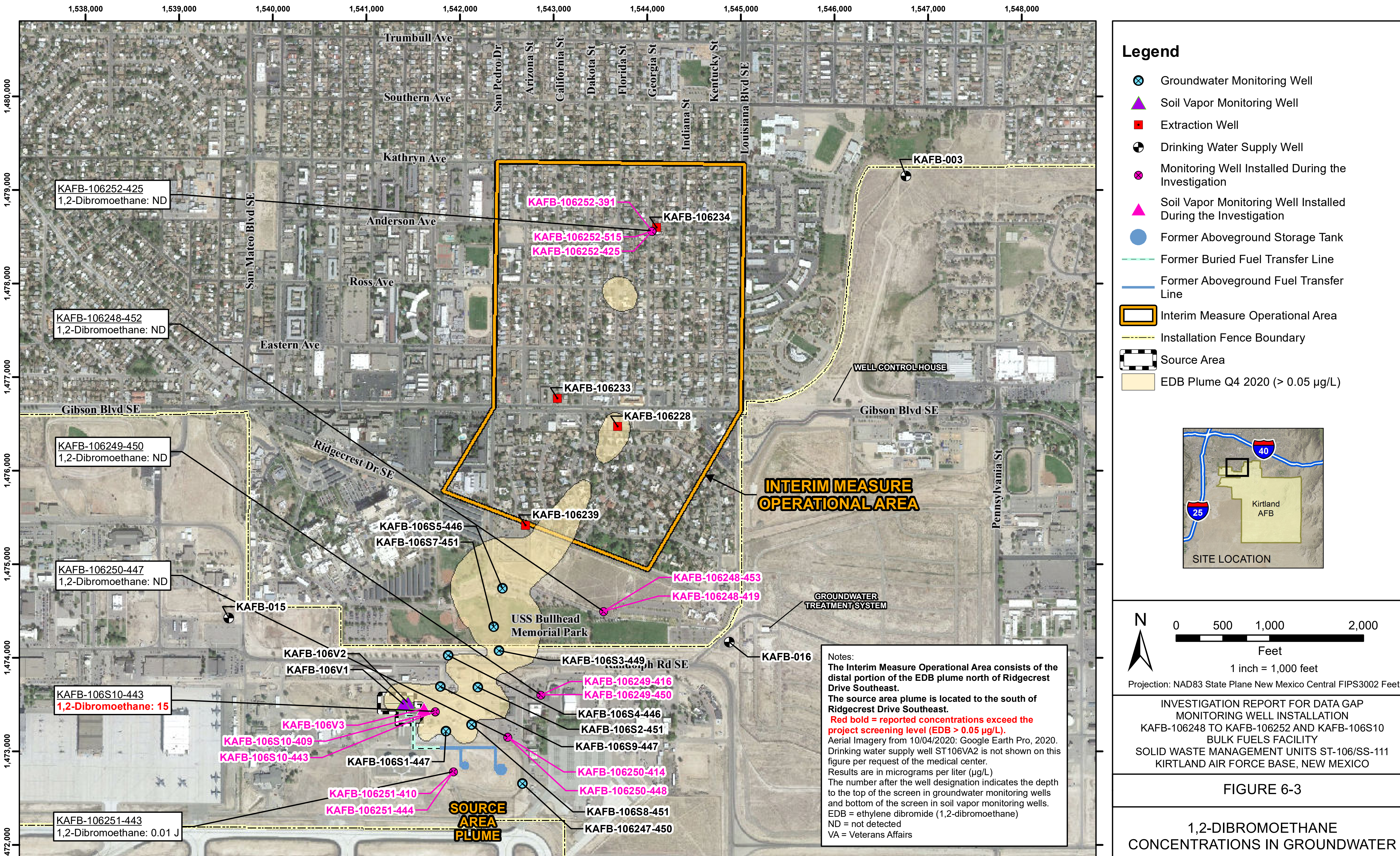

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 6-3

1,2-DIBROMOETHANE CONCENTRATIONS IN GROUNDWATER

P:\Projects\Kirtland\Figures\Data Gap Monitoring Wells\2020_Data_Gap_Well_Install\6-3_2020_2021_DATA_GAP_EDB_GW.mxd 7/28/2021 EA ecarpio

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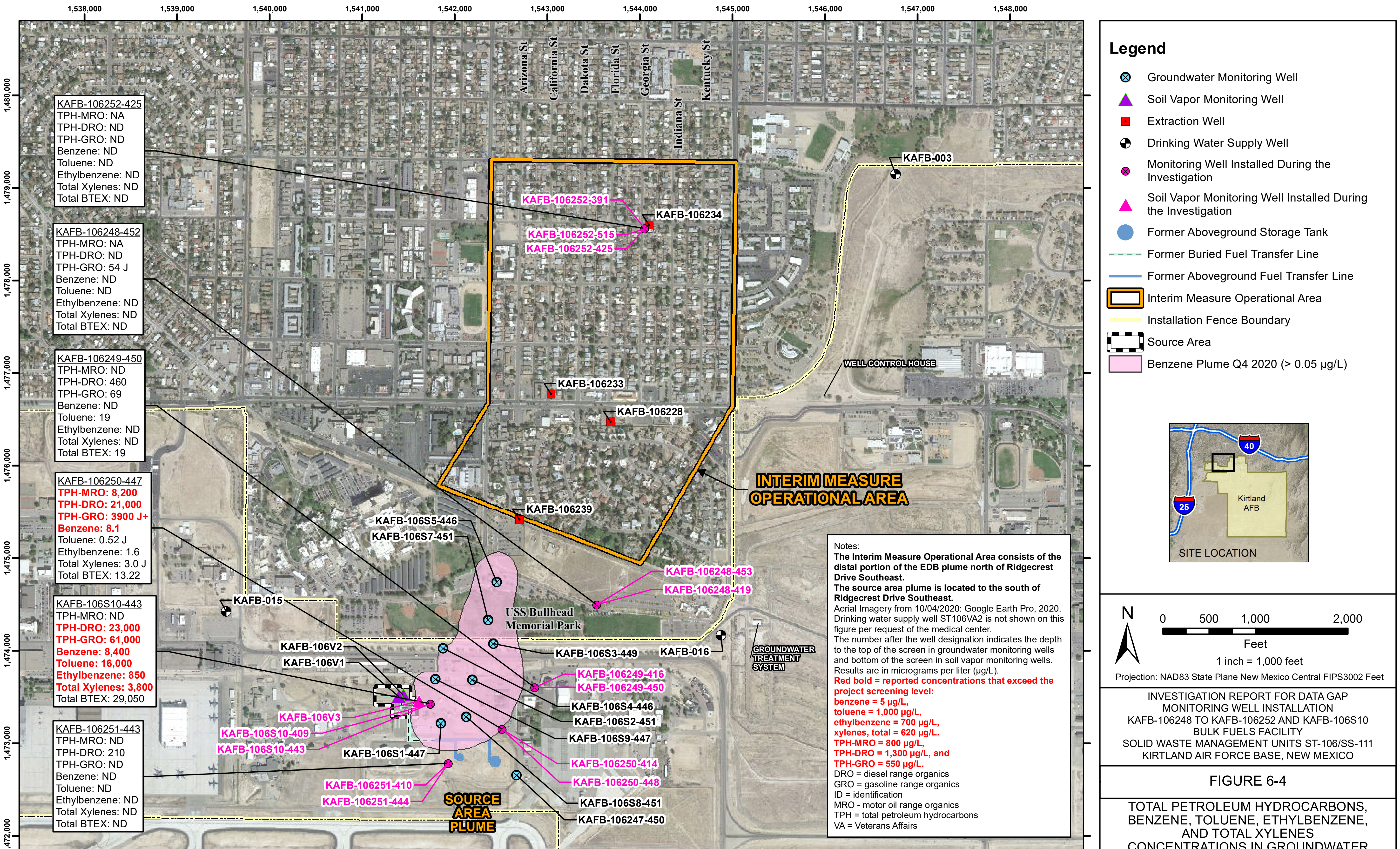

Notes:
The Interim Measure Operational Area consists of the distal portion of the EDB plume north of Ridgecrest Drive Southeast.
The source area plume is located to the south of Ridgecrest Drive Southeast.
Aerial Imagery from 10/04/2020: Google Earth Pro, 2020.
Drinking water supply well ST106VA2 is not shown on this figure per request of the medical center.
The number after the well designation indicates the depth to the top of the screen in groundwater monitoring wells and bottom of the screen in soil vapor monitoring wells.
Results are in micrograms per liter (µg/L).
Red bold = reported concentrations that exceed the project screening level:
benzene = 5 µg/L,
toluene = 1,000 µg/L,
ethylbenzene = 700 µg/L,
xylenes, total = 620 µg/L.
TPH-MRO = 800 µg/L,
TPH-DRO = 1,300 µg/L, and
TPH-GRO = 550 µg/L.
DRO = diesel range organics
GRO = gasoline range organics
ID = identification
MRO - motor oil range organics
TPH = total petroleum hydrocarbons
VA = Veterans Affairs

INVESTIGATION REPORT FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 TO KAFB-106252 AND KAFB-106S10
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 6-4

TOTAL PETROLEUM HYDROCARBONS, BENZENE, TOLUENE, ETHYLBENZENE, AND TOTAL XYLENES CONCENTRATIONS IN GROUNDWATER

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TABLES

Table 5-1
Coring Intervals and Soil Sample Locations

Coring Location	Laboratory Analysis	Total Depth (ft bgs)	Drilling Method (ft bgs)		Soil Sample Depths (ft bgs)			
			ARCH	Sonic Coring[a]	200-300	300-400	400-500	500-600
KAFB-106S10	TPH and VOCs	517	0-227	227-517	230, 240, 245, 250, 260, 270, 280, 281, 291	300, 310, 320, 330, 340, 350, 360, 370, 380, 390	400, 410, 415, 420, 433, 440, 450, 460, 470, 480, 490	500, 510, 517
KAFB-106V3	TPH and VOCs	300	0-227	227-300	230, 240, 250[b], 260, 270, 271, 280.5, 290, 300	--	--	--

All analyses were performed on samples collected from sonic cores.

[a] The sonic drill rig performed a borehole cleanout from 227-230 ft bgs before coring for samples.

[b] This sample was disturbed during collection.

AFB = Air Force Base

ARCH = air rotary casing hammer

bgs = below ground surface

EPA = U.S. Environmental Protection Agency

MW = monitoring well

TPH = total petroleum hydrocarbons. Soil samples were analyzed for gasoline range, diesel range, and motor oil range total petroleum hydrocarbons by EPA Method 8015M.

VOCs = volatile organic compounds. Soil samples were analyzed by EPA Method 8260 B/C.

ft = foot/feet

-- = samples not collected.

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Table 5-2
Photoionization Detector and Core Temperature Field Screening Data

KAFB-106248

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)
		10	1.2
		20	1.4
		30	0.8
data were not abl		40	2.0
		50	0.9
		60	2.7
		70	0.6
		80	1.3
		90	1.7
		100	1.9
		110	1.9
		120	2.2
		130	2.6
		140	3.6
		150	2.3
		160	2.3
		170	2.8
		180	2.5
		190	0.9
		200	1.1
		210	4.6
		220	4.0
		230	4.5
		240	3.1
	ARCH	250	3.2
		260	4.8
		270	4.7
		280	2.6
		290	1.7
		300	1.5
		310	1.5
		320	0.6
		330	0.8
		340	0.4
		350	0.3
		360	1.1
		370	1.1
		380	3.5
		390	3.2
403[a]		400	3.2
413[b]		410	3.5
423[c]		420	2.4
		430	8.1
		440	0.9
		450	6.5
		460	3.8
		470	2.2
		480	4.0
		490	3.0
501[d]		500	1.0
		508	0.8
		Max	8.1
		Min	0.3

KAFB-106249

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)
		10	0.0
		20	0.2
		30	0.1
		40	0.1
		50	0.2
		60	0.1
		70	0.1
		80	0.3
		90	2.2
		100	0.9
		110	2.5
		120	1.6
		130	0.9
		140	2.4
		150	1.8
		160	0.9
		170	1.6
		180	0.6
		190	0.5
		200	1.4
		210	1.0
		220	2.1
		230	2.3
	ARCH	240	1.7
		250	1.3
		260	0.4
		270	0.3
		280	0.4
		290	1.9
		300	0.0
		310	0.0
		320	0.3
		330	0.5
		340	0.1
		350	0.3
		360	1.6
		370	0.4
		380	1.7
		390	1.8
403[a]		400	0.6
413[b]		410	0.3
423[c]		420	2.5
		430	0.3
		440	0.3
		450	0.6
		460	0.3
		470	0.1
		480	1.3
		490	0.9
		Max	2.5
		Min	0.0

KAFB-106250

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)
		10	0.8
		20	1.3
		30	1.0
		40	1.5
		50	1.2
		60	0.3
		70	2.7
		80	0.3
		90	1.7
		100	1.1
		110	1.4
		120	2.1
		130	0.6
		140	1.3
		150	0.9
		160	0.6
		170	0.3
		180	0.1
		190	1.2
		200	2.5
		210	0.5
		220	1.3
		230	0.3
	ARCH	240	1.9
		250	0.9
		260	0.5
		270	2.1
		280	1.7
		290	0.8
		300	0.6
		310	2.2
		320	0.3
		330	0.5
		340	0.2
		350	0.5
		360	0.3
		370	0.3
		380	1.5
		390	0.8
399[a]		400	0.6
409[b]		410	1.6
419[c]		420	0.8
		430	1.1
		440	1.3
		450	0.8
		460	0.9
		470	1.2
		480	1.4
		490	1.3
		Max	2.7
		Min	0.1

KAFB-106251

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)
		10	0.7
		20	0.4
		30	18.6
		40	5.5
		50	0.1
		60	1.6
		70	36.5
		80	3.9
		90	28.1
		100	1.3
		110	1.6
		120	2.3
		130	2.2
		140	1.3
		150	0.1
		160	3.9
		170	2.5
		180	3.0
		190	1.0
		200	9.9
		210	0.6
		220	1.7
		230	1.6
	ARCH	240	3.5
		250	4.5
		260	1.5
		270	0.7
		280	1.3
		290	0.7
		300	0.9
		310	1.3
		320	1.2
		330	2.9
		340	0.4
		350	0.7
		360	0.4
		370	0.5
		380	0.6
395[a]		390	1.0
405[b]		400	2.5
415[c]		410	1.2
		420	0.5
		430	0.3
		440	0.9
		450	0.3
		460	1.5
		470	1.1
		480	1.0
493[d]		490	1.2
		Max	36.5
		Min	0.1

KAFB-106252

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)
		10	0.5
		20	0.0
		30	0.0
		40	0.0
		50	0.3
		60	0.0
		70	0.2
		80	1.2
		90	1.1
		100	0.4
		110	0.1
		120	0.2
		130	0.2
		140	1.7
		150	1.2
		160	1.3
		170	1.8
		180	1.4
		190	1.0
		200	6.3
		210	2.5
		220	3.4
		230	2.3
		240	1.7
		250	0.9
		260	2.6
		270	2.9
	ARCH	280	2.0
		290	1.4
		300	2.3
		310	1.7
		320	2.6
		330	1.6
		340	2.4
		350	0.9
		360	3.7
375[a]		370	5.1
385[b]		380	5.2
395[c]		390	2.5
		400	1.1
		410	1.1
		420	1.3
		430	1.0
		440	0.8
		450	2.1
		460	2.7
473[d]		470	1.5
		480	2.4
		490	2.1
		500	1.9
		510	2.4
		520	2.0
		527	1.7
		530	1.8
		538	1.3
		Max	6.3
		Min	0.0

KAFB-106S10

Historical DTW (ft bgs)	Drilling Method	Depth (ft bgs)	PID (ppm-v)	Temperature (°C)
		10	5.0	NA
		20	6.2	NA
		30	4.5	NA
		40	2.0	NA
		50	1.5	NA
		60	1.8	NA
		70	3.5	NA
		80	5.7	NA
		90	5.5	NA
		100	8.4	NA
	ARCH	110	5.3	NA
		120	5.7	NA
		130	5.0	NA
		140	3.3	NA
		150	5.2	NA
		160	8.4	NA
		170	10.3	NA
		180	-	NA
		190	-	NA
		200	10.0	NA
		210	10.3	NA
		220	10.4	NA
		230	5.4	16.7
		235	4.6	14.1
		240	4.1	24.8
		245	52.2	22.7
		250	132.9	18.1
		252	133.2	18.1
		255	165.4	15.9
		260	178.7	21.2
		265	-	21.4
		270	183.1	19.8
		275	202.7	23.0
		280	24.6	9.2
		285	9.4	22.6
		290[e]	13.1	65.2
		295	3.6	24.3
		300	7.5	16.3
		305	5.6	13.8
		310	20.2	13.9
		315	26.6	21.5
		320	62.0	19.4
		325	8.4	24.6
		330	8.5	30.1
		335	87.7	14.5
		340	20.8	19.5
		345	26.1	12.7
		350	8.3	8.2
		355	256.7	17.3
		360	43.9	13.5
		365	314.0	17.0
	SONIC	370	825.7	14.4
		375	835.7	8.8
		380	47.4	20.3
		385[e]	-	-
		390	11.3	47.7
395[a]		395[e]	-	-
		400	226.1	4.9
405[b]		405	18.8	21.8
		410	86.4	14.2
415[c]		415	**5,903**	19.1
		420	**5,513**	11.1
		425	306.9	16.2
		430[e]	390.1	14.7
		433	303.3	14.7
		435	17.2	23.1
		440	287.4	18.0
		445	361.8	20.7
		450	392.2	21.7
		455	321.6	22.0
		460	242.5	19.8
		465	**3,473**	15.9
		470	**4,481**	17.0
		475	**4,787**	17.0
		480	**5,900**	19.6
		485	**5,720**	19.6
493[d]		490	**5,383**	19.3
		495	8.5	19.3
		500	178.8	18.3
		505	13.6	18.3
		510	17.0	28.0
		515	22.2	28.0
		517	9.6	28.0
		Max	**5,903**	65.2
		Min	1.5	4.9

KAFB-106V3

Drilling Method	Depth (ft bgs)	PID (ppm-v)	Temperature (°C)
	10	1.3	NA
	20	0.7	NA
	30	0.7	NA
	40	0.5	NA
	50	0.4	NA
	60	0.5	NA
	70	0.0	NA
	80	0.5	NA
	90	0.1	NA
	100	1.0	NA
ARCH	110	1.2	NA
	120	-	NA
	130	0.5	NA
	140	0.0	NA
	150	2.4	NA
	160	3.5	NA
	170	1.6	NA
	180	1.4	NA
	190	1.2	NA
	200	0.6	NA
	210	0.4	NA
	220	0.2	NA
	230	6.5	16.5
	235	11.2	22.4
	240	0.4	29.7
	245	43.8	36.2
	250[e]	4.6	36.2
	255	639.6	20.5
SONIC	260	**1,444**	24.7
	265	866.7	24.2
	270	546.6	25.1
	271	796.6	25.1
	275	72.8	45.8
	280	247.8	14.6
	285	63.4	25.3
	290	22.4	21.8
	295	79.6	23.2
	300	22.3	23.2
	Max	**1,444**	45.8
	Min	0.0	14.6

Table 5-2
Photoionization Detector and Core Temperature Field Screening Data

[a] 1950 historical depth to water
[b] 1960 historical depth to water
[c] 1970 historical depth to water
[d] 2009 historical depth to water
[e] Indicates sample was partially recovered, disturbed during collection, or not able to be recovered.
"-" Indicates that data were not able to be collected.
ARCH = air rotary casing hammer
bgs = below ground surface
°C = degrees Celsius
ft = foot/feet
DTW = depth to water
MAX = maximum
MIN = minimum
MW = monitoring well
NA = not applicable (temperature was only recorded during coring operations).
PID = photoionization detector
ppm-v = parts per million by volume
Bold print PID numbers indicate readings greater than 1,000 ppm.

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/22/2020			11/22/2020			11/22/2020			11/22/2020		
				Sample Depth (ft bgs)	230			240			245			250		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	16.7			24.8			22.7			18.1		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	22	ND	U	23	ND	U	31	ND	U	25
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.5	ND	U	8	ND	U	10	ND	U	8.6
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.5	1.2	J	1.9	ND	U	3.2	1.8	J	2.3
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		1,1,1-Trichloroethane	71-55-6	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.8	ND	U	3	ND	U	3.7	ND	U	3.8
		1,1-Dichloroethane	75-34-3	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		1,1-Dichloroethene	75-35-4	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		1,1-Dichloropropene	563-58-6	—	ND	UJ	0.48	ND	UJ	0.37	ND	UJ	0.46	ND	UJ	0.48
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.8	ND	U	3	ND	U	3.7	ND	U	3.8
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	6	ND	U	4.6	ND	U	5.7	0.0052	J	6
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	12	ND	U	9.2	ND	U	11	ND	U	12
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.9	ND	U	1.5	0.0016	J	1.8	0.021		1.9
		1,2-Dichlorobenzene	95-50-1	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		1,2-Dichloroethane	107-06-2	—	ND	UJ	1.9	ND	UJ	1.5	ND	UJ	1.8	ND	UJ	1.9
		1,2-Dichloroethene	540-59-0	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		1,2-Dichloropropane	78-87-5	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		1,3-Dichloropropane	142-28-9	—	ND	U	0.48	ND	U	0.37	ND	U	0.46	ND	U	0.48
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		2,2-Dichloropropane	594-20-7	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		2-Butanone	78-93-3	—	ND	U	15	ND	U	12	ND	U	15	0.15		15
		2-Chlorotoluene	95-49-8	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		2-Hexanone	591-78-6	—	ND	U	15	ND	U	12	ND	U	15	ND	U	15
		4-Chlorotoluene	106-43-4	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		4-Isopropyltoluene	99-87-6	—	ND	U	3.8	ND	U	3	ND	U	3.7	ND	U	3.8
		4-Methyl-2-pentanone	108-10-1	—	ND	U	15	ND	U	12	ND	U	15	0.008	J	15
		Acetone	67-64-1	—	ND	U	86	ND	U	66	ND	U	82	3.3	J	4900
		Benzene	71-43-2	17.8	ND	U	0.48	ND	U	0.37	0.078		0.46	0.36		27
		Bromobenzene	108-86-1	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/22/2020			11/22/2020			11/22/2020			11/22/2020		
				Sample Depth (ft bgs)	230			240			245			250		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	16.7			24.8			22.7			18.1		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Bromodichloromethane	75-27-4	—	ND	UJ	6	ND	UJ	4.6	ND	UJ	5.7	ND	UJ	6
		Bromoform	75-25-2	—	ND	U	6.1	ND	U	4.7	ND	U	5.8	ND	U	6.1
		Bromomethane	74-83-9	—	ND	U	3.8	ND	U	3	ND	U	3.7	ND	U	3.8
		Carbon disulfide	75-15-0	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Carbon tetrachloride	56-23-5	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Chlorobenzene	108-90-7	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Chloroethane	75-00-3	—	ND	U	7.6	ND	U	5.9	ND	U	7.3	ND	U	7.7
		Chloroform	67-66-3	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		Chloromethane	74-87-3	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		cis-1,3-Dichloropropene	10061-01-5	—	ND	UJ	0.48	ND	UJ	0.37	ND	UJ	0.46	ND	UJ	0.48
		Dibromochloromethane	124-48-1	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Dibromomethane	74-95-3	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		Dichlorodifluoromethane	75-71-8	—	ND	U	7.6	ND	U	5.9	ND	U	7.3	ND	U	7.7
		Ethylbenzene	100-41-4	75.1	ND	U	0.95	ND	U	0.74	0.00052	J	0.91	0.017		0.96
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Isopropylbenzene	98-82-8	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.8	ND	U	3	0.0026	J	3.7	0.043		3.8
		Methyl tert-butyl ether	1634-04-4	—	ND	UJ	7.6	ND	UJ	5.9	ND	UJ	7.3	ND	UJ	7.7
		Methylene chloride	75-09-2	—	ND	U	3.8	ND	U	3	ND	U	3.7	ND	U	3.8
		Naphthalene	91-20-3	—	ND	U	8	ND	U	6.2	ND	U	7.6	ND	U	8
		n-Butylbenzene	104-51-8	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		n-Propylbenzene	103-65-1	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		o-Xylene	95-47-6	871[b]	ND	U	0.95	ND	U	0.74	0.0011	J	0.91	0.026		0.96
		sec-Butylbenzene	135-98-8	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		Styrene	100-42-5	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		tert-Butylbenzene	98-06-6	—	ND	U	1.9	ND	U	1.5	ND	U	1.8	ND	U	1.9
		Tetrachloroethene	127-18-4	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Toluene	108-88-3	5230	ND	U	0.95	ND	U	0.74	0.021		0.91	0.7		55
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.95	ND	U	0.74	ND	U	0.91	ND	U	0.96
		trans-1,3-Dichloropropene	10061-02-6	—	ND	UJ	0.24	ND	UJ	0.18	ND	UJ	0.23	ND	UJ	0.24
		Trichloroethene	79-01-6	—	ND	U	6	ND	U	4.6	ND	U	5.7	ND	U	6
		Trichlorofluoromethane	75-69-4	—	ND	U	12	ND	U	9.2	ND	U	11	ND	U	12
		Vinyl chloride	75-01-4	—	ND	UJ	3.8	ND	UJ	3	ND	UJ	3.7	ND	UJ	3.8

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/22/2020			11/22/2020			11/24/2020			11/24/2020		
				Sample Depth (ft bgs)	260			270			280			281		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	21.2			19.8			9.2			9.2		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	26	ND	U	23	13	J	25	ND	U	24
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	9	ND	U	7.8	16		8.7	ND	U	8.3
		TPH-GRO (C6-C10)	TPH-GRO	100	1.9	J	2.1	2.5		2.1	ND	U	2.1	ND	U	2.2
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		1,1,2,2-Tetrachloroethane	79-34-5	—	0.00078	J	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		1,1,2-Trichloroethane	79-00-5	—	ND	U	2.9	ND	U	3.4	ND	U	2.9	ND	U	3.2
		1,1-Dichloroethane	75-34-3	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		1,1-Dichloroethene	75-35-4	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	UJ	0.36	ND	UJ	0.43	ND	U	0.36	ND	U	0.39
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	2.9	ND	U	3.4	ND	U	2.9	ND	U	3.2
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	0.013		4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9	ND	U	11	ND	U	9	ND	U	9.9
		1,2-Dibromoethane	106-93-4	0.672	0.021		1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		1,2-Dichloroethane	107-06-2	—	ND	UJ	1.4	ND	UJ	1.7	ND	U	1.4	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.36	ND	U	0.43	ND	U	0.36	ND	U	0.39
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		2,2-Dichloropropane	594-20-7	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		2-Butanone	78-93-3	—	0.21		11	ND	U	14	ND	U	11	ND	U	13
		2-Chlorotoluene	95-49-8	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	11	ND	U	14	ND	U	11	ND	U	13
		4-Chlorotoluene	106-43-4	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		4-Isopropyltoluene	99-87-6	—	ND	U	2.9	ND	U	3.4	ND	U	2.9	ND	U	3.2
		4-Methyl-2-pentanone	108-10-1	—	0.034		11	ND	U	14	ND	U	11	ND	U	13
		Acetone	67-64-1	—	2.3	J	3500	0.35		77	ND	U	65	ND	U	71
		Benzene	71-43-2	17.8	0.1		0.36	0.0042	J	0.43	0.015		0.36	0.00056	J	0.39
		Bromobenzene	108-86-1	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

Parameter	Analytical Method	Analyte	CAS	NMED Residential Soil Screening Level[a]	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD
				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/24/2020			11/24/2020			11/24/2020			11/24/2020		
				Sample Depth (ft bgs)	291			291			300			310		
				Sample Type:	REG			Field Duplicate			REG			REG		
				Core Temperature (°C)	21.8			21.8			16.3			13.9		
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	22	ND	U	23	ND	U	23	ND	U	24
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.7	ND	U	7.9	ND	U	8	ND	U	8.1
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.2	ND	U	2.2	ND	U	2.3	ND	U	2.1
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		1,1-Dichloroethane	75-34-3	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		1,1-Dichloroethene	75-35-4	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.39	ND	U	0.37	ND	U	0.46	ND	U	0.41
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9.7	ND	U	9.3	ND	U	12	ND	U	10
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		1,2-Dichloroethane	107-06-2	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.39	ND	U	0.37	ND	U	0.46	ND	U	0.41
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		2,2-Dichloropropane	594-20-7	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		2-Butanone	78-93-3	—	ND	U	12	ND	U	12	ND	U	15	ND	U	13
		2-Chlorotoluene	95-49-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	12	ND	U	12	ND	U	15	ND	U	13
		4-Chlorotoluene	106-43-4	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		4-Isopropyltoluene	99-87-6	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		4-Methyl-2-pentanone	108-10-1	—	ND	U	12	ND	U	12	ND	U	15	ND	U	13
		Acetone	67-64-1	—	ND	U	70	ND	U	67	ND	U	83	ND	U	74
		Benzene	71-43-2	17.8	ND	U	0.39	ND	U	0.37	ND	U	0.46	ND	U	0.41
		Bromobenzene	108-86-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/22/2020			11/22/2020			11/24/2020			11/24/2020		
				Sample Depth (ft bgs)	260			270			280			281		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	21.2			19.8			9.2			9.2		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Bromodichloromethane	75-27-4	—	ND	UJ	4.5	ND	UJ	5.3	ND	U	4.5	ND	U	4.9
		Bromoform	75-25-2	—	ND	U	4.6	ND	U	5.4	ND	U	4.6	ND	U	5
		Bromomethane	74-83-9	—	ND	U	2.9	ND	U	3.4	ND	U	2.9	ND	U	3.2
		Carbon disulfide	75-15-0	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Carbon tetrachloride	56-23-5	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Chlorobenzene	108-90-7	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Chloroethane	75-00-3	—	ND	U	5.7	ND	U	6.8	ND	U	5.7	ND	U	6.3
		Chloroform	67-66-3	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		Chloromethane	74-87-3	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		cis-1,3-Dichloropropene	10061-01-5	—	ND	UJ	0.36	ND	UJ	0.43	ND	U	0.36	ND	U	0.39
		Dibromochloromethane	124-48-1	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Dibromomethane	74-95-3	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		Dichlorodifluoromethane	75-71-8	—	ND	U	5.7	ND	U	6.8	ND	U	5.7	ND	U	6.3
		Ethylbenzene	100-41-4	75.1	0.013		0.72	0.00064	J	0.85	0.001	J	0.72	ND	U	0.79
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.5	ND	U	5.3	ND	UJ	4.5	ND	UJ	4.9
		Isopropylbenzene	98-82-8	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		m- & p-Xylenes	179601-23-1	871[b]	0.038		2.9	0.0015	J	3.4	0.0026	J	2.9	ND	U	3.2
		Methyl tert-butyl ether	1634-04-4	—	ND	UJ	5.7	ND	UJ	6.8	ND	UJ	5.7	ND	UJ	6.3
		Methylene chloride	75-09-2	—	ND	U	2.9	ND	U	3.4	ND	U	2.9	ND	U	3.2
		Naphthalene	91-20-3	—	ND	U	6	ND	U	7.1	ND	U	6	ND	U	6.6
		n-Butylbenzene	104-51-8	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		n-Propylbenzene	103-65-1	—	0.0012	J	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		o-Xylene	95-47-6	871[b]	0.017		0.72	0.00069	J	0.85	0.0014	J	0.72	ND	U	0.79
		sec-Butylbenzene	135-98-8	—	0.00075	J	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		tert-Butylbenzene	98-06-6	—	ND	U	1.4	ND	U	1.7	ND	U	1.4	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Toluene	108-88-3	5230	0.57		38	0.01		0.85	0.03		0.72	0.002	J	0.79
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.72	ND	U	0.85	ND	U	0.72	ND	U	0.79
		trans-1,3-Dichloropropene	10061-02-6	—	ND	UJ	0.18	ND	UJ	0.21	ND	U	0.18	ND	U	0.2
		Trichloroethene	79-01-6	—	ND	U	4.5	ND	U	5.3	ND	U	4.5	ND	U	4.9
		Trichlorofluoromethane	75-69-4	—	ND	U	9	ND	U	11	ND	U	9	ND	U	9.9
		Vinyl chloride	75-01-4	—	ND	UJ	2.9	ND	UJ	3.4	ND	U	2.9	ND	U	3.2

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/24/2020			11/24/2020			11/24/2020			11/24/2020		
				Sample Depth (ft bgs):	291			291			300			310		
				Sample Type:	REG			Field Duplicate			REG			REG		
				Core Temperature (°C):	21.8			21.8			16.3			13.9		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.8	ND	U	4.6	ND	UJ	5.8	ND	U	5.1
		Bromodichloromethane	75-27-4	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Bromoform	75-25-2	—	ND	U	4.9	ND	U	4.7	ND	U	5.9	ND	U	5.2
		Bromomethane	74-83-9	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		Carbon disulfide	75-15-0	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Carbon tetrachloride	56-23-5	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Chlorobenzene	108-90-7	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Chloroethane	75-00-3	—	ND	U	6.2	ND	U	5.9	ND	U	7.4	ND	U	6.6
		Chloroform	67-66-3	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		Chloromethane	74-87-3	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.39	ND	U	0.37	ND	U	0.46	ND	U	0.41
		Dibromochloromethane	124-48-1	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Dibromomethane	74-95-3	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		Dichlorodifluoromethane	75-71-8	—	ND	U	6.2	ND	U	5.9	ND	U	7.4	ND	U	6.6
		Ethylbenzene	100-41-4	75.1	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		Hexachloro-1,3-butadiene	87-68-3	—	ND	UJ	4.8	ND	UJ	4.6	ND	UJ	5.8	ND	UJ	5.1
		Isopropylbenzene	98-82-8	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		Methyl tert-butyl ether	1634-04-4	—	ND	UJ	6.2	ND	UJ	5.9	ND	UJ	7.4	ND	UJ	6.6
		Methylene chloride	75-09-2	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3
		Naphthalene	91-20-3	—	ND	U	6.5	ND	U	6.2	ND	U	7.8	ND	U	6.9
		n-Butylbenzene	104-51-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		n-Propylbenzene	103-65-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		o-Xylene	95-47-6	871[b]	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		sec-Butylbenzene	135-98-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		tert-Butylbenzene	98-06-6	—	ND	U	1.5	ND	U	1.5	ND	U	1.9	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Toluene	108-88-3	5230	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.77	ND	U	0.74	ND	U	0.93	ND	U	0.82
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.19	ND	U	0.19	ND	U	0.23	ND	U	0.21
		Trichloroethene	79-01-6	—	ND	U	4.8	ND	U	4.6	ND	U	5.8	ND	U	5.1
		Trichlorofluoromethane	75-69-4	—	ND	U	9.7	ND	U	9.3	ND	U	12	ND	U	10
		Vinyl chloride	75-01-4	—	ND	U	3.1	ND	U	3	ND	U	3.7	ND	U	3.3

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/24/2020			11/25/2020			11/25/2020			11/25/2020		
				Sample Depth (ft bgs)	320			330			340			350		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	19.4			30.1			19.5			8.2		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	23	ND	U	23	ND	U	23	ND	U	24
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.9	ND	U	7.9	ND	U	8	ND	U	8.3
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.2	ND	U	2.1	ND	U	2.2	ND	U	2
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		1,1,1-Trichloroethane	71-55-6	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		1,1-Dichloroethane	75-34-3	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		1,1-Dichloroethene	75-35-4	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.43	ND	UJ	0.42	ND	UJ	0.45	ND	UJ	0.39
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	11	ND	U	10	ND	U	11	ND	U	9.7
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		1,2-Dichloroethane	107-06-2	—	ND	U	1.7	ND	UJ	1.7	ND	UJ	1.8	ND	UJ	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.43	ND	U	0.42	ND	U	0.45	ND	U	0.39
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		2,2-Dichloropropane	594-20-7	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		2-Butanone	78-93-3	—	ND	U	14	ND	U	13	ND	U	14	ND	U	12
		2-Chlorotoluene	95-49-8	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	14	ND	U	13	ND	U	14	ND	U	12
		4-Chlorotoluene	106-43-4	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		4-Isopropyltoluene	99-87-6	—	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		4-Methyl-2-pentanone	108-10-1	—	ND	U	14	ND	U	13	ND	U	14	ND	U	12
		Acetone	67-64-1	—	ND	U	78	ND	U	75	ND	U	80	ND	U	70
		Benzene	71-43-2	17.8	ND	U	0.43	ND	U	0.42	ND	U	0.45	ND	U	0.39
		Bromobenzene	108-86-1	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	11/24/2020			11/25/2020			11/25/2020			11/25/2020		
				Sample Depth (ft bgs)	320			330			340			350		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	19.4			30.1			19.5			8.2		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Bromodichloromethane	75-27-4	—	ND	U	5.4	ND	UJ	5.2	ND	UJ	5.6	ND	UJ	4.9
		Bromoform	75-25-2	—	ND	U	5.5	ND	U	5.3	ND	U	5.7	ND	U	5
		Bromomethane	74-83-9	—	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		Carbon disulfide	75-15-0	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Carbon tetrachloride	56-23-5	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Chlorobenzene	108-90-7	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Chloroethane	75-00-3	—	ND	U	6.9	ND	U	6.7	ND	U	7.1	ND	U	6.2
		Chloroform	67-66-3	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		Chloromethane	74-87-3	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.43	ND	UJ	0.42	ND	UJ	0.45	ND	UJ	0.39
		Dibromochloromethane	124-48-1	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Dibromomethane	74-95-3	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		Dichlorodifluoromethane	75-71-8	—	ND	U	6.9	ND	U	6.7	ND	U	7.1	ND	U	6.2
		Ethylbenzene	100-41-4	75.1	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		Hexachloro-1,3-butadiene	87-68-3	—	ND	UJ	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Isopropylbenzene	98-82-8	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		Methyl tert-butyl ether	1634-04-4	—	ND	UJ	6.9	ND	UJ	6.7	ND	UJ	7.1	ND	UJ	6.2
		Methylene chloride	75-09-2	—	ND	U	3.5	ND	U	3.3	ND	U	3.6	ND	U	3.1
		Naphthalene	91-20-3	—	ND	U	7.3	ND	U	7	ND	U	7.5	ND	U	6.5
		n-Butylbenzene	104-51-8	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		n-Propylbenzene	103-65-1	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		o-Xylene	95-47-6	871[b]	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		sec-Butylbenzene	135-98-8	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		tert-Butylbenzene	98-06-6	—	ND	U	1.7	ND	U	1.7	ND	U	1.8	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Toluene	108-88-3	5230	ND	U	0.87	0.00028	J	0.83	0.00035	J	0.89	0.00025	J	0.78
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.87	ND	U	0.83	ND	U	0.89	ND	U	0.78
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.22	ND	UJ	0.21	ND	UJ	0.22	ND	UJ	0.19
		Trichloroethene	79-01-6	—	ND	U	5.4	ND	U	5.2	ND	U	5.6	ND	U	4.9
		Trichlorofluoromethane	75-69-4	—	ND	U	11	ND	U	10	ND	U	11	ND	U	9.7
		Vinyl chloride	75-01-4	—	ND	U	3.5	ND	UJ	3.3	ND	UJ	3.6	ND	UJ	3.1

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/1/2020			12/1/2020			12/1/2020			12/1/2020		
				Sample Depth (ft bgs)	360			360			370			380		
				Sample Type:	REG			Field Duplicate			REG			REG		
				Core Temperature (°C)	13.5			13.5			14.4			20.3		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	24	ND	U	24	ND	U	24	ND	U	22
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	8.2	ND	U	8.3	ND	U	8.1	ND	U	7.6
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.1	ND	U	2.3	1.6	J	2.1	ND	U	2.2
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		1,1,1-Trichloroethane	71-55-6	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		1,1-Dichloroethane	75-34-3	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		1,1-Dichloroethene	75-35-4	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.46	ND	U	0.4	ND	U	0.42	ND	U	0.39
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	11	ND	U	10	ND	U	10	ND	U	9.7
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		1,2-Dichloroethane	107-06-2	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.46	ND	U	0.4	ND	U	0.42	ND	U	0.39
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		2,2-Dichloropropane	594-20-7	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		2-Butanone	78-93-3	—	ND	U	15	ND	U	13	ND	U	13	ND	U	12
		2-Chlorotoluene	95-49-8	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	15	ND	U	13	ND	U	13	ND	U	12
		4-Chlorotoluene	106-43-4	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		4-Isopropyltoluene	99-87-6	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		4-Methyl-2-pentanone	108-10-1	—	ND	U	15	ND	U	13	ND	U	13	ND	U	12
		Acetone	67-64-1	—	ND	U	82	ND	U	73	ND	U	75	ND	U	70
		Benzene	71-43-2	17.8	ND	U	0.46	ND	U	0.4	ND	U	0.42	ND	U	0.39
		Bromobenzene	108-86-1	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/1/2020			12/1/2020			12/1/2020			12/1/2020		
				Sample Depth (ft bgs)	360			360			370			380		
				Sample Type:	REG			Field Duplicate			REG			REG		
				Core Temperature (°C)	13.5			13.5			14.4			20.3		
Parameter	Analytical Method	Analyte	CAS	NMED Residential Soil Screening Level[a]	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Bromodichloromethane	75-27-4	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Bromoform	75-25-2	—	ND	U	5.8	ND	U	5.1	ND	U	5.3	ND	U	5
		Bromomethane	74-83-9	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		Carbon disulfide	75-15-0	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Carbon tetrachloride	56-23-5	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Chlorobenzene	108-90-7	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Chloroethane	75-00-3	—	ND	U	7.3	ND	U	6.5	ND	U	6.7	ND	U	6.2
		Chloroform	67-66-3	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		Chloromethane	74-87-3	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.46	ND	U	0.4	ND	U	0.42	ND	U	0.39
		Dibromochloromethane	124-48-1	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Dibromomethane	74-95-3	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		Dichlorodifluoromethane	75-71-8	—	ND	U	7.3	ND	U	6.5	ND	U	6.7	ND	U	6.2
		Ethylbenzene	100-41-4	75.1	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Isopropylbenzene	98-82-8	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		Methyl tert-butyl ether	1634-04-4	—	ND	U	7.3	ND	U	6.5	ND	U	6.7	ND	U	6.2
		Methylene chloride	75-09-2	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1
		Naphthalene	91-20-3	—	ND	U	7.6	ND	U	6.8	ND	U	7	ND	U	6.5
		n-Butylbenzene	104-51-8	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		n-Propylbenzene	103-65-1	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		o-Xylene	95-47-6	871[b]	ND	U	0.91	ND	U	0.81	0.00042	J	0.83	ND	U	0.78
		sec-Butylbenzene	135-98-8	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		tert-Butylbenzene	98-06-6	—	ND	U	1.8	ND	U	1.6	ND	U	1.7	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Toluene	108-88-3	5230	ND	U	0.91	ND	U	0.81	0.0011	J	0.83	0.00035	J	0.78
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.91	ND	U	0.81	ND	U	0.83	ND	U	0.78
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.23	ND	U	0.2	ND	U	0.21	ND	U	0.19
		Trichloroethene	79-01-6	—	ND	U	5.7	ND	U	5	ND	U	5.2	ND	U	4.9
		Trichlorofluoromethane	75-69-4	—	ND	U	11	ND	U	10	ND	U	10	ND	U	9.7
		Vinyl chloride	75-01-4	—	ND	U	3.7	ND	U	3.2	ND	U	3.3	ND	U	3.1

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/2/2020			12/12/2020			12/12/2020			12/12/2020		
				Sample Depth (ft bgs)	390			400			410			415		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	47.7			4.9			14.2			19.1		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	23	21	J	23	ND	U	23	7.6	J	22
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.9	12		7.9	ND	U	7.8	3.7	J	7.7
		TPH-GRO (C6-C10)	TPH-GRO	100	1.5	J	1.9	1.3	J	1.9	ND	U	2.1	44	J	1.8
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		1,1,2-Trichloroethane	79-00-5	—	ND	U	2.8	ND	U	2.9	ND	U	3.2	ND	U	2.8
		1,1-Dichloroethane	75-34-3	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		1,1-Dichloroethene	75-35-4	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,1-Dichloropropene	563-58-6	—	ND	U	0.35	ND	U	0.37	ND	U	0.4	ND	U	0.35
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	2.8	ND	U	2.9	ND	U	3.2	ND	U	2.8
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,2,4-Trimethylbenzene	95-63-6	—	0.0024	J	4.4	0.016		4.6	ND	U	5	0.033	J	4.4
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	8.8	ND	U	9.2	ND	U	10	ND	U	8.8
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		1,2-Dichloroethane	107-06-2	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,2-Dichloroethene	540-59-0	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,2-Dichloropropane	78-87-5	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	4.4	0.0081		4.6	ND	U	5	0.021	J	4.4
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		1,3-Dichloropropane	142-28-9	—	ND	U	0.35	ND	U	0.37	ND	U	0.4	ND	U	0.35
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		2,2-Dichloropropane	594-20-7	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		2-Butanone	78-93-3	—	ND	U	11	ND	U	12	ND	U	13	ND	U	11
		2-Chlorotoluene	95-49-8	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		2-Hexanone	591-78-6	—	0.016	J	11	ND	U	12	ND	U	13	ND	U	11
		4-Chlorotoluene	106-43-4	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		4-Isopropyltoluene	99-87-6	—	ND	U	2.8	0.001	J	2.9	ND	U	3.2	0.0025	J	2.8
		4-Methyl-2-pentanone	108-10-1	—	ND	U	11	ND	U	12	ND	U	13	ND	U	11
		Acetone	67-64-1	—	0.11		63	ND	U	66	ND	U	72	ND	U	64
		Benzene	71-43-2	17.8	0.00072	J	0.35	0.0058		0.37	0.00082	J	0.4	0.00093	J	0.35
		Bromobenzene	108-86-1	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/2/2020			12/12/2020			12/12/2020			12/12/2020		
				Sample Depth (ft bgs)	390			400			410			415		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	47.7			4.9			14.2			19.1		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Bromodichloromethane	75-27-4	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Bromoform	75-25-2	—	ND	U	4.5	ND	U	4.7	ND	U	5.1	ND	U	4.5
		Bromomethane	74-83-9	—	ND	U	2.8	ND	U	2.9	ND	U	3.2	ND	U	2.8
		Carbon disulfide	75-15-0	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Carbon tetrachloride	56-23-5	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Chlorobenzene	108-90-7	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Chloroethane	75-00-3	—	ND	U	5.6	ND	UJ	5.9	ND	U	6.4	ND	U	5.7
		Chloroform	67-66-3	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		Chloromethane	74-87-3	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.35	ND	U	0.37	ND	U	0.4	ND	U	0.35
		Dibromochloromethane	124-48-1	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Dibromomethane	74-95-3	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		Dichlorodifluoromethane	75-71-8	—	ND	U	5.6	ND	U	5.9	ND	U	6.4	ND	U	5.7
		Ethylbenzene	100-41-4	75.1	0.0019	J	0.7	0.013		0.73	0.00043	J	0.8	0.024	J	0.71
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Isopropylbenzene	98-82-8	—	ND	U	4.4	0.0026	J	4.6	ND	U	5	0.009	J	4.4
		m- & p-Xylenes	179601-23-1	871[b]	0.0068		2.8	0.065		2.9	0.0022	J	3.2	0.13	J	2.8
		Methyl tert-butyl ether	1634-04-4	—	ND	U	5.6	ND	U	5.9	ND	U	6.4	ND	U	5.7
		Methylene chloride	75-09-2	—	ND	U	2.8	ND	U	2.9	ND	U	3.2	ND	U	2.8
		Naphthalene	91-20-3	—	ND	U	5.9	ND	U	6.2	ND	U	6.7	ND	U	5.9
		n-Butylbenzene	104-51-8	—	0.00055	J	1.4	0.0022	J	1.5	ND	U	1.6	0.0062	J	1.4
		n-Propylbenzene	103-65-1	—	0.00092	J	1.4	0.0044	J	1.5	ND	U	1.6	0.012	J	1.4
		o-Xylene	95-47-6	871[b]	0.003	J	0.7	0.03		0.73	0.0011	J	0.8	0.051	J	0.71
		sec-Butylbenzene	135-98-8	—	0.00078	J	1.4	0.0035	J	1.5	ND	U	1.6	0.014	J	1.4
		Styrene	100-42-5	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		tert-Butylbenzene	98-06-6	—	ND	U	1.4	ND	U	1.5	ND	U	1.6	ND	U	1.4
		Tetrachloroethene	127-18-4	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Toluene	108-88-3	5230	0.0069		0.7	0.074		0.73	0.0045	J	0.8	0.047	J	0.71
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.7	ND	U	0.73	ND	U	0.8	ND	U	0.71
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.18	ND	U	0.18	ND	U	0.2	ND	U	0.18
		Trichloroethene	79-01-6	—	ND	U	4.4	ND	U	4.6	ND	U	5	ND	U	4.4
		Trichlorofluoromethane	75-69-4	—	ND	U	8.8	ND	U	9.2	ND	U	10	ND	U	8.8
		Vinyl chloride	75-01-4	—	ND	U	2.8	ND	U	2.9	ND	U	3.2	ND	U	2.8

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/12/2020			12/13/2020			12/13/2020			12/13/2020		
				Sample Depth (ft bgs)	420			433			440			450		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	11.1			14.7			18			21.7		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	23	ND	U	23	ND	U	24	ND	U	22
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.8	ND	U	7.8	12		8.3	8		7.5
		TPH-GRO (C6-C10)	TPH-GRO	100	31	J	2	4		2.1	10		2.1	2.5		2
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		1,1,2-Trichloroethane	79-00-5	—	ND	U	2.9	ND	U	3	ND	U	3.3	ND	U	3.2
		1,1-Dichloroethane	75-34-3	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		1,1-Dichloroethene	75-35-4	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.37	ND	U	0.38	ND	U	0.42	ND	U	0.39
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	2.9	ND	U	3	ND	U	3.3	ND	U	3.2
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	0.1	J	4.6	0.029		4.8	0.024		5.2	0.018		4.9
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9.2	ND	U	9.5	ND	U	10	ND	U	9.9
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.5	ND	U	1.5	0.0076		1.7	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		1,2-Dichloroethane	107-06-2	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	0.067	J	4.6	0.015		4.8	0.009		5.2	0.0072		4.9
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.37	ND	U	0.38	ND	U	0.42	ND	U	0.39
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		2,2-Dichloropropane	594-20-7	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		2-Butanone	78-93-3	—	ND	U	12	0.023		12	0.18		13	ND	U	13
		2-Chlorotoluene	95-49-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	12	ND	U	12	0.038		13	ND	U	13
		4-Chlorotoluene	106-43-4	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		4-Isopropyltoluene	99-87-6	—	0.0062	J	2.9	0.0021	J	3	0.0021	J	3.3	0.0017	J	3.2
		4-Methyl-2-pentanone	108-10-1	—	ND	U	12	ND	U	12	0.025		13	ND	U	13
		Acetone	67-64-1	—	0.069	J	66	0.1		69	ND	U	3700	0.28		71
		Benzene	71-43-2	17.8	0.018	J	0.37	0.0021	J	0.38	ND	U	0.42	ND	U	0.39
		Bromobenzene	108-86-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/12/2020			12/13/2020			12/13/2020			12/13/2020		
				Sample Depth (ft bgs)	420			433			440			450		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	11.1			14.7			18			21.7		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Bromodichloromethane	75-27-4	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Bromoform	75-25-2	—	ND	U	4.7	ND	U	4.9	ND	U	5.3	ND	U	5
		Bromomethane	74-83-9	—	ND	U	2.9	ND	U	3	ND	U	3.3	ND	U	3.2
		Carbon disulfide	75-15-0	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Carbon tetrachloride	56-23-5	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Chlorobenzene	108-90-7	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Chloroethane	75-00-3	—	ND	U	5.9	ND	U	6.1	ND	U	6.7	ND	U	6.3
		Chloroform	67-66-3	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		Chloromethane	74-87-3	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.37	ND	U	0.38	ND	U	0.42	ND	U	0.39
		Dibromochloromethane	124-48-1	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Dibromomethane	74-95-3	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		Dichlorodifluoromethane	75-71-8	—	ND	U	5.9	ND	U	6.1	ND	U	6.7	ND	U	6.3
		Ethylbenzene	100-41-4	75.1	0.15	J	0.73	0.011		0.76	ND	U	0.83	ND	U	0.79
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Isopropylbenzene	98-82-8	—	0.036	J	4.6	0.0044	J	4.8	ND	U	5.2	ND	U	4.9
		m- & p-Xylenes	179601-23-1	871[b]	0.55		130	0.078		3	0.019		3.3	0.021		3.2
		Methyl tert-butyl ether	1634-04-4	—	ND	U	5.9	ND	U	6.1	ND	U	6.7	ND	U	6.3
		Methylene chloride	75-09-2	—	ND	U	2.9	ND	U	3	ND	U	3.3	ND	U	3.2
		Naphthalene	91-20-3	—	ND	U	6.2	0.0065		6.4	0.036		7	0.025		6.6
		n-Butylbenzene	104-51-8	—	0.014	J	1.5	0.0058		1.5	0.0064		1.7	0.0039	J	1.6
		n-Propylbenzene	103-65-1	—	0.045	J	1.5	0.0062		1.5	ND	U	1.7	ND	U	1.6
		o-Xylene	95-47-6	871[b]	0.2		32	0.034		0.76	0.013		0.83	0.012		0.79
		sec-Butylbenzene	135-98-8	—	0.037	J	1.5	0.0095		1.5	0.0072		1.7	0.0063		1.6
		Styrene	100-42-5	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		tert-Butylbenzene	98-06-6	—	ND	U	1.5	ND	U	1.5	ND	U	1.7	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Toluene	108-88-3	5230	0.72		32	0.042		0.76	0.0021	J	0.83	0.0014	J	0.79
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.73	ND	U	0.76	ND	U	0.83	ND	U	0.79
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.18	ND	U	0.19	ND	U	0.21	ND	U	0.2
		Trichloroethene	79-01-6	—	ND	U	4.6	ND	U	4.8	ND	U	5.2	ND	U	4.9
		Trichlorofluoromethane	75-69-4	—	ND	U	9.2	ND	U	9.5	ND	U	10	ND	U	9.9
		Vinyl chloride	75-01-4	—	ND	U	2.9	ND	U	3	ND	U	3.3	ND	U	3.2

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/13/2020			12/14/2020			12/14/2020			12/14/2020		
				Sample Depth (ft bgs)	460			470			480			490		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	19.8			17			19.6			19.3		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	26	ND	U	24	ND	U	26	ND	U	25
		TPH-DRO (C10-C28)	TPH-DRO	1000	15		9	35		8.2	20		9	31		8.6
		TPH-GRO (C6-C10)	TPH-GRO	100	8.6		2.2	100		2.4	73	J	2.1	41	J	2.5
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3	ND	U	2.8	ND	U	2.6	ND	U	2.8
		1,1-Dichloroethane	75-34-3	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		1,1-Dichloroethene	75-35-4	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,1-Dichloropropene	563-58-6	—	ND	U	0.38	ND	U	0.35	ND	U	0.32	ND	U	0.36
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3	ND	U	2.8	ND	U	2.6	ND	U	2.8
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,2,4-Trimethylbenzene	95-63-6	—	0.084		4.7	0.3		240	0.13	J	4.1	0.05		4.4
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9.4	ND	U	8.8	ND	U	8.1	ND	U	8.9
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		1,2-Dichloroethane	107-06-2	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,2-Dichloroethene	540-59-0	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,2-Dichloropropane	78-87-5	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,3,5-Trimethylbenzene	108-67-8	—	0.052		4.7	0.13	J	4.4	0.054	J	4.1	0.019		4.4
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		1,3-Dichloropropane	142-28-9	—	ND	U	0.38	ND	U	0.35	ND	U	0.32	ND	U	0.36
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		2,2-Dichloropropane	594-20-7	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		2-Butanone	78-93-3	—	2.8		500	0.1	J	11	ND	U	10	ND	U	11
		2-Chlorotoluene	95-49-8	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		2-Hexanone	591-78-6	—	0.46		12	ND	U	11	ND	U	10	ND	U	11
		4-Chlorotoluene	106-43-4	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		4-Isopropyltoluene	99-87-6	—	0.0031	J	3	0.0088	J	2.8	0.0071	J	2.6	0.0055		2.8
		4-Methyl-2-pentanone	108-10-1	—	0.13		12	ND	U	11	ND	U	10	ND	U	11
		Acetone	67-64-1	—	11		2800	ND	U	3400	0.14	J	58	0.12		64
		Benzene	71-43-2	17.8	0.081		0.38	0.15	J	0.35	1.6		18	0.11		0.36
		Bromobenzene	108-86-1	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/13/2020			12/14/2020			12/14/2020			12/14/2020		
				Sample Depth (ft bgs)	460			470			480			490		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	19.8			17			19.6			19.3		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Bromodichloromethane	75-27-4	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Bromoform	75-25-2	—	ND	U	4.8	ND	U	4.5	ND	U	4.1	ND	U	4.5
		Bromomethane	74-83-9	—	ND	U	3	ND	U	2.8	ND	U	2.6	ND	U	2.8
		Carbon disulfide	75-15-0	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Carbon tetrachloride	56-23-5	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Chlorobenzene	108-90-7	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Chloroethane	75-00-3	—	ND	U	6	ND	U	5.6	ND	U	5.2	ND	U	5.7
		Chloroform	67-66-3	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		Chloromethane	74-87-3	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.38	ND	U	0.35	ND	U	0.32	ND	U	0.36
		Dibromochloromethane	124-48-1	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Dibromomethane	74-95-3	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		Dichlorodifluoromethane	75-71-8	—	ND	U	6	ND	U	5.6	ND	U	5.2	ND	U	5.7
		Ethylbenzene	100-41-4	75.1	0.031		0.75	0.073	J	0.7	0.16	J	0.65	0.043		0.71
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Isopropylbenzene	98-82-8	—	0.011		4.7	0.03	J	4.4	0.029	J	4.1	0.0092		4.4
		m- & p-Xylenes	179601-23-1	871[b]	0.17		3	0.37		150	2.1		150	0.098		2.8
		Methyl tert-butyl ether	1634-04-4	—	ND	U	6	ND	U	5.6	ND	U	5.2	ND	U	5.7
		Methylene chloride	75-09-2	—	ND	U	3	ND	U	2.8	ND	U	2.6	ND	U	2.8
		Naphthalene	91-20-3	—	0.061		6.3	0.12	J	5.9	0.034	J	5.4	0.015		6
		n-Butylbenzene	104-51-8	—	0.025		1.5	0.057	J	1.4	0.018	J	1.3	0.013		1.4
		n-Propylbenzene	103-65-1	—	0.041		1.5	0.11	J	1.4	0.052	J	1.3	0.015		1.4
		o-Xylene	95-47-6	871[b]	0.082		0.75	0.14	J	0.7	0.76		36	0.043		0.71
		sec-Butylbenzene	135-98-8	—	0.052		1.5	0.13	J	1.4	0.028	J	1.3	0.012		1.4
		Styrene	100-42-5	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		tert-Butylbenzene	98-06-6	—	ND	U	1.5	ND	U	1.4	ND	U	1.3	ND	U	1.4
		Tetrachloroethene	127-18-4	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Toluene	108-88-3	5230	0.15		0.75	0.7		38	4.5		36	0.11	J	36
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.75	ND	U	0.7	ND	U	0.65	ND	U	0.71
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.19	ND	U	0.18	ND	U	0.16	ND	U	0.18
		Trichloroethene	79-01-6	—	ND	U	4.7	ND	U	4.4	ND	U	4.1	ND	U	4.4
		Trichlorofluoromethane	75-69-4	—	ND	U	9.4	ND	U	8.8	ND	U	8.1	ND	U	8.9
		Vinyl chloride	75-01-4	—	ND	U	3	ND	U	2.8	ND	U	2.6	ND	U	2.8

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/14/2020			12/14/2020			12/14/2020			12/14/2020		
				Sample Depth (ft bgs)	500			510			517			517		
				Sample Type:	REG			REG			REG			Field Duplicate		
				Core Temperature (°C)	18.3			28			28			28		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	25	ND	U	25	ND	U	23	ND	U	24
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	8.4	ND	U	8.6	ND	U	8	ND	U	8.1
		TPH-GRO (C6-C10)	TPH-GRO	100	1.7	J	2.4	ND	U	2.5	ND	U	2.2	ND	U	2.2
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		1,1-Dichloroethane	75-34-3	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		1,1-Dichloroethene	75-35-4	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,1-Dichloropropene	563-58-6	—	ND	U	0.37	ND	U	0.37	ND	U	0.36	ND	U	0.35
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9.3	ND	U	9.4	ND	U	9.1	ND	U	8.7
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		1,2-Dichloroethane	107-06-2	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,2-Dichloroethene	540-59-0	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,2-Dichloropropane	78-87-5	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		1,3-Dichloropropane	142-28-9	—	ND	U	0.37	ND	U	0.37	ND	U	0.36	ND	U	0.35
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		2,2-Dichloropropane	594-20-7	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		2-Butanone	78-93-3	—	ND	U	12	ND	U	12	ND	U	12	ND	U	11
		2-Chlorotoluene	95-49-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		2-Hexanone	591-78-6	—	ND	U	12	ND	U	12	ND	U	12	ND	U	11
		4-Chlorotoluene	106-43-4	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		4-Isopropyltoluene	99-87-6	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		4-Methyl-2-pentanone	108-10-1	—	ND	U	12	ND	U	12	ND	U	12	ND	U	11
		Acetone	67-64-1	—	ND	U	67	ND	U	67	ND	U	65	ND	U	63
		Benzene	71-43-2	17.8	ND	U	0.37	ND	U	0.37	ND	U	0.36	ND	U	0.35
		Bromobenzene	108-86-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106S10			KAFB-106S10			KAFB-106S10			KAFB-106S10		
				Sample Date:	12/14/2020			12/14/2020			12/14/2020			12/14/2020		
				Sample Depth (ft bgs)	500			510			517			517		
				Sample Type:	REG			REG			REG			Field Duplicate		
				Core Temperature (°C)	18.3			28			28			28		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Bromodichloromethane	75-27-4	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Bromoform	75-25-2	—	ND	U	4.7	ND	U	4.8	ND	U	4.6	ND	U	4.4
		Bromomethane	74-83-9	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		Carbon disulfide	75-15-0	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Carbon tetrachloride	56-23-5	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Chlorobenzene	108-90-7	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Chloroethane	75-00-3	—	ND	U	5.9	ND	U	6	ND	U	5.8	ND	U	5.6
		Chloroform	67-66-3	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		Chloromethane	74-87-3	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.37	ND	U	0.37	ND	U	0.36	ND	U	0.35
		Dibromochloromethane	124-48-1	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Dibromomethane	74-95-3	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		Dichlorodifluoromethane	75-71-8	—	ND	U	5.9	ND	U	6	ND	U	5.8	ND	U	5.6
		Ethylbenzene	100-41-4	75.1	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Isopropylbenzene	98-82-8	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		Methyl tert-butyl ether	1634-04-4	—	ND	U	5.9	ND	U	6	ND	U	5.8	ND	U	5.6
		Methylene chloride	75-09-2	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8
		Naphthalene	91-20-3	—	ND	U	6.2	ND	U	6.3	ND	U	6.1	ND	U	5.8
		n-Butylbenzene	104-51-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		n-Propylbenzene	103-65-1	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		o-Xylene	95-47-6	871[b]	0.00043	J	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		sec-Butylbenzene	135-98-8	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		Styrene	100-42-5	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		tert-Butylbenzene	98-06-6	—	ND	U	1.5	ND	U	1.5	ND	U	1.5	ND	U	1.4
		Tetrachloroethene	127-18-4	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Toluene	108-88-3	5230	0.001	J	0.74	0.00041	J	0.75	0.00041	J	0.73	0.00023	J	0.7
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.74	ND	U	0.75	ND	U	0.73	ND	U	0.7
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.19	ND	U	0.19	ND	U	0.18	ND	U	0.17
		Trichloroethene	79-01-6	—	ND	U	4.6	ND	U	4.7	ND	U	4.5	ND	U	4.4
		Trichlorofluoromethane	75-69-4	—	ND	U	9.3	ND	U	9.4	ND	U	9.1	ND	U	8.7
		Vinyl chloride	75-01-4	—	ND	U	3	ND	U	3	ND	U	2.9	ND	U	2.8

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106V3			KAFB-106V3			KAFB-106V3			KAFB-106V3		
				Sample Date:	11/11/2020			11/11/2020			11/11/2020			11/11/2020		
				Sample Depth (ft bgs)	230			240			250			260		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	16.5			29.7			36.2			24.7		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	23	ND	U	24	ND	U	24	ND	U	24
		TPH-DRO (C10-C28)	TPH-DRO	1000	3.6	J	7.7	ND	U	8.1	4.5	J	8.1	ND	U	8.3
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.3	ND	U	2.2	ND	U	2.7	1.6	J	2.5
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		1,1,1-Trichloroethane	71-55-6	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		1,1-Dichloroethane	75-34-3	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		1,1-Dichloroethene	75-35-4	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.41	ND	U	0.77	ND	U	0.52	ND	U	0.41
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	10	ND	U	19	ND	U	13	ND	U	10
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.6	ND	U	3.1	ND	U	2.1	0.0051		1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		1,2-Dichloroethane	107-06-2	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.41	ND	U	0.77	ND	U	0.52	ND	U	0.41
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		2,2-Dichloropropane	594-20-7	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		2-Butanone	78-93-3	—	ND	U	13	ND	U	25	ND	U	17	6.4		670
		2-Chlorotoluene	95-49-8	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	13	ND	U	25	ND	U	17	0.12		13
		4-Chlorotoluene	106-43-4	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		4-Isopropyltoluene	99-87-6	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		4-Methyl-2-pentanone	108-10-1	—	ND	U	13	ND	U	25	ND	U	17	0.094		13
		Acetone	67-64-1	—	ND	U	74	ND	U	140	ND	U	94	27		3800
		Benzene	71-43-2	17.8	ND	U	0.41	0.00082	J	0.77	ND	U	0.52	0.0012	J	0.41
		Bromobenzene	108-86-1	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106V3			KAFB-106V3			KAFB-106V3			KAFB-106V3		
				Sample Date:	11/11/2020			11/11/2020			11/11/2020			11/11/2020		
				Sample Depth (ft bgs)	230			240			250			260		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	16.5			29.7			36.2			24.7		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Bromodichloromethane	75-27-4	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Bromoform	75-25-2	—	ND	U	5.2	ND	U	9.8	ND	U	6.6	ND	U	5.2
		Bromomethane	74-83-9	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		Carbon disulfide	75-15-0	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Carbon tetrachloride	56-23-5	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Chlorobenzene	108-90-7	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Chloroethane	75-00-3	—	ND	U	6.6	ND	U	12	ND	U	8.3	ND	U	6.6
		Chloroform	67-66-3	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		Chloromethane	74-87-3	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.41	ND	U	0.77	ND	U	0.52	ND	U	0.41
		Dibromochloromethane	124-48-1	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Dibromomethane	74-95-3	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		Dichlorodifluoromethane	75-71-8	—	ND	U	6.6	ND	U	12	ND	U	8.3	ND	U	6.6
		Ethylbenzene	100-41-4	75.1	ND	U	0.82	ND	U	1.5	ND	U	1	0.00034	J	0.82
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Isopropylbenzene	98-82-8	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		Methyl tert-butyl ether	1634-04-4	—	ND	U	6.6	ND	U	12	ND	U	8.3	ND	U	6.6
		Methylene chloride	75-09-2	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3
		Naphthalene	91-20-3	—	ND	U	6.9	ND	U	13	ND	U	8.7	ND	U	6.9
		n-Butylbenzene	104-51-8	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		n-Propylbenzene	103-65-1	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		o-Xylene	95-47-6	871[b]	ND	U	0.82	ND	U	1.5	ND	U	1	0.00083	J	0.82
		sec-Butylbenzene	135-98-8	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		tert-Butylbenzene	98-06-6	—	ND	U	1.6	ND	U	3.1	ND	U	2.1	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Toluene	108-88-3	5230	0.00033	J	0.82	0.0021	J	1.5	0.00048	J	1	0.0046	J	0.82
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.82	ND	U	1.5	ND	U	1	ND	U	0.82
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.2	ND	U	0.38	ND	U	0.26	ND	U	0.21
		Trichloroethene	79-01-6	—	ND	U	5.1	ND	U	9.6	ND	U	6.5	ND	U	5.1
		Trichlorofluoromethane	75-69-4	—	ND	U	10	ND	U	19	ND	U	13	ND	U	10
		Vinyl chloride	75-01-4	—	ND	U	3.3	ND	U	6.1	ND	U	4.2	ND	U	3.3

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106V3			KAFB-106V3			KAFB-106V3			KAFB-106V3		
				Sample Date:	11/12/2020			11/12/2020			11/12/2020			11/12/2020		
				Sample Depth (ft bgs)	270			271			280.5			290		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	25.1			25.1			14.6			21.8		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	22	ND	U	26	ND	U	25	ND	U	22
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.4	ND	U	8.9	ND	U	8.5	ND	U	7.6
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2.1	8.3		2.5	ND	U	2.3	ND	U	2.3
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		1,1,1-Trichloroethane	71-55-6	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9
		1,1-Dichloroethane	75-34-3	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		1,1-Dichloroethene	75-35-4	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,1-Dichloropropene	563-58-6	—	ND	U	0.42	ND	U	0.41	ND	U	0.42	ND	U	0.48
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	5.2	0.032		5.1	0.0068		5.3	ND	U	6.1
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	10	ND	U	10	ND	U	11	ND	U	12
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.7	0.04		1.6	0.0027	J	1.7	ND	U	1.9
		1,2-Dichlorobenzene	95-50-1	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		1,2-Dichloroethane	107-06-2	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,2-Dichloroethene	540-59-0	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,2-Dichloropropane	78-87-5	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	5.2	0.0063		5.1	0.0027	J	5.3	ND	U	6.1
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		1,3-Dichloropropane	142-28-9	—	ND	U	0.42	ND	U	0.41	ND	U	0.42	ND	U	0.48
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		2,2-Dichloropropane	594-20-7	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		2-Butanone	78-93-3	—	0.35		13	14		670	ND	U	13	ND	U	16
		2-Chlorotoluene	95-49-8	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		2-Hexanone	591-78-6	—	0.0083	J	13	0.31		13	ND	U	13	ND	U	16
		4-Chlorotoluene	106-43-4	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		4-Isopropyltoluene	99-87-6	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9
		4-Methyl-2-pentanone	108-10-1	—	ND	U	13	0.3		13	ND	U	13	ND	U	16
		Acetone	67-64-1	—	2.7	J	3900	55		7600	2	J	4000	ND	U	86
		Benzene	71-43-2	17.8	0.0016	J	0.42	0.33		21	0.034		0.42	ND	U	0.48
		Bromobenzene	108-86-1	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106V3			KAFB-106V3			KAFB-106V3			KAFB-106V3		
				Sample Date:	11/12/2020			11/12/2020			11/12/2020			11/12/2020		
				Sample Depth (ft bgs)	270			271			280.5			290		
				Sample Type:	REG			REG			REG			REG		
				Core Temperature (°C)	25.1			25.1			14.6			21.8		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Bromodichloromethane	75-27-4	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Bromoform	75-25-2	—	ND	U	5.3	ND	U	5.2	ND	U	5.4	ND	U	6.2
		Bromomethane	74-83-9	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9
		Carbon disulfide	75-15-0	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Carbon tetrachloride	56-23-5	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Chlorobenzene	108-90-7	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Chloroethane	75-00-3	—	ND	U	6.6	ND	U	6.6	ND	U	6.7	ND	U	7.8
		Chloroform	67-66-3	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		Chloromethane	74-87-3	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.42	ND	U	0.41	ND	U	0.42	ND	U	0.48
		Dibromochloromethane	124-48-1	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Dibromomethane	74-95-3	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		Dichlorodifluoromethane	75-71-8	—	ND	U	6.6	ND	U	6.6	ND	U	6.7	ND	U	7.8
		Ethylbenzene	100-41-4	75.1	0.0005	J	0.83	0.053		0.82	0.012		0.84	ND	U	0.97
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Isopropylbenzene	98-82-8	—	ND	U	5.2	0.0041	J	5.1	ND	U	5.3	ND	U	6.1
		m- & p-Xylenes	179601-23-1	871[b]	0.0014	J	3.3	0.14		3.3	0.034		3.4	ND	U	3.9
		Methyl tert-butyl ether	1634-04-4	—	ND	U	6.6	ND	U	6.6	ND	U	6.7	ND	U	7.8
		Methylene chloride	75-09-2	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9
		Naphthalene	91-20-3	—	ND	U	7	0.011		6.9	ND	U	7	ND	U	8.1
		n-Butylbenzene	104-51-8	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		n-Propylbenzene	103-65-1	—	ND	U	1.7	0.0046	J	1.6	0.0014	J	1.7	ND	U	1.9
		o-Xylene	95-47-6	871[b]	0.00063	J	0.83	0.067		0.82	0.018		0.84	ND	U	0.97
		sec-Butylbenzene	135-98-8	—	ND	U	1.7	0.0012	J	1.6	ND	U	1.7	ND	U	1.9
		Styrene	100-42-5	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		tert-Butylbenzene	98-06-6	—	ND	U	1.7	ND	U	1.6	ND	U	1.7	ND	U	1.9
		Tetrachloroethene	127-18-4	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Toluene	108-88-3	5230	0.0066		0.83	0.89		42	0.11		0.84	0.00073	J	0.97
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.83	ND	U	0.82	ND	U	0.84	ND	U	0.97
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.21	ND	U	0.2	ND	U	0.21	ND	U	0.24
		Trichloroethene	79-01-6	—	ND	U	5.2	ND	U	5.1	ND	U	5.3	ND	U	6.1
		Trichlorofluoromethane	75-69-4	—	ND	U	10	ND	U	10	ND	U	11	ND	U	12
		Vinyl chloride	75-01-4	—	ND	U	3.3	ND	U	3.3	ND	U	3.4	ND	U	3.9

0.00203

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

Parameter	Analytical Method	Analyte	CAS	NMED Residential Soil Screening Level[a]	Result	Val Qual	LOD	Result	Val Qual	LOD
				Well Location ID:	KAFB-106V3			KAFB-106V3		
				Sample Date:	11/12/2020			11/12/2020		
				Sample Depth (ft bgs)	300			300		
				Sample Type:	REG			Field Duplicate		
				Core Temperature (°C)	23.2			23.2		
TPH	Method SW8015M (mg/kg)	Motor Oil (C20-C38)	MOIL	1000	ND	U	21	ND	U	22
		TPH-DRO (C10-C28)	TPH-DRO	1000	ND	U	7.3	ND	U	7.6
		TPH-GRO (C6-C10)	TPH-GRO	100	ND	U	2	ND	U	2.1
VOCs	Methods SW8260B (mg/kg)	1,1,1,2-Tetrachloroethane	630-20-6	—	ND	U	4.9	ND	U	5.1
		1,1,1-Trichloroethane	71-55-6	—	ND	U	4.9	ND	U	5.1
		1,1,2,2-Tetrachloroethane	79-34-5	—	ND	U	0.79	ND	U	0.82
		1,1,2-Trichloroethane	79-00-5	—	ND	U	3.2	ND	U	3.3
		1,1-Dichloroethane	75-34-3	—	ND	U	0.79	ND	U	0.82
		1,1-Dichloroethene	75-35-4	—	ND	U	1.6	ND	U	1.6
		1,1-Dichloropropene	563-58-6	—	ND	U	0.4	ND	U	0.41
		1,2,3-Trichlorobenzene	87-61-6	—	ND	U	3.2	ND	U	3.3
		1,2,3-Trichloropropane	96-18-4	—	ND	U	0.79	ND	U	0.82
		1,2,4-Trichlorobenzene	120-82-1	—	ND	U	1.6	ND	U	1.6
		1,2,4-Trimethylbenzene	95-63-6	—	ND	U	4.9	ND	U	5.1
		1,2-Dibromo-3-chloropropane	96-12-8	—	ND	U	9.9	ND	U	10
		1,2-Dibromoethane	106-93-4	0.672	ND	U	1.6	ND	U	1.6
		1,2-Dichlorobenzene	95-50-1	—	ND	U	4.9	ND	U	5.1
		1,2-Dichloroethane	107-06-2	—	ND	U	1.6	ND	U	1.6
		1,2-Dichloroethene	540-59-0	—	ND	U	1.6	ND	U	1.6
		1,2-Dichloropropane	78-87-5	—	ND	U	1.6	ND	U	1.6
		1,3,5-Trimethylbenzene	108-67-8	—	ND	U	4.9	ND	U	5.1
		1,3-Dichlorobenzene	541-73-1	—	ND	U	1.6	ND	U	1.6
		1,3-Dichloropropane	142-28-9	—	ND	U	0.4	ND	U	0.41
		1,4-Dichlorobenzene	106-46-7	—	ND	U	0.79	ND	U	0.82
		2,2-Dichloropropane	594-20-7	—	ND	U	1.6	ND	U	1.6
		2-Butanone	78-93-3	—	0.0046	J	13	ND	U	13
		2-Chlorotoluene	95-49-8	—	ND	U	1.6	ND	U	1.6
		2-Hexanone	591-78-6	—	ND	U	13	ND	U	13
		4-Chlorotoluene	106-43-4	—	ND	U	0.79	ND	U	0.82
		4-Isopropyltoluene	99-87-6	—	ND	U	3.2	ND	U	3.3
		4-Methyl-2-pentanone	108-10-1	—	ND	U	13	ND	U	13
		Acetone	67-64-1	—	ND	U	72	ND	U	69
		Benzene	71-43-2	17.8	ND	U	0.4	0.00042	J	0.41
		Bromobenzene	108-86-1	—	ND	U	1.6	ND	U	1.6

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

				Well Location ID:	KAFB-106V3			KAFB-106V3		
				Sample Date:	11/12/2020			11/12/2020		
				Sample Depth (ft bgs)	300			300		
				Sample Type:	REG			Field Duplicate		
				Core Temperature (°C)	23.2			23.2		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMED Residential Soil Screening Level[a]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Methods SW8260B (mg/kg)	Bromochloromethane	74-97-5	—	ND	U	4.9	ND	U	5.1
		Bromodichloromethane	75-27-4	—	ND	U	4.9	ND	U	5.1
		Bromoform	75-25-2	—	ND	U	5	ND	U	5.2
		Bromomethane	74-83-9	—	ND	U	3.2	ND	U	3.3
		Carbon disulfide	75-15-0	—	ND	U	4.9	ND	U	5.1
		Carbon tetrachloride	56-23-5	—	ND	U	4.9	ND	U	5.1
		Chlorobenzene	108-90-7	—	ND	U	4.9	ND	U	5.1
		Chloroethane	75-00-3	—	ND	U	6.3	ND	U	6.6
		Chloroform	67-66-3	—	ND	U	0.79	ND	U	0.82
		Chloromethane	74-87-3	—	ND	U	1.6	ND	U	1.6
		cis-1,2-Dichloroethene	156-59-2	—	ND	U	0.79	ND	U	0.82
		cis-1,3-Dichloropropene	10061-01-5	—	ND	U	0.4	ND	U	0.41
		Dibromochloromethane	124-48-1	—	ND	U	4.9	ND	U	5.1
		Dibromomethane	74-95-3	—	ND	U	0.79	ND	U	0.82
		Dichlorodifluoromethane	75-71-8	—	ND	U	6.3	ND	U	6.6
		Ethylbenzene	100-41-4	75.1	ND	U	0.79	ND	U	0.82
		Hexachloro-1,3-butadiene	87-68-3	—	ND	U	4.9	ND	U	5.1
		Isopropylbenzene	98-82-8	—	ND	U	4.9	ND	U	5.1
		m- & p-Xylenes	179601-23-1	871[b]	ND	U	3.2	ND	U	3.3
		Methyl tert-butyl ether	1634-04-4	—	ND	U	6.3	ND	U	6.6
		Methylene chloride	75-09-2	—	ND	U	3.2	ND	U	3.3
		Naphthalene	91-20-3	—	ND	U	6.6	ND	U	6.9
		n-Butylbenzene	104-51-8	—	ND	U	1.6	ND	U	1.6
		n-Propylbenzene	103-65-1	—	ND	U	1.6	ND	U	1.6
		o-Xylene	95-47-6	871[b]	ND	U	0.79	ND	U	0.82
		sec-Butylbenzene	135-98-8	—	ND	U	1.6	ND	U	1.6
		Styrene	100-42-5	—	ND	U	0.79	ND	U	0.82
		tert-Butylbenzene	98-06-6	—	ND	U	1.6	ND	U	1.6
		Tetrachloroethene	127-18-4	—	ND	U	4.9	ND	U	5.1
		Toluene	108-88-3	5230	0.0013	J	0.79	0.002	J	0.82
		trans-1,2-Dichloroethene	156-60-5	—	ND	U	0.79	ND	U	0.82
		trans-1,3-Dichloropropene	10061-02-6	—	ND	U	0.2	ND	U	0.2
		Trichloroethene	79-01-6	—	ND	U	4.9	ND	U	5.1
		Trichlorofluoromethane	75-69-4	—	ND	U	9.9	ND	U	10
		Vinyl chloride	75-01-4	—	ND	U	3.2	ND	U	3.3

Table 5-3
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Soil

[a]New Mexico Environment Department (NMED) Risk Assessment Guidance for Site Investigations and Remediation, Volume I Soil Screening Guidance for Human Health Risk Assessments, Revision 2, 6/19/19. Table 6-2 TPH Soil Screening Levels and Table A-1 NMED Soil Screening Levels. Only contaminants of potential concern are shown.

[b]The screening level for xylenes includes m-,p-, and-x xylenes.
— = This analyte is not considered a contaminant of potential concern.
°C = degrees Celsius
AFB = Air Force Base
BFF = Bulk Fuels Facility
bgs = below ground surface
CAS = chemical abstract service number
DRO = diesel range organics
ft = foot/feet
GRO = gasoline range organics
ID = identification
LOD = limit of detection
mg/Kg = milligram per kilogram
MW = monitoring well
ND = not detected
REG = normal field sample
TPH = total petroleum hydrocarbons
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.

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Table 5-4
Well Construction Details for Soil Vapor Monitoring Well KAFB-106V3

		Survey Data					Construction Details										
		State Plane Coordinate System (NAD83)		Elevations (NAVD88)													
							Bentonite Chips		10/20 Silica Sand			Blank Casing		Screen[a]		Sump	
Well ID	Installation Date	Northing (ft)	Easting (ft)	Top of PVC Casing (ft amsl)	Top of Concrete Elevation (ft amsl)	Measuring Point Elevation (ft amsl)	Top (ft bgs)	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)	Casing Inside Diameter (in)	Top (ft bgs)[b]	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)
KAFB-106V3-7	20-Nov-20	1473457.02	1541614.54	5346.56	5344.01	5346.95	2	4	4	9.1	0.722	-2.55	5	5	7	NA	NA
KAFB-106V3-15		1473457.26	1541614.37	5346.68			9.1	12	12	17	0.722	-2.67	13	13	15	NA	NA
KAFB-106V3-272		1473457.08	1541614.17	5346.49			235.2	262.7	262.7	273	2.864	-2.48	267	267	272	272	274

[a] Screen is 0.010-inch slot.
[b] Negative values are due to wells completed aboveground.
amsl = above mean sea level
bgs = below ground surface
ft = foot/feet
ID = identification
in = inch
MW = monitoring well
NA = not applicable
NAD83 = North American Datum of 1983
NAVD88 = North American Vertical Datum of 1988
PVC = polyvinyl chloride

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Table 5-5
Well Construction Details for Groundwater Monitoring Wells

			Survey Data					Well Construction Details										
			State Plane Coordinate System (NAD83)		Elevations (NAVD88)													
								Bentonite Chips		10/20 Silica Sand			Blank Casing		Screen[a]		Sump	
Well Identification	DTW (ft bgs)	Installation Date	Northing (ft)	Easting (ft)	Top of PVC Casing (ft amsl)	Top of Concrete (ft amsl)	Measuring Point Elevation (ft amsl)	Top (ft bgs)	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)	Casing Inside Diameter (in)	Top[b] (ft bgs)	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)	Top (ft bgs)	Bottom (ft bgs)
KAFB-106248-453	479.01	22-Mar-21	1474498.4	1543532.86	5355.97	5353.31	5356.34	445.6	450.6	450.6	499.8	3.786	-2.66	452.5	452.5	492.5	492.5	494.5
KAFB-106248-419			1474497.99	1543532.67	5355.98			378	415.8	415.8	445.6	3.786	-2.67	418.5	418.5	443.5	443.5	445.5
KAFB-106249-450	476.95	10-Feb-21	1473603.56	1542864.41	5352.67	5353.24	5353.27	443.1	448.2	448.2	492.1	3.786	0.57	450.1	450.1	490.1	490.1	492.1
KAFB-106249-416			1473603.71	1542864.91	5352.59			383.2	413.8	413.8	443.1	3.786	0.65	416.1	416.1	441.1	441.1	443.1
KAFB-106250-448	472.2	21-Feb-21	1473154.15	1542509.94	5349.13	5349.6	5349.55	440.7	445.6	445.6	489.7	3.786	0.47	447.7	447.7	487.7	487.7	489.7
KAFB-106250-414			1473154.64	1542509.81	5349.12			378.5	411.5	411.5	440.7	3.786	0.48	413.7	413.7	438.7	438.7	440.7
KAFB-106251-444	468.5	21-Jan-21	1472784.14	1541930.93	5347.84	5345.06	5348.06	436.7	441.6	441.6	496	3.786	-2.78	443.6	443.6	483.6	483.6	485.6
KAFB-106251-410			1472784.41	1541930.59	5347.81			378	407.2	407.2	436.7	3.786	-2.75	409.7	409.7	434.7	434.7	436.7
KAFB-106252-515[c]	450.2	11-Mar-21	1478561.66	1544052.54	5325.05	5325.57	5325.57	504.8	509.9	509.9	538	3.786	0.52	515	515	525	NA	NA
KAFB-106252-425			1478561.98	1544052.73	5324.75			418	423	423	504.8	3.786	0.82	425	425	465	465	467
KAFB-106252-391			1478561.63	1544052.94	5324.91			358	388.4	388.4	418	3.786	0.66	390.5	390.5	415.5	415.5	417.5
KAFB-106S10-443	473.32	20-Dec-20	1473425.22	1541736.24	5348.41	5345.7	5348.73	436.2	440.8	440.8	497	3.786	-2.71	443	443	483	483	485
KAFB-106S10-409			1473424.81	1541736.29	5348.43			373.6	405.5	405.5	436.2	3.786	-2.73	409	409	434	434	436

Table 5-5
Well Construction Details for Groundwater Monitoring Wells

Well Identification
[b] Negative values are due to wells completed aboveground.
[c] This well was completed as a piezometer.
amsl = above mean sea level
bgs = below ground surface
DTW = depth to water at the time of well construction.
ft = foot/feet
ID = identification
in = inch
MW = monitoring well
NA = not applicable
NAD83 = North American Datum of 1983
NAVD88 = North American Vertical Datum of 1988
PVC = polyvinyl chloride

Table 5-6
Water Tracking Table

Well Identification	Water Injected for Cleanout (gal)	Water Removed for Cleanout (gal)	Water Injected for Hydrostatic Head (gal)	Water Removed During Development (gal)
KAFB-106V3	N/A	N/A	N/A	N/A
KAFB-106S10	N/A	N/A	N/A	160
KAFB-106248	800	900	300	340
KAFB-106249	400	400	N/A	350
KAFB-106250	300	300	N/A	370
KAFB-106251	450	450	N/A	410
KAFB-106252	1800	2000	N/A	200

gal = gallons
MW = monitoring well
N/A = not applicable

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Table 5-7
Initial Water Levels Versus Current Water Levels

Well Identification	Initial Measurement Date at Time of Drilling	Depth to Water (ft bgs)	Second Quarter 2021 Sampling Date	Depth to Water (ft bgs)
KAFB-106248-453	3/19/2021	479.01[a]	5/12/2021	480.46
KAFB-106249-450	2/10/2021	476.95	5/12/2021	476.87
KAFB-106250-448	2/21/2021	472.20	5/12/2021	473.55
KAFB-106251-444	1/20/2021	468.50	5/12/2021	471.21
KAFB-106252-425	12/26/2020	450.20	5/12/2021	452.00
KAFB-106S10-443	12/16/2020	472.32	5/10/2021	471.57

[a]The depth to water in monitoring well KAFB-106248 was measured at 440.62 ft bgs. However, the well had water added to it at the time to control flowing sands. As such, the water level measurement for well KAFB-106248 was from KAFB-106019, located to the west of KAFB-106248, as reported for March 2021 to design the well.

bgs = below ground surface
EPA = U.S. Environmental Protection Agency
ft = foot/feet
MW = monitoring well

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Table 6-1
Soil Vapor Analytical Results

		Well Location ID:	KAFB-106V3-007			KAFB-106V3-007			KAFB-106V3-015			KAFB-106V3-272		
		Field Sample ID:	SV3-007-212			SV3-007-612			SV3-015-212			SV3-272-212		
		Sample Date:	4/20/2021			4/20/2021			4/20/2021			4/20/2021		
		Sample Type:	REG			Field Duplicate			REG			REG		
Analytical Method	Analyte	NMED Residential VISL[a]	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD
Method TO-15 ($\mu g/m^3$)	1,1,2-Trichloro-1,2,2-trifluoroethane	1,040,000	3.3	--	0.76	3.6	--	0.79	7.9	--	0.73	0.41	J	0.64
	1,1-Dichloroethane	585	ND	U	1.5	ND	U	1.5	ND	U	1.4	ND	U	1.2
	1,2,4-Trichlorobenzene	69.5	ND	U	1.4	ND	U	1.5	ND	U	1.4	ND	U	1.2
	1,2,4-Trimethylbenzene	NS	26	--	0.76	39	--	0.79	17	--	0.73	37	--	0.64
	1,2-Dibromoethane	1.56	**6.8**	--	0.76	**6.6**	--	0.79	**12**	--	0.73	**17**	--	0.64
	1,2-Dichloroethane	36	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	1,3,5-Trimethylbenzene	NS	29	--	0.76	28	--	0.79	13	--	0.73	13	--	0.64
	1,3-Butadiene	31.2	ND	U	1.4	ND	U	1.5	ND	U	1.4	ND	U	1.2
	1,4-Dioxane	187	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	2-Butanone	174,000	14	--	1.4	11	--	1.5	6	--	1.4	62	--	1.2
	2-Hexanone	NS	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	4-Methyl-2-pentanone	104,000	0.49	J	0.76	0.59	J	0.79	ND	U	0.73	3.1	J	0.64
	Acetone	1,080,000	24	--	12	32	--	12	10	J	12	330	--	10
	Benzene	120	**260**	--	0.76	**210**	--	0.79	**160**	--	0.73	**200**	--	0.64
	Bromodichloromethane	25.3	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	Bromoform	851	ND	U	1.4	ND	U	1.5	ND	U	1.4	ND	U	1.2
	Carbon disulfide	24,300	1.7	J	2.4	ND	U	2.5	0.97	J	2.3	2.6	J	2
	Carbon tetrachloride	156	0.78	J	0.76	0.76	J	0.79	1.4	J	0.73	0.28	J	0.64
	Chloroethane	348,000	ND	U	1.4	ND	U	1.5	ND	U	1.4	ND	U	1.2
	Chloroform	40.7	0.6	J	0.76	0.54	J	0.79	ND	U	0.73	ND	U	0.64
	Chloromethane	520	ND	U	1.4	ND	U	1.5	ND	U	1.4	0.38	J	1.2
	Cyclohexane	NS	1,200	--	15	1,300	--	16	2,800	--	29	64	--	1.3
	Dibromochloromethane	34.7	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	Dichlorodifluoromethane	3,480	2.3	--	1.4	1.3	J	1.5	ND	U	1.4	1.6	J	1.2
	Ethanol	NS	32	--	3.7	33	--	3.8	24	--	3.6	28	--	3.1
	Ethyl acetate	2,430	ND	U	2.9	ND	U	3	16	J	2.8	ND	U	2.4
	Ethylbenzene	374	110	--	0.76	91	--	0.79	58	--	0.73	88	--	0.64
	Hexane	24,300	320	--	1.4	360	--	1.5	440	--	28	27	--	1.2
	Isopropyl alcohol	NS	5.3	J	2.8	1,600	J	29	37	--	2.7	160	--	2.4
	m- & p-Xylenes	3,480	190	--	1.5	170	--	1.6	120	--	1.5	250	--	1.3
	Methylene chloride	20,900	ND	U	1.4	ND	U	1.5	ND	U	1.4	ND	U	1.2
	Naphthalene	27.5	5.3	--	1.4	9.5	--	1.4	2.7	--	1.3	11	--	1.2
	n-Heptane	NS	160	--	1.4	180	--	1.5	320	--	1.4	89	--	1.2
	o-Xylene	3,480	120	--	0.76	100	--	0.79	56	--	0.73	71	--	0.64
	Propylene (propene)	NS	5.5	J	1.4	170	J	1.5	4	--	1.4	53	--	1.2
	Styrene	34,800	0.65	J	1.4	0.73	J	1.5	ND	U	1.4	0.44	J	1.2
	Tetrachloroethene	1,390	ND	U	0.76	ND	U	0.79	0.55	J	0.73	ND	U	0.64
	Tetrahydrofuran	NS	ND	U	0.76	ND	U	0.79	ND	U	0.73	0.26	J	0.64
	Toluene	174,000	840	--	7.6	700	--	7.9	420	--	15	930	--	6.4
	Trichloroethene	69.5	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	Trichlorofluoromethane	24,300	1.3	J	1.4	1.1	J	1.5	0.98	J	1.4	0.84	J	1.2
	Vinyl chloride	55.9	ND	U	0.76	ND	U	0.79	ND	U	0.73	ND	U	0.64
	Xylenes, total	3,480	310	--	1.5	270	--	1.6	170	--	1.5	320	--	1.3

Table 6-1
Soil Vapor Analytical Results

[a] New Mexico Environment Department VISL Residential Soil Gas, dated 2017.
$\mu g/m^3$ = microgram per cubic meter
ft = foot (feet)
ID = identification
LOD = limit of detection
MW = monitoring well
ND = not detected
NMED = New Mexico Environmental Department
NS = not specified
REG = normal field sample
Val Qual = validation qualifier
VISL = vapor intrusion screening level
VOC = volatile organic compound
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the NMED Residential VISL

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106248-452			KAFB-106248-452			KAFB-106249-450		
							Field Sample ID:	GW248-452-212			GW248-452-612			GW249-211		
							Sample Date:	4/5/2021			4/5/2021			2/24/2021		
							Sample Type:	REG			Field Duplicate			REG		
							Sample Depth (ft bgs)	493.3			493.3			488.1		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019
TPH	Method SW8015M (µg/L)	TPH (C28-C40)	TPHC28C40	NS	NS	800	800	—	—	—	—	—	—	ND	U	91
		TPH-DRO (C10-C28)	TPH-DRO	NS	NS	1,300	1,300	ND	U	40	ND	U	40	460	--	91
		TPH-GRO (C6-C10)	TPH-GRO	NS	NS	550	550	54	J	91	58	J	90	69	--	40
VOCs	Method SW8260C (µg/L)	1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	5.7	5.7	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1,1-Trichloroethane	71-55-6	200	200	8,000	200	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1,2,2-Tetrachloroethane	79-34-5	10	NS	0.76	10	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1,2-Trichloroethane	79-00-5	5	5	2.8	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1-Dichloroethane	75-34-3	25	NS	28	25	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1-Dichloroethene	75-35-4	7	7	280	7	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,1-Dichloropropene	563-58-6	NS	NS	NS	NS	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,2,3-Trichlorobenzene	87-61-6	NS	NS	7	7	ND	U	1.0	ND	U	1.0	ND	U	1.0
		1,2,3-Trichloropropane	96-18-4	NS	NS	0.0075	0.05[e]	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,2,4-Trichlorobenzene	120-82-1	70	70	12	70	ND	U	1.0	ND	U	1.0	ND	U	1.0
		1,2,4-Trimethylbenzene	95-63-6	NS	NS	56	56	ND	U	2.0	ND	U	2.0	ND	U	2.0
		1,2-Dibromo-3-chloropropane	96-12-8	NS	0.2	0.0033	1[e]	ND	U	1.0	ND	U	1.0	ND	U	1.0
		1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,2-Dichlorobenzene	95-50-1	600	600	300	600	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,2-Dichloroethane	107-06-2	5	5	1.7	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,2-Dichloropropane	78-87-5	5	5	8.5	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,3,5-Trimethylbenzene	108-67-8	NS	NS	60	60	ND	U	1.0	ND	U	1.0	ND	U	1.0
		1,3-Dichlorobenzene	541-73-1	NS	NS	NS	NS	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,3-Dichloropropane	142-28-9	NS	NS	370	370	ND	U	0.50	ND	U	0.50	ND	U	0.50
		1,4-Dichlorobenzene	106-46-7	75	75	4.8	75	ND	U	0.50	ND	U	0.50	ND	U	0.50
		2,2-Dichloropropane	594-20-7	NS	NS	NS	NS	ND	U	0.50	ND	U	0.50	ND	U	0.50
		2-Butanone	78-93-3	NS	NS	5,600	5,600	ND	U	1.0	ND	U	1.0	ND	U	1.0
		2-Chlorotoluene	95-49-8	NS	NS	240	240	ND	U	0.50	ND	U	0.50	ND	U	0.50
		2-Hexanone	591-78-6	NS	NS	38	38	ND	U	1.0	ND	U	1.0	ND	U	1.0
		4-Chlorotoluene	106-43-4	NS	NS	250	250	ND	U	0.50	ND	U	0.50	ND	U	0.50
		4-Isopropyltoluene	99-87-6	NS	NS	NS	NS	ND	U	0.50	ND	U	0.50	ND	U	0.50

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106248-452			KAFB-106248-452			KAFB-106249-450		
							Field Sample ID:	GW248-452-212			GW248-452-612			GW249-211		
							Sample Date:	4/5/2021			4/5/2021			2/24/2021		
							Sample Type:	REG			Field Duplicate			REG		
							Sample Depth (ft bgs)	493.3			493.3			488.1		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Method SW8260C (µg/L)	4-Methyl-2-pentanone	108-10-1	NS	NS	6,300	6,300	ND	U	1.0	ND	U	1.0	ND	U	1.0
		Acetone	67-64-1	NS	NS	14,000	14,000	ND	U	2.0	1.5	J	2.0	2.7	J	2.0
		Acrolein	107-02-8	NS	NS	0.042	5[e]	ND	U	5.0	ND	U	5.0	ND	UJ	5.0
		Acrylonitrile	107-13-1	NS	NS	0.52	1[e]	ND	U	1.0	ND	U	1.0	ND	U	1.0
		Benzene	71-43-2	5	5	4.6	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Bromobenzene	108-86-1	NS	NS	62	62	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Bromochloromethane	74-97-5	NS	NS	83	83	ND	UJ	0.50	ND	UJ	0.50	ND	U	0.50
		Bromodichloromethane	75-27-4	NS	80	1.3	80	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Bromoform	75-25-2	NS	80	33	80	ND	U	2.0	ND	U	2.0	ND	U	2.0
		Bromomethane	74-83-9	NS	NS	7.5	7.5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Carbon disulfide	75-15-0	NS	NS	810	810	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Carbon tetrachloride	56-23-5	5	5	4.6	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Chlorobenzene	108-90-7	NS	100	78	100	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Chloroethane	75-00-3	NS	NS	21,000	21,000	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Chloroform	67-66-3	100	80	2.2	80	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Chloromethane	74-87-3	NS	NS	190	190	ND	U	0.50	ND	U	0.50	ND	U	0.50
		cis-1,2-Dichloroethene	156-59-2	70	70	36	70	ND	U	0.50	ND	U	0.50	ND	U	0.50
		cis-1,3-Dichloropropene	10061-01-5	NS	NS	4.7	4.7	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Dibromochloromethane	124-48-1	NS	80	8.7	80	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Dibromomethane	74-95-3	NS	NS	8.3	8.3	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Dichlorodifluoromethane	75-71-8	NS	NS	200	200	ND	U	0.50	ND	U	0.50	ND	UJ	0.50
		Ethylbenzene	100-41-4	700	700	15	700	ND	U	0.80	ND	U	0.80	ND	U	0.80
		Hexachloro-1,3-butadiene	87-68-3	NS	NS	1.4	4[e]	ND	U	4.0	ND	U	4.0	ND	U	4.0
		Isopropylbenzene	98-82-8	NS	NS	450	450	ND	U	0.50	ND	U	0.50	ND	U	0.50
		m- & p-Xylenes	179601-23-1	NS	NS	NS	NS	ND	U	2.0	ND	U	2.0	ND	U	2.0
		Methyl tert-butyl ether	1634-04-4	100	NS	140	100	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Methylene chloride	75-09-2	5	5	110	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Naphthalene	91-20-3	30	NS	1.2	30	ND	U	2.0	ND	U	2.0	ND	U	2.0
		n-Butylbenzene	104-51-8	NS	NS	1,000	1,000	ND	U	0.50	ND	U	0.50	ND	U	0.50

Table 6-2

Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106248-452			KAFB-106248-452			KAFB-106249-450		
							Field Sample ID:	GW248-452-212			GW248-452-612			GW249-211		
							Sample Date:	4/5/2021			4/5/2021			2/24/2021		
							Sample Type:	REG			Field Duplicate			REG		
							Sample Depth (ft bgs)	493.3			493.3			488.1		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Method SW8260C (µg/L)	n-Propylbenzene	103-65-1	NS	NS	660	660	ND	U	0.50	ND	U	0.50	ND	U	0.50
		o-Xylene	95-47-6	NS	NS	190	190	ND	U	0.80	ND	U	0.80	ND	U	0.80
		sec-Butylbenzene	135-98-8	NS	NS	2,000	2,000	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Styrene	100-42-5	100	100	1,200	100	ND	U	0.50	ND	U	0.50	ND	U	0.50
		tert-Butylbenzene	98-06-6	NS	NS	690	690	ND	U	1.0	ND	U	1.0	ND	U	1.0
		Tetrachloroethene	127-18-4	5	5	110	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Toluene	108-88-3	1,000	1,000	1,100	1,000	ND	U	0.50	ND	U	0.50	19	--	0.50
		trans-1,2-Dichloroethene	156-60-5	100	100	68	100	ND	U	0.50	ND	U	0.50	ND	U	0.50
		trans-1,3-Dichloropropene	10061-02-6	NS	NS	4.7	4.7	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Trichloroethene	79-01-6	5	5	4.9	5	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Trichlorofluoromethane	75-69-4	NS	NS	5,200	5,200	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Vinyl acetate	108-05-4	NS	NS	410	410	ND	U	2.0	ND	U	2.0	ND	U	2.0
		Vinyl chloride	75-01-4	2	2	0.19	2	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Xylenes, total	1330-20-7	620	10,000	190	620	ND	U	2.8	ND	U	2.8	ND	U	2.8
Metals	Method SW6010C (mg/L)	Calcium	7440-70-2	NS	NS	NS	NS	43	--	0.15	44	--	0.15	47	J	0.15
		Iron, dissolved	7439-89-6	1.0	NS	14	1.0	ND	U	0.10	ND	U	0.10	0.12	J	100
		Magnesium	7439-95-4	NS	NS	NS	NS	6.3	--	0.075	6.2	--	0.075	7.1	J	0.075
		Manganese, dissolved	7439-96-5	0.2	NS	0.43	0.2	0.11	--	0.0052	0.10	--	0.0052	**0.38**	--	0.0052
		Potassium	7440-09-7	NS	NS	NS	NS	2.8	--	0.45	2.9	--	0.45	2.7	--	450
		Sodium	7440-23-5	NS	NS	NS	NS	29	--	0.50	29	--	0.50	26	J	0.5
	Method SW6020A (mg/L)	Arsenic	7440-38-2	0.01	0.01	0.00052	0.01	ND	U	0.0016	ND	U	0.0016	ND	U	1.6
		Lead	7439-92-1	0.015	0.015	0.015	0.015	0.00052	--	0.00025	0.00041	J	0.00025	0.00012	J	0.25
Anions	Method E300.0 (mg/L)	Bromide	24959-67-9	NS	NS	NS	NS	ND	U	2.0	ND	U	2.0	ND	U	2.0
		Chloride	16887-00-6	250	NS	NS	250	29	--	1.5	29	--	1.5	10	J-	1.5
		Sulfate	14808-79-8	600	NS	NS	600	42	--	4.5	42	--	4.5	28	--	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	NNN	10[f]	10[f]	NS	10[f]	0.30	--	0.090	0.29	--	0.090	—	—	—
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	ALK-B	NS	NS	NS	NS	ND	U	2.0	ND	U	2.0	160	--	6.0
		Alkalinity, carbonate (as CaCO3)	ALK-C	NS	NS	NS	NS	29	--	1.5	29	--	1.5	ND	U	6.0
		Alkalinity, total (as CaCO3)	ALK	NS	NS	NS	NS	42	--	4.5	42	--	4.5	160	--	6.0

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106249-450			KAFB-106250-447			KAFB-106251-443		
							Field Sample ID:	GW249-611			GW250-211			GW251-211		
							Sample Date:	2/24/2021			3/4/2021			2/23/2021		
							Sample Type:	Field Duplicate			REG			REG		
							Sample Depth (ft bgs)	488.1			486			481.6		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	0.010	J	0.019
TPH	Method SW8015M (µg/L)	TPH (C28-C40)	TPHC28C40	NS	NS	800	800	ND	U	92	**8200**	--	480	ND	U	110
		TPH-DRO (C10-C28)	TPH-DRO	NS	NS	1,300	1,300	480	--	92	**21,000**	--	480	210	--	110
		TPH-GRO (C6-C10)	TPH-GRO	NS	NS	550	550	79	--	40	**3,900**	J+	40	ND	U	40
VOCs	Method SW8260C (µg/L)	1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	5.7	5.7	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,1,1-Trichloroethane	71-55-6	200	200	8,000	200	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,1,2,2-Tetrachloroethane	79-34-5	10	NS	0.76	10	ND	U	0.50	ND	UJ	0.5	ND	U	0.5
		1,1,2-Trichloroethane	79-00-5	5	5	2.8	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,1-Dichloroethane	75-34-3	25	NS	28	25	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,1-Dichloroethene	75-35-4	7	7	280	7	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,1-Dichloropropene	563-58-6	NS	NS	NS	NS	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,2,3-Trichlorobenzene	87-61-6	NS	NS	7	7	ND	U	1.0	ND	U	1	ND	U	1
		1,2,3-Trichloropropane	96-18-4	NS	NS	0.0075	0.05[e]	ND	U	0.50	ND	UJ	0.5	ND	U	0.5
		1,2,4-Trichlorobenzene	120-82-1	70	70	12	70	ND	U	1.0	ND	U	1	ND	U	1
		1,2,4-Trimethylbenzene	95-63-6	NS	NS	56	56	ND	U	2.0	1.2	J	2	ND	U	2
		1,2-Dibromo-3-chloropropane	96-12-8	NS	0.2	0.0033	1[e]	ND	U	1.0	ND	U	1	ND	U	1
		1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,2-Dichlorobenzene	95-50-1	600	600	300	600	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,2-Dichloroethane	107-06-2	5	5	1.7	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,2-Dichloropropane	78-87-5	5	5	8.5	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,3,5-Trimethylbenzene	108-67-8	NS	NS	60	60	ND	U	1.0	ND	U	1	ND	U	1
		1,3-Dichlorobenzene	541-73-1	NS	NS	NS	NS	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,3-Dichloropropane	142-28-9	NS	NS	370	370	ND	U	0.50	ND	U	0.5	ND	U	0.5
		1,4-Dichlorobenzene	106-46-7	75	75	4.8	75	ND	U	0.50	ND	U	0.5	ND	U	0.5
		2,2-Dichloropropane	594-20-7	NS	NS	NS	NS	ND	U	0.50	ND	U	0.5	ND	U	0.5
		2-Butanone	78-93-3	NS	NS	5,600	5,600	ND	U	1.0	14	--	1	0.31	J	1
		2-Chlorotoluene	95-49-8	NS	NS	240	240	ND	U	0.50	ND	U	0.5	ND	U	0.5
		2-Hexanone	591-78-6	NS	NS	38	38	ND	U	1.0	ND	UJ	1	ND	U	1
		4-Chlorotoluene	106-43-4	NS	NS	250	250	ND	U	0.50	ND	U	0.5	ND	U	0.5
		4-Isopropyltoluene	99-87-6	NS	NS	NS	NS	ND	U	0.50	14	--	0.5	ND	U	0.5

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

Parameter	Analytical Method	Analyte	CAS	NMAC NMWQCC[a]	EPA MCL[b]	EPA RSL[c]	Project Screening Level[d]	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD
							Well Location ID:	KAFB-106249-450			KAFB-106250-447			KAFB-106251-443		
							Field Sample ID:	GW249-611			GW250-211			GW251-211		
							Sample Date:	2/24/2021			3/4/2021			2/23/2021		
							Sample Type:	Field Duplicate			REG			REG		
							Sample Depth (ft bgs)	488.1			486			481.6		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
VOCs	Method SW8260C (µg/L)	4-Methyl-2-pentanone	108-10-1	NS	NS	6,300	6,300	ND	U	1.0	15	--	1	ND	U	1
		Acetone	67-64-1	NS	NS	14,000	14,000	2.9	J	2.0	88	--	2	5.3	J	2
		Acrolein	107-02-8	NS	NS	0.042	5[e]	ND	UJ	5.0	ND	U	5	ND	UJ	5
		Acrylonitrile	107-13-1	NS	NS	0.52	1[e]	ND	U	1.0	ND	U	1	ND	U	1
		Benzene	71-43-2	5	5	4.6	5	ND	U	0.50	**8.1**	--	0.5	ND	U	0.5
		Bromobenzene	108-86-1	NS	NS	62	62	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Bromochloromethane	74-97-5	NS	NS	83	83	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Bromodichloromethane	75-27-4	NS	80	1.3	80	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Bromoform	75-25-2	NS	80	33	80	ND	U	2.0	ND	U	2	ND	U	2
		Bromomethane	74-83-9	NS	NS	7.5	7.5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Carbon disulfide	75-15-0	NS	NS	810	810	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Carbon tetrachloride	56-23-5	5	5	4.6	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Chlorobenzene	108-90-7	NS	100	78	100	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Chloroethane	75-00-3	NS	NS	21,000	21,000	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Chloroform	67-66-3	100	80	2.2	80	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Chloromethane	74-87-3	NS	NS	190	190	ND	U	0.50	ND	U	0.5	ND	U	0.5
		cis-1,2-Dichloroethene	156-59-2	70	70	36	70	ND	U	0.50	ND	U	0.5	ND	U	0.5
		cis-1,3-Dichloropropene	10061-01-5	NS	NS	4.7	4.7	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Dibromochloromethane	124-48-1	NS	80	8.7	80	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Dibromomethane	74-95-3	NS	NS	8.3	8.3	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Dichlorodifluoromethane	75-71-8	NS	NS	200	200	ND	UJ	0.50	ND	UJ	0.5	ND	UJ	0.5
		Ethylbenzene	100-41-4	700	700	15	700	ND	U	0.80	1.6	--	0.8	ND	U	0.8
		Hexachloro-1,3-butadiene	87-68-3	NS	NS	1.4	4[e]	ND	U	4.0	ND	U	4	ND	U	4
		Isopropylbenzene	98-82-8	NS	NS	450	450	ND	U	0.50	12	--	0.5	ND	U	0.5
		m- & p-Xylenes	179601-23-1	NS	NS	NS	NS	ND	U	2.0	ND	U	2	ND	U	2
		Methyl tert-butyl ether	1634-04-4	100	NS	140	100	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Methylene chloride	75-09-2	5	5	110	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Naphthalene	91-20-3	30	NS	1.2	30	ND	U	2.0	2.9	J	2	ND	U	2
		n-Butylbenzene	104-51-8	NS	NS	1,000	1,000	ND	U	0.50	0.23	J	0.5	ND	U	0.5

Table 6-2

Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106249-450			KAFB-106250-447			KAFB-106251-443		
							Field Sample ID:	GW249-611			GW250-211			GW251-211		
							Sample Date:	2/24/2021			3/4/2021			2/23/2021		
							Sample Type:	Field Duplicate			REG			REG		
							Sample Depth (ft bgs)	488.1			486			481.6		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Method SW8260C (µg/L)	n-Propylbenzene	103-65-1	NS	NS	660	660	ND	U	0.50	0.87	J	0.5	ND	U	0.5
		o-Xylene	95-47-6	NS	NS	190	190	ND	U	0.80	3	--	0.8	ND	U	0.8
		sec-Butylbenzene	135-98-8	NS	NS	2,000	2,000	ND	U	0.50	1.1	J	0.5	ND	U	0.5
		Styrene	100-42-5	100	100	1,200	100	ND	U	0.50	ND	U	0.5	ND	U	0.5
		tert-Butylbenzene	98-06-6	NS	NS	690	690	ND	U	1.0	ND	UJ	1	ND	U	1
		Tetrachloroethene	127-18-4	5	5	110	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Toluene	108-88-3	1,000	1,000	1,100	1,000	18	--	0.50	0.52	J	0.5	ND	U	0.5
		trans-1,2-Dichloroethene	156-60-5	100	100	68	100	ND	U	0.50	ND	U	0.5	ND	U	0.5
		trans-1,3-Dichloropropene	10061-02-6	NS	NS	4.7	4.7	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Trichloroethene	79-01-6	5	5	4.9	5	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Trichlorofluoromethane	75-69-4	NS	NS	5,200	5,200	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Vinyl acetate	108-05-4	NS	NS	410	410	ND	U	2.0	ND	U	2	ND	U	2
		Vinyl chloride	75-01-4	2	2	0.19	2	ND	U	0.50	ND	U	0.5	ND	U	0.5
		Xylenes, total	1330-20-7	620	10,000	190	620	ND	U	2.8	3	J	2.8	ND	U	2.8
Metals	Method SW6010C (mg/L)	Calcium	7440-70-2	NS	NS	NS	NS	47	--	0.15	75	J	0.15	61	--	0.15
		Iron, dissolved	7439-89-6	1.0	NS	14	1.0	0.11	J	100	0.96	--	100	ND	U	100
		Magnesium	7439-95-4	NS	NS	NS	NS	7.1	--	0.075	13	J	0.075	9.7	--	0.075
		Manganese, dissolved	7439-96-5	0.2	NS	0.43	0.2	**0.39**	--	0.0052	**2.4**	J	0.0052	**0.41**	--	0.0052
		Potassium	7440-09-7	NS	NS	NS	NS	2.8	--	450	3.7	--	450	3.5	--	450
		Sodium	7440-23-5	NS	NS	NS	NS	26	--	0.5	31	J	0.5	30	--	0.5
	Method SW6020A (mg/L)	Arsenic	7440-38-2	0.01	0.01	0.00052	0.01	ND	U	1.6	0.0015	J	1.6	0.00095	J	1.6
		Lead	7439-92-1	0.015	0.015	0.015	0.015	0.000099	J	0.25	0.00053	--	0.25	0.000086	J	0.25
Anions	Method E300.0 (mg/L)	Bromide	24959-67-9	NS	NS	NS	NS	ND	U	2.0	ND	U	2	ND	U	2
		Chloride	16887-00-6	250	NS	NS	250	9.8	J-	1.5	12	--	1.5	11	--	1.5
		Sulfate	14808-79-8	600	NS	NS	600	27	--	4.5	6	J+	4.5	29	--	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	NNN	10[f]	10[f]	NS	10[f]	—	—	—	—	—	—	—	—	—
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	ALK-B	NS	NS	NS	NS	160	--	6.0	270	--	6	220	--	6
		Alkalinity, carbonate (as CaCO3)	ALK-C	NS	NS	NS	NS	ND	U	6.0	ND	U	6	ND	U	6
		Alkalinity, total (as CaCO3)	ALK	NS	NS	NS	NS	160	--	6.0	270	J-	6	220	J-	6

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106252-425			KAFB-106S10-443		
							Field Sample ID:	GW252-425-211			GWS10-204		
							Sample Date:	3/23/2021			12/30/2020		
							Sample Type:	REG			REG		
							Sample Depth (ft bgs)	463			483		
							Reference Elevation Interval (ft AMSL):	4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.019	**15**	--	1.9
TPH	Method SW8015M (µg/L)	TPH (C28-C40)	TPHC28C40	NS	NS	800	800	—	—	—	ND	U	440
		TPH-DRO (C10-C28)	TPH-DRO	NS	NS	1,300	1,300	ND	U	90	**23,000**	--	740
		TPH-GRO (C6-C10)	TPH-GRO	NS	NS	550	550	ND	U	40	**61,000**	--	2000
VOCs	Method SW8260C (µg/L)	1,1,1,2-Tetrachloroethane	630-20-6	NS	NS	5.7	5.7	ND	U	0.5	ND	U	2.5
		1,1,1-Trichloroethane	71-55-6	200	200	8,000	200	ND	U	0.5	ND	U	2.5
		1,1,2,2-Tetrachloroethane	79-34-5	10	NS	0.76	10	ND	U	0.5	5.2	--	2.5
		1,1,2-Trichloroethane	79-00-5	5	5	2.8	5	ND	U	0.5	ND	U	2.5
		1,1-Dichloroethane	75-34-3	25	NS	28	25	ND	U	0.5	ND	U	2.5
		1,1-Dichloroethene	75-35-4	7	7	280	7	ND	U	0.5	ND	U	2.5
		1,1-Dichloropropene	563-58-6	NS	NS	NS	NS	ND	U	0.5	ND	U	2.5
		1,2,3-Trichlorobenzene	87-61-6	NS	NS	7	7	ND	U	1	ND	U	5
		1,2,3-Trichloropropane	96-18-4	NS	NS	0.0075	0.05[e]	ND	U	0.5	**1.2**	J	2.5
		1,2,4-Trichlorobenzene	120-82-1	70	70	12	70	ND	U	1	ND	U	5
		1,2,4-Trimethylbenzene	95-63-6	NS	NS	56	56	ND	U	2	**280**	--	10
		1,2-Dibromo-3-chloropropane	96-12-8	NS	0.2	0.0033	1[e]	ND	U	1	ND	U	5
		1,2-Dibromoethane	106-93-4	0.05	0.05	0.075	0.05	ND	U	0.5	**140**	--	2.5
		1,2-Dichlorobenzene	95-50-1	600	600	300	600	ND	U	0.5	ND	U	2.5
		1,2-Dichloroethane	107-06-2	5	5	1.7	5	ND	U	0.5	ND	U	2.5
		1,2-Dichloropropane	78-87-5	5	5	8.5	5	ND	U	0.5	ND	U	2.5
		1,3,5-Trimethylbenzene	108-67-8	NS	NS	60	60	ND	U	1	**82**	--	5
		1,3-Dichlorobenzene	541-73-1	NS	NS	NS	NS	ND	U	0.5	ND	U	2.5
		1,3-Dichloropropane	142-28-9	NS	NS	370	370	ND	U	0.5	ND	U	2.5
		1,4-Dichlorobenzene	106-46-7	75	75	4.8	75	ND	U	0.5	ND	U	2.5
		2,2-Dichloropropane	594-20-7	NS	NS	NS	NS	ND	U	0.5	ND	U	2.5
		2-Butanone	78-93-3	NS	NS	5,600	5,600	ND	UJ	1	57	--	5
		2-Chlorotoluene	95-49-8	NS	NS	240	240	ND	U	0.5	ND	U	2.5
		2-Hexanone	591-78-6	NS	NS	38	38	ND	UJ	1	31	J	5
		4-Chlorotoluene	106-43-4	NS	NS	250	250	ND	U	0.5	ND	U	2.5
		4-Isopropyltoluene	99-87-6	NS	NS	NS	NS	ND	U	0.5	5.1	J	2.5

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106252-425			KAFB-106S10-443		
							Field Sample ID:	GW252-425-211			GWS10-204		
							Sample Date:	3/23/2021			12/30/2020		
							Sample Type:	REG			REG		
							Sample Depth (ft bgs)	463			483		
							Reference Elevation Interval (ft AMSL):	4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Method SW8260C (µg/L)	4-Methyl-2-pentanone	108-10-1	NS	NS	6,300	6,300	ND	UJ	1	13	J	5
		Acetone	67-64-1	NS	NS	14,000	14,000	ND	U	2	410	--	10
		Acrolein	107-02-8	NS	NS	0.042	5[e]	ND	U	5	ND	U	25
		Acrylonitrile	107-13-1	NS	NS	0.52	1[e]	ND	UJ	1	ND	U	5
		Benzene	71-43-2	5	5	4.6	5	ND	U	0.5	**8,400**	--	25
		Bromobenzene	108-86-1	NS	NS	62	62	ND	U	0.5	ND	U	2.5
		Bromochloromethane	74-97-5	NS	NS	83	83	ND	U	0.5	ND	U	2.5
		Bromodichloromethane	75-27-4	NS	80	1.3	80	ND	U	0.5	ND	U	2.5
		Bromoform	75-25-2	NS	80	33	80	ND	U	2	ND	U	10
		Bromomethane	74-83-9	NS	NS	7.5	7.5	ND	U	0.5	ND	U	2.5
		Carbon disulfide	75-15-0	NS	NS	810	810	ND	U	0.5	ND	U	2.5
		Carbon tetrachloride	56-23-5	5	5	4.6	5	ND	U	0.5	ND	U	2.5
		Chlorobenzene	108-90-7	NS	100	78	100	ND	U	0.5	ND	U	2.5
		Chloroethane	75-00-3	NS	NS	21,000	21,000	ND	U	0.5	ND	U	2.5
		Chloroform	67-66-3	100	80	2.2	80	ND	U	0.5	ND	U	2.5
		Chloromethane	74-87-3	NS	NS	190	190	ND	U	0.5	ND	U	2.5
		cis-1,2-Dichloroethene	156-59-2	70	70	36	70	ND	U	0.5	ND	U	2.5
		cis-1,3-Dichloropropene	10061-01-5	NS	NS	4.7	4.7	ND	U	0.5	ND	U	2.5
		Dibromochloromethane	124-48-1	NS	80	8.7	80	ND	U	0.5	ND	U	2.5
		Dibromomethane	74-95-3	NS	NS	8.3	8.3	ND	U	0.5	ND	U	2.5
		Dichlorodifluoromethane	75-71-8	NS	NS	200	200	ND	U	0.5	ND	U	2.5
		Ethylbenzene	100-41-4	700	700	15	700	ND	U	0.8	**850**	--	4
		Hexachloro-1,3-butadiene	87-68-3	NS	NS	1.4	4[e]	ND	U	4	ND	U	20
		Isopropylbenzene	98-82-8	NS	NS	450	450	ND	U	0.5	53	--	2.5
		m- & p-Xylenes	179601-23-1	NS	NS	NS	NS	ND	U	2	2,700	--	10
		Methyl tert-butyl ether	1634-04-4	100	NS	140	100	ND	U	0.5	ND	U	2.5
		Methylene chloride	75-09-2	5	5	110	5	ND	U	0.5	ND	U	2.5
		Naphthalene	91-20-3	30	NS	1.2	30	ND	U	2	**160**	--	10
		n-Butylbenzene	104-51-8	NS	NS	1,000	1,000	ND	U	0.5	5	J	2.5

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

							Well Location ID:	KAFB-106252-425			KAFB-106S10-443		
							Field Sample ID:	GW252-425-211			GWS10-204		
							Sample Date:	3/23/2021			12/30/2020		
							Sample Type:	REG			REG		
							Sample Depth (ft bgs)	463			483		
							Reference Elevation Interval (ft AMSL):	4857			4857		
Parameter	**Analytical Method**	**Analyte**	**CAS**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
VOCs	Method SW8260C (µg/L)	n-Propylbenzene	103-65-1	NS	NS	660	660	ND	U	0.5	45	--	2.5
		o-Xylene	95-47-6	NS	NS	190	190	ND	U	0.8	**1,100**	--	4
		sec-Butylbenzene	135-98-8	NS	NS	2,000	2,000	ND	U	0.5	8	J	2.5
		Styrene	100-42-5	100	100	1,200	100	ND	U	0.5	ND	U	2.5
		tert-Butylbenzene	98-06-6	NS	NS	690	690	ND	U	1	ND	U	5
		Tetrachloroethene	127-18-4	5	5	110	5	ND	U	0.5	ND	U	2.5
		Toluene	108-88-3	1,000	1,000	1,100	1,000	ND	U	0.5	**16,000**	--	250
		trans-1,2-Dichloroethene	156-60-5	100	100	68	100	ND	U	0.5	ND	U	2.5
		trans-1,3-Dichloropropene	10061-02-6	NS	NS	4.7	4.7	ND	U	0.5	ND	U	2.5
		Trichloroethene	79-01-6	5	5	4.9	5	ND	U	0.5	ND	U	2.5
		Trichlorofluoromethane	75-69-4	NS	NS	5,200	5,200	ND	U	0.5	ND	U	2.5
		Vinyl acetate	108-05-4	NS	NS	410	410	ND	U	2	ND	U	10
		Vinyl chloride	75-01-4	2	2	0.19	2	ND	U	0.5	ND	U	2.5
		Xylenes, total	1330-20-7	620	10,000	190	620	ND	U	2.8	**3,800**	--	14
Metals	Method SW6010C (mg/L)	Calcium	7440-70-2	NS	NS	NS	NS	61	--	0.15	49	--	0.15
		Iron, dissolved	7439-89-6	1.0	NS	14	1.0	ND	U	0.1	0.046	J	0.1
		Magnesium	7439-95-4	NS	NS	NS	NS	8.2	--	0.075	8.2	--	0.075
		Manganese, dissolved	7439-96-5	0.2	NS	0.43	0.2	0.074	--	0.0052	**0.6**	--	0.0052
		Potassium	7440-09-7	NS	NS	NS	NS	3.6	--	0.45	3.2	--	0.45
		Sodium	7440-23-5	NS	NS	NS	NS	28	--	0.5	26	--	0.5
	Method SW6020A (mg/L)	Arsenic	7440-38-2	0.01	0.01	0.00052	0.01	ND	U	0.0016	0.00085	J	0.0016
		Lead	7439-92-1	0.015	0.015	0.015	0.015	0.00011	J	0.00025	ND	U	0.00025
Anions	Method E300.0 (mg/L)	Bromide	24959-67-9	NS	NS	NS	NS	ND	U	2	ND	U	2
		Chloride	16887-00-6	250	NS	NS	250	67	--	15	15	--	1.5
		Sulfate	14808-79-8	600	NS	NS	600	61	--	4.5	14	--	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	NNN	10[f]	10[f]	NS	10[f]	2.1	--	0.45	ND	U	0.09
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	ALK-B	NS	NS	NS	NS	91	--	6	180	—	6
		Alkalinity, carbonate (as CaCO3)	ALK-C	NS	NS	NS	NS	ND	U	6	ND	—	6
		Alkalinity, total (as CaCO3)	ALK	NS	NS	NS	NS	91	--	6	180	J	6

Table 6-2
Analytical Results for Total Petroleum Hydrocarbons and Volatile Organic Compounds in Groundwater

[a] New Mexico WQCC numeric standards per the NMAC Title 20.6.2.3101A, Standards for Ground Water of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018). For metals, the NMWQCC numeric standard applies to dissolved metals.
[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40CFR Part 141, 143 (May 2018).
[c] EPA Region 6 RSL for Tapwater (May 2021) for hazard index = 1.0 for noncarcinogens and a 10-5 cancer risk level for carcinogens.
[d] The project screening level was selected to satisfy the requirements of the Kirtland AFB Hazardous Waste Permit Number NM9570024423 as the lowest of (1) New Mexico WQCC numeric standard or (2) EPA MCL. If no New Mexico WQCC standard or MCL exists for any analyte, then the project screening level will be the EPA RSL.
[e] The project screening level has been raised to the laboratory limit of detection.
[f] Based on the geochemical equilibrium of the site groundwater and previous site data analyses, nitrate/nitrite results represent nitrate concentrations.

µg/L = microgram per liter
AFB = Air Force Base
AMSL = above mean sea level
bgs = below ground surface
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
ft = foot (feet)
ID = identification
LOD = limit of detection
MCL = maximum contaminant level
mg/L = milligrams per liter
MW = monitoring well
ND = not detected
NMAC = New Mexico Administrative Code
WQCC = Water Quality Control Commission
NS = not specified
REG = normal field sample
RSL = regional screening level
Val Qual = validation qualifier
VOC = volatile organic compound
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
J+ = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated biased high.
J- = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated biased low.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level

APPENDICES

APPENDICES

APPENDIX A

REGULATORY CORRESPONDENCE AND CROSS-WALK TABLE

APPENDIX A-1

REGULATORY CORRESPONDENCE

Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
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James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

May 24, 2021

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil engineer Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

RE: APPROVAL – REQUEST FOR EXTENSION TO SUBMIT THE DATA GAP MONITORING WELL INSTALLATION-INVESTIGATION REPORT FOR WELLS KAFB-106248 to KAFB-106252
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-KAFB-19-015

Dear Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) received the Kirtland Air Force Base (Permittee) letter requesting an extension of time to submit the *Data Gap Monitoring Well Installation-Investigation Report for wells KAFB-106248 to KAFB-106252* (Report), dated May 6, 2021. The Report iss required by the July 9, 2020 Approval with Modifications for the *Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252*. The Permittee requests an extension of time for submittal of the Report due to delays in completing field work due to inclement weather, drilling equipment failure, and equipment maintenance.
NMED hereby approves the Permittee's request for an extension; the Report must be submitted to NMED for review no later than **October 12, 2021**, as requested.

If you have any questions, please contact me at (505) 476-6035.

Sincerely,

Kevin Pierard

Digitally signed by Kevin Pierard
Date: 2021.05.24 09:38:09 -06'00'

Kevin M. Pierard, Chief
Hazardous Waste Bureau

cc: B. Wear, NMED HWB
L. Andress, NMED HWB
S. Kottkamp, KAFB
K. Lynnes, KAFB
C. Cash, KAFB
D. Agnew, ABCWUA
A. Tafoya, VA

File: KAFB 2021 Bulk Fuels Facility Spill and Reading

NEW MEXICO
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Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 14, 2020

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil engineer Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

RE: APPROVAL WITH MODIFICATIONS
WORK PLAN FOR DATA GAP MONITORING WELL INSTALLATION
KAFB-106248 to KAFB-106252
BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID# NM6213820974
HWB-KAFB-19-015

Dear Colonel Miller and Lt. Colonel Acosta:

The New Mexico Environment Department (NMED) is in receipt of the Kirtland Air Force Base (Permittee or KAFB) *Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252* (Work Plan), dated December 2019. NMED has reviewed the Work Plan and hereby issues this Approval with Modifications.

The attached comments include direction to expedite the characterization of the source area contaminant migration pathway, correct deficiencies in the Work Plan, and provide specific information regarding the sampling of newly installed groundwater monitoring wells. NMED comments are presented in Attachments I and II. NMED and KAFB staff met on May 28, 2020 to discuss relocating one or two of the wells closer to the source area, the associated changes to the scope of the project, and additional NMED comments and questions. NMED sent a list to KAFB describing the changes in scope of work via electronic mail on June 1, 2020.

Please submit replacement pages and proposed borehole locations to NMED no later than **September 15, 2020**. The Permittee shall ensure that all copies of the Work Plan are updated with the NMED-approved replacement pages and that contractors are issued copies of the updated Work Plan so that investigation activities are conducted according to the modified scope provided in this Approval with Modifications letter. The Permittee is advised that if field work is not performed appropriately due to incorrect direction given to field staff, it may result in the Permittee being required to repeat or conduct additional work.

Please submit an investigation report summarizing the results of the implementation of this Work Plan no later than **June 15, 2021**. The report must address all of the comments included in this Approval with Modifications. The report must be submitted to NMED in the form of two hard copies and one electronic copy.

This approval is based on the information presented in the document as it relates to the objectives of the work identified by NMED at the time of review. Approval of this document does not constitute agreement with all information, or every statement presented in the document.

Should you have any questions or wish to meet with us to discuss these comments, please contact me at (505) 476-6035.

Sincerely,

for

Kevin M. Pierard, Chief
Hazardous Waste Bureau

Attachments I and II

cc: S. Stringer, Director NMED RPD
D. Cobrain, NMED HWB
B. Wear, NMED HWB
R. Murphy, NMED HWB
L. King EPA Region 6 (6LCRRC)
S. Kottkamp, KAFB
K. Lynnes, KAFB

File: KAFB 2020 Bulk Fuels Facility Spill and Reading

Attachment I

APPROVAL WITH MODIFICATIONS COMMENTS:

1. Address contaminant migration pathway data gaps beneath the source area.

NMED Comment: Data gaps remain from the source zone characterization previously performed under the Permittee's *Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Bulk Fuels Facility, Solid Waste Management Unit (SWMU) ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision R1*, dated December 2017 and approved with conditions by NMED on February 23, 2018. The results of the investigation were presented in the *Source Zone Characterization Report for the Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111*, received by NMED on October 30, 2019. This Report is currently under NMED review. The review in progress indicates that that the migration pathway has not been adequately characterized beneath the source area.

In order to understand the migration of contaminants through the vadose zone beneath the former fuel offloading rack (FFOR), an understanding of the stratigraphy approximately 250-300 feet below ground surface (ft bgs) is essential. The source area contaminants descend essentially vertically from the surface to a depth of approximately 250-350 ft bgs where a distinct clay layer is present. The clay layer is easily identified in drill cores and on geophysical logs. The thickness, lateral continuity, and geometry of this clay layer changes across the site. Directly below the FFOR the clay occurs as a single layer at approximately 275-300 ft bgs (lower clay). East-southeast of the FFOR the clay occurs as a single layer at approximately 250 ft bgs (upper clay). A vertical offset can be identified in the clay layer directly below the FFOR that likely creates a preferential pathway to vertical migration of contaminants. Once contaminants reach the 250-300 foot depth range they appear to migrate predominantly downdip (to the east-southeast) on the lower clay layer and then generally vertically to the water table. Three other data sets support this interpretation of the contaminant migration pathway: the observed lateral offset of elevated volatile organic compound (VOC) concentrations with depth; soil vapor extraction system rebound data; and Pneulog total volatile petroleum hydrocarbons (TVPH) soil gas data. All three data sets show contaminant migration to be predominantly vertical beneath the FFOR to a depth in the 250-300 foot range with a shift in the pathway to the east-southeast before continuing on a vertical downward path to the water table.

As stated in NMED's November 4, 2019 letter, "NMED met with the Permittee on September 26, 2019 to discuss the potential to utilize some of the proposed wells for multiple purposes to address other data gaps, the most important being the further characterization of the source area migration pathway through the vadose zone east of the former location of the bulk fuels loading racks. The Permittee agreed to evaluate the potential..." Therefore, the Permittee is instructed to relocate one or two of the proposed monitoring wells (KAFB-106250 and KAFB-106251) nearer to source area, as shown in Attachment II.

In order to reduce cost and accelerate work, borehole(s) may be drilled with air rotary casing hammer techniques (ARCH) to a depth of approximately 230 ft bgs, just above the top of the clay described above. The boreholes must then be continuously cored to the total depth of the borehole and sampled for total petroleum hydrocarbons (TPH) gasoline range organics (GRO) and diesel range organics (DRO) Extended using United States Environmental Protection Agency (EPA) Method 8015 (modified). The total depth must be 10 feet below any field screening evidence of contamination (e.g., photoionization detector (PID) readings greater than 10 parts per million volume (ppmv)) to obtain a consistent detailed vertical profile of the migration pathway and to determine the vertical extent of contamination in the source area. A sample for TPH GRO and DRO Extended must be collected at the total depth of the borehole(s). The borehole(s) must also be geophysically logged. See Attachment II for NMED's proposed location for source area migration pathway boreholes.

The Permittee must provide NMED email notification at certain stages of the drilling process. These stages include but may not be limited to:

a) initiation and cessation of ARCH drilling,
b) initiation of sonic drilling,
c) upon reaching a depth of 300 ft bgs,
d) upon reaching the water table, and
e) upon reaching total well depth.

The Permittee's notification to NMED that the driller has reached a depth of 300 ft bgs must include the actual depth bgs and thickness of the clay layer, if it is encountered. If the clay layer is not encountered then the objective of the well will have been achieved, that is, to identify the possible gap in the clay layer located 250 and 300 ft bgs as described above.

If the clay layer is encountered, the Permittee, in consultation with NMED, must make a determination about whether it is the lower or upper clay. If it is determined that the driller has encountered the lower clay, the driller should stop at 300 ft bgs or just below the bottom of the clay and the Permittee must partially backfill the borehole with a bentonite seal and sand. The bentonite must be emplaced with a tremie pipe to approximately 2 ft below the top of the clay followed by one foot of sand to prevent bentonite from entering the well screen. The borehole must then be completed as a soil vapor monitoring well (SVMW) with the lower end of the screen located across the top of the clay layer. The SVMW must be constructed with a 1 foot sump and a 2 foot screen of an appropriate slot size. A SVMW design must be submitted to NMED for review with the Work Plan replacement pages.

If it is determined that the driller has encountered the upper clay only, the driller should advance the borehole to total depth below the water table and the Permittee must complete the well as a dual screen ground water monitoring well as proposed in the Work Plan.

If the first borehole is not successful in locating the contamination migration pathway (i.e., lower clay has been encountered) then a second borehole location should be selected based on the findings of the first borehole. The proposed second borehole location must be submitted by the Permittee to NMED for approval via electronic mail and approved prior to initiation of drilling.

If the first borehole is successful in locating the contamination migration pathway then the Permittee, in consultation with NMED, must make a determination if a second borehole location should be selected to refine the migration pathway or if the borehole should be used to meet the objectives outlined in the Work Plan. See comments below for further detail.

Upon completion of drilling the first borehole in the source area, the Permittee must provide NMED a copy of the lithologic log(s) by email. After reviewing the lithologic logs, NMED will provide direction for well installation at that location and direction on drilling a second borehole in the source area.

NMED may require the installation of additional groundwater monitoring wells, if the five wells installed pursuant to this Work Plan do not sufficiently address the data gaps.

2. Section 6.0 Monitoring and Sampling, page 6-1, line 28

Permittee Statement: "Beginning in 2016 passive sampling techniques were implemented at select GWM [ground water monitoring] well locations. The transition to passive sampling for select GWM well locations was formally approved by NMED on May 31, 2017 (NMED, 2017. A further passive sampling evaluation was performed in Q4 2017 (Section 3.7.7 of KAFB, 2018b). This evaluation demonstrated that analytical results from passive sampling techniques and analytical results from low-flow sampling techniques are generally comparable between the two sampling methods, with no consistent bias identified (i.e., neither method has consistently resulted in higher or lower concentrations)."

NMED Comment: NMED's May 31, 2017 approval letter approved the change to the use of passive diffusion bags and dual membrane samplers for certain groundwater monitoring wells located north of Ridgecrest Drive in residential areas. NMED did not approve the use of passive sampling south of Ridgecrest Drive, particularly in areas with elevated petroleum hydrocarbon contamination. The passive sampling demonstration evaluation performed in Q4 [fourth quarter] 2017 and presented in the *Quarterly Monitoring Report October-December 2017 and Annual Report for 2017*, dated March 2018, was not reviewed or approved by NMED Hazardous Waste Bureau (HWB).

The *Quarterly Monitoring Report-October-December 2018 and Annual Report for 2018*, dated March 2019, states "Field parameters [i.e., turbidity, temperature, dissolved oxygen, specific conductivity, pH, and oxidation reduction potential] were not collected from wells that were sampled using passive sampling methods due to the unreliable field parameter data associated with this technology."

Additionally, an email to NMED from KAFB, dated February 28, 2020, provided data from this evaluation. The data indicates that source area monitoring well KAFB-106053 does not produce "high quality and representative sampling that was highly comparable to low-flow sampling," as indicated in the text of the email. Low-flow sampling results indicated a benzene concentration of 15,000 μg/L with duplicate results of 16,000 μg/L, while the passive sampling results for this same well indicated a benzene concentration of 3,700 μg/L with duplicate results of 3,600 μg/L. This demonstrates an order of magnitude difference between the sampling methods for this well located in the source area.

3. Section 4.0, Scope of Activities, page 4-1

NMED Comment: The Permittee must revise Section 4.0 of the Work Plan along with corresponding Figures and Tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 4.0 revisions below. The Permittee must submit the revised Section 4.0 and corresponding Figures and Tables as replacement pages.

4. Section 4.0, Scope of Activities, page 4-1, line 6

Permittee Statement: "...well locations proposed in this Work Plan are shown on Figure 2-1 and Figure 2-2."

NMED Comment: The Permittee must relocate one or two of the proposed monitoring wells (KAFB-106250 and KAFB-106251) to locations in the source area to determine the source area migration pathway. Propose two new locations within the area identified in Attachment 2. Include a primary location to be drilled first and a secondary location to be drilled should the first borehole not successfully locate the migration pathway.

5. Section 4.0, Scope of Activities, page 4-1, line 9 and Figure 4-1, Proposed Construction Diagram for Groundwater Monitoring Well with Contingency Well and Figure 4-2, Proposed Construction Diagram for Groundwater Monitoring Well KAFB-10624

Permittee Statement: "Four of the five proposed GWM wells (KAFB-106249 through KAFB-106252) will be constructed with the same design employed by the Work Plan for Data Gap Monitoring Well Installation (Section 3.1.1 of [Work Plan for Data Gap Well Installation, 2017]) as shown on the construction diagram (Figure 4-1)."

NMED Comment: All groundwater monitoring wells must be constructed utilizing an appropriate well casing diameter (e.g., four-inch inside diameter) to accommodate equipment, such as low-flow pumps, which can effectively purge wells for active sampling.

6. **Section 4.0, Scope of Activities, page 4-2, lines 1 through 16**

Permittee Statement: "KAFB-106250 is proposed to be installed in the parking lot of the Air National Guard (ANG) adjacent to the existing well KAFB-106046. This location will help to bound both the EDB [ethylene dibromide] and benzene plumes in this area...KAFB-106251 is also proposed for installation on ANG property, adjacent to the boundary with the BFF [Bulk Fuels Facility]... However, water table wells are needed closer to the source area to more accurately delineate the EDB and benzene plumes in this area."

NMED Comment: According to Figures 2-1, Proposed Monitoring Well Locations and Q2 [second quarter] 2019 EDB Plume Map, and Figure 2-2, Proposed Monitoring Well Locations and Q2 2019 Benzene Plume Map, wells KAFB-106245 and KAFB-106247 do not have submerged well screens and neither EDB nor benzene were detected in the second quarter of 2019 (Q2 2019). These wells provide delineation of the plumes to the east and east-southeast of the source area; therefore, proposed wells KAFB-106250 and KAFB-106251 are good candidates to be moved to characterize the source area migration pathway.

7. **Section 5.0, Scope of Activities, page 4-1**

NMED Comment: Please revise Section 5.0 of the Work Plan along with corresponding Figures and Tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 5.0 revisions below. The Permittee must submit the revised Section 5.0 and corresponding Figures and Tables as replacement pages.

8. **Section 5.0, Scope of Activities, page 4-1**

NMED Comment: The Permittee must incorporate / reference the relevant scopes of work from the *Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Bulk Fuels Facility, Solid Waste Management Unit (SWMU) ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision R1,* dated December 2017, and approved with conditions by NMED on February 23, 2018 (VZ Work Plan), including, but not limited to, the following:

a) Drilling Approach and Methodology as outlined in Section 3.1.1.1, page 3-2 of the VZ Work Plan: "....borings can be cored continuously from ground surface to total depth, these borings will be over-reamed via air rotary casing hammer (ARCH) technique to the nominal 10-inch diameter OR borings can be accomplished using a combination of ARCH drilling to the designated coring depth, followed by sonic drilling [or other continuous core methodology] to obtain undisturbed cores from the designated coring intervals. Upon achieving the top of the designated coring interval depth, the ARCH rig will be moved off each location while leaving the casing downhole, and the sonic [or other continuous core] rigs will be positioned at the cased holes to core the prescribed designated coring intervals and then subsequently reamed with a sufficient size bit with the ARCH drilling rig to provide a large enough borehole for well construction."

b) Core temperatures must be monitored as outlined on page 3-2 in Section 3.1.1.1, page 3-2 of the VZ Work Plan: "Heating during continuous core collection can impact contaminant, geochemical and microbial properties and adversely affect sample representativeness. In addition to advancing the borehole to the designated coring depth with the ARCH rig, to minimize the heating potential, heating of the sonic drilling core barrels in the unsaturated zone can be controlled by any one or combination of the following:
   i. Advancing shorter sampling runs (5-10 feet versus 20 feet)
   ii. Allowing the core barrel to cool (or pre-cooling the core barrel) before tripping back into the borehole
   iii. Changing the vibration level and rotation speed
   iv. Injecting small quantities of potable water between the override casing and the core barrel without compromising sample integrity as described in ASTM International D6914/D6914M-16.
   v. Temperature inside the core will be monitored when returned to the surface to ensure that heating of the core barrel is not impacting sample selection or integrity. Background soil vapor temperatures in the vadose zone have historically averaged from 20 to 22 degrees Celsius (°C). Average groundwater temperatures at the site are 19°C. Any core heating over 20°C will require mitigation steps as outlined above. If water is injected, the bottom few inches of the core intervals that are possibly in contact with water accumulating in the bottom of borehole will be discarded prior to collection of samples. Sonic core barrels in the saturated zone are naturally cooled by the presence of formation water; however, similar steps will be implemented as described above to ensure sample representativeness."

c) Field Screening for hydrocarbons must be conducted as outlined in Section 3.1.1.3, page 3-3 of the VZ WP, with depths modified as follows: When advancing the borehole to the designated coring interval with ARCH, all cuttings must be logged and PID measurements collected at a minimum of every 10 feet as described in Section 3.2.10 of the VZ WP. Within the designated coring interval, PID readings must be collected every 5 ft. Additional measurements will be collected if qualitative data (e.g., staining, odor, etc.) indicate possible LNAPL. All PID readings shall be recorded on borehole logs.

d) Laboratory Analyses for Selected Core Samples as outlined in Section 3.1.1.4, page 3-4 of the VZ WP, and modified as follows: Samples for laboratory analyses shall be collected every 10 ft, additional samples shall be selected based on elevated PID measurements (augmented by lithologic and qualitative data) and sampled for TPH GRO/DRO Extended by EPA Method 8015 (modified) from 230 ft bgs to the total depth of the boring(s), to obtain a consistent detailed vertical profile of the migration pathway.

9. Section 5.1.2 Drilling of Groundwater Monitoring Wells, page 5-2, line 2

Permittee Statement: "All five new monitoring nested wells will be installed via air rotary casing hammer technology with casing advancement."

NMED Comment: The two designated boreholes to be used for the investigation of the source area migration pathway must be continuously cored from 230 ft bgs to total depth. This will provide undisturbed cores for more accurate lithologic logging, field screening, and soil sampling. This can be accomplished using a combination of ARCH drilling to the designated coring depth, followed by sonic or other continuous core drilling method to obtain undisturbed cores from the designated coring intervals.

10. Section 5.1.2.2 Photoionization Detector [PID] and Headspace Screening, page 5-2, line 32

Permittee Statement: "PIDs will be used for breathing zone monitoring during drilling and sampling activities, as well as for field screening of hydrocarbons in soil cuttings during drilling. This instrument monitors volatile organic compounds using a PID with a 9.8-electronvolt (eV), 10.6-eV, or 11.7-eV UV lamp."

NMED Comment: The Permittee must use either a 9.5 eV or 9.8 eV UV lamp for field screening samples to avoid fouling of the lamp due to dust, moisture, or high concentrations of petroleum vapors. If evidence of lamp fouling is observed during use of a PID with a 9.8 eV lamp, the Permittee must switch to a 9.5 eV UV lamp to obtain the most accurate PID readings possible. The Permittee must have an additional PID with the lower lamp strength readily available. Reliable PID readings will result in a consistent detailed vertical profile of the migration pathway. Failure to obtain reliable readings in the potential migration pathway may result in having to drill another boring to obtain accurate readings.

11. Section 5.1.2.2 Photoionization Detector and Headspace Screening, page 5-2, line 37

Permittee Statement: "Record PID measurements at a minimum of every 25 ft of drill cuttings down to 450-ft depth, and then every 10 ft of drill cuttings to total depth following the process below..."

NMED Comment: For boreholes that will be continuously cored, the Permittee must record PID sample measurement, at a minimum, every 10 ft from ground surface to the start of coring and every 5 ft from the start of coring to the total depth of the borehole to obtain a detailed vertical profile of the migration pathway.

12. Section 5.1.3 Construction of Groundwater Monitoring Wells, page5-3, line 21

Permittee Statement: "The GWM nested wells will each be constructed using 3-inch diameter Schedule 80 polyvinyl chloride (PVC) casing..."

NMED Comment: The Permittee must construct all wells with well casing of sufficient diameter such that they can be sampled via active sampling techniques (e.g.: four-inch inside diameter well casing to accommodate pumps). See also Comment 5.

13. Geophysical logging of source area boreholes

NMED Comment: The Permittee must add a section to the Work Plan proposing to geophysically log all source area migration pathway investigation bore holes with a dual induction geophysical logging tool. The Permittee must specify approximate depths of interrogation for the tool they propose to use. The tool must be calibrated and operated according to American Society for Testing and Materials (ASTM) standards for geophysical logging and the operation manual for the specific model of logging tool. In the report summarizing the results of the investigation the Permittee must provide shop calibration and daily field calibration data. An electronic copy of raw and processed data must be provided in Excel table format. A visual presentation of the log curve must be presented on a single page in a continuous format rather than as several separate pages. The geophysical log(s) for each well must be displayed with the lithologic log for comparison purposes and a discussion of the results must be included in the main body of the investigation report. Wells that are to be or will be geophysically logged must be designed with PVC centralizers rather than steel centralizers.

14. Section 5.1.3.2 Well Development, page 5-4

NMED Comment:
The Permittee must measure and record the parameters for pH, temperature, conductivity, and turbidity, as shown on the field form presented in Appendix B, Field Forms.

The Permittee must collect groundwater samples within 10 days after well development in accordance with Section 6.5.17.3 of the Permit. Samples must be analyzed in accordance with Table 6-1, Groundwater Monitoring Requirements for Data Gap Wells.

15. Section 5.1.3.2 Well Development, page 5-4, line 34

Permittee Statement: "The new wells (KAFB-106248 through KAFB-106252) were designed for passive sampling (Section 6), and the 0.010-inch slot size should minimize formation fines in these wells."

NMED Comment: The new wells must be designed for active sampling techniques. The new wells must be sampled using active sampling (e.g., low-flow sampling) for a minimum of eight consecutive quarters to establish baseline concentrations in order to establish the precision criteria for passive sampling methods for the newly installed wells. While the approved work plans for data gap well installation and vadose zone coring included passive sampling of newly installed wells, the NMED administrative record does not contain documentation that the use of passive sampling south of Ridgecrest Drive, particularly in areas of elevated contaminant concentrations, has been evaluated or approved by NMED.

16. Section 6.0 Monitoring and Sampling, page 6-1

NMED Comment: The Permittee must revise Section 6.0 of the Work Plan along with corresponding figures and tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 6.0 revisions below. The Permittee must submit the revised Section 6.0 and corresponding figures and tables as replacement pages.

17. Section 6.0 Monitoring and Sampling, page 6-1, line 11

Permittee Statement: "All newly installed wells will be sampled for four consecutive quarters to establish baseline concentrations for the parameters listed in Table 6-1."

NMED Comment: The Permittee must collect groundwater samples from all newly installed wells within 10 days after well development in accordance with Section 6.5.17.3 of the Permit, at the next quarterly sampling event, and quarterly thereafter for eight consecutive quarters via active sampling methods (e.g., low-flow) to establish baseline concentrations. These data will be used to establish precision criteria for passive sampling methods for the newly installed wells. Groundwater samples must be analyzed for analytes presented in Table 6-1, Groundwater Monitoring Sampling Requirements for Data Gap Wells, of the Work Plan.

18. Section 6.0 Monitoring and Sampling, page 6-1, line 35

Permittee Statement: "Groundwater sampling will be performed via passive sampling techniques for all new GWM wells covered in this Work Plan, barring any environmental factors that would preclude the ability to sample with this technology (e.g., significant and continuous LNAPL thickness in the well)."

NMED Comment: Given the concerns stated above, the Permittee must not use passive sampling in areas with elevated petroleum hydrocarbon contamination (i.e., in the vicinity of the source area).

19. Section 6.2 Preparation for Groundwater Well Sampling, page 6-3, line 2

Permittee Statement: "All wells covered in this Work Plan will be sampled via passive sampling technology and, therefore, well purging will not be required in association with sampling"

NMED Comment: The Permittee must add active sampling (e.g., low-flow) to relevant portions of Section 6.0. See the preceding comments regarding passive sampling.

20. Section 6.2.1 Collection of Groundwater Samples from Monitoring Wells Using Passive Sampling Techniques, page 6-3, line 19

Permittee Statement: "The procedures below will be followed for passive sampling."

NMED Comment: As stated previously, active sampling techniques are required. Please include a section describing the procedures for active sampling in the modified Section 6.0 replacement pages and remove the description for passive sampling.

21. Section 6.3 Analytical Requirements and Quality Control, page 6-4, line 31

NMED Comment: The Permittee must revise Section 6.3 of the Work Plan along with the relevant figures and tables to include the additional sampling required for the modified scopes of work in the modified Section 6.0 replacement pages.

22. Section 6.3 Analytical Requirements and Quality Control, page 6-4, line 31

NMED Comment: The Permittee must include a data validation section of the Report which describes the data validation process outlined in this Section 6.3 of the Work Plan. Data validation shall be conducted in accordance with Permit Section 6.5.18.

23. Section 6.5.2 Hazardous Water Investigation-Derived Waste, page 6-6, line 30

Permittee Statement: "No hazardous/potentially hazardous [investigation-derived waste] IDW is anticipated to be generated from the activities outlined in this Work Plan."

NMED Comment: This statement must be revised in the modified Section 6.0 replacement pages. The modified scope of work requires drilling and well development activities in the source area which may generate potentially hazardous IDW. Provide a description of the proposed management of hazardous IDW. Alternately, propose to dispose of purge / development water in the on-site groundwater treatment system that treats groundwater removed from recovery wells located north of Ridgecrest Drive.

24. Section 7 Project Schedule, page 7-1, line 1

NMED Comment: The Permittee must revise Section 7.0 of the Work Plan along with corresponding figures and tables to incorporate the modifications required by NMED to characterize the source area migration pathway. See individual comments on Section 7.0 revisions below. The Permittee must submit the revised Section 7.0 section as replacement pages.

25. Table 6-1, Groundwater Monitoring Sampling Requirements for Data Gap Wells

NMED Comment: Baseline sampling of newly installed wells must include quarterly sampling for GRO, DRO, and volatile organic compounds. The sampling frequency and analytical suite will be re-evaluated after the initial post-development sampling plus eight quarters of baseline sampling.

26. Table 6-3, Summary of Investigation-Derived Waste Sampling

NMED Comment: Under the portion of the table titled "Water Investigation-Derived Waste from Drilling", the Permittee indicates that post development water will be characterized by a sample taken from "the bailer at end of development". The Permittee is directed to take a composite sample of water from all containers of development water from each well. The contaminant concentrations in the development water may be higher or lower at the start of well development than at the end of development. A composite sample will provide a more accurate representation of contaminant concentrations in the IDW.

27. Appendix B, Field Forms

NMED Comment: The Borehole/Well Construction Log must include well details for all wells to be installed in a single borehole. The example field form shows only one well while the scope of work proposes two wells per borehole. The field form must include well details for installing two wells in each borehole.

28. Appendix C, Eurofins Lancaster Laboratories Environmental [Limited Liability Company] LLC Method Reporting Limits and Screening Criteria

NMED Comment: The Permittee must add a table which presents relevant Method Reporting Limits for soil analyses for the modified scope of work outlined in this Approval with Modifications letter.

29. Appendix C, Eurofins Lancaster Laboratories Environmental LLC Method Reporting Limits and Screening Criteria

NMED Comment: The Permittee must ensure that the limit of quantitation (LOQ) is less than the project screening levels. If this cannot be achieved by the laboratory due to the dilution of samples or other reason, the new LOQ, and all data qualifiers must be reported. Data tables in the investigation report must present the final limit of detection (LOD), LOQ, sample results, and all laboratory data qualifiers for the analytical results. No revision to Work Plan required.

SPECIFIC COMMENTS:

30. Section 2.1, Background Information, page 2-1, line 5

NMED Comment: The Permittee must include a more complete site history in the investigation report. The background information / site history must include a comprehensive summary of the subsurface field investigations that have contributed to the understanding of the site conceptual model and hydrogeology. The Report must also include a more detailed discussion of current water use and the influence of water supply wells on the hydrology and dissolved phase contaminant migration at the site. Discuss the impact these factors may have on projected future use of the water supply wells.

31. Section 2, Background Information, page 2-1, line 34

Permittee Statement: "Appendix A-1…illustrates groundwater elevations from 2011 through 2018 along two transects through the [ethylene dibromide] EDB plume. These time series graphs illustrate that the most pronounced increases in groundwater elevation are in the northern area of the site."

NMED Comment: Appendix A-1, Water Level Hydrographs, does not clearly illustrate this. It is difficult to ascertain trends with the bar graphs presented. Significant differences between the southern and northern portions of the site are not readily apparent. In future documents the Permittee must present data trends in an easy to interpret format. In addition, on Figure L-2-1, Groundwater Elevation Cross Section, three drinking water supply wells are shown on the figure but are not identified in the legend. Other figures had to be consulted to identify these wells. In future documents the Permittee must include all pertinent symbols in the legends of figures. No revision is necessary.

32. Section 2, Background Information, page 2-1, line 45 and page 2-2, line1

Permittee Statement: "Appendix A-1 includes compiled potentiometric surface maps, EDB plume maps, and benzene plume maps at the 4,857 reference elevation interval (REI)..."

NMED Comment: In the investigation report the Permittee must add a brief explanation of REI's at the site including the depth intervals they represent in both words and numbers (e.g., "the 4,857 REI represents wells screened in the shallow zone at depths ranging from approximately X ft bgs to X ft bgs.") and include a figure / table for visual clarification of this term.

33. Section 2.2, Initial Data Gap Groundwater Wells and Vadose Zone Coring Activities, page 2-2, line 38

Permittee Statement: "The Source Zone Characterization Report...describes the complete suite of analyses performed to characterize LNAPL in the soil cores. The report also describes the conclusions of the LNAPL analyses."

NMED Comment: The Source Zone Characterization Report is currently in review by NMED and has not yet been approved. In future documents the Permittee must refrain from referencing documents that have not been approved by NMED, as it could be misleading to stakeholders reviewing documents. If referencing such documents is necessary, the Permittee must add a statement stating the official status of the referenced document (e.g., "currently in review by NMED".)

34. Section 3.0, Site Conditions, page 3-1, line 14

Permittee Statement: "The groundwater elevation graphs shown in Appendix A-1, illustrate that the operation of the Ridgecrest wellfield has a significant influence on the groundwater gradient at SWMUs ST-106/SS-111. Measurements from 2010 to 2015 indicated a north–northeast-oriented hydraulic gradient toward the Ridgecrest wellfield (Section 7.6.1.2 of KAFB, 2018a). However, with changes in Water Authority and Kirtland AFB pumping practices, the hydraulic gradient no longer has a consistent orientation each quarter. As described in the Q2 2018 report (Section 5.4.4.1 of KAFB, 2018c), the observed rise in groundwater levels across the plume area has occurred at the same time as a continual decrease in groundwater extraction at the Ridgecrest wellfield."

NMED Comment: Appendix A-1 does not clearly depict this. See Comments 35 and 36.

35. Section 3.0, Site Conditions, page 3-1, line 41

Permittee Statement: "Currently, these exceedances of EDB and benzene cannot be accurately bounded because GWM wells with non-detect concentrations of EDB and benzene to the southeast have submerged well screens."

NMED Comment: According to Figures 2-1, Proposed Monitoring Well Locations and Q2 2019 EDB Plume Map, and Figure 2-2, Proposed Monitoring Well Locations and Q2 2019 Benzene Plume Map, the southeast boundaries of both the benzene and EDB plumes are bounded by groundwater monitoring wells KAFB-106245 and KAFB-106247, neither of which have submerged well screens. According to these figures it appears that the southern and southwestern boundaries of these plumes are not bounded by any wells which do not have submerged well screens. Proposed groundwater monitoring well KAFB-106252 will close the southern data gap, however, additional wells may need to be installed in the future to delineate the southwestern edge of these plumes. No response required.

36. Section 6.4 Reporting, page 6-5, line 25

Permittee Statement: "Information and data collected during any quarter from drilling, installation, sampling, and gauging activities performed on the newly added monitoring wells will be submitted in SWMUs ST-106/SS-111 Quarterly Monitoring Reports."

NMED Comment: In accordance with Section 6.2.2.1.2, Site Investigations, Investigation Reports, and Section 6.2.4.3, Reporting Requirements, Investigation Reports of the KAFB Resource Conservation and Recovery Act (RCRA) Permit the information and data collected from all investigation activities related to this Work Plan must be submitted to NMED as a separate stand-alone Investigation Report.

37. Section 8.0 References, page 8-2, line 1

Permittee Statement: The Permittee cites, "KAFB, 2019c. *Source Zone Characterization Report Bulk Fuels Facility, SWMUs ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for USACE Albuquerque District under USACE Contract No. W912DR-12-D-006. November."

NMED Comment: The Permittee is reminded not to include references for documents that have not been approved by NMED.

38. Appendix A-2 HISTORICAL GROUNDWATER PLUME MAPS

NMED Comment: The Permittee is reminded that all appendices must have properly numbered pages, tables, and figures. For example, the figure numbers presented in Appendix A-2 include five Figure 3-3's, three Figure 3-6's, two Figure 3-7's, three Figure 3-9's, and two Figure 3-10's. There is no Figure 3-1, Figure 3-2, Figure 3-4, Figure 3-5, or Figure 3-8. In all future submittals all figures, tables, and pages must be renumbered sequentially for the specific appendices they are placed in and include cross-references to corresponding tables and figures in referenced documents.

Attachment II

Figure 1: Site map of KAFB Bulk Fuels Facility. The blue polygon represents the area proposed by NMED for relocating boreholes KAFB-106250 and KAFB-106251. Aerial imagery from Google Earth Pro, 2018.

NEW MEXICO
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
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Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

November 4, 2019

Colonel David S. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117

Lt. Colonel Wayne J. Acosta
Civil Engineer Office
377 Civil Engineering Division
2050 Wyoming Blvd SE, Suite 116
Kirtland AFB, NM 87117

**RE: REQUIREMENT TO SUBMIT WELL INSTALLATION WORK PLAN
KIRTLAND AIR FORCE BASE, NEW MEXICO
EPA ID # NM9570024423
HWB-KAFB-BFF-MISC**

Dear Colonel Miller and Colonel Acosta:

The New Mexico Environment Department (NMED), during the August 2019 Kirtland Air Force Base (Facility) Bulk Fuels Facility Technical Working Group Meeting, was informed by the U.S. Air Force (Permittee) that the Permittee was proposing to install five new monitoring wells in order to support and refine its vadose zone modeling effort.

NMED met with the Permittee on September 26, 2019 to discuss the potential to utilize some of the proposed wells for multiple purposes to address other data gaps, the most important being the further characterization of the source area migration pathway through the vadose zone east of the former location of the bulk fuels loading racks. The Permittee agreed to evaluate the potential and to provide NMED with a date for submittal of the work plan in late October.

In a conference call on October 29, 2019 between the Permittee and NMED, the parties agreed to a work plan submittal date in late December prior to the Christmas holiday.

KAFB4906

As discussed in the conference call, the Permittee must submit a work plan to install a minimum of five wells to NMED for approval no later than **December 20, 2019**. The work plan must include the requirements for a work plan as described in the Facility's RCRA Permit section 6.2.4.2 and a proposed schedule for completion of field activities and submittal of a report summarizing the well installation activities and data collection.

If you have any questions regarding this letter, please contact Ben Wear at (505) 476-6041.

Sincerely,

Dave Cobrain
Program Manager
Hazardous Waste Bureau

cc: B. Wear, NMED HWB
R. Murphy, NMED HWB
M. Suzuki, NMED HWB
L. King, EPA Region 6 (6LCRRC)
S. Clark, KAFB

File: KAFB 2019 and Reading

Bockisch, Bernard

From: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>
Sent: Monday, November 16, 2020 4:43 PM
To: Bockisch, Bernard
Subject: FW: Follow up on Friday's call on source area drilling

Bernie, see below. Sheen

From: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Sent: Monday, November 16, 2020 4:28 PM
To: Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>; KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Subject: [Non-DoD Source] RE: Follow up on Friday's call on source area drilling

Mr. Moayyad and Mr. Kottkamp,

NMED has reviewed the proposed construction diagram for KAFB-106V3. NMED approves the construction diagram with the following conditions:

1. Complete the soil vapor wells utilizing a well screen with a 0.01 slot size. The use of 10/20 sand is best, however the 12/20 sand will be sufficient.
2. The boring may be backfilled with filter pack sand to 281 ft bgs followed by carefully placed bentonite utilizing a tremie pipe. Ensure proper hydration of the bentonite to form a good seal.

NMED has review the lithologic log for the placement of the shallow soil vapor points and notes the following:

1. There was no geologic logging from 0-8 ft bgs, it is uncertain where the shallowest vapor point from 5-7 ft bgs will be, it could be placed in either topsoil or backfill.
2. The shallow vapor point from 13-15 ft bgs is being place in a clay.

It is not clear to NMED what the value of the data obtained from these two shallow soil points would be.

Please contact me if you have any questions or concerns,

Thank you,
Lane

Lane Andress, P.G.
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1

Santa Fe, NM 87505-6313
Office: 505-476-6059

From: Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>
Sent: Monday, November 16, 2020 12:44 PM
To: Andress, Lane, NMENV <Lane.Andress@state.nm.us>; KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Subject: [EXT] RE: Follow up on Friday's call on source area drilling
Importance: High

Mr. Cobrain and Ms. Andress,
Please see attached proposed construction diagram for KAFB-106V3 provided on behalf of the Air Force. Construction can begin tomorrow with your concurrence.
Please note that a 1-ft sump is not currently available and would have to be cut and threaded to size. A 2-ft sump has been substituted to prevent field delays.

Thank you,
Ben Moayyad
USACE-Albuquerque
Mobile: (505) 639-3195

From: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Sent: Monday, November 16, 2020 8:30 AM
To: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Cc: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Subject: [Non-DoD Source] Follow up on Friday's call on source area drilling

Sheen and Ben, Just to follow up:

First of all, thank you both for your working with us on this, it is much appreciated.

This current boring will be completed as KAFB-106V3, a soil vapor monitoring well screened across the clay, as described in NMED's approval with modifications letter, to be able to check for LNAPL accumulation on top of the clay in this location. This well will be constructed of 3" PVC casing to accommodate the geophysical logging tools and be constructed with 5 ft screen (vs the 2 ft in NMED's letter) with the screen from 266-271 ft bgs and the sump from 271 to 272 ft bgs. This well will also include a shallow soil vapor monitoring well to 25 ft bgs. KAFB will send NMED a construction diagram for approval.

KAFB-106V3 will be geophysically logged with gamma neutron and dual induction.

Attached is a map with the updated step out location for the utility clearance. Thank you for assisting with this Sheen.

Please let me know if you have any questions or concerns.

Lane

Lane Andress, P.G.
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313
Office: 505-476-6059

Bockisch, Bernard

From: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>
Sent: Tuesday, December 8, 2020 8:45 AM
To: Behnaum.Moayyad (Behnaum.Moayyad@usace.army.mil); Phaneuf, Mark J SPA; Phil Lovato; Dreeland, Linda E CIV USARMY CESPA (USA); Bockisch, Bernard; Rachel Hobbs, PG, PMP
Subject: FW: Response to your request for a summary of the step-out boring issue
Attachments: Justification for Well KAFB-106S10A_V2_12-4-20.pdf

FYSA and file. Sheen

From: Pierard, Kevin, NMENV <Kevin.Pierard@state.nm.us>
Sent: Monday, December 7, 2020 5:09 PM
To: LYNNES, KATHRYN D HQE USAF AFGSC 377 MSG/SAF/IEE <kathryn.lynnes@us.af.mil>
Cc: SEGURA, CHRISTOPHER G GS-14 USAF AFCEC/CZO <christopher.segura.2@us.af.mil>; KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; GILLESPIE, JOHN L GS-14 USAF HAF AFCEC/CZTE <john.gillespie.3@us.af.mil>; Stapleton, Mark <Mark.Stapleton@noblis.org>; Stringer, Stephanie, NMENV <Stephanie.Stringer@state.nm.us>
Subject: [Non-DoD Source] RE: Response to your request for a summary of the step-out boring issue

Kate – Thank you for expanding upon your verbal request to abandon boring KAFB-106S10 rather than completing it as a monitoring well. We have considered your request and continue to believe completion of the well at this location would be appropriate and beneficial. I have attached the rationale for this decision. Please let us know if you have any questions.

From: LYNNES, KATHRYN D HQE USAF AFGSC 377 MSG/SAF/IEE <kathryn.lynnes@us.af.mil>
Sent: Thursday, December 3, 2020 2:46 PM
To: Pierard, Kevin, NMENV <Kevin.Pierard@state.nm.us>
Cc: SEGURA, CHRISTOPHER G GS-14 USAF AFCEC/CZO <christopher.segura.2@us.af.mil>; KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; GILLESPIE, JOHN L GS-14 USAF HAF AFCEC/CZTE <john.gillespie.3@us.af.mil>; Stapleton, Mark <Mark.Stapleton@noblis.org>; Stringer, Stephanie, NMENV <Stephanie.Stringer@state.nm.us>
Subject: [EXT] Response to your request for a summary of the step-out boring issue

Hi Kevin:

As we discussed during our 01 December 2020 conference call, the Air Force is proposing to abandon the KAFB-106S10 step-out boring rather than completing it as a monitoring well. A summary of the rationale for this change is provided below.

According to the approved work plan, Work Plan For Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 and KAFB-106S10 Bulk Fuels Facility, Solid Waste Management Units ST-106/SS-111 dated September 2020, the primary objective of the source area part of this effort was to identify the single point of discontinuity where the LNAPL from the fuel leak migrated down to the water table. This would be achieved by identifying the single point where no upper or lower clay units exist and, based on Figure 5.1 in the approved work plan, would be declared the migration pathway.

The work plan identified an initial boring location and allowed for a step-out boring if a discontinuity was not found. The initial boring location encountered a significant clay layer, which was not expected based upon both NMED's and the Air Force's review of the available logs. As result NMED and the Air Force held a conference call on 13 November 2020 to select a step-out boring location. The Air Force's subject matter expert(s) indicated during the 13 November 20 conference call with NMED that the step-out location that had the greatest chance of identifying the point of discontinuity was west of the proposed coring location KAFB-106V3 (see attached Tech Memo). NMED instead directed the Air Force to drill the step-out boring KAFB-106S10 in the location shown on the attached figure. Unfortunately, the KAFB-106S10 step-out boring also encountered significant clay at both the upper and lower units and failed to achieve its overall objective. In other words, neither location identified the LNAPL migration pathway to the aquifer.

An additional monitoring well at this location will provide no additional resolution to the nature and extent of contamination at this site. KAFB already has a significant number of monitoring points surrounding the KAFB-106V3 coring location as well as KAFB-106S10 step-out location (see Figures 2.2 and 2.3 of the approved work plan). The BFF monitoring network in this area is comprised of 35 monitoring wells. Seventeen of those wells have submerged screens, which are available to monitor the dissolved phase plume in the source area. Eighteen monitoring wells that have screens extending above the water table which are available for both LNAPL monitoring and dissolved phase plume monitoring. In addition, the KAFB-106S10 step out location is in close proximity to KAFB-106154-484 which is not a submerged point.

Lastly, of the 35 groundwater monitoring wells, seven were coring locations that were completed as groundwater monitoring wells that were used to determine submerged saturated residual concentrations on-base. The addition of the saturated matrix coring sampling at the KAFB-106S10 step-out location will provide valuable information for conceptual site model and the overall mass determination for the Corrective Measure Evaluation (CME).

Finally, the Air Force posits that upon the completion of the coring at KFB-106S10 step-out and the installation of the five additional data gap monitoring wells at the approved target locations, that the sufficient data exist in multiple horizons both on base and off that the nature and extent of contamination has been satisfied. Any additional modifications or drilling requests will delay the completion of RFI Phase 2 project completion by several more years.

With the abundance of monitoring wells and coring locations in the immediate subject area, the USAF does not believe that an additional groundwater monitoring well at the KAFB-106S10 step-out location is necessary and will provide no additional illumination on the nature and extent of contamination in the source area. The Air Force requests that upon the completion of the KAFB-106S10, given its redundant nature, that the well casings not be installed and the well borehole be properly abandoned. Given the time sensitive nature of this request (coring of KAFB-106S10 step-out is scheduled to be completed by Monday 7 December 20), we would like to receive your concurrence on this request by COB on 7 December 20.

Thank you for taking the time to meet with us and to work collaboratively to resolving this friction point. We hope that additional meetings and conversations can be conducted like this in the future to minimize and reduce the time to get the CME phase of project.

Regards,

Kate

Kathryn (Kate) Lynnes
Senior Advisor, SAF/IEE
Bulk Fuels Facility Remediation
2000 Wyoming Blvd. SE
Kirtland AFB, NM 87117
Office: 505-846-8703

Brandon, Alan

From: Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>
Sent: Monday, November 16, 2020 9:43 AM
To: Bockisch, Bernard; Brandon, Alan; Sheen Kottkamp; Ryan Wortman (ryan.wortman.3 @us.af.mil); Mark Stapleton; Rod Reeve (Rodneyr@ageiss-inc.com); Bryan Banks (jesse.banks@us.af.mil); RENAGHAN, BRIAN J GS-13 USAF AFMC AFCEC/CZRX (brian.renaghan@us.af.mil); Cordova, Amy Elizabeth CIV USARMY CESPA (USA); Phaneuf, Mark J CIV USARMY CESPA (USA); Earthman, Matthew A CIV USARMY CESPA (USA)
Subject: FW: Follow up on Friday's call on source area drilling
Attachments: NMED proposed location as discussed in meeting.pdf

See slightly revised step-out location from NMED, per the call on Friday.

Thanks,
Ben Moayyad
USACE-Albuquerque

1

Mobile: (505) 639-3195

From: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Sent: Monday, November 16, 2020 8:30 AM
To: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Cc: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Subject: [Non-DoD Source] Follow up on Friday's call on source area drilling

Sheen and Ben, Just to follow up:

First of all, thank you both for your working with us on this, it is much appreciated.

This current boring will be completed as KAFB-106V3, a soil vapor monitoring well screened across the clay, as described in NMED's approval with modifications letter, to be able to check for LNAPL accumulation on top of the clay in this location. This well will be constructed of 3" PVC casing to accommodate the geophysical logging tools and be constructed with 5 ft screen (vs the 2 ft in NMED's letter) with the screen from 266-271 ft bgs and the sump from 271 to 272 ft bgs. This well will also include a shallow soil vapor monitoring well to 25 ft bgs. KAFB will send NMED a construction diagram for approval.

KAFB-106V3 will be geophysically logged with gamma neutron and dual induction.

Attached is a map with the updated step out location for the utility clearance. Thank you for assisting with this Sheen.

Please let me know if you have any questions or concerns.

Lane

Lane Andress, P.G.
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313
Office: 505-476-6059

Bockisch, Bernard

From: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>
Sent: Monday, November 16, 2020 12:08 PM
To: Moayyad, Behnaum CIV USARMY CESPA (USA); Phaneuf, Mark J CIV USARMY CESPA (USA); Dreeland, Linda E CIV USARMY CESPA (USA); Lovato, Phillip J CIV USARMY CESPA (USA); Bockisch, Bernard; Rachel Hobbs, PG, PMP
Cc: LYNNES, KATHRYN D HQE USAF AFGSC 377 MSG/SAF/IEE; SEGURA, CHRISTOPHER G GS-14 USAF AFCEC/CZO; WORTMAN, RYAN J GS-13 USAF AFCEC AFCEC/CZO; Stapleton, Mark
Subject: FW: Follow up on Friday's call on source area drilling
Attachments: NMED proposed location as discussed in meeting.pdf

FYSA and file. Sheen

From: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Sent: Monday, November 16, 2020 8:30 AM
To: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; Moayyad, Behnaum CIV USARMY CESPA (USA) <Behnaum.Moayyad@usace.army.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Cc: Andress, Lane, NMENV <Lane.Andress@state.nm.us>
Subject: [Non-DoD Source] Follow up on Friday's call on source area drilling

Sheen and Ben, Just to follow up:

First of all, thank you both for your working with us on this, it is much appreciated.

This current boring will be completed as KAFB-106V3, a soil vapor monitoring well screened across the clay, as described in NMED's approval with modifications letter, to be able to check for LNAPL accumulation on top of the clay in this location. This well will be constructed of 3" PVC casing to accommodate the geophysical logging tools and be constructed with 5 ft screen (vs the 2 ft in NMED's letter) with the screen from 266-271 ft bgs and the sump from 271 to 272 ft bgs. This well will also include a shallow soil vapor monitoring well to 25 ft bgs. KAFB will send NMED a construction diagram for approval.

KAFB-106V3 will be geophysically logged with gamma neutron and dual induction.

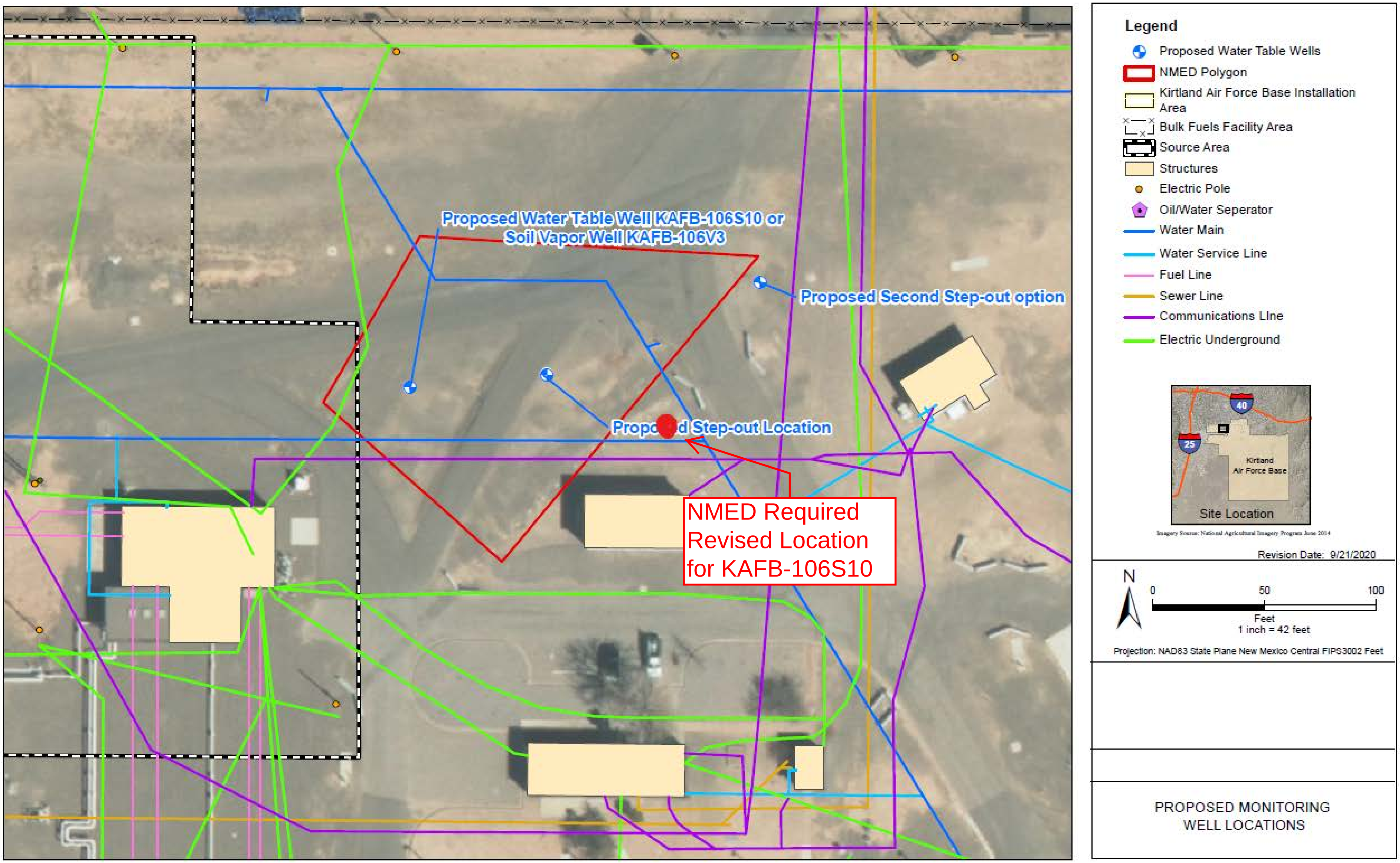
Attached is a map with the updated step out location for the utility clearance. Thank you for assisting with this Sheen.

Please let me know if you have any questions or concerns.

Lane

Lane Andress, P.G.
NMED - Hazardous Waste Bureau
2905 Rodeo Park Drive East, Building 1
Santa Fe, NM 87505-6313
Office: 505-476-6059

NMED proposed location as discussed in 11/13/2020 meeting with Air Force



From: Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Sent: Monday, June 1, 2020 5:25 PM
To: KOTTKAMP, SHEEN T GS-13 USAF AFCEC AFCEC/CZOW <sheen.kottkamp.1@us.af.mil>; LYNNES, KATHRYN D HQE USAF AFGSC 377 MSG/SAF/IEE <kathryn.lynnes@us.af.mil>
Cc: Pierard, Kevin, NMENV <Kevin.Pierard@state.nm.us>; Murphy, Robert, NMENV <Robert.Murphy@state.nm.us>; Andress, Lane, NMENV <Lane.Andress@state.nm.us>; Wear, Benjamin, NMENV <Benjamin.Wear@state.nm.us>
Subject: [Non-DoD Source] data gap well installation scope

Sheen/Kate,

The scope below should help you evaluate any contract adjustments or issues. Please distribute to the appropriate people. We've modified the requirements for sampling from the previous coring conducted over the past couple of years to focus on what we need to meet the objective for the one or maybe two borings at the location we discussed. The other well installations will remain as proposed in the work plan as contract limitations based on the changes may allow. Please get back to us next week on a timeframe for the field work and for providing replacement pages for the work plan. Please call if you want to discuss this further.

Thanks.

Dave

Dave Cobrain

New Mexico Environment Department

Hazardous Waste Bureau

2905 Rodeo Park Drive East Bldg 1

Santa Fe, NM 87505-6313

Main Office Phone 505-476-6000

Direct Line 505-476-6055

Fax 505-476-6030

* Drill one borehole closer to source area with potential for a second if the objective is not achieved with first borehole

    * If second borehole is necessary due to encountering clay at approximately 300 feet bgs, complete the first borehole as a SVMW at the depth of the clay

* Drill at the migration pathway location with ARCH or sonic rig to 230 feet bgs. Drill the other wells with ARCH as proposed in the work plan to TD.
* Drill with sonic rig in order to collect continuous core from depth of 230 feet bgs to TD at the migration pathway location.
* Cool core barrel when collecting continuous core
* Field screening

    * Log cuttings and collect PID readings every 20 feet from ground surface to 230 feet bgs
    * Log core and collect samples for lab analysis and PID readings every 5 feet from 230 feet bgs to TD

* Lab samples

    * Collect samples for lab analyses every 5 feet from 230 feet bgs to TD; TPH GRO and DRO extended

* GWMW's must be designed to allow for active sampling methods rather than passive sampling

APPENDIX A-2

CROSS-WALK TABLE BETWEEN THE RCRA PERMIT REQUIREMENTS AND THE INVESTIGATION REPORT

Appendix A-2
Cross-Walk Table Between the RCRA Permit and Investigation Report for Data Gap Monitoring Well Installation

RCRA Permit Part	Permit Requirement	Reference Location in Investigation Report for Data Gap Monitoring Well Installation
Part 6	Corrective Action	Section 1 Introduction
Part 6.2.2.1	Site Investigations	Section 1 Introduction
Part 6.2.4.2	Investigation Work Plans	Section 1 Introduction
Part 6.2.4.3	Investigation Reports	Section 1 Introduction
Part 6.5.2	Documentation of Field Activities	Section 4 - Scope of Activities, Appendix B - Field Methods, Appendix C - Daily Quality Control Reports, Appendix D - Lithologic Logs, Appendix E -Core Temperature Logs, Appendix F - Core Photography, Appendix K - Well Development Documentation, Appendix L - Groundwater Purge and Sample Logs, and Appendix M - Soil Vapor Calibration and Purge Logs.
Part 6.5.3	Decontamination Procedures	Appendix B - Field Methods
Part 6.5.4	Field Equipment Calibration Procedures	Appendix B - Field Methods, Appendix H - PID calibration logs, Appendix I-1 - Geophysics Calibration Report, and Appendix M - Soil Vapor Calibration and Purge Logs.
Part 6.5.5	Sample Handling, Shipping, and Custody Requirements	Appendix B - Field Methods
Part 6.5.5.1	Sample Handling	Appendix B - Field Methods
Part 6.5.5.2	Sample Shipment Procedures	Appendix B - Field Methods
Part 6.5.5.3	Sample Custody	Appendix B - Field Methods
Part 6.5.5.4	Sample Labels	Appendix B - Field Methods
Part 6.5.7	Collection and Management of Investigation Derived Waste	Appendix G - Investigation Derived Waste
Part 6.5.8	Surveying Sample, Well, and Site Feature Locations	Section 5.5.6 Monitoring Well Surveying and Appendix I Well Surveys
Part 6.5.9	Requirements for Exploratory and Well Installation Borings and Exploratory Excavations	Section 5.2 Exploratory Drilling
Part 6.5.10	Requirements for Geophysical Surveys	Section 5.3 Geophysical Logging and Appendix I Geophysics
Part 6.5.11	Requirements for Deep Subsurface Soil, Rock, and Sediment Sampling	Section 5.2.1 Field Screening and Soil Sampling and Section 6.1 Soil Sampling
Part 6.5.13	Field Screening of Soil, Rock, and Sediment Samples	Section 5.2.1 Field Screening and Soil Sampling, Section 5.8 Subsurface Air Conditions, and Section 6.2 Sample Field Screening Results
Part 6.5.14	Field Quality Control for Soil, Rock, and Sediment Sampling	Appendix B - Field Methods
Part 6.5.15	Logging of Soil, Rock, and Sediment Samples	Section 5.2.2 Borehole Logging and Appendix D - Lithologic Logs
Part 6.5.16	Requirements for Soil-Vapor Monitoring	Section 6.4 Subsurface Vapor Sampling
Part 6.5.17	Technical Requirements for Groundwater Investigations	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.2	Groundwater Levels	Section 5.7 Groundwater Conditions
Part 6.5.17.3	Groundwater Sampling	Appendix B Field Methods
Part 6.5.17.4	Well Purging	Appendix B Field Methods
Part 6.5.17.5	Groundwater Sample Collection	Appendix B Field Methods
Part 6.5.17.6	Field QC for Groundwater Sampling	Appendix B Field Methods

Appendix A-2
Cross-Walk Table Between the RCRA Permit and Investigation Report for Data Gap Monitoring Well Installation

RCRA Permit Part	Permit Requirement	Reference Location in Investigation Report for Data Gap Monitoring Well Installation
Part 6.5.17.10	Groundwater Monitoring Well Construction Requirements	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.1	Drilling Methods	Section 4 Scope of Activities and Section 5.2 Exploratory Drilling Investigation
Part 6.5.17.10.2	Monitoring Wells and Piezometers Construction	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.3	Well and Piezometer Construction Materials	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.4	Design and Construction of Screens and Filter Packs	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.5	Design and Construction of Annular Seals	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.6	Well and Piezometer Development Methods	Section 5.5 Monitoring Well Construction and Boring Abandonment and Appendix J Well Development Documentation
Part 6.5.17.10.7	Surface Completion Methods	Section 5.5 Monitoring Well Construction and Boring Abandonment
Part 6.5.17.10.10	Well and Piezometer Construction Diagrams, Logs, and Boring Logs	Appendix D Lithologic Logs
Part 6.5.18	Laboratory Analyses Requirements for all Environmental Media	Section 6.1 Soil Sampling, Section 6.4 Subsurface Sampling, and Section 6.6 Groundwater Sampling Analytical Results
Part 6.5.18.1	Laboratory QA/QC Requirements	Section 6.3.3 Source Area Soil Laboratory Analytical Data Review and Usability, Section 6.4.2 Soil Vapor Laboratory Anayltical Data Review and Usability, and Section 6.5.2 Analytical Data Quality and Data Usability.
Part 6.5.18.2	Laboratory Deliverables	Appendix N-2 - Level 2 Soil Analytical Reports and Excel Data File, Appendix N-3 Soil Vapor Analytical Report and Excel Data File, and Appendix N-4 - Groundwater Analytical Reports and Excel Data File
Part 6.5.18.3	Review of Field and Laboratory QC Data for all Media	Appendix N-1 Data Quality Evaluation Report

MW = monitoring well
QA = quality assurance
QC = quality control
RCRA = Resource Conservation and Recovery Act

APPENDIX A-3 Source Area Characterization Report Response to Comments Cross-Walk Table					
Date	**Reviewer**	**Document Title (version)**		**Contract/TO Number**	
17-Aug-20	**NMED HWB**	**Source Zone Characterization Report for the Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111**		**EPA ID# NM9570024423**	
Item	**NMED NOD Comment Number**	**Page**	**Comment**	**Response**	**Reference Location in Investigation Report for Data Gap Monitoring Well Installation**
16	7	6	**7. Executive Summary, page ES-1** **Permittee Statement:** "LNAPL saturation in vadose zone samples was highest in the source area and none of the samples were found to contain mobile LNAPL. This demonstrates that there is no drainage of LNAPL that could cause continued LNAPL head in the source area that would be required to drive migration." **NMED Comment:** Report revision required. Analysis of multiple geophysical and lithologic logs at the site indicate it is likely that a discontinuous clay layer in the source area may have altered the pathway for the migration of fuels related contamination to groundwater. This potential migration pathway is likely to contain hydrocarbon saturated soils that, while not mobile under current conditions, would likely serve as a significant source of dissolved phase petroleum hydrocarbon contamination as groundwater levels continue to rise and come into contact with them. The lithologic cross sections and the discussion of the site hydrogeology presented in the Report do not address this issue. Revise the Report to address this possibility by identifying the top and bottom surfaces of both the upper and lower clay units beneath the site using cross sections and isopach maps.	The Air Force agrees that there is residual source fuel in the saturated zone as well as in the vadose zone above the capillary fringe. Each monitoring well is gauged on a quarterly basis and minor amounts of LNAPL are observed in only a few wells that are located within the boundary of benzene effective solubilities (see Figure 5-7). In addition, LNAPL mobility analysis performed on samples collected above and below the clay in the vadose all indicated that the residual LNAPL is no longer mobile. Creating cross sections and a site-wide clay isopach map was beyond the scope of this investigation and not included in the approved work plan. Additional information regarding the clay pathway will also be included in the forthcoming Data Gap Report. The Air Force agrees that it is important to understand the historic LNAPL migration pathway to the extent necessary to support the Corrective Measures Evaluation. The Air Force will summarize the data concerning the historic LNAPL migration pathway in an updated Conceptual Site Model in the RFI Phase II once the investigation phase of the RCRA process has been completed.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.
23	13b	8	**13. Section 5.1 Subsurface Lithology, page 5-1** **Permittee Statement:** "The subsurface in the area of the Source Zone Characterization project is shown on a west-to-east transect (A-A') and a north-to-south transect (B-B') (Figures 5-1 and 5-2)." **NMED Comments:** Report revision required. **b.** Figures 5-1 and 5-2 contain errors. Please revise the report to correct the following errors: i. The X-axis on Figure 5-2 should read "1,474,500" rather than "1,475,500" ii. The inset aerial photograph in the Key incorrectly shows the scale of the axes as 2:1 while the scale of the photograph is shown as 1:1	Cross sections were removed from the revised report. Updated cross sections that will include the data from this investigation as well as the recently installed data gap wells (Including wells KAFB-106S10 and KAFB-106V3) will be presented in the upcoming Data Gap report submittal.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.
24	13c	8	**13. Section 5.1 Subsurface Lithology, page 5-1** **Permittee Statement:** "The subsurface in the area of the Source Zone Characterization project is shown on a west-to-east transect (A-A') and a north-to-south transect (B-B') (Figures 5-1 and 5-2)." **NMED Comments:** Report revision required. **c.** The Permittee must include copies of the field lithologic logs and well completion diagrams as an appendix to the Report.	Cross sections were removed from the revised report. Updated cross sections that will include the data from this investigation as well as the recently installed data gap wells (Including wells KAFB-106S10 and KAFB-106V3) will be presented in the upcoming Data Gap report submittal.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.
57	35a	18/19	**35. 5.3 Light Non-Aqueous Phase Liquid and Fuel Hydrocarbon Spatial Distribution, page 5-9** **Permittee Statement:** "The lack of significant soil vapor hydrocarbon results directly above these shallow clay units laterally from the source area suggests that LNAPL maintained a near vertical migration pathway through higher permeable areas around, as well as through, the clays. This indicates that LNAPL migration was dominated by gravity drainage rather than horizontal migration along low permeability (i.e., clay or silt) zones." **a. NMED Comment:** Report revision required. The Permittee makes a comparison of a physical process (gravity drainage) relative to horizontal migration. It is not clear how gravity drainage, migration direction, and permeability relate to one another in this example or why gravity drainage is considered the dominant factor for LNAPL migration. Revise the statement for clarity.	The model and the associated discussion were removed from the report. However, as discussed above, gravity was the force that caused the fuel to move downwards through the vadose zone through higher permeability units (sands/gravels). Lower permeability units (clays/silts) likely caused lateral migration of the fuel in the subsurface, but the investigation did not uncover direct evidence of this. For example, the lower clay layer in KAFB-106S9 (the closest well to the release area) was observed from 270 to 283 ft bgs. Heated headspace concentrations at 269, 280, and 289 ft bgs (above, within, and below the lower clay) were less than 10 ppmv. If lateral migration occurred along the lower clay unit identified in KAFB-106S9, it did not migrate as far east as the well location. Additional information regarding the lower clay unit will be presented in the upcoming Data Gap report that will include information for wells KAFB-106S10 and KAFB-106V3 that are located closer to the release area.	Information regarding the lower clay unit is presented in the Executive Summary and Sections 4.0, 4.1, 5.2.1.1, 5.3, 5.4, 5.5.1, and 7.0.

APPENDIX A-3 Source Area Characterization Report Response to Comments Cross-Walk Table					
Date	**Reviewer**	**Document Title (version)**		**Contract/TO Number**	
17-Aug-20	**NMED HWB**	**Source Zone Characterization Report for the Bulk Fuels Facility Solid Waste Management Units ST-106/SS-111**		**EPA ID# NM9570024423**	
Item	**NMED NOD Comment Number**	**Page**	**Comment**	**Response**	**Reference Location in Investigation Report for Data Gap Monitoring Well Installation**
58	35b	19	**35. 5.3 Light Non-Aqueous Phase Liquid and Fuel Hydrocarbon Spatial Distribution, page 5-9** **Permittee Statement:** "The lack of significant soil vapor hydrocarbon results directly above these shallow clay units laterally from the source area suggests that LNAPL maintained a near vertical migration pathway through higher permeable areas around, as well as through, the clays. This indicates that LNAPL migration was dominated by gravity drainage rather than horizontal migration along low permeability (i.e., clay or silt) zones." **b. NMED Comment:** Report revision required. In the discussion of downward migration of the contaminant plume the Permittee refers to shallow clay layers and deeper clay layers but provides no information on the different characteristics of the shallow versus deep clay layers to support the conclusions presented in the discussion. The Permittee must differentiate between the shallow and deeper clay layers by including in the discussion, at a minimum, information on the depositional environment, bed geometry and thickness, lateral continuity, and physical and interstitial properties.	The model and the associated discussion were removed from the report. However, information on the depositional environment can be found in Section 2.1. Bed thickness can be found in the lithologic logs. Sufficient samples to distinguish physical and interstitial properties between the two clay layers were not collected from the borings. This, and the assessment of the clay bed geometry, was not one of the objectives of the approved work plan. The lateral continuity of the clay beds will be provided in cross sections in the upcoming Data Gap Report. These cross sections will include additional information regarding these clay layers obtained from newly installed wells KAFB-106S10 and KAFB-106V3.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.
67	44	21	**44. Section 7 Summary and Conclusions, page 7-1** **Permittee Statement:** "The source zone characterization included coring at 11 locations to assess the horizontal and vertical extent of LNAPL at the Site… the collection of over 3,600 linear ft of core, chemical analysis of 87 soil samples, UV fluorescence of 30 cores..." Soil core samples were collected to obtain contaminant concentration and soil and LNAPL properties data." **NMED Comment:** Report revision required. Please provide the results of these data on cross sections or fence diagrams so that a direct comparison can be made of the lithology and the locations of samples, LNAPL, and UV detections found through field screening and laboratory analyses.	Creating an updated cross section with information presented in this report was not part of the scope in the approved work plan. In addition, the cross section has been removed from the revised report. The Air Force agrees that it is important to compare the data presented in this report with other historical information/cross sections. Updated cross sections that will include the data from this investigation as well as the recently installed data gap wells (Including wells KAFB-106S10 and KAFB-106V3) will be presented in the upcoming Data Gap Report submittal.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.
78	55	24	**55. Section 7 Summary and Conclusions, page 7-3** **Permittee Statement:** " The clays do not appear to have significantly affected lateral migration of the LNAPL. LNAPL migration was primarily by gravity drainage rather than horizontal migration along low permeability (i.e., clay or silt) zones." **NMED Comment:** Report revision required. The conclusion that clays do not appear to have significantly affected lateral migration of the LNAPL minimizes the importance of the impact of the clays at the site. The vapor and LNAPL plumes depicted in Figures 5-8 through 5-14 indicate that the clay layer at approximately 265 ft bgs caused lateral migration of the contaminant plume. The statement must be revised for clarity.	As discussed in comment 21, the model and the associated discussion was removed from the report. The following text was removed, "The clays do not appear to have significantly affected lateral migration of the LNAPL." As previously discussed in comments 56 and 57 if lateral migration occurred, it is bounded on the east by KAFB-106S9, Additional information regarding the lower clay unit will be presented in the upcoming Data Gap report that will include information for wells KAFB-106S10 and KAFB-106V3 that are located closer to the release area.	Information regarding the lower clay unit is presented in the Executive Summary and Sections 4.0, 4.1, 5.2.1.1, 5.3, 5.4, 5.5.1, and 7.0.
82	59a	25	**59. Figure 5-1 Cross Section A-A' and 5-2 , Cross Section B-B' NMED Comment:** Report revision required. **a.** Figures 5-1 and 5-2 are not true cross sections or fence diagrams. They appear to be an interpolation of subsurface geology across the site. Some of the wells used to create the figures are offset too far from the transects to accurately depict subsurface geology. Please revise Figure 5-1 and 5-2 with more reasonable cross section lines. The Permittee must also depict the actual elevation/depth to water on the figure.	Cross sections were removed from the revised report. Updated cross sections that will include the data from this investigation as well as the recently installed data gap wells (Including wells KAFB-106S10 and KAFB-106V3) will be presented in the upcoming Data Gap report submittal.	Cross sections can be found as Figures 5-2 through 5-4. A discussion of the cross sections and clay layers can be found in Section 5.4. While this report included additional data regarding the presence of LNAPL and the potential historic LNAPL pathways, the nature and extent of the LNAPL will be more fully described based on the most representative site data collected to date. This data will be presented in the RFI Phase II report.

Albuquerque District. September.

APPENDIX B

FIELD METHODS

CONTENTS

LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
<	less than
±	plus or minus
AFB	Air Force Base
ARCH	Air Rotary Casing Hammer
ASTM	American Society for Testing and Materials
bgs	below ground surface
cy	cubic yard
ft	foot/feet
IDW	investigation-derived waste
LNAPL	light non-aqueous phase liquid
NMED	New Mexico Environment Department
No.	Number
ppmv	parts per million by volume
PID	photoionization detector
RCRA	Resource Conservation and Recovery Act
TPH	Total Petroleum Hydrocarbons
UV	ultraviolet
VOCs	volatile organic compounds

APPENDIX B: DRILLING AND BOREHOLE LOGGING

Drilling, and logging activities were conducted in accordance with Parts 6.5.9, 6.5.17.10.1, and 6.5.15 of the Resource Conservation Recovery Act (RCRA) Hazardous Waste Treatment Facility Operating Permit Number (No.) NM9570024423 (RCRA Permit) (NMED, 2010) and the Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 (Kirtland Air Force Base [AFB], 2020), approved by NMED with modifications in July 2020 (NMED, 2020).

B-1.1 Drilling Equipment

Groundwater monitoring wells, KAFB-106248 through KAFB-106252, were installed using air rotary casing hammer (ARCH) drilling technology. Boreholes were advanced using 13 3/8-inch casing to approximately 200 feet below ground surface (ft bgs), depending on site conditions; thereafter, 11 3/4-inch casing was advanced to the total depth of the borehole.

Source area characterization wells, KAFB-106S10 and KAFB-106V3, were drilled using a combination of ARCH and sonic drilling technologies. Boreholes were initially advanced using ARCH and 11 3/4-inch casing to a depth of approximately 230 ft bgs. The sonic rig was used to continuously core to total depth with 6-inch or 8-inch casing and a 4-inch core barrel. After reaching total depth, the ARCH rig was used to pull the 11 3/4-inch casing and advance 13 3/8-inch casing to approximately 200 ft bgs. The borehole was then advanced by ARCH to total depth with 11 3/4-inch casing. The total depth of the borehole was 10 ft below any field screening evidence of contamination (e.g., photoionization detector [PID] readings greater than 10 parts per million by volume [ppmv]).

B-1.2 Decontamination Procedures

Prior to drilling each well, drilling equipment including the ARCH and sonic drilling rigs, drive casing, drill rods, core barrels, and all other downhole drilling and sampling equipment were decontaminated using a hot pressure washer with a Liquinox® wash and freshwater rinse, in accordance with Part 6.5.3 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

B-1.3 Core Handling

During sonic coring, temperature controls were implemented to maintain the data quality for light non-aqueous phase liquid (LNAPL) and volatile organic compounds analytical results. Temperature inside the sample core was monitored when returned to the surface to ensure that heating of the sonic core barrel was not impacting sample selection or integrity. To minimize heating of the sonic core barrels to greater than 20 degrees Celsius while drilling in the unsaturated zone, core barrels were cooled with dry ice immediately prior to deployment downhole. The pre-deployment temperatures were monitored using a FLUKE 59 MAX+IR thermometer.

If, while coring, the samples exceeded this temperature then remedial efforts including cooling the core barrel with dry ice, limiting the coring run length, changing the vibration and rotation speed of the coring, adding minimal amounts of water were implemented. Cores collected from sonic drilling were extruded into plastic core sleeves at 1- to 2-ft increments over the selected coring interval. Coring intervals varied during drilling primarily to minimize core temperatures to prevent loss of volatile organic constituents. However, other downhole conditions required varying the coring intervals (typically due to caving).

Immediately following submittal of the core from the driller to the field geologist for logging, a thermometer was inserted to the middle of the core for the most accurate reading. The temperature of each core was measured with a National Institutes of Standards and Technology Traceable® digital thermometer. Temperature data were recorded on the core sleeves and field forms. Following temperature collection, core sleeves were labeled with the well number, temperature, and the interval of the individual sleeve. The core boxes were labeled with coring run interval and the core sleeve interval.

Due to the ability of LNAPL to fluoresce in the presence of ultraviolet (UV) light, a UV flashlight was used to screen for its presence. Following collection, soil cores were placed within a darkened workspace and screened for the presence of areas that may fluoresce. During screening, a UV light (Spectronics Optimax 365 UVA Inspection Flashlight) was shown on the core sample. Following UV screening, the results were annotated on the core sleeve (“NO UV”) before photographing.

Individual cores were placed in a standard core box to allow for efficient cataloging, storage, and assist with core photography. Photography of the core was performed using an on-site, high resolution digital camera (Nikon Coolpix B500). Each photograph was logged on a field form, noting the borehole number, depth, and date. Core photographs with the core run interval annotated are presented in Appendix F of the report.

A box truck was also used to provide a mobile workspace. The box truck allowed for a darkened workspace to perform UV screening as well as a place for core photography, lithologic logging, and sample preparation.

B-1.4 Lithologic Logging

Lithologic logging was conducted in accordance with Part 6.5.15 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).
During drilling, each boring was fully described on a boring log form in accordance with American Society for Testing and Materials (ASTM) International D5434 or D2488 by an experienced geologist. Lithology was logged from cyclone cuttings during ARCH drilling at a minimum of 5-ft intervals. Core from sonic drilling was collected in a 4-inch diameter core barrel and extruded into two plastic core sleeves for 5-ft core runs.

B-1.5 Field Screening for Volatile Organic Compounds

Field screening was conducted in accordance with Part 6.5.13 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

A PID with a 9.8-electron volt UV lamp was used to screen for the presence of volatile organic compounds (VOCs) in soil cuttings and sonic cores collected during drilling. Results of field screening at the corresponding depths were recorded on the Boring Log Forms in ppmv for total VOCs. The PID was calibrated in accordance with the requirements of Part 6.5.4 of the RCRA Permit (NMED, 2010). During use, the PID was bump tested daily and calibrated weekly and when the results of the daily bump test fell outside of the accepted range.

For field screening for boreholes drilled using only ARCH technology, PID measurements were recorded at a minimum of 10-ft intervals down to total depth. PID headspace measurements were taken from soil cuttings collected from the cyclone during ARCH drilling a representative portion of the soil cuttings placed in a clean, dedicated (e.g., single sample) 1-gallon press-and-seal plastic storage bag.

For boreholes drilled using a combination of ARCH and sonic coring technology, PID measurements were recorded at a minimum of 10-ft intervals from ground surface to the start of coring and every 5-ft from the start of coring to total depth. During coring, immediately upon retrieval of the 5ft sonic core, Immediately upon retrieval, a representative portion of the core placed in a clean, dedicated (e.g., single sample) 1-gallon press-and-seal plastic storage bag prior to sealing the core sleeve. The cuttings were vigorously agitated for at least 15 seconds and then allowed a minimum of 10 minutes for VOCs to adequately volatilize.

During cold weather, the cuttings were warmed to room temperature before taking the headspace measurement. The cuttings were re-agitated and the PID sampling probe was quickly inserted. The maximum meter response, which typically occurred within the first 2-5 seconds, was recorded on the boring log.

B-1.6 Geophysical Logging

Geophysical logging was conducted in accordance with Part 6.5.10 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).
Upon completion of wells KAFB-106S10 and KAFB-106V3, geophysical logging was performed. The wells were logged with Dual Induction, Gamma Ray, and Neutron down-hole logging tools. Logging was performed to the total depth of each well. Each run was performed twice to assess reproducibility. The tools were calibrated and operated according to ASTM International standards for geophysical logging and the operation manual of the specific tool utilized.

B-1.7 Well Development

Well development was conducted in accordance with Part 6.5.17.10.6 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020). Well development was performed by surging and bailing after a minimum of 4 days following well completion. Further development by pumping was performed at KAFB-106248 and KAFB-106252.

B-1.7.1 Equipment

Equipment used for well development included a swabber, bailer, pump, YSI multiparameter meter, HACH 2100Q Turbidimeter, Imhoff cone, and a water level meter. Equipment was decontaminated prior to use at each well using Liquinox® or Alconox® and a freshwater rinse.

The YSI multiparameter meter was calibrated in accordance with the manufacturer’s instructions weekly, and bump tested daily as required by Part 6.5.4 of the RCRA Permit (NMED, 2010). If the results of the bump test fell outside of the accepted range, the instrument was calibrated. The turbidimeter was calibrated at the beginning of development and bump tested daily. If the results of the bump test fell outside of the accepted range, the instrument was calibrated.

B-1.7.2 Well Development Methods

Well development was conducted as follows:

- Initial development consisted of swabbing and bailing until little or no sediment entered the well (approximately 2–6 hours). Development and purge water was contained in a temporary tank, tote, or drum.

- A bailer fitted with a toggle valve was lowered into the well and used to gently surge the screen interval to remove any sand, silt, and debris accumulated in the well. When the bailer was brought to the surface, an Imhoff cone was used to collect water from the first bailer run to evaluate the amount of silt and sediment in the water. This process was repeated after each cycle of surging development. Wells were bailed until the discharge water contained less than 2 milliliters of sediment per 1 liter of water, as measured using an Imhoff cone.

- Additional development was completed by pumping. The pump was positioned just above the bottom of the screen and set to a rate between 0.5 and 3 gallons per minute. Pumping continued until water returned was less than 10 nephelometric turbidity units, total water volume exceeded the volume of water added during the drilling process, and monitored parameters were stabilized for four consecutive readings,

- A minimum of five casing volumes of water were purged from each well to develop the filter pack. Additional volume was purged during development to equal the volume of water added during the drilling process.

- At the completion of well development, an aliquot was collected in the Imhoff cone and immediately photographed to document the final turbidity.

- Initial groundwater samples were collected within 10 days after well development, in accordance with Section 6.5.17.3 of the RCRA Permit (NMED, 2010).

The site geologist monitored field parameters including pH, temperature, turbidity, and specific conductance with the multiparameter meter and turbidimeter, and recorded the results and other pertinent information on a Field Record of Well Development Form that can be found in Appendix J.

B-1.8 Well Survey

Land survey activities were conducted after well installation activities were complete, in accordance with the requirements of Part 6.5.8 of the RCRA Permit (NMED, 2010) and the approved Work Plan for (Kirtland AFB, 2020).

The surveys were conducted at locations on Kirtland AFB, adjacent National Guard property, and residential neighborhoods within a city of Albuquerque right-of-way, as required. Surveys were performed by a New Mexico licensed surveyor to 0.01-ft accuracy. The surveys were tied into the existing well network survey in at least two points plus a benchmark.

The surveys established northings, eastings, and elevations at all locations. Daily reports consisted of a tabulation of the location, identification, coordinates, and elevations of each point surveyed that day.

B-1.9 Sampling

Investigation soil boring, initial soil vapor, and initial groundwater samples were collected in accordance with the requirements in Part 6.5.1.1, 6.5.16, and 6.5.17.5 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

B-1.9.1 Sample Handling, Shipping, and Custody

Sample handling, shipping, custody, and labeling was conducted in accordance with the requirements of Part 6.5.5.1, 6.5.5.2, and 6.5.5.3, 6.5.5.4 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

Sample packaging and shipping requirements were designed to maintain sample integrity from the time a sample was collected until it was received at the analytical laboratory. All chain-of-custody forms, sample labels, custody seals, and other sample documents were completed. The following specific procedures for packaging and shipping of environmental samples were followed:

1. Sample labels were completed with indelible ink and attached to the sample bottle. For soil vapor samples, Summa canister labels, which were affixed to each canister, were filled out.

2. Soil and groundwater samples were shipped in coolers. In preparation for shipping the drain plug, if present, was taped shut so that no fluids (i.e., melted ice) could drain out of the cooler during shipment. Two large plastic bags were used as liners for the cooler. Ice was placed into the interior liner.

3. Containers for soil and groundwater samples were placed in bubble wrap at the discretion of the shipper, into press-and-seal plastic storage bags, and onto the ice. Summa canisters were wrapped in bubble wrap and placed in cardboard boxes.

4. A temperature blank was added into each cooler.

5. The liner was taped close, and additional packing material was added if needed.

6. A copy of the chain-of-custody form was taped to the inside of the cooler for soil and groundwater samples. The soil vapor sample chain-of-custody was placed inside of each cardboard box.

7. The cooler was closed, custody seals were affixed, and the cooler was taped shut.

8. Each cooler of soil and groundwater samples was shipped via an overnight carrier. A copy of the shipping bill was retained with the field records and sent electronically to the Project Chemist.

B-1.9.2 Soil Sampling

Soil sampling was conducted in accordance with the requirements in Parts 6.5.11, and 6.5.14 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

Forty-two samples for laboratory analysis were collected every 10 ft during sonic drilling throughout the continuously cored interval (approximately 230 ft bgs to total depth). Additional samples for laboratory analyses were selected based on elevated PID measurements (augmented by lithologic and qualitative data).
Soil samples were collected at a minimum of every 10 feet of the soil interval that was sampled using sonic coring in accordance with the approved Work Plan (Kirtland AFB, 2020). Soil samples were collected in laboratory-provided containers immediately after the core sleeves were opened for photographic documentation. Soil sampling for VOCs and gasoline-range organics was performed by

pushing the En Core® sampler into the soil within the opened core sleeve. When the core device became full, the cap sealed the soil sample in the En Core® sampler void of headspace. Additionally, 4-oz jars were filled with soil for moisture and diesel-range organic analyses. Soil samples were stored on ice and shipped to the analytical laboratory on ice under chain of custody documentation.

B-1.9.3 Soil Vapor Sampling

Soil vapor sampling was conducted in accordance with the requirements in Part 6.5.16 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

B-1.9.3.1 Equipment

Soil vapor samples were collected in Summa canisters, each with a unique pressure gauge. A sample train consisting of 0.5-inch fluorinated ethylene propylene tubing and a four-way stainless steel Swagelok cross equipped with quick connects was used in conjunction with a Horiba Mexa-584L emissions analyzer and a Gast rotary vane pump to purge the well, measure field parameters, and collect the soil vapor sample. The Horiba Mexa-584L was calibrated in accordance with the manufacturer's instructions daily before sampling and bump tested halfway through the day. If the results of the bump test fell outside of the accepted range, the instrument was calibrated. In addition, the instrument was recalibrated if readings began to drift, based on the professional judgement of the sampling team.

A digital manometer was used to gauge pressure in the well and a PID was used to ensure a safe working environment. The digital manometer does not require field calibration. The Swagelok fittings and tubing assembly underwent a pressure test at the beginning, middle, and end of each day by sealing the assembly, using the pump to apply a vacuum, and using the digital manometer to measure the vacuum pressure over a 10-minute period to confirm that there was no leakage in the assembly.

B-1.9.3.2 Methods

Upon removing the well cap, the well head was connected to the sample train via a quick connect port. The manometer was added to the system to gauge the initial well pressure and then removed. The well was then be purged of a pre-calculated vapor volume based upon the well dimensions; a flow control valve fitted to the rotary vane pump controlled the purge flow rate. The initial pressure of the Summa canister was recorded.

Once the purge was complete, the field parameters, carbon dioxide, oxygen, and total hydrocarbons, were measured by the Horiba and the manometer was used to read the post-purge pressure. Field parameters were recorded on field data sheets and a photograph of the Horiba measurement screen was taken for documentation. A sample was collected by connecting the Summa canister to the system and filling it to a vacuum pressure between 0 and -5inches of mercury. The final pressure of the Summa canister was recorded on a field form, and the sample was shipped to a laboratory for analysis.

B-1.10 Groundwater Sampling

Liquid levels were measured, and wells were purged and sampled in accordance with the requirements of Parts 6.5.17.2 through 6.5.17.6 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020).

Wells were allowed to recover a minimum of 24 hours following development before gauging, or any applicable water sampling. Initial sampling of each well occurred within 10 days after development. Depth to groundwater and LNAPL, if present, were measured following well development. All wells were sampled using the low flow sampling technique.

B-1.10.1 Equipment

Low flow sampling was conducted using a portable Bennett pump. Interface probes, PIDs, multi-parameter meters with a flow-through cell attached, and turbidimeters were also used during low-flow sampling.

B-1.10.2 Field Parameter Measurements

Field parameters were collected in accordance with the requirements in Part 6.2.2.1 of the RCRA Permit (NMED, 2010).

B-1.10.2.1 Field Parameter Measurements Using a Flow-Through Cell

Field parameters were measured using a flow-through cell. The multiparameter meter probe was placed into the flow-through cell. Purge water entered the cell through the bottom and exited through the top into the required container to be held in the appropriate investigation-derived waste (IDW) yard. The multiparameter meter displayed instantaneous measurements that updated as the chemistry of the water flowing through the cell changed. Data was recorded on a field form at the frequency required for the activity.

B-1.10.3 Liquid Levels

Liquid levels were measured in accordance with the requirements in Part 6.5.17.2 of the RCRA Permit (NMED, 2010) and the approved Work Plan (Kirtland AFB, 2020) using an oil-water interface probe of appropriate length based on historical water levels. The interface probe was deployed in the well, and depth to LNAPL (if applicable) and water was measured to the individual well’s measuring reference point, the top of the well vault, using a straight edge placed across the vault. The interface probe was decontaminated prior to use.

B-1.10.4 Low Flow Groundwater Sampling

Monitoring wells were sampled following field parameter stabilization in accordance with an approved variance to the purge completion requirements in Part 6.5.17.4 of the RCRA Permit (NMED, 2010). Sampling was conducted as follows:

- Dedicated tubing and a decontaminated pump were used to sample each well. The pump intake was set approximately 2 ft above the bottom of the screened interval.
- Purging began at a rate of approximately 0.5 liter per minute and was increased or decreased to maintain the water level in the well. The flow rate did not exceed 1 liter per minute or fall below 0.1 liter per minute during the stabilization and sampling periods.
- The following field parameters were monitoring during purging: dissolved oxygen, pH, oxygen reduction potential, turbidity, specific conductivity, and temperature.
- The water level was monitored continuously during purging to ensure it did not exceed a distance of 25 percent (%) of the length of the saturated screened interval.

Purging was considered complete when the groundwater quality parameters stabilized for three consecutive readings to within ±10% for specific conductivity, dissolved oxygen, temperature, and turbidity (only required when the nephelometric turbidity units are greater than 10) and ± 0.5 standard units for pH. Groundwater quality measurements were made at a minimum of 5-minute intervals and recorded on a Well Purge and Sampling Log.

Upon stabilization of groundwater quality parameters, groundwater samples were collected and handled in accordance with Part 6.5.5 of the RCRA Permit (NMED, 2010). The required sampling containers were filled and placed on ice pending shipping. The samples were submitted for laboratory analysis of the constituents specified in the approved Work Plan (Kirtland AFB, 2020). Six groundwater samples were collected for this investigation.

B-1.11 Investigation Derived Waste Management and Disposal

The IDW was managed and disposed of in accordance with Part 6.5.7 of the RCRA Permit (NMED, 2010 and the approved Work Plan (Kirtland AFB, 2020). The generated IDW was properly contained, handled, labeled, transported, and placed in IDW storage areas prior to the end of each shift. The waste material was then sampled for characterization to determine the disposal method.

All waste was placed in appropriate containers, in good condition, at the point of origin. Waste containers were selected, in advanced, based on the anticipated waste type and volume as part of the investigation pre-planning activities. All waste containers were inspected prior to use to ensure they were good usable condition.

All waste containers were properly labeled immediately upon receiving waste. Labels, once placed on the container, were 100% covered with clear tape to help protect it from the elements. All non-hazardous waste containers received a green “Non-Hazardous Waste” label. All containers containing known or suspected hazardous waste were properly labeled per State and Federal RCRA waste requirements.

Non-hazardous liquids were placed in blue, polyethylene, open-top 55 to 65-gallon capacity drums. The drums had matching polyethylene covers with lock rings to seal the container. Drums were filled to a maximum capacity of 80%. During this investigation, non-hazardous liquid waste placed in either 55-gallon (gal) steel drums, 280-gal totes, 2500-gal, or 3,000-gal poly tanks.

Hazardous or suspected hazardous liquids were generated from well development activities. These liquids were placed in UN-approved, steel, open-top, 55-gallon drums. Drums had a matching steel cover with a moisture seal and a lock ring that securely sealed the lid to the container. The lock rings were installed with the bolt rings downward once installed and properly secured.

Non-hazardous drill cuttings were placed in either 16-cubic yard (cy) or 20-cy roll off bins that were double-lined with 10-mil plastic sheeting. The 20-cy roll off bins were open top with a heavy, flexible “tarp” cover and the 16-cy bins had hard-top lids with an attached, sliding solid top with integrated tie-down straps.

Non-hazardous and hazardous waste generated during the investigation were held in designated, on-Base, storage yards. Non-hazardous waste was placed at the Zia Park IDW yard located just south of the main EA Field Office. Hazardous waste was stored in a designated, RCRA less than (<) 90-day accumulation area per State/Federal RCRA regulations. At Kirtland AFB, the BFF project has two designated RCRA 90-day accumulation areas:

1) BFF <90-Day Accumulation Area: Used strictly for BFF GWM liquid hazardous or potentially hazardous waste.

2) Zia Park Temporary <90-Day Accumulation Area: Used for drilling-related liquid and solid (soil) potentially hazardous or hazardous waste.

The drilling and GWM liquid/solid waste was not kept at the point of origin for either on-Base or off-Base drilling locations. Soil roll-off bins were temporarily held at a secured drill site and covered at the end of each shift and there was sufficient site security during non-work hours. Drill sites within Kirtland AFB were considered secure locations. Security services were in place at the off-Base site locations during non-working hours.

All drummed waste was placed on wooden pallets that were available in the Zia Park temporary <90-day accumulation area. Soil roll-off bins with dry soil were placed directly on the ground. Bins with non-hazardous soils with free liquids in the bin were placed on poly sheeting with bermed edges to act as secondary containment. All hazardous liquid waste in the held in the BFF<90-day accumulation area was placed on secondary containment pallets. The pallets were of sufficient volume to hold at least one drum of liquid. Drums were properly positioned on the containment pallet so that no part of the drum was hanging over the edge.

B-1.12 Documentation

All IDW was tracked from the point of generation to disposal and reported in the investigation report. The Project Waste Coordinator was responsible for tracking all non-hazardous and hazardous waste generated on the project and worked with the groundwater treatment system (GWTS) engineers and operator to document all IDW processed through the GWTS.

B-1.13 Waste Disposal

Routine non-hazardous liquids, such as GWM purge and well development water, was disposed on-Base at the GWTS provided the water meets GWTS waste acceptance criteria WAC. Water that did not meet GWTS criteria were disposed at an off-Base permitted facility.
Hazardous liquids were transported off-Base and disposed of at a permitted facility.

Non-hazardous solids (soil), typically drill cuttings are disposed at the Kirtland AFB construction & demolition landfill. Each roll off bin was independently sampled for characterization. Generated disposal request packages were reviewed and approved by Kirtland AFB.

Off-Base disposal of non-hazardous solids was performed for wastes including saturated drill cuttings and heavy drilling mud. Heavy drilling mud and saturated cuttings were disposed at a permitted facility.

Liquid hazardous waste held in the RCRA <90-day accumulation areas were disposed at permitted hazardous waste facility licensed to accept liquids or liquids with solids with benzene (D018) and LNAPL waste.

B-1.14 References

Kirtland AFB. 2020. *Work Plan for Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252, Bulk Fuels Facility, SWMUs ST-106/SS-111*. Prepared by Sundance Consulting, Inc., for Kirtland AFB under USACE–Albuquerque District Contract No. W912PP-17-C-0028. September.

NMED. 2010. Hazardous Waste Treatment Facility Operating Permit, EPA ID No. NM9570024423, issued to U.S. Air Force for the Open Detonation Unit Located at Kirtland Air Force Base, Bernalillo County, New Mexico, by the NMED Hazardous Waste Bureau. July.

APPENDIX C

DATA QUALITY CONTROL REPORTS

Daily Field Activity Log

DATE: 10/9/2020 PROJECT NAME/NO.: USO1-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SN 11/23/2020

SUMMARY OF DAILY ACTIVITIES

10/9	Trailer delivery Fenc install

WORK PERFORMED

0800	Met Scotts Fencing at trailer. Discussed utility locate
0815	Escorted Mobile minito Laydown Yard
0845	Scott's finished at contractor yard, escorted to IDW Yard
0900	Chris from Scotts arrived. Discussed fence panel quantities
0930	Left to run errands
1100	Returned to IDW Yard, signed Scotts paperwork.
1115	Left Site

RGH 10/9/2020

Rachel Hobbs
Name

Rachel Hobbs
Signature

Stephen Newman
Reviewed By

11/23/2020
Reviewed Date

DATE: 10·15·20 PROJECT NAME/NO.: KAFB BFF /US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance
LEROY MOORHEAD	HMCG
DALLAS FIELDER	HMCG

SUMMARY OF DAILY ACTIVITIES

10.15	POTHOLING & UTILITY CLEARANCE

WORK PERFORMED

0700	ARRIVE OUTSIDE BFF TO MEET HIGH MESA
	CONSULTING
0705	MEET L MOOREHEAD AND D. FIELDER. ENTER BFF
	PERFORM SAFETY TAILGATE, SIGN TAILGATE & JSA
	AT LOCATION 251. OBSERVE HMCG LOOK FOR
	METAL UTILITIES AT KAFB-106251
0825	E. WHITE ARRIVED DISCUSSED LOCATION OF
	UTILITIES AT KAFB-106249 & KAFB-106250
0930	OBSERVED COMPLETE HOLE AT KAFB-106251
	HMCG BACKFILLED HOLE AND REPLACED STAKE
1000	ARRIVED AT KAFB-106250. MANY CARS IN
	PARKING LOT. WENT TO KAFB-106249 WHERE
	PARKING SPOTS WERE BLOCKED OFF
1045	MARK LOCATION - LOCATION IS 4.5 FEET FROM
	~~AN~~ PREVIOUSLY UNKNOWN LINE THAT WAS NOT
	MARKED ON DIG PERMIT, CALL B. NYDOSKE TO
	DISCUSS REQUIREMENTS FOR MOVING LOCATION
1050	BEGIN TO CUT ASPHALT AT 106249 RGH
1230	TALK W/ J. GONZALEZ. AGREE TO JUST DO
	POTHOLING TODAY. COLD PATCH 16" HOLES AND
	RETURN LATER TO DO ASPHALT CUTTING
1240	HCMG STOPPED DO TO AIR GUN OVERHEATING
1325	COMPLETED EXCAVATION AT KAFB-106249
1330	BACKFILLED HOLE W/ CUTTINGS AND COLD-PATCHED
	THE HOLE
1400	ARRIVED AT KAFB-106251- TRUCK IN WAY. HAVE TO
	FIND OWNER AND HAVE HIM MOVE. HMCG BIO BREAK
1430	BEGIN POTHOLING AT KAFB-106251

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fitch
Reviewed By

11/09/2020
Reviewed Date

DATE: 10/15/20 PROJECT NAME/NO.: US01-030

WORK PERFORMED

1545	COMPLETE POTHOLING AT KAFB-106251
1600	BACKFILL AT 251 AND PATCH
1620	CLEANUP / DEMOB

RGH 10/15/20

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fitch
Reviewed By

11/09/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 11/7/20

WEATHER: Cloudy, windy, Hi 68° WELL ID: N/A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Mason Miller	Cascade
John Alexander	Cascade

2. OPERATING EQUIPMENT

Fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Unloaded pipe, decon pad, organized lay down yard, fixed fuel line on drilling rig.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

1030	M. McVey on site at lay down yard.
1100	Cascade on site at lay down yard. Unload pipe, organize lay down yard, set up decon pad, etc.

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 11-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11/7/20

4. WORK PERFORMED (Continued)

1500	Forrest heading to the shop in Peralta to get a replacement part for the fuel line on the drilling rig.
1715	Forrest back at the lay down yard. Will replace the part. Sonic rig on site at the lay down yard. Sonic pipe and support items will arrive tomorrow.
1725	ARCH rig is fixed. Will mob everything over to the BFF in the morning.
1730	Cascade and M. McVey off site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 11-19-2020

Data Gaps Drilling Proj.

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone Coring~~ -- 62735DM02

Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/8/20

WEATHER: Sunny, windy, Hi 65°

WELL ID: ~~KAFB-106IN2~~ KAFB-106V3

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
Forrest Chattin	Cascade
Mason Miller	Cascade
John Alexander	Cascade
Dylan Schmeeck	EA
Josh Messenger	EA

2. OPERATING EQUIPMENT

ARCH rig, air compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Moved ARCH rig, pipe, and support equipment to the BFF. Rig set up at first drilling location, but there was a problem with the fuel system. Wagner will call the driller in the morning and will likely need to come to the site to repair the rig before drilling can commence.

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	M. McVey, Cascade on site at the lay down yard. Loading pipe and drilling support equipment for the ARCH rig to take to the BFF.
0730	Mob equipment, pipe, and ARCH rig to the BFF.

DQCR Page 1 of 2

Reviewed by: JM Initials: — Reviewed date: 11-19-2020

DATE: 11/8/20

4. WORK PERFORMED (Continued)

	Begin setting up rig and drilling support equipment at first drilling location in the BFF.
0800	Sonic pipe and support equipment arrives at BFF. Unload and stage pipe and equipment in gravel area north of first drilling location.
1042	Finished unloading sonic pipe and equipment, finished transporting and unloading ARCH pipe and drilling equipment to BFF.
1320	Finished setting up ARCH rig, hammer, air compressor, cyclone, cuttings bin, traffic control, etc. in preparation to drill.
1340	Drilling rig keeps dying. Forrest will call Bryan to discuss.
1418	Calling Wagner to come work on the rig. Something wrong with the fuel system.
1502	Wagner cannot come out today. Will call Forrest in the morning. Head over to lay down yard to finish screwing pipe together.
1730	M. McVey, Cascade off site.
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 11-19-2020

DATE: 11/8/2020 PROJECT NAME/NO.: KAFB BFF US01030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	SND
Stephen Newman	SND
Rachel Hobbs	SND

SUMMARY OF DAILY ACTIVITIES

	Tailgate meeting at SND Yard
	Observe EA Drilling

WORK PERFORMED

11:30	Arrived at SND Yard
1145	Tailgate meeting w/ SND personnel
1230	Arrive at Drill site
1420	Left Drill site to SND Yard (Rig Broken)
1430	Left Yard

11/8/2020

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/8/2020
Reviewed Date

Data Gaps Drilling Project

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone Coring~~ -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/9/20

WEATHER: Cloudy, windy, cold

WELL ID: ~~KAFB-106IN2~~ KAFB-106V3

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bankisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Josh Messenger	EA
Dylan Schmeelk	EA
Forrest Chattin	
John Alexander	
Mason Mills	

2. OPERATING EQUIPMENT

ARCH rig, air compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

	- Drilled boring 106S10 to 175'

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	M. McVey, Cascade on site at lay down yard.
	Will continue to screw pipe together and
	stage in laydown yard. Doghouse for sonic
	rig arrives on site at laydown yard with

DQCR Page 1 of 2

Reviewed by: Initials: — Reviewed date: 11-19-2020

DATE: 11/4/20

4. WORK PERFORMED (Continued)

	the rest of the sonic rig helpers. Unload sonic
	pipe and equipment from doghouse.
0800	Santiago Gallegos (USACE) on site at BFF.
1130	Mechanic arrives at BFF to repair ABCH
	rig.
1238	Rig fixed, mechanic off site.
1240	Ben Moayyad (USACE) on site at BFF; Jim
	kirkland (PAE corrosion control) on site at
	BFF.
1300	Call in hot work permit; Ben Moayyad and
	Santiago Gallegos off site.
1328	Hot work permit cancelled.
1340	Project H&S ~~a~~ kickoff meeting conducted.
1420	Start drilling.
1430	Sundance on site to observe drilling.
1440	Jim kirkland, off site. ~~B. Bockisch off site.~~
1600	B. Bockisch off site.
1626	Sundance off site.
1700	Shut down drilling for the day, drilled
	to 175'. Approx. 5 yd³ of IDW.
1715	J. Messenger, D. Schmeelk, Sundance
	off site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 11-19-2020

DATE: 11/09/2020 PROJECT NAME/NO.: KAFB 01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Rachel ~~H~~ Hobbs	

SUMMARY OF DAILY ACTIVITIES

	Observe EA Drilling

WORK PERFORMED

7:00	Safety Meeting
720	Drive to Drill site
7:25	Observe Drilling
1625	Left site to Yard
1630	Left Yard

SN 11/9/2020

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/9/20
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO
DATE: 11/10/20
WEATHER: CLEAR, COLD ≈ 45°F
WELL ID: KAFB106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. BOGLISCH	EA - Site Manager/Supervisor
B. BOGLISCH / M. MCVEY	EA - Site Health and Safetly Office
J. MESSENGER	EA
D. SCHMEELK	EA
Justin Maples, Josh Clotwier, Austin Reeves, Mason Miller, John Alexander, Forrest Chattin	Cascade

2. OPERATING EQUIPMENT
SPEEDSTAR 50K, TENDER, FORKLIFT

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
0700	EA AND CASCADE ONSITE, PREP FOR WORK
0730	TGSM
	- Drilled to 227' with the ARCH rig.
	- Tripped in sonic casing to 227' and pulled out the ARCH casing.
	- Collected rinsate samples from two of the four sonic core barrels.
	- Ready to start drilling at 227' with the sonic rig tomorrow morning.
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0700	PREP FOR WORK
0730	TGSM, DISCUSSED PINCH POINTS, OVERHEAD HAZARDS WATCH FOR TRAFFIC
0750	CASCADE MOVES TO LAYDOWN TO CHECK CONTRACT LOAD OF

DQCR Page 1 of 2

Reviewed by: JM
Reviewed date: 11-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11/10/20

4. WORK PERFORMED (Continued)

	materials and offload
0800	Offloading well materials at laydown yard.
0820	M. McVey on site. Hand over SSHO duties.
0828	Start drilling.
0915	Drilled to 227'. Bottom of drive casing at 228'.
0920	Trip out ARCH drilling pipe.
1105	Trip in sonic casing.
1225	Sonic casing tripped in and sitting on the bottom of the borehole at 227'.
1335	Tripping out ARCH drive casing, which was advanced to 228'.
1446	ARCH casing pulled. Demob ARCH rig and bring in sonic rig. 6 yd³ of IDW generated from ARCH drilling today.
1558	Tripping sonic drill pipe into borehole, screw 2 10-foot joints together and trip back out in preparation for drilling tomorrow.
1635	Collect rinsate samples from two of the sonic core barrels which have already been deconed. The other two core barrels will be deconed in the morning and then rinsate samples will be collected.
1653	Cascade off site
1705	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 11-19-2020

DATE: 11/10/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

	Observe EA Drilling -> move rig to KAFB-106251

WORK PERFORMED

0900	JF observed EA Drilling at KAFB-106510
1000	JF returned to Yard to organize/load for drilling KAFB-106251
1500	Rig Demob from KAFB-106510 & move to stage at KAFB-106251
1530	RH Arrives
	Observe/talk w/ drillers
1700	Depart site

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/11/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/11/20

WEATHER: Partly cloudy, breezy, cold

WELL ID: 106510

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Dylan Schmeelk	EA
Josh Messenger	EA
Josh Clotwier	Cascade
Justin Maples	Cascade

2. OPERATING EQUIPMENT

Sonic rig, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Cored to 270' today. PID readings in samples ranged from 0.0 to 1,444 ppmv.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site at BFF.
0805	Heading over to laydown yard to decon the two remaining core barrels.
0841	Lane Andress (NMED) and Ben Moayyad (USACE)

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 11-19-2020

DATE: 11/11/20

4. WORK PERFORMED (Continued)

	on site
0905	Collect rinsate samples from two core barrels that were decon'd earlier.
0930	Start drilling. TD tagged at 226'. Will remove sluff and native soil to 230' in first core barrel and then start coring at 230'.
1658	Finished drilling for the day. Drilled to 270' today. PID readings for samples ranged from 0.0 to 1,444 ppmv.
1700	Cascade off site
1705	Luna Andrews and Ben Moayyad off site
1730	EA off site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVay
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 11-19-2020

DATE: 11/11/20 PROJECT NAME/NO.: 0501-030 KAFB BFF

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	SD
Justin Fitch	SD
Stephen Newman	SD

SUMMARY OF DAILY ACTIVITIES

11/11/20	Advance casing to 130

WORK PERFORMED

0710	Meet w/drillers Cascade at laydown yard
	discuss APP and safety tailgate
0730	Cascade gets water, Rachel to office
	to print OSE permit, Cascade loads casing
0840	Arrive at KAFB-106251, Cascade sets up location.
0940	Safety discussion w/ Cascade, discuss hazards
	emergency stops, Fire ~~ext~~ inquishers etc.
1000	Call in hot work so cascade can grind casing.
	Observe hot work in yard.
1020	Called off hot work permit, Cascade continues
	setup
1130	B. Moayyad on site.
1150	Lunch
1230	Started drilling
1430	~80 Ft BGS. JD Nance Arrives, B. Moayyad
	& L. Andress on site
1540	at 125 ft bgs. Dirt and clay in casing hammer.
	Casing hammer lost bottom seal and clay stuck
	casing hammer to drill stem
1630	~~the~~ Circulating water to separate hammer from
	drill stem.
1645	Hammer unstuck continue to 135 ft bgs.
1700	Call B. Moayad to report path forward.
1720	Clean up for night.
	RGH

Rachel Hobbs
Name

Rachel Hobbs
Signature

Stephen Newman
Reviewed By

11/11/2020
Reviewed Date

DATE: 11/11/2020 PROJECT NAME/NO.: KAFB-106257 - VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Rachel Hobbs	Sundance
Stephen Newman	Sundance

SUMMARY OF DAILY ACTIVITIES

	Rig up
	Drill (ARCH) to 200'

WORK PERFORMED

0700	Arrive - Monitor Cascade setup - water/casing loading
0900	Move to KAFB-106257 site & Rig up
1230	Start drilling
1540	Rig Repairs - Clay clog btwn drillstring & casing
	- flush w/ water to unclog - 150 gal
1700	Rig fixed - next 2 samples only a slurry - No PID at 130'
1720	covered IDW Rolloffs & left to Yard
1730	Unpack at Yard
1735	Depart

Name: Justin Fitch Signature: [signature]

Reviewed By: Stephen Newman Reviewed Date: 11/11/2020

Data Gaps Drilling Project

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone Coring~~ -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/12/20

WEATHER: Partly cloudy, Hi 57°

WELL ID: ~~KAFB-106IN2~~ KAFB-106V3 SM

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Boskisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
J. Messenger	EA
D. Schmeelk	EA
Justin Maples	Cascade
Josh Clotwier	Cascade
Ben Moayyad	USACE
Phil Lovato	USACE

2. OPERATING EQUIPMENT

Sonic rig, fork lift, generator, support trucks

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Finished coring to 300'
- Emptied ~1 yd³ of IDW in roll off. Total from ARCH and Sonic ~12 yd³

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site
0800	Start drilling. Will trip in, clean out any sluff in the bottom of the borehole and then start coring at 270'.

DQCR Page 1 of 2

Reviewed by: JM Initials: — Reviewed date: 11-19-2020

DATE: 11/12/20

4. WORK PERFORMED (Continued)	
0805	Ben Mouyyad (USACE) on site
0845	Phil Lovato (USACE) on site
1318	Finish coring to 300'. Pulled 8" casing
	up to 272' for days off so that it won't
	get stuck in the clay if it swells. Shut
	rig down
1340	Cascade off site
1400	J. Messenger and D. Schmeelk off site
1430	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature

EA Engineering, Science and Technology Inc., PBC

Reviewed by:

Reviewed date: 11-19-2020

DATE: 11/12/2020 PROJECT NAME/NO.: KAFB USDI-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance

SUMMARY OF DAILY ACTIVITIES

	Fix rig
	Drill to 200'
	Seal up well

WORK PERFORMED

0700	Arrived - check in w/ Forrest at drill site
0710	Go to yard - load up equip
0720	Back to site
0730	Tailgate
0740	Commence repairs
0800	Stephen went to trailer to calibrate PID
1130	Rig Repaired - fuel rig - Drillers went off-base for fuel - Lunch break
1235	Start drilling
1505	reach 13 3/8 TD @ 200' - trip out drill string
1515	Pack up gear in truck
1545	Return to yard - unpack
1605	Depart

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/12/2020
Reviewed Date

DATE: 11/16/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance

SUMMARY OF DAILY ACTIVITIES

	SN
	Trip in, toy & Connect

WORK PERFORMED

0830	Arrive - chat w/ drillers
0845	Pick up truck
0910	Tailgate meeting
0920	Remount hammer
1050	Accompany Drillers to yard for 11 3/4" casing & drillstring
1200	Drillers Lunch
1230	Trip in 11 3/4" casing & Drill string
1430	Accompany drillers to yard for 300' casing/drill string
1510	Begin Drilling
1645	Casing not threading - drillers went to yard for wrench
	Worked to unstick casing
1715	Packed up
1730	Returned to yard
1745	Depart

Justin Fitch
Name

[signature]
Signature

Stephen Newman
Reviewed By

11/18/2020
Reviewed Date

Data Gaps

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone~~ On Coring -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/17/20

WEATHER: Sunny, Hi 66°

WELL ID: ~~KAFB-106IN2~~ KAFB-106V3 SM

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
E. Morse/M. McVey	EA - Site Health and Safety Office
J. Messenger	EA
D. Schmeelk	EA
Justin Maples	Cascade
Josh Clotwier	Cascade

2. OPERATING EQUIPMENT

Sonic rig, fork lift, support truck and trailer, pressure washer

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Collected rinsate samples from core barrels post decon.
- Prepared materials to build well 106510/V3.
- Well casing and screen will be on site in the morning.

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	EA on site
0845	J. Messenger/D. Schmeelk disposing of core from boring 106510/V3
0915	Cascade on site. Finalize well construction

DQCR Page 1 of 2

Reviewed by: JM Initials: — Reviewed date: 11-19-2020

DATE: 11/17/20

4. WORK PERFORMED (Continued)

	details for 106510/V5 with Bernie.
1000	J. Messenger/D. Schmeck off site
1120	Cleaned 106510/V3 boring out to
	285' Casing set at 271.5'. Will
	take core barrels over to laydown
	yard to decon.
1245	J. Messenger/D. Schmeck on site
	at laydown yard to collect rinsate
	samples for second core barrels.
1335	Bring sand and bentonite back to
	well and stage.
1408	Head over to Truman gate to
	get Justin and Josh badges.
1435	Back at boring 106510/V3. Will
	clean up and finish staging
	materials. Casing and screen
	will be on site in the morning.
1445	Cascade off site, EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 11-19-2020

DATE: 11/17/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, John, Mason	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drill to ~400'.
	Trip out drillstring

WORK PERFORMED

0645	Arrive, cal. PID, Load truck
0700	Go to site
0715	Tailgate
0800	Begin Drilling/Sampling
1230	Lunch
1300	Tight hole - trip out bit, use pipe jack to back out casing
1700	Left site to Yard
1705	Unpack Truck
1715	Depart

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/17/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project – 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11/18/20

WEATHER: Sunny, warm, slight breeze

WELL ID: 106510/V3

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bakisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
D. Schmeelk	EA
JUSTIN MAPLES	Cascade
Josh Clotwier	Cascade

2. OPERATING EQUIPMENT

Sonic rig, forklift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Completed well to 235.3'. Bentonite chips will hydrate overnight. Bentonite grout to be placed from 235.3' to 25' in the morning.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

1100	EA on site
1130	Cascade on site
1254	Backfill boring from 285' to 281' with
	10/20 silica sand. Begin well construction.

DQCR Page 1 of 2

Reviewed by:

Reviewed date: 11-20-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11/18/20

4. WORK PERFORMED (Continued)

1605	Completed well to 235.3'. Will allow bentonite chips to hydrate. Will prep for injection of grout in the morning.
1625	J. Messenger / U. Schmeellk off site
1700	Cascade off site
1710	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: ______ Reviewed date: 10-20-2020

DATE: 11/18/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, Mason, John	Cascade

SUMMARY OF DAILY ACTIVITIES

	Weld under-reaming bit and put in hole - trip in drillstring & replace 80' casing
	Drill 400' to 435' - broken chain in hammer

WORK PERFORMED

0650	Arrive at Yard
0700	Go to site
0705	Tailgate Safety meeting
0715	Accompany Cascade to their yard for bit
0745	Return to site
0750	Call in hot work for Cascade welding on bit
0850	finished welding
0900	Went to Laydown Yard to load up sampling gear
0915	Returned to site
0930	Drillers began running drillstring in w/ new bit
1145	Lunch
1215	Re-insert 80' removed yesterday
1445	Start collecting samples at 400'
1500	Breathing Zone PID at wellhead: 0.0
1620	Rachel Arrived
1630	Stop Drilling to replace broken chain in hammer
1640	Close IDW roll-offs
1725	Leave site to Yard
1730	Unload truck
1740	Leave Yard

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/18/2020
Reviewed Date

Data Gap Drilling Project 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring~~ -- ~~62599DM01~~ JM
Daily Quality Control Report – Non-Construction

1062

ROLE: SSHO

DATE: 11-19-2020

WEATHER: Clear / Mild

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse / Mike McVey	EA - Site Health and Safetly Office
Justin Maples	Cascade
Josh Chothier	Cascade
J. Messenger	EA
D. Schmeelk	EA

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Approximately 90' of 1" SCH 80 PVC tremie pipe broke off at the joint and is encased in high solids bentonite grout from approx. 130 to 210' bgs.
- Cascade used 1" steel tremie pipe to grout to approx. 90' bgs by the end of the day. Will get a hard tag in the morning.

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0715	Safety Brief
0720	Cascade discusses Plan of day
0740	Setting up to grout well.
0923	Begin grouting well from 235.3' to 25'.

DQCR Page 1 of 2

Reviewed by: JM Initials: — Reviewed date: 11-20-2020

Data Gap Drilling Program - 62735DM02 2 of 2

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ JM
Daily Quality Control Report – Non-Construction

KAFB-106V3

4. WORK PERFORMED (Continued) DATE: 11-19-2020

0955	Approx. 90' of 1" SCH 80 PVC tremie pipe broke off at the joint and is encased in high solids bentonite grout from approx. 130' to 210'. Discussed situation with USACE and the Air Force. Decision was made to continue with well construction using new tremie pipe.
1040	Drillers refilling water tote. Will then go get new tremie pipe to finish completion of the well.
1330	Drillers back on site with 1" steel tremie pipe.
1350	Start grouting.
1710	Finished grouting for the day. Grout at approx. 90' bgs. Will get a hard tag in the morning.
1720	Cascade off site
1730	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM Initials: Reviewed date: 11-20-2020

Hydrovac

Data Gaps Drilling - 62735DM02 1 of 2

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~ JM
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11-20-2020

WEATHER:

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse	EA - Site Health and Safetly Office
Leroy Moorehead	High Mesa
Dallas Fielden	High Mesa

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0650	Meet at Truman to get High Mesa Badges
0710	See Bernie at BFF Trailer. He is confirming
	well spot. Waiting on High Mesa to get
	through Contractor Gate.

DQCR Page 1 of 2

Reviewed by: JM Initials: Reviewed date: 11-23-2020

KAFB-106S10

4. WORK PERFORMED (Continued) DATE: 11-20-2020

0735	High Mesa Arrives
0740	Daily safety brief. Confirmed with Bernie
	that the hydrovac hole is 14" x 8'
0750	Start Hydrovacing.
0830	High Mesa down to 7' bgs, still need to open
	up diameter to 14"
0850	Hole to 8' depth, clear of all utilities
	Measured hole diameter, 16" at surface, 14"
	diameter below. All looks good. OK to
	backfill hole with cuttings.
0905	Backfilling hole
0912	Staking & Flagging hole
0920	High Mesa off site.
0930	E. Morse off site.

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Earl Morse
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM Initials: Reviewed date: 11-23-2020

Coring

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone~~ Data Gaps Coring -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11 / 20 / 20

WEATHER: Partly cloudy, Hi 65°

WELL ID: ~~KAFB-106IN2~~ KAFB-106V3/ KAFB-106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
D. Schmeelk	EA
Justin Maples	Cascade
Josh Clotwier	Cascade

2. OPERATING EQUIPMENT

Sonic rig, fork lifts, ARCH rig, generator, compressor, support trucks

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Completed construction of well 106V3. Will finish surface completion tomorrow.
- New hammer installed on ARCH rig. Ready to start drilling at new location in the morning.

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	EA on site
0700	Cascade on site, B. Bockisch on site
0720	Cascade leaving site to fill water tote.
0740	Cascade back on site

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM Initials: ____ Reviewed date: 11-23-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11/20/20

4. WORK PERFORMED (Continued)

0805	B. Brakiseh off site
0807	Tagged top of grout at 105' bgs
0815	Tripping in 1" steel tremie pipe to continue grout placement.
0830	Start grouting
1052	Tagged top of grout at 27.8' bgs. Will add bentonite chips from 27.8 to 17' bgs
1116	Bentonite chips placed ~~to~~ to 17' bgs
1125	Hanging lower 3/4" soil vapor well casing and screen in boring.
1158	Adding sand and bentonite chips in annulus around the well screen and casing, respectively
1221	Hanging upper 3/4" soil vapor well casing and screen in boring
1235	Adding sand and bentonite chips in annulus around the well screen and casing, respectively.
1250	Finished well construction. Will finish surface completion tomorrow.
1329	ARCH rig set up at next drilling location. Completing set up of ancillary drilling support equipment, exclusion zone, etc.
1351	Moving sonic rig off of 106V3. Dumping hopper in roll off bin. Finishing site cleanup.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVay

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 11-23-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11/22/20

4. WORK PERFORMED (Continued)

1420	Taking 8" sonic casing to the laydown yard to decon. ARCH rig crew loading well materials on trailer at laydown yard. Bryan Nydoske and Forrest Chattin are going to meet the driver with the hammer.
1615	Forrest on site at laydown yard with hammer.
1635	ARCH crew putting the new hammer on the tower.
1705	Hammer installed. Ready to drill in the morning.
1710	ARCH crew off site
1718	8" sonic core decond. Sonic crew off site.
1725	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ 3 of ~~2~~ 3

Reviewed by:

Reviewed date: 11-23-2020

KAFB-106 V3 Borehole fill notes

Time/Date	Initial depth	Actual Final depth	change	Target Section Volume	Bore/well diam.	Materials Installed	Theoretical material usage	Actual material usage	
1253 11-18-2020	285	281.1	3.9 ft	0.79 ft³	6" no well	1.5 Bags Sand (10/20) 50 lb	285-281 = 4 ft ≈ 1.5 bags @ ~2.5 ~~bags/ft~~ ft/bag	1.5 bags	Backfill
1311 11-18-2020	281.1	276.2	4.9 ft	1.5 ft³	6"/ 1 ft of 3" SCH 80 (3.5" OD)	Med Bentonite chips (50 lb bag) 2.25 bags	281-273 = 8 ft ~2.5 ~~bags/ft~~ ft/bag ≈ 3.2 bags	3.75 bags	Seal through clay
1315 11-18-2020	276.2	273.0	3.2 ft	~~[illegible]~~		+ 1/4 + 1 1/4 = 1.5 bags			
1409 11-18-2020	273.0	262.7	10.3 ft	2.5 ft³	6" to 271 ft, 8" above 3" SCH 80 throughout	Sand (10/20) 10 bags (50 lb)	273-263 = 10 ft ≈ 5 bags	10 bags likely due to void	Filter Pack
1455 11-18-2020 to 1558 EOB	262.7	235.3	27.4 ft	7.8 ft³	8"/3.5" OD sch 80	Med Bentonite Chips (50 lb bag) HHT HHT 111	262.7-235 = 27.7' ≈ 2.6 ft/bag req ≈ 10.5 bags	13 bags	Main seal (lower bentonite)
0750 (TD) 11-19-2020 Grouting 0923-1000, 1350-1700	235.2 New TD measurement	228	7.2 ft	2.0 ft³	8"/3.5" ~~sch 80~~ OD	Quick Grout (20% solids) in ~45 gal batches (~1.5 bags/batch)	235.2 - 25 = 210.2' req 680.7 gal ≈ 15 batches ≈ 22.5 bags	21	Grout
EOD	228	105 tagged at 0805 11-20-2020	123	+ 89.0 ft³ = 91 ft³ (680.7 gal)	9.625"/3.5" OD	21 bags @ EOD. ≈ 14 batches @ ≈45 gal ea ≈ 630 gal	@ EOD w/ ~630 gal TD estimated @ 90 ft BGS w/ theoretical estimate @ ~40 ft BGS		
0830 11-20-2020	105	27.8				Quick Grout (20% solids) in ~45 gal batches (~1.5 bags/batch) HHT 11		+	
1055 11-20-2020	27.8	17.0	10.8	4.7 ft³	9.625"/3.50 OD	Med Bentonite Chips (50 lb bag) HHT 11 + 1/2	27.8 - 17 = 10.8 ft ~37.5 lbs/ft req ≈ 7.5 bags	7.5	Main Seal (upper Bentonite)
1158 11-20-2020	~~10.8~~ 17.0	12.0	5.0 ft	1.2975 ~~0.853 ft³~~ ~~0.677 ft³~~ ~~1.73 ft³~~ 2.15 ft³	9 5/8"/3.5" OD + for 3' a 1.05" OD	Sand (10/20) 50 lb bags: HHT + 1/2 + 1 1/4	~~10.8 - 5~~ 17.0' - 12.0' = 5 ft req ≈ 4.5 bags	6.25	Lower SVM filter pack
1207 11-20-2020	~~5.0 ft~~ 12.0	9.1	2.9 ft	1.2975 ft³	9 5/8"/3.5" OD + 1.05" OD	Med Bentonite Chips (50 lb bag) 11	12 - 9 = 3' @ ~37 lbs/ft req. ≈ 2.25	2.25	Lower SVM Seal

KAFB-106V3 Borehole fill notes

Time / Date	Actual Initial depth	Actual Final Depth	Actual change	Target section Volume	Bore/well diam.	Materials Installed	Theoretical material usage	Actual material usage	
1223 11-20-2020	9.1	4.0	5.1 ft	0.865 ft^3 +1.~~28~~6 ft^3 ~~2.571 ft^3~~ 2.145 ft^3	9⅝"/3.5" OD + 2' 1.05" OD +3' 2x 1.05" OD	Sand 50 lb bag (10/20) HHT + ¼	~~9 - 3 = 6 ft~~ 9-4 = 5 ft^3 @ 0.49 ft^3/bag req ≈ 5.25 bags	5.25	Upper SVM filter pack
1242 11-20-2020 1250	4.0	2.0	2 ft	~~0.43 ft^3~~ 0.85 ft^3	9⅝"/3.5" +2x1.05"	Bentonite Chips Med (50 lb bags) 1 + ½	4-2 = 2 ft^3 req ~~~⅔ bag~~ ~1.5 bags	1.5	Upper SVM seal

0-228 = 9⅝"
228 - 271 = 8"
271 - ~~285~~ 281.1 = 6"

1250 — Tagged KAFB-106V3 (3" deep) for grout intrusion/water — no sign of grout intrusion — bottom 6" of sump had water

Data Gaps Drilling - 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~ Daily Quality Control Report – Non-Construction

1068

ROLE: SSHO

DATE: ~~11~~-21-2020

WEATHER:

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse/Mike McVey	EA - Site Health and Safetly Office
Josh Messenger	EA - GEO
Dylan Schmeelk	EA - GEO
Forrest Chester	Cascade
Mason Miller	Cascade
John Alexander	Cascade
Justin Maples Josh Clothier	Cascade

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

JM

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Drilled boring 106S10A to 230' bgs with the ARCH rig.
- Cored to 235' bgs with the sonic rig.
- Completed framing of concrete pad w/ rebar at 106V3. Dug holes for bollards and steel well shroud. Will mix concrete and finish the surface completion when done drilling 106S10A.

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0715	Safety Brief, Cascade setting up ARCH rig
0725	Justin/Josh arrive to install pad at V3
	Give them safety brief and discuss plan for
	Pad. Verified pad for V3 is 4'x4' w/rebar and 4 bollards at corners.

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM Initials: ~ Reviewed date: 11-23-2020

Data Gaps Drilling - 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ Daily Quality Control Report – Non-Construction

2 of 8

KAFB-106510A

4. WORK PERFORMED (Continued) DATE: 11-21-2020

0800	Start drilling on ARCH rig
0900	Drilling at 80' bgs, No odors from soil
	Removing discharge line to clear clog in line.
0905	Justin is cleaning out hole for surface casing,
	wood form for pad is ready.
0920	Clog cleared & rig back together, started drilling
0935	@115' breathing zone 0.0 ppm
1025	@175' " " 0.0 ppm
	Justin is setting rebar into form, digging holes
	for the bollards
1045	Drilling @ 200' bgs
1050	M. McVey arrives
1110	TD at 230' bgs. Pulling drill pipe.
1143	Finished pulling drill pipe
1154	ARCH rig demobes from boring 106510A.
	Finish site cleanup and demob before
	bringing in the sonic rig.
1234	Mobing sonic rig into place over
	boring 106510A. Will finish site setup
	to complete casing.
1320	Screwing 8" casing and drill pipe
	together
1501	Wireline kinked while screwing joints of
	drill pipe together. Justin heading to the
	hardware store to get the parts to
	splice it.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: Initials: Reviewed date: 11-23-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

KAFB 106510A DATE: 11/21/20

4. WORK PERFORMED (Continued)

1615	Justen back on site to repair wireline
1630	Wireline repaired. Start coring.
1705	Core barrel not cold enough to
	make another run to 240' so
	we will call it for the day and
	pickup in the morning.
1710	Cascade off site. Log core from 230 to
	235' bgs.
1730	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3 of 3

Reviewed by: JM

Reviewed date: 11-23-2020

Daily Field Activity Log

DATE: 11/21/2020 PROJECT NAME/NO.: KAFB-USO1-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, Mason, John	Cascade

SN

SUMMARY OF DAILY ACTIVITIES

	~~Change DS & set jacks~~

SN

WORK PERFORMED

1300	Arrive - pickup truck - go to site
1320	Tailgate Meeting
1330	Rig up, fuel up
1415	Fill water truck/tank
1440	Go to yard to unload drillstring (EAs) from truck
1500	Return to site - remove drillstring & bit
1630	Mount jack over hole
1715	Return to yard - unpack & lock up
1720	Leave Yard

SN 11/23/2020

Justin Fitch
Name

Signature

Stephen Newman
Reviewed By

11/23/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 11 / 22 / 20

WEATHER: Cloudy, Hi 55°, windy

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
D. Schmeelk	EA
J. Maples	Cascade
J. Slotwier	Cascade

2. OPERATING EQUIPMENT
Sonic rig, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

	- Drilled from 235' to 280' bgs with the Sonic rig.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site. Continue coring with the sonic rig.
0735	Start coring
1045	ACT on site to pick up roll off

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 11-23-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 11 / 22 / 20

4. WORK PERFORMED (Continued)

1306	Galveston Begay on site
1454	Galveston Begay off site
1635	D. Schmeelk off site
1645	J. Messenger off site
1700	8" casing driven to 280' bgs into the clay. Will leave the 8" casing in the clay and go in with 6" casing to TD. The 8" casing will keep the sand above the clay from being drug down and binding the casing up.
1710	Drive the box truck over to the laydown yard so we can load up the 6" casing in the morning.
1715	Cascade off site
1720	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 11-23-2020

DATE: 11/22/2020 PROJECT NAME/NO.:

ONSITE PERSONNEL

NAME	ORGANIZATION
Stephen Newman	Sundance
Forrest, John, Mason	Cascade

SUMMARY OF DAILY ACTIVITIES

	Efforts were made to pull the full length of the 11 3/4"
	casing out to replace the shoe, with no luck. A new strategy
	has been made to resolve the issue tomorrow.

WORK PERFORMED

0655	Arrive at Sundance laydown yard to prep for day.
0705	Arrive at KAFB-106251 for safety tailgate with crew
	from Cascade; discuss plan for the day.
0810	Back up empty rig, tender to well to begin pulling up casing.
1030	After pulling up 9 lengths of 20 ft, 11 3/4" diameter casing,
	casing has broken somewhere down-hole. Drillers
	now must try to pull casing up by using the bit
	and drill string. These tools will be used to pull
	up the casing from the bottom.
1215	The drillers went off-site for lunch.
1250	Drillers go to laydown yard for extra drill string.
1310	Raise boom and begin tripping in drill string to lift
	casing.
1500	Drill string is down hole as deep as casing. Drillers
	will use the hammer to loosen casing down hole, then
	try to lift casing using the drill string.
1630	Inner casing is not moving.
1645	After discussion with Bryan Nydoske, the drillers are
	going to set up to lift the outer casing out of the
	ground a few feet. If the two casings are bound together,
	this should resolve the issue. The drillers will set
	up for this and head home for the day.
1700	Drillers leave site; I return to trailer
1715	off site.

Stephen Newman
Name

Signature

Justin Fitch
Reviewed By

11/23/2020
Reviewed Date

DATE: 11/23/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, John, Mason	Cascade

SUMMARY OF DAILY ACTIVITIES

	Try to get tools out

WORK PERFORMED

0650	Arrive at Yard
0700	Go to site
0710	Tailgate
0725	Run to site for zip ties to hang Exclusion Zone signs
0740	PID Breathing Zone: 0.0 PPM
0840	Accompany Cascade to laydown yard
0900	Back to site
1215	Lunch
1245	Go to Yard for 5' casing
1255	Return to site
1615	Pipe not broke - just disconnected - attaching new 11 3/4" then removing some 13 3/8"
1710	Finish for day
1715	Return to yard
1715	Depart

SN 12/1/2020

Justin Fitch
Name

[signature]
Signature

Rachel Mohl
Reviewed By

3.4.2021
Reviewed Date

DATE: 11/24/20 PROJECT NAME/NO.: KAFB USCI-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, John, Mason	Cascade

SUMMARY OF DAILY ACTIVITIES

	Try to unstick pipe

SN 11/24/20

WORK PERFORMED

0650	Arrive at Yard
0700	Go to site
0710	Tailgate Meeting
0720	try to unstick pipe
	remove 3 stands of 13 3/8"
	Pull on 11 3/4"
	Broke drillstring
1700	Left site to yard
1715	Left yard

SN 11/24/2020

Name: Justin Fitch

Signature: [signature]

Reviewed By: Stephen Newman

Reviewed Date: [signature] 11/24/2020

DATE: 11/30/2020 PROJECT NAME/NO.: KAFB-US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, Mason, Sim	Cascade

SUMMARY OF DAILY ACTIVITIES

	Run camera downhole to view top of drill string
	Remove 13 5/8" casing
~~ ~~	~~ ~~

SN 12/1/20

WORK PERFORMED

0950	Arrive at Yard - Grab gear and truck & head to site
1000	Arrive at site
1025	Tailgate meeting
1040	Went to Laydown Yard to offload pipe (to be deconned)
1100	Started running camera downhole to view broken top of drillstring to be fished
1115	Rachel came - Discussed situation and plan forward
1230	Cascade took lunch
1300	Begin pulling 13 5/8" casing
1500	Casing getting tight at 95' - move jack - rig up to push casing back in
1630	Rig back up with casing jack
1650	Cascade left for yard to winterize casing
	Head to yard
1700	Depart

SN 12/1/20

Justin Fitch

Name

Signature

Stephen Newman

Reviewed By

12/1/2020

Reviewed Date

DATE: 12/1/2020 PROJECT NAME/NO.: US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Stephen Newman	Sundance
Forrest, John, Mason	Cascade
Justin Fitch	Sundance

SUMMARY OF DAILY ACTIVITIES

	Trip out all 13-3/8" casing, use bell tap to clean
	up broke drill string, prep fishing tools.

SN 12/1/2020

WORK PERFORMED

0655	Arrive at laydown yard
0700	Arrive at KAFB-106251; cascade is repairing a sensor
	on their forklift
0733	Safety tailgate
0735	Bryan Nydoske arrives on-site.
0940	All 13-3/8" casing has been tripped-out. (100 ft)
1000	Send camera down hole to get a second look.
1200	Bryan Nydoski returns to help/oversee operations.
	Drillers prep fishing equipment. Begin tripping in ~~belltap~~ SN
	drill string with bell-tap at the tip; this will be used
	for cleaning up the mutilated end of the drill string down hole.
1300	Trip out drill string, take another look with camera.
1340	Drillers decide to use bell tap to clean up
	down hole drill string a bit more.
1440	Trip out drill string, go down-hole with camera.
1530	Drill string looks good. Prep fishing tools to pull up drill
	string and casing
1700	Drillers leave site
1715	Off-site
	SN 12/1/2020

Name: Stephen Newman

Signature: [signature]

Reviewed By: Justin Fitch

Reviewed Date: 12/02/2020

Sundance Consulting, Inc. **Daily Field Activity Log**

DATE: 12/02/2020 PROJECT NAME/NO.: KAFB VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, Macon, Bryan	Cascade
Stephen Newman	Sundance

SUMMARY OF DAILY ACTIVITIES

	Try to get tools out

WORK PERFORMED

0645	Arrive at site yard
0650	Head to drill site
0715	Tailgate Meeting
0720	Prepare & mount fishing grapple & run downhole to connect w/ drillstring
1115	Rig down to pull forward & set casing jack
1145	Attempt to pull up drillstring -
1215	lunch
1245	Talked with Forrest - metal plate bent - Bryan is looking for a stronger replacement
1300	Drill crew went to yard to decon
1430	Drill crew returned to site
	Remove jack - rig up to try to remove stands of drill pipe with overshot grapple
1530	Stephen Newman arrives to sample full IDW soil roll-off
1540	Justin went to dig permit office
1620	Returned & helped package up IDW sample
1700	Drillers left
1715	Headed to yard to unload
1730	Depart

Justin Fitch

Name

Signature

Rachel Hobbs

Reviewed By

3-4-2021

Reviewed Date

DATE: 12/3/2020 PROJECT NAME/NO.: KHFB-106257 USCI-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, Julian, Mason	Cascade

SUMMARY OF DAILY ACTIVITIES

	Try to get tools out of well

WORK PERFORMED

0655	Arrive at Yard
0705	Go to site
0720	Tailgate
0730	Run overshot and casing down hole
1115	Move rig & set casing jack up
1215	Lunch
1215	Fire rig back up and pull on drillstring by bracing on casing stand & jacking casing
1500	Casing string "popped" back up - Not sure what released (bit, overshot, drillstring?)
1530	Move jack-rig up (Forklift tire blew..)
1630	Got overshot out - attached to one drillstring stand, which broke off from below
1640	Run pipe to fishing tool back in hole
1720	Leave site to yard
1730	Depart Yard

Justin Fitch
Name

Signature

Rachel Hahls
Reviewed By

3.4.2021
Reviewed Date

DATE: 12/4/2020 PROJECT NAME/NO.: KAFB VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Stephen Newman	Sundance
Forrest, Mason, John, Bryan, Matt (camera IT)	Cascade
Ben Maynard	USACE

SUMMARY OF DAILY ACTIVITIES

	-Attempt to pull out drill string
	-Uncoupled fishing string instead - reconnect & remove overshot

WORK PERFORMED

0650	Arrive at yard - pick up truck
0700	Go to site
0710	Tailgate
0720	Begin pulling on drillstring w/ casing jack
0900	Drillstring popped - Rig up and remove fishing string
1115	Fishing string disconnected at threading down hole
1120	Trip back in w/ fishing string to reconnect and remove overshot
~~1150~~ 1200	Bryan is giving up - overshot pulled out
1205	Lunch
1250	Back to removing 11 3/4" casing
1540	Got last of casing out
1545	Tag hole at 102'
1555	Add chips to well - Cetco Pure Gold Medium Chips ~30 Bags (50 lb)
1600	Tag bottom @ 100'
1610	30 more bags of chips
1620	Tag bottom @ 95' (96')
1630	Pump 400 gal H_2O
1640	Ran to yard (Cascade) for trailer
1705	Return from Yard
1745	Left site for yard
1800	Left yard

Justin Fitch

Name

Signature

Stephen Newman

Reviewed By

12/4/2020

Reviewed Date

Sundance Consulting, Inc. **Daily Field Activity Log**

DATE: 12/5/2020 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, ~~Mason~~	Cascade

SUMMARY OF DAILY ACTIVITIES

	Decon casing and drillstring - reload onto truck in prep for next week
	Go to office to scan field docs

WORK PERFORMED

0715	Arrive at yard to get truck
0720	Arrive at site
0740	Tailgate
0735	Loaded casing/drillstring & transported to yard to offload
0950	Cascade left to move a rig elsewhere in town
0950	JF left to go to office to scan field paperwork
—	- forgot entry badge at base - returned
—	- then went back to office & scanned docs
1230	Returned to site, along with Cascade
1240	Went to cascade yard to decon casing & drillstring
1500	Forrest went to yard to load up more ds/casing - Mason returned from WTF?
1500	"Stab" & load casings/ds on truck
1635	Finish up for day & return to yard
1645	Depart
	12/6/2020 SN

Justin Fitch
Name

[signature]
Signature

Stephen Newman
Reviewed By

12/6/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/6/20

WEATHER: Clear, cool

WELL ID: 106S104

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Boskinsh	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Saftely Office
Justen Maples	Cascade
Josh Slotwier	Cascade

2. OPERATING EQUIPMENT
Sonic rig, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Put a camera down the 6" casing twice
	to identify potential problem causing
	the core barrel to get stuck inside
	of the casing at 393 - 395' bgs. Nothing
	significant was observed because the
	camera went black in the zone of
	interest (see notes).
	Started ~~tripping~~ tripping and ~~[illegible]~~ the 6" ~~[illegible]~~
	Sonic casing.
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0645	EA, Cascade on site
0715	H&S meeting, plan for the day
0754	Tagged bottom of boring at 393' bgs
0810	Preparing to send camera down the

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 12-11-2020

DATE: 12/6/20

4. WORK PERFORMED (Continued)

	inside of the casing
0911	Camera not working; Cascade is
	troubleshooting.
0935	Camera now working. Start lowering
	camera.
1022	Camera didn't show anything noteworthy
	down to 385' bgs. At 385', the water
	that was added yesterday inside the
	casing was encountered. From 387' bgs
	to 393' the camera went black, likely
	due to the turbidity of the water.
1100	Justen is going to trip out the 6" casing
	to 370' bgs and ream the boring really
	well again. The casing will then be
	tripped back in and the camera will
	be lowered down the inside of the
	casing again after the water and soil
	cuttings have been vibrated out of the
	casing. This will allow for the casing
	to be viewed with the camera from
	385' bgs to the bottom of the shoe.
1248	Bottom of casing at 398' bgs. Tagged
	bottom of the boring at 397.5'. Will
	let the dust settle in the casing, then
	go back in with the camera.
1351	Setting up camera

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by:

Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/6/20

4. WORK PERFORMED (Continued)

1355	Start lowering camera
1530	Camera did not show anything definitive. The sidewall of the casing was caked with dirt starting at approx. 380' bgs, but the camera feed went dead and blank at approx. 390' (possibly due to a short in the cable). We were not able to see to the bottom of the casing at 398' bgs. Justin consulting with Bryan Nydoske.
1548	Bryan Nydoske speaking with B. Bonkisch about path forward. Will stand by to hear back from Bernie and Bryan.
1600	Received direction back from Bernie and Bryan. Will trip out the 6" and 8" sonic casing. The ARCH rig will then be used to advance 13 3/8" casing to 200' bgs and 11 3/4" casing to 400' bgs. The sonic rig will then be brought back in to core to TD. The ARCH rig will then be brought back in to complete the well.
	Broke down drill pipe and put back into box truck. Started tripping out 6" casing.
1730	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ of ~~2~~ 3 of 3

Reviewed by: JM

Reviewed date: 12-11-2020

Daily Field Activity Log

DATE: 12/6/2020 PROJECT NAME/NO.: KAFB Data Gap Wells, US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Stephen Newman	Sundance
Forrest, John, Mason	CDLP

SUMMARY OF DAILY ACTIVITIES

	Prep for new hole & P&A original

WORK PERFORMED

0655	Arrive at trailer, go meet cascade at FA Laydown.
0705	Safety Tailgate
0730	Drop off equipment at Drill Site, return to get more equipment.
0740	Return to BFF to off-load equipment.
0755	Take rig tender/forklift back to laydown yard to load with
	casing/drill string.
	Forrest is with Sonic Rig helping set up camera
0845	Return to drill site to off-load casing/drill string.
1000	Run to laydown yard to get final supplies, then return to site
	~~to site~~ SN to off-load
1045	Begin prepping for drilling operations
1115	Rig is in place and the mast is up.
1225	Drillers taking lunch
1345	Drillers go off site for the day.
1400	Return to Sundance yard.

Stephen Newman
Name

Signature

Justin Fitch
Reviewed By

12/10/2020
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/7/20

WEATHER: Clear, cool

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Justen Maples	Cascade
Josh Clotwier	Cascade
Forrest Chattin	Cascade
John Alexander	Cascade
Mason Miller	Cascade

2. OPERATING EQUIPMENT
Sonic rig, fork lift, pipe hoist

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Tripped out all of the 6" and 8" sonic
	casing and demobed the sonic rig.
	- Set up the ARCH rig and removed
	all of the 9 5/8" casing. Tripped in
	13 3/8" casing to 100' bgs.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0645	Cascade on site
0700	EA on site
0708	H+S meeting, plan for the day
0730	off-load 6" casing

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/7/20

4. WORK PERFORMED (Continued)	
0826	Begin tripping out 8" sonic casing and loading in box truck
0924	Finished tripping out 8" sonic casing. Towering down, moving sonic rig, cleaning up site, dumping hopper in roll off bin.
1027	Taking 8" casing to laydown yard to decon and stage
1030	Setting up ARCH rig over 106510A borehole to pull 9 5/8" casing and install 13 3/8" casing to 200' and 11 3/4" to 400'.
1306	Begin pulling 9 5/8" casing out of the borehole.
1334	Finished decon and staging of 8" sonic casing at the laydown yard
1408	Justin Maples and Josh Clotwier (Sonic drilling crew) leaving to go on days off. Will return to site Saturday morning at 7am.
1435	Finished tripping out all of the 9 5/8" casing. Will set up ARCH rig to start installing the 13 3/8" and 11 3/4" casing.
1536	Start installing 13 3/8" casing
1700	Installed 100' of 13 3/8" casing
1715	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ Data Gaps Drilling Project - 62735DM02
Daily Quality Control Report – Non-Construction

1 of 2

ROLE: SSHO

DATE: 12-8-2020

WEATHER: Clear/Cold in Am

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse/Mike McVey	EA - Site Health and Safety Office
Forrest Chattin	Cascade Drilling
Mason Miller	Cascade Drilling
John Alexander	Cascade Drilling

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the public and governmental employees, and problems encountered and remedies applied)

- Installed 13 3/8" casing to 200' bgs and 11 3/4" casing to 200' bgs.

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0650	Arrive on-site
0710	Safety briefing
0720	Drillers start work
0725	First joint being connected

DQCR Page 1 of 2

Reviewed by: JM Initials: ______ Reviewed date: 12-11-2020

Data Gaps Drilling Project - 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ JM

Daily Quality Control Report – Non-Construction

2 of 2

KAFB-106S10A

DATE: 12-8-2020

4. WORK PERFORMED (Continued)

0735	Drilling @ 110' bgs / 0812 at 140' bgs
0815	M. McVey on site
0900	E. Morse off site
0913	Lost the seal on the compressor. Forced
	trying to find one locally to replace it.
1242	Seal replaced. Continue installation of
	13 3/8" casing.
1631	Start installation of 11 3/4" casing.
1732	Installed 13 3/8" casing to 200' bgs and
	11 3/4" casing to 200' bgs
1740	Cascade off site
1750	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM Initials: ——— Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 12/9/20
WEATHER: Clear, cool WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Boskisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Mason Miller	Cascade
John Alexander	Cascade

2. OPERATING EQUIPMENT
ARCH rig, fork lift, air compressor

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Tripped 13 3/8" casing out of the borehole
	- Installed 11 3/4" casing to 400' bgs
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0700	EA, Cascade on site
0710	H+S meeting, plan for the day
0745	Setting up to pull 13 3/8" casing
0810	Tripping out the 13 3/8" casing

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/9/20

4. WORK PERFORMED (Continued)

0920	Finished tripping out 13 3/8" casing
0927	Setting up to continue installation of 11 3/4" casing
1010	Taking 13 3/8" casing to the laydown yard
1040	Loading the 9 5/8" casing onto the truck to take to the laydown yard
1124	Loading 11 3/4" casing from the Sundance drilling location onto the truck
1140	Continue installation of the 11 3/4" casing
1626	Finished installation of 11 3/4" casing to 400' bgs
1628	Tripping drill pipe out of the hole
1705	Will finish cleaning up site and demobing the ARCH rig and equipment in the morning
1710	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 12-11-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO
DATE: 12/10/20
WEATHER: Cloudy, Cool
WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Mason Miller	Cascade
John Alexander	Cascade

2. OPERATING EQUIPMENT

Fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Demob ARCH rig and equipment, finish site cleanup

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site
0710	H&S meeting, plan for the day
0730	Demob ARCH rig and equipment, clean up site

DQCR Page 1 of 2

Reviewed by: JM
Reviewed date: 12-16-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/10/20

4. WORK PERFORMED (Continued)	
1000	Completed site cleanup
1015	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 12-16-2020

DATE: 12/10/2020 PROJECT NAME/NO.: KAFB U501-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, Mason, John	Cascade
Leroy Moorhead & Dallas Fielder	High Mesa

SUMMARY OF DAILY ACTIVITIES

	Pothole new location
	Tremie old hole to 20' - add 5' chips

WORK PERFORMED

0740	Arrive at Yard - warm up truck
0750	Go to BFF Gate to escort High Mesa onto BFF
0803	HM Arrives - Back to site
0815	Tailgate w/ High Mesa - They start
0910	Look at hole - it looks good - 7' deep/14' wide - no utilities
0915	Backfill
0915	Cascade Arrives
0930	Escort HM off site
0940	Tailgate w/ Cascade
0950	Insert Tremie pipes 15ft up mixer & pumps - tremie pipes: 80'
1015	start mixing grout - 8 bags - pump into hole via tremie pipe - 200 gal
1030	Tagged bottom @ 67' - pulled 1 pipe - now 60' Tremie Pipe
1040	Mix/Pump ~~7~~ 8 more bags of grout ~200 gal
1050	Pull another piece of Tremie pipe - Tag: 40' & add 5 bags - 175 gal
1100	Tag bottom @ 20' - pull tremie pipe
1105	~~Lunch~~ Add 7 Bags bentonite Chips
1120	Tag at 15'
1200	Lunch
1240	Mix 120 gal portland cement - 20 Bags cement / 1 bag quick gel - pump in
1300	depth ~2' - once dry, will Quikrete the top 2' to surface
1315	Went to Firestation #1 to renew Hot Work Permit - called in work at BFF
1430	Returned to site - mechanic present working on rig - arrived at 1420
1435	Rath to yard w/ Mason / John
1445	Return to site for hot work
1645	called in end of hot work
1720	leave site for yard
1730	leave yard

Justin Fitch
Name

[signature]
Signature

Riley Witter
Reviewed By

02-05-2021
Reviewed Date

Data Gaps Drilling Project – 62735DM02 1062

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12-12-2020

WEATHER: Clear/cold

KAFB-106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse	EA - Site Health and Safetly Office
Josh Messenger	Cascade Drilling (Sonic)
Justin Maples	Cascade Drilling (Sonic)
Josh Clothier	Cascade Drilling (Sonic)

2. OPERATING EQUIPMENT

Team #1	Team #2	Spare
YSI Professional Plus 15K101398 Wh0003 ☐	YSI Professional Plus 15K101396 Wh0001 ☐	YSI Professional Plus 15L100541 Wh0002 ☐
MiniRAE 3000 592-915778 Wh0005 ☐	MiniRAE 3000 592-915790 Wh0004 ☐	MiniRAE 3000 592-915579 Wh0006 ☐
Hach 2100Q 15100C045034 Wh0008 ☐	Hach 2100Q 15100C044633 Wh0009 ☐	Hach 2100Q 15100C045025 Wh0007 ☐
Solinst Water Level Meter 253054 ☐	Solinst Water Level Meter 253053 ☐	Solinst Water Level Meter 253056 ☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

-	Set up Sonic rig over 106S10
-	Cored from 400' to 430'

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0650	Arrive on-site
0710	Safety Brief
0720	Cascade starts equipment setup
0840	Setup/Inspections continue on Rig.

DQCR Page 1 of 2

Reviewed by: JM   Initials: —   Reviewed date: 12-15-2020

Data Gaps Drilling Project - 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ Jm

Daily Quality Control Report – Non-Construction

2 of 2

KAFB-106S10

DATE: 12-12-2020

4. WORK PERFORMED (Continued)

0845	Start running 6" pipe into hole
0920	Tagged bottom of hole at 398.10' / OK on dry ice for today
0930	Start running ~~3~~" pipe / Remove 3" core barrel pipe, ready to core.
1020	Drillers offsite to get water / Josh Livingston arrives on-site
1055	Drillers back on site, preppin to run core barrel.
1110	Start running 1st core barrel, 11:40 first core out of hole 400'-405'
1200	Josh Livingston off-site
1400	Core recovered to 414'
1445	Core to 420' starting to see fluxuations in PID readings
	Headspace on core samples getting PID readings
1600	Core to 425' getting PID readings on core samples
1630	Core to 430' Drillers running core barrel for final
	cleanout
1740	off-site

Jm

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Earl Morse

Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: Jm Initials: Reviewed date: 12-15-2020

Data Gaps Drilling Project - 62735DM02 1 of 2

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12-13-2020

WEATHER: Clear/Cold KAFB-106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse	EA - Site Health and Safetly Office
Justin Maples	Cascade (Sonic)
Josh Clothier	Cascade (Sonic)

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

Drilled/Cored from 430' to 470' bgs

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0650	Arrive on-site
0710	Safety Brief / POD
0720	Drillers warming up equipment / inspections / Prep
0755	Drillers start to trip pipe

DQCR Page 1 of 2

Reviewed by: JM Initials: — Reviewed date: 12-15-2020

2 of 2

KAFB-106S10

DATE: 12-13-2020

4. WORK PERFORMED (Continued)	
0815	Start first coring run / Core to 435 by 0830
0915	Core recovered to 440' bgs
1040	Core recovered to 445' bgs / No VOC problems
1120	Core recovered to 450' bgs / No VOC problems
1210	Driller believes he hit water @ 440'-445' bgs Too shallow based on surrounding wells
	Loading 5-joints of casing into sonic truck
1320	Core recovered from 455' bgs, Looks dry - not in H_2O
1410	Core recovered from 458' bgs. Dry - not in H_2O
1525	Core recovered from 465 bgs Appears dry
1600	Core recovered from 470' bgs
1615	Site Shutdown
1705	Off Site

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: EArL Morse

Signature: E Morse

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM Initials: ___ Reviewed date: 12-15-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project – 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 12/14/20

WEATHER: Cloudy, cold WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Justen Mapler	Cascade
Josh Clotwier	
Josh Messenger	EA
Josh Livingston	

2. OPERATING EQUIPMENT
Sonic rig, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Sonic cored to 517' bgs
	- PID reading at 517' bgs = 4.6 ppmv
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0650	EA, Cascade on site
0710	H&S meeting, plan for the day
0750	Start drilling
0840	Josh Livingston on site

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 12-16-2020

DATE: 12 / 14 / 20

4. WORK PERFORMED (Continued)	
1320	Phillip Lovato (USACE) on site
1330	Ben Moayyad (USACE) on site
1335	Completed coring to 510' bgs
1344	Gauged depth to water : 473.02' bgs
1400	PID reading at 510' bgs : 17.0 ppmv. Will core another 10'
1518	Matt Earthman (USACE) on site
1524	ACT on site to change out cover on open top roll off bin
1606	PID reading at 517' bgs : 9.6 ppmv. In consultation with B. Backisch and Ben Moayyad, the decision was made to call this TD.
1610	Breaking down drill pipe
1715	Cascade off site
1725	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 12-16-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/15/20

WEATHER: Cold, windy, snow

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Justen Maples	Cascade
Josh Clotwier	Cascade
John Alexander	Cascade
Mason Miller	Cascade
Forrest Chattin	Cascade

2. OPERATING EQUIPMENT

Sonic rig, ARCH rig, air compressor, fork lifts

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Gauged static water level in 106510A borehole at 472.30' bgs
- Pulled 6" sonic casing, demobed sonic rig and box truck
- Set up ARCH rig and support equipment, tripped in drill pipe. Ready to start drilling in the morning.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	Cascade on site
0700	EA on site
0715	H+S meeting, plan for the day
0730	Gauge static water level : 472.30' bgs

DQCR Page 1 of 2

Reviewed by: [signature]

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/15/20

4. WORK PERFORMED (Continued)	
0745	Start pulling 6" Sonic casing
0750	J. Messenger off site
0855	Finished pulling 6" casing
0900	Towering down, dumping hopper, cleaning up site, demobing sonic rig and box truck
0953	Setting up ARCH rig, support equipment at 106510A
1005	Sonic rig, box truck, fork lift moving to laydown yard to decon 6" casing and sonic rig for demob off site. Earl Morse (EA 55H0) at laydown yard to provide oversight for decon activities
1400	ARCH rig and support equipment set up. Start tripping in drill rod.
1450	Heading over to the laydown yard to load up well materials.
1600	Back at BFF. Unloading and staging well materials. Finish loading and staging casing and rods.
1639	Back to laydown yard to load up a few more joints of drill rod.
1650	Back at BFF. Pipe trucks backed into place. Will start drilling in the morning.
1700	Cascade off site
1710	EA off site
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 12-19-2020

ROLE: SSHO DATE: 12/16/20

WEATHER: Clear, cold, breezy WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chuttin	Cascade
John Alexander	Cascade
Mason Miller	Cascade
J. Messenger	EA

2. OPERATING EQUIPMENT

ARCH rig, air compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled to 497' bgs with the ARCH rig
- Tripped well screen and casing into boring
- Placed sand from 497' to 487' bgs
- Noticed water dripping from the bottom of the hard top roll off bin. Tightened wing nuts and immediately bermed water. Contacted AGI and other EA staff to assist w/ cleanup. Pumped free liquid into 2 55-gallons drums. Will assess in the morning.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA on site
0700	Cascade on site
0710	EA gauging nearby wells
0715	Cascade heading over to the laydown yard

DQCR Page 1 of 24

Reviewed by: [signature] Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/16/20

4. WORK PERFORMED (Continued)	
	to load up a few things.
0738	EA done gauging wells
	-Well 149-484 DTW = 469.72
	-Well 024 DTW = 467.03
	- Well 154-484 DTW = 470.91
0740	Cascade back on site. Will now head over
	to fill water tank on pipe truck.
0813	Forrest called and said that the underground
	line to the fire hydrant used to fill their
	water tanks is broken. Water surfaces
	from east side of hydrant when the
	valve is turned on.
0834	Spoke with a fireman at Fire Station
	No. 2 and showed him the issue with
	the hydrant. He showed us alternate
	hydrants to obtain water from and
	said he would contact the appropriate
	entities to take care of the issue
	with the hydrant.
0845	Paul Baca with PAE showed up and
	looked at the hydrant. Said he would
	contact CE (Civil Engineering).
0905	Finished filling the water tank on the
	pipe truck. Back on site at BFF.
0920	Eric Martinez with CE showed up at
	BFF. He said he checked the hydrant

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 4

Reviewed by: [signature]

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12 / 16 / 20

4. WORK PERFORMED (Continued)

	and everything was fine. He said that
	the water was coming from weep holes
	in the pipe and is normal. He gave me
	his bossed' contact info in case of
	any future issues:
	→ Eric Korsil (Sp?) CE - (505) 377-0855
0935	Start drilling
1316	Phillip Lovato (USACE) on site
1328	Reached total depth of 497' bgs
1330	Tripping out drill pipe
1402	Finished tripping out drill pipe. Setting
	up to install well. Proposed well
	construction diagram attached. The
	well construction was verbally approved
	by the Air Force and NMED.
1517	Tripping in well screen and casing
1615	Finished tripping in well screen and casing.
	Tower down, move rig to bring in casing
	jack, reposition rig, tower up.
1630	Resume well construction
1619	Noticed water dripping from the bottom of
	the hard top roll off bin. Tightened wing
	nuts, which were loose, and immediately
	contained the water by making a berm.
	Contacted ACT to assist with cleanup and
	contacted other EA staff to assist.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

3 of 4
DQCR Page ~~2~~ of ~~2~~

Reviewed by: JM

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/16/20

4. WORK PERFORMED (Continued)	
	Pumped free liquid into 55 gallon drums.
	Assessment will be performed
	tomorrow morning.
1719	Sand placed from 497' to 487' bgs
1722	Cascade off site.
1756	Secure roll off bins, 55 gallon drums
1800	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ 4 of ~~2~~ 4

Reviewed by: JM

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/17/20

WEATHER: Clear, windy, cold

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Boekisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
John Alexander	Cascade
Mason Miller	Cascade

2. OPERATING EQUIPMENT

Sonic rig, casing jack, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Excavated IDW water impacted soil from the area around the roll off bins. Excavated soil placed in open top roll off.
- Roll off bins moved to Zia Park 90-day storage area
- Samples sent to TA Denver for analysis (EPA Methods 8260, 8011, 8015 GRO/DRO)
- Sand pack placed from 447' to 440.8' bgs; 3/8" bentonite chips from 440.8' to 436.2' bgs

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site
0720	H+S meeting, plan for the day
0737	Resume well construction
0746	United Rentals dropping off skidsteer for

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 12-19-2020

DATE: 12 / 17 / 20

4. WORK PERFORMED (Continued)

	use in removing IDW water impacted soils
	from the area of the roll off bins.
1038	Sand placed from 497' to 440.8' bgs (lower sand pack?)
1100	Place 3/8" bentonite chips
1118	Tripping in contingency well screen and
	casing.
1120	ACT on site to pick up the roll off bins
	and take them to the Zia Park 90-day
	storage area.
1211	Finished tripping in contingency well
	screen and casing
1250	Excavating IDW water impacted soil in
	the area of the roll off bins. Total area
	of impact roughly 40' long by 12' feet
	at widest point. Placing excavated
	soil in open top roll off bin.
1300	Ben Moayyad (USACE) on site
1338	Finished excavating impacted soil. Open
	top roll off bin moved to the Zia Park
	90-day storage area.
1400	Collect 3 soil samples from area of
	IDW water impact. Samples will be
	submitted to TA Denver for 8260, 8011,
	and 8015 GRO/DRO analysis. One duplicate
	and one MS/MSD will also be collected.
1425	Ben Moayyad off site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/17/20

4. WORK PERFORMED (Continued)

1456	Finished soil sampling.
1549	Placed 3/8" bentonite chips from 440.5'
	to 436.2' bgs (lower bentonite seal)
1654	Placed sand pack for the contingency well
	from 436.2' to 415' bgs
1700	Cascade off site
1715	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature:

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ 3 of ~~2~~ 3

Reviewed by:

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/18/20

WEATHER: Clear, mild

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
John Alexander	Cascade
Mason Miller	Cascade

2. OPERATING EQUIPMENT

Sonic rig, casing jack, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Installed upper filter pack from 436.2' to 405.5' bgs
- Installed upper 3/8" hydrated bentonite chip seal from 405.5' to 373.6' bgs
- Installed grout from 373.6' to 60' bgs

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0715	H & S meeting, plan for the day
0755	Resume well construction
0924	Installed upper filter pack from 436.2' to

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/18/20

4. WORK PERFORMED (Continued)

	405.5' bgs
0926	Installing upper 3/8" bentonite chip seal
1052	Installed upper bentonite chip seal from 405.5' to 373.6' bgs. Setting up to begin grouting.
1140	Taking drill pipe and casing over to the laydown yard to unload for decon.
1355	Begin installing grout.
1531	Going to get water to continue grouting, drop off more casing at the laydown yard.
1625	Back at BFF. Continue grouting.
1820	Grout installed from 373.6' to 60' bgs
1830	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 12-19-2020

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project – 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12/19/20

WEATHER: Clear, mild

WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Beckisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
John Alexander	Cascade
Mason Miller	Cascade

2. OPERATING EQUIPMENT

Sonic rig, bladder pump, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Installed grout from 373.6' to 20' bgs
- Installed Portland Cement from 20' bgs to ground surface
- Filled 2 open potholes with grout
- Tagged water level in deep well at 469.06' bgs
- Finished site cleanup, decoened ARCH rig

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0720	H&S meeting, plan for the day
0722	Forrest going to get new ignition switch for the fork lift

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 2-5-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/19/20

4. WORK PERFORMED (Continued)

0730	John and Mason heading to the laydown yard to drop off the casing that was tripped out of the borehole yesterday afternoon
0822	Tagged top of grout at 72' bgs
0830	Continue grouting
1040	Installed grout from 373.6' to 20' bgs. Installed Portland Cement from 20' to ground surface.
1050	Filling two open pothole locations with grout
1110	Tagged water level in deep well at 475.53' btoc.
	Stickup = 6.47'
	DTW = 475.53 - 6.47 = 469.06' bgs
	- Bottom of deep well = 485.13' bgs
	- Bottom of contingency well = 436.2' bgs
1130	Moving rig off of well, cleaning up site, demobing equipment, etc.
1155	Taking the ARCH rig to the lay down yard for decon. Loading sonic pipe and casing onto truck to take off site.
1725	Site cleanup completed. ARCH rig deconed, pit pumped off.
1730	EA, Cascade off site

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 2-5-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 12/20/20

WEATHER: Clear, mild WELL ID: 106510A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
John Alexander	Cascade
Mason Miller	Cascade

2. OPERATING EQUIPMENT

Fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Finished surface completion for 106510A

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0650	EA, Cascade on site
0715	H+S meeting, plan for the day
0730	Removing hammer and hose from ARCH
	rig, decoming pipe and casing. Forrest

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 2-5-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12/20/20

4. WORK PERFORMED (Continued)

	going to Home Depot for supplies to finish the well pads for V3 and 106510A.
1100	Back at the BFF to finish well pads.
1118	Generator/welder not working. Forrest will head to the shop to pick up another generator/welder so he can run the concrete mixer. He'll also cut the rebar for the concrete pad while he's there. John and Mason will stay here and prepare the pad and bollards for concrete.
1520	Finished well pad for 106510A, but don't have time to complete the well pad for V3 because Forrest has to leave the site by 5pm to get John and Mason to the airport. Forrest will finish the V3 well pad when they return in January.
1550	Heading over to the laydown yard to continue decon-ing pipe and casing.
1718	EA, Cascade off site.

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 2-5-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 12-23-2020

WEATHER: low 50s (°F); clear; breezy - windy

WELL ID: KAFB-106V3 / KAFB-106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Al Henderson	Jet West
Lane Andress	NMED
Ryan Wintman	AFCEC
Santiago Gallegos	USACE
Forrest Chatten	Cascade
Acie Essen	

2. OPERATING EQUIPMENT

Geophysical instruments
PID (SN: 5778)
GR 5599 - Gamma Ray sensor - source
Cement mixer

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
-	Well pad installed @ KAFB-106V3
-	Geophysical logging completed @ KAFB-106S10 + KAFB-106V3
-	Lane Andress (NMED), Ryan Wintman (AFCEC, Santiago Gallegos (USACE) onsite

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0930	Jet West, EA, USACE, NMED, AFCEC on site @ KAFB-106S10
0950	H&S briefing - Cascade to pour pad @ KAFB-106V3
1010	Setup to log @ KAFB-106S10
1025	Sensor deploying down KAFB-106S10

DQCR Page 1 of 2

Reviewed by: AK Brown

Reviewed date: 2/25/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 12-23-2020

4. WORK PERFORMED (Continued)

1044	TD = 488 ft bgs reached (discrepancy w/TD = measurement error w/logger; adjustment will be made to final log)
1045	pad installed @ KAFB-106V3
1125	prep to deploy dual-induction sensor - deployment began
1200	Dual Induction completed
1300	Prep to move to KAFB-106V3
1310	Set up over KAFB-106V3
1319	Began deploying DI sensor in KAFB-106V3
1347	DI sensor back up — 1358 GR sensor began deployment down well
1430	GR tool out of hole
1515	USACE, AFCEC and NMED off site
1600	EA & Jet West off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: [signature]

Reviewed date: 2/25/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO   DATE: 12-24-2020

WEATHER: low 40s (°F); clear; light breeze   WELL ID: KAFB-106S10

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
M. Cain / S. Leslie	Cascade

2. OPERATING EQUIPMENT

M85 rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

—	Developed KAFB-106S10
—	120 gallons bailed — 3 × 55 gallon steel drums brought to <90-day yard

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA + Cascade on site
0715	H&S brief + discuss work for the day
0730	began site setup to develop well
0820	Swabbing began — 0830 Swabbing completed

DQCR Page 1 of 2

Reviewed by: [signature]   Reviewed date: 2/25/21

DATE: 12-24-2020

4. WORK PERFORMED (Continued)	
0835	bailer deployed (4") - didn't make it down well completely
	- switched to 2" bailer
1100	5 well volumes bailed - M. Cain switches back to swabbing - preps swabber
1109	Swabbing began - 1120 Swabbing ended; prep to begin bailing again
1130	Bailing continued - 1232 driller takes break - 1242 off break
1415	development completed after 120 gallons bailed
	→ 1 mg of sediment
1420	Site Cleanup - Boom down
1440	EA + Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: [signature] Reviewed date: 2/2[illegible]

DATE: 1/4/2021 PROJECT NAME/NO.: KAFB VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John	Cascade

SUMMARY OF DAILY ACTIVITIES

	Decon & prep

WORK PERFORMED

0815	Arrive at yard - Dump some trash out of truck, load eqpt. to prepare
	for drilling
0830	Drive by drill site - check IDW Bins - All full - only 1 w/ H2O on top
0840	Go to yard to meet Drillers - working on rig / decon
0845	Tailgate
	Drillers mounted hose & changed rig oil
1100	Start Decon
1200	Lunch
1500	Put pipe segments together
1700	Return to yard - Drillers to Auto Zone
1710	Leave

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

Daily Field Activity Log

DATE: ~~12/5/21~~ 01/5/21' JF

PROJECT NAME/NO.: KAFB / U501-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest Chatham	Cascade
John Alexander	Cascade

SUMMARY OF DAILY ACTIVITIES

	Stab casing - load/transport rig & equip to site
	Stage & get ready to start drilling

WORK PERFORMED

0845	Arrive at yard - load truck - head to ~~site~~ Cascade laydown yard
0915	Quick tailgate - Cascade already did theirs
0920	Stab pipe
1030	Start loading
1130	First load to site
	Dump old samples from first wells in IDW Rolloff
	Prep everything to start drilling
1230	Lunch
1300	continue moving/Staging pipe
1500	Fuel ~~vehicle~~ truck & get coolant
1530	Move rig to site
1600	Stage rig over drill location
1855	Return to yard
1905	Depart

Justin Fitch

Name

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

Daily Field Activity Log

DATE: 01/06/2021 PROJECT NAME/NO.: KAFB /VSO1-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest / John	Cascade

SUMMARY OF DAILY ACTIVITIES

	Finish rigging up - Drill to 130 - unclog clay plug in pipe
	Drill to 155 unclog clay from hose

WORK PERFORMED

0645	Arrive at yard - load truck, calibrate PID
0655	Go to site
0710	Tailgate
0715	Setup exclusion zone - plastic under rig - set up cuttings tables
0800	Fire up rig
0815	Start Drilling
0855	PID Breathing Zone: 0.0
1130	Stopped getting cuttings back - clog (clay) in cyclone + hammer
1150	Seems to be clay plug downhole - Taking lunch while Forrest talks to Bryan
1230	Prepped to pump water downhole
1300	Pumped ~200 gal H_2O - Unplugged drill string
1345	Cascade to yard to get traction pads (a lot of water around work area)
1500	Making slow progress - clay stuck in hose again - working to get it out
1600	Hose de-clogged - Cascade has to go to another site
	will drill last 40' tomorrow - telescope - remove 13" and continue
	packed up
1615	Back to Yard to unload
1630	Depart

Justin Fitch
Name

Justin Fitch
Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/7/21 PROJECT NAME/NO.: KAFB / VS04-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest / John	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drill ahead - telescope

WORK PERFORMED

0650	Arrive at Yard - pack truck - Calibrate PID
0700	Go to site to set up
0710	Tailgate
0715	Set-up Geo area - prep rig - warm-up, empty cuttings bin, etc.
0730	Start drilling
0830	Reach 200' - Start pulling drill string
0910	Breathing Zone PID: 0.0
1000	move 11" pipe to truck
1145	Cascade to get fuel, lunch, & accept delivery of 40-yd trash receptacle at laydown
	Lunch
1320	Resume telescoping
1500	Pull outer casing
1545	Bryan Nydoski came by for site inspection (Cascade)
1650	Finish pulling 13" drive casing
1700	Cascade dropping truck loaded w/ 13" drive casing to their laydown yard
1705	Return to yard w/ truck/equipment
1715	Depart

Justin Fitch
Name

[signature]
Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/8/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest / John	Cascade
Bryan Ndyoske	Cascade

SUMMARY OF DAILY ACTIVITIES

	Change to Under-ream bit

WORK PERFORMED

0645	Arrive at yard - calibrate PID
0655	Go to BFF
0705	Tailgate Meeting
0715	Go to Cascade laydown to offload 13" pipe
0815	Return to site
0830	ACT came to add 2ndary containment to Roll-offs
	Cascade moving jacks & setting up to drill ahead
0930	USACE on-site
0945	Start Drilling
1005	Breathing Space PID: 0.0
1120	Cascade went to get underreaming bit & take lunch
	Installed straw wattles around IDW Bin #4 for 2ndary containment
	Cleaned out back of truck
	Lunch
1400	Began tripping out DS to change bit
1600	Pull 2 stands of drive casing
	Change bit
1700	Shut rig down and get ready to go
1710	Return to yard
1715	Depart

Justin Fitch
Name

[signature]
Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

Sundance Consulting, Inc. **Daily Field Activity Log** Page 1 of 1

DATE: 1/9/21 PROJECT NAME/NO.: KAFB USO1-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John	Cascade

SUMMARY OF DAILY ACTIVITIES

	Trip in & Drill ahead

WORK PERFORMED

0715	Arrive at yard - calibrate PID
0720	Head to site
0725	Tailgate
0740	Attach bit & trip in to 200'
1030	Start reinserting 11 3/4" drive casing while expanding borehole w/ under-ream bit
1130	Making new hole
1230	lunch
1310	Start again with second stand
1420	Forrest is going to switch back to original bit as we're through hard interval
1500	Calling it for the day. Winds are too high and too much dust to pull drillstring
	cover IDW & Pack up
1530	Return to yard
1540	Depart

Justin Fitch

Name

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

DATE: 1/10/21 PROJECT NAME/NO.: KAFB-106251

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forest Chattin / John Alexander	Cascade

SUMMARY OF DAILY ACTIVITIES

	Trip out; change bit; trip in Drill ahead to 440'
	Trip out; set jacks to pull 2-3 stands of drive casing out
	tomorrow morning

WORK PERFORMED

0720	Arrive at Yard - calibrate PID
0725	Go to Site
0730	Tailgate
0745	Start tripping out DS
0900	Trip in new bit
1000	Drill ahead
1200	Lunch / Re-fill fuel tank (cascade)
1245	Restart
1257	Breathing space PID - 0.0
1500	Hole got tight after drilling through ~70' of gravel, so pulling back a few stands
	Tripping DS - Close IDW Rolloffs, pack geo gear
1600	Fuel pick-up - Drop stuff (sampler, PID, truck) at yard
1640	Mast down & move rig to set jack
1645	Set Jack - mast up - pull stand part-way out - pack up
1720	Depart

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

Sundance Consulting, Inc. **Daily Field Activity Log**

DATE: 1/11/2021 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest Chattin / John Alexander	Cascade

SUMMARY OF DAILY ACTIVITIES

	pull back 3 stands DC then drill ahead

WORK PERFORMED

0650	Arrive at Yard - calibrate PID - warm up truck/defrost windows
0705	Go to site
0710	Tailgate safety meeting
0715	Forrest/John to Autozone for new Forklift Battery
0815	Install new battery
0830	Prep and pull back 3 stands of drive casing
0935	Move jack & rig up - trip in tri-cone bit
1130	Set up to start drilling
1230	Lunch & pick up new 3rd (drilling Asst)
1400	Safety orientation / tailgate w/ new guy
1430	Start drilling again
1610	Breathing space PID measurement: 0.0
1730	TD - pull 1 stand of DS
	close up & DW
1750	Leave site to Yard
1800	Depart

Justin Fitch

Name

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

DATE: 1/12/2021 PROJECT NAME/NO.: KAFB /VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch / Rachel Hobbs	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Construct Well

WORK PERFORMED

0645	Arrive at Yard - pack truck
0700	Drive to ANG - put cones up at asphalt cutting sites
0715	meet rachel at yard
0725	Head to site
0735	Tailgate
0830	Measure depth in KAFB-106007 -
0900	Measure depth in KAFB-106251
1000	Run in PVC for primary well
1206	Lunch
1230	Start adding sand and pulling Drive casing
1530	Add Bentonite & Run second well
1710	Measure depth to Bentonite - not accomplished due to size between wells & casing
	Will start with that tomorrow
1720	Finish up & depart site to yard
1735	Depart Yard

Justin Fitch
Name

Signature

Riley Whittier
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/13/21 PROJECT NAME/NO.: ~~#~~ KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Continue building well w/ lower bentonite, upper sand, upper bentonite
	set up and grout well from 378' to

WORK PERFORMED

0645	Arrive at Yard
0655	Go to site
0720	Tailgate
0730	Continue well construction - Bentonite, ~~Grout~~ Sand, Bentonite
1045	Set up to hydrate Bentonite & begin grouting
1140	Lunch & run to Cascade laydown yard
1230	Start grouting
1525	Refill water truck (1400 gal of grout in so far)
1600	Back to grouting
1720	finish grouting - Tag at 40'
	winterize / pack up
	Return to yard
	Depart

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/14/2021 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Grout & cement - Decon

WORK PERFORMED

0655	Arrive at yard - pick up truck/gear
0700	Head to site
0715	Tailgate
0720	mix and run Grout
0745	mix and run cement
0815	Tag bottom of wells at 491.6' and 441.9' (6' & 5.2' stick-up, resp.)
0820	Blow dust off rig - clean-up; empty last (wet) IDW
0830	Mast down
0900	Move rig, forklift, ~~drive casing~~ to Cascade yard
	Return for trailer & drive casing
0930	Remove casing Hammer & hose - move rig to decon pad
1015	John Decon rig - Forrest to drop Gerry in Grants
	JF

Name: Justin Fitch

Signature: Justin Fitch

Reviewed By: Riley Witter

Reviewed Date: 02-05-2021

DATE: 1/19/2020 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Work called Due to wind
	Return Later to rope off ANG Site

WORK PERFORMED

0640	Arrive at Yard - Grab cones
0645	Go to ANG - try to cone off next site - too much wind (35 sust, 51 gusts)
0700	Go to Cascade yard - Discuss prospects/safety of work in wind
0720	Tailgate - decide to at least prep for pad construction - see how it is over at site
0730	start loading up materials/equipment
0745	Cascade called work off due to wind (w/ Sundance approval)
	sustained winds (currently 35 mph, w/ gusts to 51)
	sustained winds forecast ≥30mph until at least 2pm
	unload trailer
0800	Go to ANG to scope out site w/ Forrest
0900	BFF Project Call
0930	Go to White Cap for wattles/sandbags
1000	Staff meeting
1040	Return to base
1115	Clean up at yard - fill sandbags, lock up, sort sampling materials
1215	Depart for Home
0630	Head to Yard for truck & cones
0700	Get cones from 100257 site
0720	Place cones at ANG Site
0745	Return to yard
0750	Depart

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/20/21 PROJECT NAME/NO.: US01-030 KAFB BFF

WORK PERFORMED

0830	Meet w/ cascade to get pass for Developer
0900	Mobilize to site, prep paperwork
0930	Tailgate, discuss work steps
950	Begin setup, take water level reading of 472.5
	Tag bottom at 489.2
1045	Called in hot work permit to grind burr on
	cable
1154	First bail
1223	24 gal removed - switch to ~~bailing~~ surging
1315	stop surging, switch to bailing. Some issues
	getting longer bailer into water. Switch to
	narrower bailer.
1720	Last bail.

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fritch
Reviewed By

3/5/21
Reviewed Date

Sundance Consulting, Inc. **Daily Field Activity Log**

DATE: 1/20/21 PROJECT NAME/NO.: US01-030 / KAFB

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch, Riley Wittler, Rachel Hobbs	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Decon & Sample IDW Soil

WORK PERFORMED

0645	Arrive @ KAFB - check cones/tape at ANG Site
0650	Go to yard - warm up trucks, get WL meter out
0655	meet Riley - Give her ACT info
0700	Riley to ACT - Justin to Sundance office to let RH in
0730	At office - scan docs
0810	Leave office for ACT
0830	Pick up 275 gal tote from ACT → Back to site
0845	At site - discuss sampling & schedule w/ Riley/Rachel
0900	Go to Cascade laydown
0905	Quick tailgate (Cascade did full one earlier) - Discuss wet/cold & snow-wet gear
0910	Cascade setting up to decon eqpt for the day
0940	Gas station for fuel & ice
1000	Yard for sampling eqpt.
1030	To 106251
1130	Start IDW Sampling
1338	Finish IDW sampling - Head to FedEx (Stop for extra ice)
1430	Back to ANG to meet ACT for 3rd roll off
1445	To Cascade Yard
1530	To 106251 - to yard for straps
1615	Take water tote to IDW Yard
1630	Back to 106251
1730	Finish Development - pack up to yard
1750	Depart

Justin Fitch

Name

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

DATE: 1/21/21 PROJECT NAME/NO.: KAFB / VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Finish Dev; Decon & Move to 249; Build surface pad

WORK PERFORMED

0645	Arrive at Yard - load up truck
0700	Head to Cascade Yard
0710	Tailgate
0730	Unload IDW water from truck in IDW Yard
	Gather rest of materials for pad construction
0800	Head to site - drop 3rd hopper at next site
	Load all staged eqpt onto trailer/water truck for transit to ANG
0915	Dev rig leaves
	Move equip to new (ANG) site
1100	to yard to check sample bottle inventory - Cascade to build pad
1130	to office / Home depot
1300	Back to yard - Cascade still at 106251 building pad
1315	Load up wattles - Cascade to pick up rig
1330	2ndary Contain. on IDW water
1340	2ndary Contain. on roll-off at ANG
1400	Santiago from ACE Arrives - Back to 106251
1500	Cascade back to Finish pad
1600	Load the last gear to ANG
1730	Depart

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

DATE: 1/22/2021 PROJECT NAME/NO.: KAFB / USDI-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, John, Gerry	Cascade

SUMMARY OF DAILY ACTIVITIES

	Rig up and start drilling @ 249 - Injury incident

WORK PERFORMED

0650	Arrive at Yard - Load materials
0700	Meet Cascade at 10625 - loading up truck & last of pad materials
0715	Caravan to Cascade Yard
0720	Tailgate
0730	Unload trailers - mount hammer, etc on rig, load pipe on water truck
1000	Move rig to site and mast up
1130	Stage pipe/truck at site, drop IDW
1200	mount bit, ~~start drilling~~
1225	Lunch
1255	Start Drilling
1439	Accident occurred
1447	Called base emergency number - Colleen
	Called Rachel Hobbs - Justin
	Justin, Colleen, Gerry did not see incident
	Santiago Gallegos of USACE saw the event
	- pipe rotated w/ 105 lb wrench and hit John in lower right ribs
	- Knocked John off platform into Forrest
	- John complained of soreness on right lower ribs
	- Forrest had a bloody lower right lip from being hit by John's hardhat
	- EMS felt no broken ribs, but couldn't rule out fractures
1516	John loaded onto ambulance - Bryan arrived at site
1540	Ambulance left - checked eqpt, Bryan/Forrest to hosp.
1555	Santiago left; Gerry left
1600	Called Rachel & JD
1725	Pack up site
1735	Return to yard - unload tables
1745	Depart

Justin Fitch

Name

[signature]

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

DATE: 1/23/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest C-E, John A, Gerry, Bryan N	Cascade

SUMMARY OF DAILY ACTIVITIES

	Review incident and button up site for safety stand-down

WORK PERFORMED

1300	Arrive at yard - pick up sup. truck
1315	Go to site
1320	Tailgate meeting
1330	Cascade buttoned up some loose ends, removed control knob to be
	repaired
	Bryan, Forrest & Gerry re-enacted incident, took photos, described
	incident for Bryan's notes
1415	Finished and left site
	Returned truck to yard
1425	Depart

Justin Fitch
Name

Signature

Riley Wittler
Reviewed By

02-05-2021
Reviewed Date

Daily Field Activity Log

DATE: 2/2/2021 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Forrest, Gerry, Bryan, Randall	cascade

SUMMARY OF DAILY ACTIVITIES

	Restart Drilling

WORK PERFORMED

0655	Arrive at site, meet Riley & Rachel
0715	Head to site
0730	USACE Phone Call
0900	Tailgate Safety meeting
1120	Run to Cascade yard
1145	Back to site
1230	Approval to begin
1235	Fire up the rig - Drillers discussing activities
1250	Start Drilling
1600	Plugged up at ~130' again
1715	Pack-up - will try to unplug tomorrow
1730	Fuel rig
1735	Return to yard
1745	Depart

Justin Fitch

Name

Signature

Riley Wittler

Reviewed By

02-05-2021

Reviewed Date

DATE: 2/3/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, JD	Sundance
Forrest, Gerry, Randall, Bryan	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drill ahead - Telescope; install ~~Power~~ Pole

WORK PERFORMED

0650	Arrive at Yard - Incl. calibrate PID
0700	Go to site
0710	Tailgate Safety meeting
0730	Fuel rig & compressor
	Unplug clay from hose
0830	Start drilling
1045	Reach 200' - prep for telescoping
1110	Trip Drillstring
1115	Breathing Space PID - 0.0
1120	Justin to meet B&D - JD & Riley stay w/ Cascade
1155	Tailgate w/ B&D
1200	Finish tripping DS & head to Laydown
	Begin Install of power pole
1330	B&D left to return tomorrow
1400	Called in Hot Work for grinding at Cascade Yard S of GWTS
1435	Call off Hot work - back to site
	trip in drill string/bit
~~1444~~	Telescope pipe
1440	Move rig & set jack - ready to pull 13-3/8" tomorrow
	Depart for yard
	Depart

Justin Fitch

Name

Signature

Riley Witter

Reviewed By

02-05-2021

Reviewed Date

DATE: 2/4/2021 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley	Sundance
Forrest, Bryan, Gerry, Randall	Cascade

SUMMARY OF DAILY ACTIVITIES

	Pull 13 3/8" & Resume Drilling - Fix compressor

WORK PERFORMED

0650	Arrive at yard - pick up trucks
0700	Head to site
0710	Tailgate and "Story time"
0735	Begin setting up to start jacking pipe
0900	Justin to gas up truck and meet B&D at Yard
1000	Cascade & Riley to Cascade yard to unload 13" & load 11" casing
1125	Back to drillsite w/ 11" casing - Rig up & prep to drill
1215	Lunch
1300	Start drilling @ 200'
1430	Shut compressor & rig down - Check check valves on rig
1700	Justin left
1800	Riley to yard to lockup
1810	Depart

Justin Fitch
Name

Signature

Riley Witter
Reviewed By

02-05-2021
Reviewed Date

Daily Field Activity Log

DATE: 2/5/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Forrest, Gerry, Randall, Bryan, Mark	Cascade

SUMMARY OF DAILY ACTIVITIES

	Continue Drilling - Pull out of tight hole, replace Hammer

WORK PERFORMED

0650	Arrive at yard - load up - calibrate PID
0700	Go to site
0730	Tailgate meeting
0745	Hook up new compressor
0900	Set up to start drilling
0930	start drilling
1200	Flang connecting hose to hammer/anvil broke
	LUNCH
1230	Prep to pull back drive casing due to tight hole
1310	Cascade taking water truck to yard to offload casing to make room to pull DS
1350	pull DS
1420	Rig down & set jack
1530	Begin Jacking Pipe - 3 stands
1630	move rig back over well
1645	change hammer
1750	Leave for yard
1800	Depart

Justin Fitch

Name

Signature

Rachel Hohl

Reviewed By

3·4·2021

Reviewed Date

DATE: 2/5/21 PROJECT NAME/NO.: KAFB-106249 / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley	Sundance
Forrest, Gerry, Randall, Mark	Cascade

SUMMARY OF DAILY ACTIVITIES

	Finish rig repairs
	Trip in w/ under-reaming bit
	re-drill 260' to 320' → Drill ahead to 360'

WORK PERFORMED

0650	Arrive at Yard
0700	Go to site
0705	Tailgate
0715	reconnect hose/hammer
	Run to Cascade yard for under-reamer bit
	prep to run in DS & re-drill
1030	Trip in w/ under-reamer
	- Justin to yard for tools
1100	Sample ~~#~~ Depth in KAFB-106148 @ 476.2'
1115	start drilling w/ under-reamer
1240	Lunch
1310	Decided to continue w/ under-reamer
1330	Go to laydown for 100' drive casing
1400	Back to drilling - starting at 300' - New hole after 315'
1725	Finish at 360'
1730	Return to yard
1740	Depart

Justin Fitch
Name

[signature]
Signature

Rachel Hobbs
Reviewed By

3.4.2021
Reviewed Date

DATE: 02-07-2021 PROJECT NAME/NO.: KAPB ~~[illegible]~~ US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Riley Wittler / Justin Fitch	Sundance
Forrest Evans, Mark Green, Gerry Woods	Cascade
Randall Hatfield	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drilling
	Trip drill string
	RW

WORK PERFORMED

0710	safety meeting
0745	start drilling
0745	go to laydown yard from drill site
0820	return from laydown yard to drillsite
1200	lunch
1240	resume drilling
1400	Drilled TD
1450	start tripping drill string
1620	finish tripping drill string
1630	go to laydown yard
1700	depart drill site

RW

Riley Wittler
Name

[signature]
Signature

Rachel Malik
Reviewed By

3-4-2021
Reviewed Date

DATE: 2-7-21 PROJECT NAME/NO.: US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2-7-21	Site safety oversight

WORK PERFORMED

1030	Arrived at project trailer. Desktop Work
1249	Arrived at KAFB-106249. Observed activities, performed safety audit.
1400	Return to project trailer to send out construction diagram.
1630	End of day

RGH

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fitch
Reviewed By

3/5/21
Reviewed Date

Sundance Consulting, Inc.

Daily Field Activity Log

DATE: 2/8/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, John David	Sundance
Forrest, Mark, Gerry, Randall	Cascade

SUMMARY OF DAILY ACTIVITIES

	Build well 106249

WORK PERFORMED

0645	Arrive at Yard - get trucks
0655	Go to site
0705	Tailgate
0725	water level reading: 415' - pipe flooded w/ sediment plug at bottom
0800	Prep to build well
0855	start running PVC for WT well
1100	pull pipe & start construction
1130	water Level inside well (PVC) @ 473.9'
	well set 1.5' high due to sediment in hole
1210	Lunch
1240	Back to it
1345	Finish lower sand emplacement & swab
1400	continue - insert contingency well
1500	add bentonite & upper sand Bentonite seal & pull casing
1700	add 300 gal to hydrate upper bentonite
1715	Load removed DC onto truck
1725	Head back to yard
1735	Depart

Justin Fitch

Name

Signature

Rachel Nohls

Reviewed By

3.4.2021

Reviewed Date

DATE: 2/9/21 PROJECT NAME/NO.: KAFB US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Mark, Forrest, Gerry, Randall	Cascade

SUMMARY OF DAILY ACTIVITIES

	Well Construction ~~[illegible]~~ (249) & Sampling IDW

WORK PERFORMED

0650	Arrive at Yard - pack up
0700	Head to site - Gerry filling H2O Truck
0750	Tailgate Meeting
0805	Begin mixing grout & pumping into well
1100	ACT Arrives to move IDW bins to storage Yard. Cascade to Yard
1230	ACT Leaves - Go to trailer to prep/organize sampling
1345	Gas station - Cascade back at site w/ riley - buy ice
1400	Back to site - cascade added more grout - now mixing/adding cement
1430	Rachel to site - riley to SWS - Justin Sample
1445	Sample KAFB-106249 # 3
	Tag bottom of WT well at 492.1' (plan was 493.2)
1510	Water Level at 476.95'
1530	Sample KAFB-106249-2-IDW
1555	Sample KAFB-106249-1-IDW
1630	Riley QC samples. pack/seal samples (at 106249 site)
1645	Back to yard
1700	Depart to Fedex
1715	Relinquish sample coolers for FedEx Express Delivery
1720	Depart for Home

Justin Fitch

Name

Signature [signature]

Rachel Malls

Reviewed By

3.4.2021

Reviewed Date

DATE: 2/10/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, JD	Sundance
Mark, Forrest, Berry, Randall	Cascade

SUMMARY OF DAILY ACTIVITIES

	Decon, Clean-up, mob to 106250

WORK PERFORMED

0650	Arrive at Yard
0700	To Cascade yard
0705	Tailgate
0730	Between Yard & site
0900	To yard for straps & move stuff to silver truck - JD on-site
0930	Riley to ACT & Office Depot
	Cascade working on surface/pad (2 at yard doing decon)
1000	Buckner came by to look at sites
1100	ACT brings new rolloff
1200	Riley Returns. Justin to yard. Continue decon & mob to 106250
1330	Justin back to site - ACT load KAFB-106249-3-IDW to storage yard
1350	Take rolloff to storage & move straw waffles
1430	Riley to ACT for more totes
	Justin sweep up straw from 249 site
1530	Unload totes in yard
1600	Back to site where Cascade continues to stage & prep
?	Riley to yard to prep sample bags
1700	Riley returns - Cascade continue moving eqpt
	Weld new shoes onto ~~drill~~ ~~drive~~ Drive casing
1800	Back to yard
1810	Depart

Justin Fitch

Name

Signature

Rachel Molds

Reviewed By

3.4.2021

Reviewed Date

Daily Field Activity Log

DATE: 2/11/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley	Sundance
Mark, Forrest, Gerry, Randall	Cascade

SUMMARY OF DAILY ACTIVITIES

	Start drilling 106250

WORK PERFORMED

0650	Arrive at Yard
0700	Go to site - Tailgate
0715	Get started setting up to drill KAFB-106250
0800	Start Drilling
0850	Hammer broke - Mark to go get another
	Finish cleaning up at 106249
1230	Got hammer fixed - Lunch
1300	Start Drilling
1315	Clay plug in cyclone - Clean out
1400	Continue Drilling
1730	Depart for Yard
1745	Depart

Justin Fitch

Name

Signature

Rachel Noble

Reviewed By

3-4-2021

Reviewed Date

Daily Field Activity Log

DATE: 2/16/21 PROJECT NAME/NO.: KAFB-106250

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Mark, Forrest, Lloyd	Cascade

SUMMARY OF DAILY ACTIVITIES

	Repair rig - trip out DS - trip in w/smaller bit
	rig down - set jack, pull 13" ~~DS~~ DC
	Rig-up

WORK PERFORMED

0650	Arrive at site - prep gear & trucks
0705	Go to site
0710	Tailgate
0720	Mark to get salt for ice
0800	Mast Down - repair rig - mast up
0930	Pull DS
1100	Telescope
1230	Lunch
1300	Mast down - set jack - pull 13" DC
1440	Finish jacking pipe - mast down to move jack - set rig up over hole
1520	To Cascade yard to unload 13"
1540	Return & load 11" casing in water truck
1600	Set up to start tomorrow morning - make connection
1630	Clean up - take waste to yard
1705	Fuel Rig
1715	Back to Yard
1720	Depart

Justin Fitch

Name

Signature

Rachel Mahl

Reviewed By

3-4-2021

Reviewed Date

DATE: 2·16·21 PROJECT NAME/NO.: US01030 KAFB BFF

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2·16·21	Well Development KAFB-106251

WORK PERFORMED

0640	Get base pass for Cascade helper
0700	Arrive at project trailer and pack up truck
0710	Communicate with Developer about schedule
0725	Calibrate Horiba, start paperwork
0800	Arrive at KAFB 106-251 and begin setup.
0830	Tailgate and review JSAs for work.
0900	Begin set up and pump install
1006	Call with Ben Moayyad to discuss weather.
	Decide to keep working with frequent breaks
	Additional discussion with team of slip
	hazards.
1130	Break. Go to other site (250) to talk with
	J. Fitch, R. Witter, M. Green about conditions
	Fill up truck at PX and return to 251
1145	Pump set at ~480 ft bgs
1300	Water to surface. Begin pumping to tote
	Unable to get water level during pumping. Sounder
	tangled with drop pipe. Got initial WL reading.
1338	Achieve stabilization & <10 NTU. Pumped ~50
	gallons
1340	Begin removing drop pipe.
1452	Complete drop pipe removal. Final WL of
	470.80
1510	Clean up for day. Decide to wait until next
	day to start 106249

Name: Rachel Hobbs

Signature: Rachel Hobbs

Reviewed By: Justin Fitch

Reviewed Date: 3/5/21

Daily Field Activity Log

DATE: 2/17/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Mark, Forrest, Lloyd, Bryan	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drill Ahead - Repair rig/compressor

WORK PERFORMED

0650	Arrive at Yard - cal PID; Pack up
0700	Go to site
0710	Tailgate
0730	Begin Drilling at @ 157' MD
1200	Hammer chain broke - repair & take lunch
1245	Resume drilling
1430	Hydraulic meter broken & leaking - needs replaced
1630	Repairs completed - Going to swap out compressor
1645	Visit Rachel at KAFB-106249
1705	Return to yard
1710	Depart

Justin Fitch

Name

Signature

Rachel [signature]

Reviewed By

3-4-2021

Reviewed Date

DATE: 2·17·21 PROJECT NAME/NO.: KAFB BFF

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2·17·21	KAFB-106249 Well Development

WORK PERFORMED

0635	Arrive at Site Location ~~KAFB-106249~~ RGH trailer
	pack up materials for day
0700	Arrive at KAFB-106249.
0715	Tailgate. Discuss site hazards, begin setup.
0750	443.21 - Tag bottom of shallow well.
	WL in deep 476.3. 491.75 Estimated bottom
0830	Lower surge block to begin surging
0946	Complete surging. WL 476.17 Bail one well
	volume
1030	Begin surging again.
1130	Finish 2nd round of surging, begin to bail
1230	Complete bailing
1300	Begin pump install
1400	Pump set
1410	Produce H_2O 1.4 gpm.
1500	Snowing, accumulating. Taking readings every
	5 well volumes
1720	Purged 350 gallons. Turbidity 10.3 NTU. No
	sediment. End development
1730	Leave site
	RGH

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fitch
Reviewed By

3/5/21
Reviewed Date

Daily Field Activity Log

DATE: 2/18/21 PROJECT NAME/NO.: KAFB / VS01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin, Riley, Rachel	Sundance
Mark, Forrest, Lloyd	Cascade

SUMMARY OF DAILY ACTIVITIES

	Drill to TD

WORK PERFORMED

1015	Arrive at yard - calibrate PID
1020	Head to site
1030	Tailgate
1050	Begin drilling
1600	TD - Go to get wattles from 106251
1730	Return to yard
1745	Depart

Justin Fitch
Name

Signature

Rachel [signature]
Reviewed By

3-4-2021
Reviewed Date

Sundance Consulting, Inc. **Daily Field Activity Log**

DATE: 2.18.21 PROJECT NAME/NO.: KAFB BFF / 0501-030

ONSITE PERSONNEL

NAME	ORGANIZATION
R. Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2.18.21	Pull development pump

WORK PERFORMED

0630	Discuss weather conditions w/ Mark. Green
	Decide to reevaluate at 0930
0930	Conditions have improved. Decide to begin work
	1030
1030	Tailgate. Cascade begins to pull pump
1140	Pump pulled - site cleaned up. Button up
	flagging. Return to project trailer
1300	Get base pass for L. Beasley. Open
RAH ~~1500~~	and organize pump materials.
1500	L. Beasley leaves site.
1550	TD at KAFB-106250. Head to well location.
	J. Fitch and R. Wiffler leave to get socks
	to put under plastic as containment.
1730	End of day
	RAH

Rachel Hobbs
Name

Rachel Hobbs
Signature

Justin Fitch
Reviewed By

3/5/21
Reviewed Date

DATE: 2/19/21 PROJECT NAME/NO.: KAFB / US01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch / Riley Wittler	Sundance
Mark, Forrest, Lloyd	Cascade

SUMMARY OF DAILY ACTIVITIES

	Build well

WORK PERFORMED

0645	Arrive at yard - warm up trucks
0700	Head to site
0710	Tailgate
0725	Start running lower well - sand & pull pipe
1100	finish adding lower sand, begin running upper well
1130	Go to yard to drop drilling tools & pick up rest of PVC for upper well
	lunch
1245	Continue running upper well
1305	Swab lower sand
1320	Resume building well
1545	Finish Bentonite emplacement - load pipe onto water truck - tag wells
1600	Hydrate Bentonite w/ 300 gal H_2O
1620	Back to yard
1630	Depart

Justin Fitch
Name

Signature

Rachel Mohle
Reviewed By

3-4-2021
Reviewed Date

Daily Field Activity Log

DATE: 02/20/2021 PROJECT NAME/NO.: KAFB US 01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Riley Wittler, Justin Fitch	Sundance
Mark Green, Forrest Chattin, Lloyd Mahaffey	Cascade

SUMMARY OF DAILY ACTIVITIES

	Finish building well (Grout/cement)
	Decon

WORK PERFORMED

0700	Safety Tailgate with cascade
0720	Start grouting
1000	refill water truck
1145	Start cementing
1215	finish cementing and start clean-up
1300	lunch
1400	Transport totes to IDW yard
1430	start cleaning rig at laydown yard
1700	leave site for the day.

RW

Name: Riley Wittler

Signature: [signature]

Reviewed By: Rachel Mahla

Reviewed Date: 3.4.2021

Sundance Consulting, Inc.

Daily Field Activity Log

Page 1 of 1

DATE: 02/21/2021 PROJECT NAME/NO.: KAFB VS 01-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Riley Wittler, Justin Fitch	Sundance
Mark Green, Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade

SUMMARY OF DAILY ACTIVITIES

	decon equipment
	construct well pad
	RW

WORK PERFORMED

0645	arrive at field trailer
0700	safety tailgate with cascade
0720	start decon
1030	Transport Materials to offsite laydown yard
1345	end deconing
1345	start pad construction
1700	Finish pad Construction
1740	leave well site
1800	leave KAFB
	RW

Riley Wittler
Name

Riley Wittler
Signature

Rachel Hohl
Reviewed By

3-4-2021
Reviewed Date

Daily Field Activity Log

DATE: 2/22/21 PROJECT NAME/NO.: KAFB / USCI-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Justin Fitch	Sundance
Forrest, Mark, Lloyd	Cascade

SUMMARY OF DAILY ACTIVITIES

	Demob w/ Cascade

WORK PERFORMED

0645	Arrive at yard
0700	Head to Cascade Yard
0710	Tailgate
0715	Load up equipt to move off-base
0830	To site to finish cleaning up
0950	Finished at site - back to Cascade yard to load up more stuff
1130	To BFF for install
1430	ACT Arrives - to 106250 & IDW yard
1530	ACT Leaves - go for fuel
1600	Back to BFF
1645	Return to yard
1700	Depart

Justin Fitch
Name

Signature

Rachel Mohls
Reviewed By

3·4·2021
Reviewed Date

DATE: 2-22-21 PROJECT NAME/NO.: USO1-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobb	Sundance
L. Beasley	Sundance
JD, Justin, Riley	Sundance

SUMMARY OF DAILY ACTIVITIES

2-22-21	Installing Pumps

WORK PERFORMED

0700	Tailgate meeting
0730	Leave to pick up canisters at Matheson.
0900	Return to project trailer, pack up equipment
1000	Arrive at KAFB-106251
1025	WL 471.22. Bottom of screen 483.5
	Set intake at 481.5 ft bgs
1200	Pump set
1300	Running pump. Not yet producing H_2O
1430	Call QED to discuss troubleshooting
1530	Produce Bubbles. Reduce Tubing Length
1645	Not producing bubbles. End of day

RGH

Name: Rachel Hobb

Signature: Rachel Hobb

Reviewed By: Justin Fitch

Reviewed Date: 3/5/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO / Geologist DATE: 2-23-21
WEATHER: ≈ 60°F; Partly Cloudy WELL ID: KAFB-106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safety Office
D. Fielder + L. Moorhead	~~HCMG~~ JM HMCG

2. OPERATING EQUIPMENT
Hydrovac Equipment

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
—	KAFB-106252 pothole/hydrovac completed @ 14" diameter x 8 ft bgs
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0800	EA + HMCG on site
0825	location of well shifted ≈ 3 ft to west to avoid utilities
0830	Began Potholing (14" diameter to 8 ft bgs)
1030	HMCG off site —— JM

1 of 1
DQCR Page ~~1 of 2~~ JM

Reviewed by: [signature] Reviewed date: 2/25/21

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~ Data Gaps Drilling Proj. - 62735DM02 JM

Daily Quality Control Report – Non-Construction

1 of 2

ROLE: SSHO

DATE: 2-23-2021

WEATHER:

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bartosch	EA - Site Manager/Supervisor
Earl Morse/Mike McVey	EA - Site Health and Safetly Office
Mark Green	Cascade
Forrest Chatburn	Cascade
Lloyd Mahaffey	Cascade
Josh Messenger	EA

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

	- Drilled to 130' ft bgs

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0715	Arrive at Truman yard to find Cascade crew
0730	Safety brief / Compressor off to drill site
0740	Cascade to start loading up sound barriers
	and move drill equipment

DQCR Page 1 of 2

Reviewed by: JM

Initials:

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~ Data Gaps Drilling Proj. - 62735DM02 JM

Daily Quality Control Report – Non-Construction

2 of 2

KAFB-106252

4. WORK PERFORMED (Continued)

DATE: 2-23-2021

0745	Setting up sound barriers, hydrovacing. High Mesa arrived at drilling site at 0800. Started hydrovacing at 0830.
1000	Finished hydrovacing - borehole clear.
1015	High Mesa off site. Heading over to the Truman yard with Josh to dump the cuttings.
1134	Towering up, sound barriers and generator in place.
1315	Finished setting up. Preparing to start drilling.
1401	ACT on site to deliver roll-off.
1417	ACT heading to get second roll-off.
1445	AAA here to drop off new porta-potty and hand wash station.
1455	Start drilling. Cascade on standby from 1210 to 1430.
1502	ACT on site with second roll-off
1743	J. Messenger, F. Chaffin, L. Mahaffey off site.
1800	M. McVay off site. M. Green will stay and wait for security.
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVay

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Initials: —

Reviewed date: 5-25-21

Daily Field Activity Log

DATE: 02/23/2021 PROJECT NAME/NO.: KAFB US01 030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs, Riley Wittler, Justin Fiten	Sundance

SUMMARY OF DAILY ACTIVITIES

	GW sampling
	pump installation

WORK PERFORMED

0700	Arrive to field trailer
0715	well installation of pump at KAFB 106251
1200	pump installed at KAFB 106251
1340	sample KAFB 106251
1518	start pump installation at KAFB 106249
1616	Finish pump installation
1630	Arrive back at field trailer

RW

Riley Wittler
Name

Signature

Rachel Hobbs
Reviewed By

3-4-2021
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 2/24/21
WEATHER: Clear, Hi 59° WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Boskisch	EA - Site Manager/Supervisor
M McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT
ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Drilled to 200' with 13 3/8" casing
	- Tripped in 11 3/4" casing to 200'
	- Tripped in drill pipe to 200'
	- Pulled out 13 3/8" casing

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0640	M. McVey on site
0650	M. Green and J. Messenger on site
0700	F. Chattin and Lloyd Mahaffey on site
0715	Safety meeting

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 2/24/21

4. WORK PERFORMED (Continued)

0730	Unplug cyclone and hose.
0814	Start drilling.
1105	At 200'. Will head over to the Truman
	yard to load up the 11 3/4" pipe.
1408	Back at the site with the 11 3/4" casing,
	drill pipe, casing jacks, and well
	casing.
	Will trip in 11 3/4" casing inside of
	13 3/8" casing to 200', then trip out
	the 13 3/8" casing.
1420	Begin tripping in 11 3/4" casing
1456	Begin tripping in drill pipe.
1511	Towering down, setting up casing jacks
1524	Towering back up
1527	Begin pulling 13 3/8" casing
1633	All of the 13 3/8" casing is out of the
	borehole.
1640	Removing the casing jacks, dumping soil
	cuttings, securing covers to the roll-offs,
	cleaning up site and getting set up to
	start drilling again in the morning.
1740	EA, Cascade off site
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Daily Field Activity Log

DATE: 02/24/2021 PROJECT NAME/NO.: KAFB US01 030

ONSITE PERSONNEL

NAME	ORGANIZATION
Riley Witter, Rachel Hobbs, Justin Fitch	Sundance
JD Nance	Sundance

SUMMARY OF DAILY ACTIVITIES

	GW sampling
	RW

WORK PERFORMED

0800	Arrive at field trailer / prep for day
0825	Arrive at KAFB 106249
1030	Go to Matheson / Act / SWS
1150	arrive back to field trailer
1215	arrive at KAFB 106249
1350	Sample KAFB 106249
1500	get ice
1630	start packing for shipping
1730	leave field trailer for the day

Name: Riley Witter

Signature: Riley Witter

Reviewed By: Rachel Hobbs

Reviewed Date: 3.4.2021

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 2/25/21

WEATHER: Mostly cloudy, cold, windy WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
Lloyd Mahaffey	
Mark Green	

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled and advanced 11 3/4" casing to 357 ft bgs

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0710	Safety meeting
0734	At Truman yard loading up drilling pipe, unloading 13 3/8" casing

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project – 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 2/25/21

4. WORK PERFORMED (Continued)

0815	Back at drilling site. Mack replacing
	bolts on the hammer at the cyclone hose
0854	Mack has to reweld the top head
	gates on the mast.
1010	Welding completed. Tooling back up.
1020	Start drilling, advancing 11 3/4" casing
1135	Problem with the compressor. Looking
	for issue to repair.
1216	Santiago Gallegos (USACE) on site
1345	Compressor repaired. Continue drilling
1500	Santiago Gallegos off site
1530	Ben Moayyad (USACE) on site
1535	ACT on site to deliver ~~op~~ hard top roll-off
	and pick up full open top roll-off
1626	Cascade done drilling for the day. Cascade
	didn't know they were installing a 2"
	piezometer so they need to head to Pergita ~~over to~~
	~~the yard and~~ to determine if they have the
	right pipe to build the well (the
	right pipe lengths).
1655	Clean up site, secure for the night.
1710	Cascade off site
1715	EA off site
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

DATE: 2.25.21 PROJECT NAME/NO.: U501-030

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2.25.21	Well Development

WORK PERFORMED

0700	Arrive at KAFB-106250
0730	Tailgate/setup. Discuss wind speed/hazard
0740	WL of 473.35, tag bottom at 489.80
0800	Begin bailing, bail ~10g.
0845	complete bailing, begin surging
0930	Stop work due to sustained winds over 25 mph
1300	Decide to restart work, winds have dropped below 25, continue to bail.
1340	Begin surging again.
1415	Done ~~bailing~~ RH surging, Begin to bail again
1440	Finish bailing 3rd well volume. Decide not to place pump due to wind. Will Return tomorrow to complete pumping

RGH

Rachel Hobbs
Name

Rachel Hobbs
Signature

[signature]
Reviewed By

3/5/21
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 2/26/21

WEATHER: Partly cloudy, Hi: 53°

WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chaffin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled and advanced 11 3/4" casing to 527 ft bgs
- Will TD the hole on Monday

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site
0715	Safety meeting
0740	ACT on site to drop off empty open top roll-off

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 5-25-21

DATE: 2/26/21

4. WORK PERFORMED (Continued)

0800	Start Drilling
0830	Tag water level in KAFB-106230
	[DTW = 448.80' btoc]
1525	ACT on site to pick up full open top
	roll-off with 17 yd^3 of soil.
	[Stencil # 104059; Painted # ACT2052]
1555	Drilled and advanced 11 3/4" casing to
	527 ft bgs.
1600	Spoke with B. Beckish – piezometer
	should be set in the coarse gravel zone
	from 515 - 525 ft bgs. Cascade will need
	to get more pipe from the laydown
	yard to drill to a deeper depth. We
	will also need to check into getting
	another hard top roll-off from ACT,
	as the one we have on site is full.
1610	J. Messenger off site to open the
	IDW yard for ACT.
1613	ACT will have to get another hard
	top roll-off ready which will take
	a couple of hours. Spoke with
	Mark Green and he said we would
	TD the hole on Monday.
1620	Securing the hole and site for the
	weekend.
1640	ACT on site to pick up hard top roll-off

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: [signature]

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 2/26/21

4. WORK PERFORMED (Continued)

	and take it to the IDW yard. 10yd³ wet soil
	[Painted stencil # ACT2057]
1720	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ 3 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 5-25-21

Daily Field Activity Log

DATE: 2·26·21 PROJECT NAME/NO.: US01-030 KAFB BFF

ONSITE PERSONNEL

NAME	ORGANIZATION
Rachel Hobbs	Sundance

SUMMARY OF DAILY ACTIVITIES

2·26·21	Well Development

WORK PERFORMED

0630	Arrive at trailer, load truck
0700	Arrive at KAFB-106250
0710	Tailgate
0715	Begin pump install
0850	Pump installed, cannot get water level.
	Tape hung up on pump tubing
0905	Produce H_2O. ~~10 gp~~ 1.9 gpm.
1130	Complete pumping, begin to remove pump.
1230	Clean up. Demob

RCH 2·26·21

Rachel Hobbs
Name

Rachel Hobbs
Signature

[signature]
Reviewed By

3/5/21
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/1/21

WEATHER: Clear, cold, Hi 47° WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Beckisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled and advanced 11 3/4" casing to 538 ft bgs.
- Casing threads were either popped or the casing broken during well construction. 2" well casing was tripped out of the borehole. Cascade will camera the inside of the 11 3/4" casing in the morning to determine where the issue lies.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0640	M. McVey on site
0645	Cascade on site
0655	J. Messenger on site
0710	Safety meeting

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/1/21

4. WORK PERFORMED (Continued)	
0742	ACT on site to deliver hard top roll-off #HTB-1
0800	Cascade changing top seal on the hammer
0820	Start drilling
0940	Drilled and advanced 11 3/4" casing to 538 ft bgs. Cleaning out borehole. Total of 1,000 gal of water removed from the borehole; total of 900 gal of water injected into borehole.
1110	Start tripping well screen and casing into the borehole for the piezometer
1150	Setting up the casing jacks
1200	AAA on site to service the porta-potty
1210	Head to Truman Yard to load up well materials (sand, bentonite, cement)
1345	Back on site with well materials, unload
1420	ACT on site to pump out the free liquid in hard top roll-off #HTB-1
1445	Mark was using the casing jacks to begin removing 11 3/4" casing for well construction and there was a loud metallic pop. Either the threads popped somewhere between two joints of casing or the casing broke somewhere downhole. Tripped

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVay

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: [signature]

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/1/21

4. WORK PERFORMED (Continued)

	2" well screen and casing out of the hole. Will camera the interior of the 11 3/4" casing tomorrow to determine where the separation in the casing is.
1453	ACT heading to Zia Yard to pump free liquid from hard top roll-off #ACT 2057.
1535	ACT taking free liquid from the two hard top roll-offs back to the Truman Yard where the liquid will be pumped into a 2,500 gal poly tank.
1604	Back at drilling site. B. Nydoske on site.
1610	Cleaning up site and securing for the night. J. Messenger off site.
1625	F. Chattin and L. Mahaffey off site
1710	B. Nydoske, M. McVay off site. M. Green waiting for security to arrive.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVay
Name

Signature

EA Engineering, Science and Technology Inc., PBC

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Reviewed by: ____________ Reviewed date: 3-9-21

KAFB-106252

1 of 3

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring — 62599DM01~~ Data Gaps Drilling Project - 62735DM02 - JM
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-2-2021

WEATHER: Clear/Mild

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse / Mike McVay	EA - Site Health and Safetly Office
Mark Green	Cascade
Llyod Mahaffey	Cascade
Forrest Chdoitler	Cascade
Arnold Laman	Cascade
Bryan Nydoski	Cascade
Santiago Gallegos	USACE

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the public and governmental employees, and problems encountered and remedies applied)

- Sent camera down the inside of the 11 3/4" casing to determine whether the casing broke or whether the threads between two joints popped.
- Determined that the threads popped at 135 ft btoc.
- Screwed the two joints of pipe back together. ~~to~~
- Sent camera back down casing to ensure that the threads were screwed together.

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	arrive onsite
0715	Site safety brief
0730	Arnold Lemon (cascade) arrives
0745	Santiago Gallegos (USACE) arrives

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM   Initials: —   Reviewed date: 3-9-21

KAFB-106252

DATE: 3-2-2021

4. WORK PERFORMED (Continued)

0745	Cascade starts setup of camera
0827	Cascade determined that the threads popped between pipe joints at 135 ft btoc. They are going to screw the casing back together at the popped threads then go back in with the camera to make sure that the threads are screwed together and seated properly. They will then set the inside grapple at 160 ft btoc and trip out the 11 3/4" casing to one joint below where the threads popped and then trip in new casing to TD and clean out the borehole.
0840	Santiago Gallegos off site
0843	Earl Mora off site
0853	Bernie Bockisch on site
0930	Threads where separation occurred are screwed back together. Will go back in with the camera.
1000	Finished running camera in. The two joints of casing where the threads popped are screwed back together.
1100	Heading over to Truman Yard to load up heavier pipe.
1243	Back at the drilling site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: JM Initials: — Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/2/21

4. WORK PERFORMED (Continued)	
1251	Tripping grapple into 11 3/4" casing to 160 ft btoc
1404	Table fork broke. Forrest heading to yard in Peralta to get another one.
1517	Forrest back on site with new table fork. Install and resume tripping in grapple.
1640	Grapple tripped in to 165 ft btoc. Will start pulling casing in the morning.
1645	Cleaning up and securing site for the night.
1730	Cascade is going to have a tool made to help pull the casing. Mark is talking to the vendor to see if he can build the tool tonight so it will be ready in the morning.
1745	Cascade off site
1750	M. McVey off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2~~ 3 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone Coring~~ Data Gaps Drilling Project -- 62735DM02

Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/3/21

WEATHER: Clear, sunny, Hi: 61°

WELL ID: KAFB-~~106IN2~~ 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Backisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chaffin	Cascade
Lloyd Mahuffey	
Mark Green	
Bryan Nydeske	

2. OPERATING EQUIPMENT

ARCH drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- 11 3/4" casing separated again in the same location at 135 ft btoc while using casing jacks. The grapple somehow released so only the casing jacks were pulling on the casing resulting in the threads popping again.
- Rescrewed casing back together and confirmed with the camera.

MM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site
0720	Safety meeting
0744	Setting up casing jacks
0803	Spoke with Bryan Nydeske (Cascade) and

Reviewed by: JM Initials: ~ Reviewed date: 3-9-21

DATE: 3/3/21

4. WORK PERFORMED (Continued)

	he said that they have decided, since the
	casing has been sitting in the hole for so
	long, that they are going to pull the
	grapple out of the ~~hole~~ casing and rig up
	to drive the casing six inches or so to
	loosen it up in the hole. Once done, they
	will trip the grapple back into the casing,
	and using the casing jacks and the new
	tool, begin tripping out the 11 3/4" casing
	to below the location where the threads
	popped. They will then begin drilling and
	driving casing, replacing the two joints
	where the threads popped, to TD.
0850	Rigged up and drove casing 6" to loosen
	it up in the borehole.
0852	Reinstalling grapple.
0912	Rigging down, setting up casing jacks.
0945	Begin pulling casing.
1140	Loud metallic pop while pulling the
	casing. Mark believes that the casing
	separated at the threads again
	below the grapple. Will pull the
	grapple and go back in with the
	camera to determine the location
	of the separation.
1318	Bryan Nydoske on site with the camera.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/3/21

4. WORK PERFORMED (Continued)

1330	Setting up camera.
1405	Casing separated at the same location
	as before at 135 ft btoc. The casing
	this time, though, is offset in the hole.
	Will work to realign casing so that
	it can be screwed together again.
1550	Casing screwed back together.
	Confirmed with the camera.
1643	Installing grapple to previous depth of
~~1643~~	167 ft btoc
1710	Finished installing grapple.
1720	Cleaning up site and securing for the
	night.
1735	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3 of 3

Reviewed by:

Reviewed date: 3-9-21

Data Gaps Drilling Project

Kirtland AFB Bulk Fuels Facility ~~Vadose Zone Coring~~ -- 62735DM02

Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/4/21

WEATHER: Cloudy, slight wind, Hi: 56°

WELL ID: KAFB-~~106IN2~~ 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade
Bryan Nydoske	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Pulled 20' of 11 3/4" casing from the borehole.

JM

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site
0715	Safety meeting
0737	Rigging down, setting up casing jacks
0750	Casing jacks in place, rigging back up.

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Reviewed by: JM Initials: Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/4/21

4. WORK PERFORMED (Continued)

0820	Begin pulling casing.
0908	Casing separated again; Evaluating options for path forward.
0912	Cascade has decided to trip out the grapple and use the camera as before to make sure the pipe is screwed together (they believe the threads popped again at the same location - 135 ft btoc). Once screwed back together, they are going to put a 5' joint of 13 3/8" casing over the 11 3/4" casing. They will then place the plate that was fabricated on top of the 13 3/8" casing and around the pipe connected to the grapple. They will the pull on the 13 3/8" casing with the casing jacks, which will put the force on the grapple and not the 11 3/4" casing.
0920	Rigging down, removing casing jacks.
0945	Tripping out pipe and grapple from inside of the 11 3/4" casing.
1010	Preparing to video
1030	Casing separated at same location as previously (135 ft btoc); screwing

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

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Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/4/21

4. WORK PERFORMED (Continued)

	casing back together.
1121	Casing is screwed together again and
	confirmed with the camera.
1140	Installing grapple inside of 11 3/4"
	casing at same location as previously
	(167 ft btoc).
1202	Rigging down, setting up casing jacks
1213	Rigging up, preparing to start pulling
	casing.
1240	Heading to the Truman Yard to load up
	13 3/8" casing
1330	Back from Truman Yard. Setting up to start
	pulling casing.
1416	Begin pulling casing.
1725	Pulled 20' of casing out of the borehole.
1730	Cleaning up the site and securing for
	the night.
1745	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3 of 3

Reviewed by:

Reviewed date: 3-9-21

DATE: 03/04/2021 PROJECT NAME/NO.: KAFB US 01030

ONSITE PERSONNEL

NAME	ORGANIZATION
Riley Wittler, Rachel Hobbs, Justin Fitch	Sundance

SUMMARY OF DAILY ACTIVITIES

	Pump installation
	GW sampling
	IDW sampling

WORK PERFORMED

0800	arrive at KAFB
0830	arrive at KAFB 106250
1000	install pump
1125	start purging KAFB 106250
1230	sample 106250 & IDW totes
1330	finish sampling KAFB 106250 + cleanup
1340	Return to trailer & start packing coolers
1500	go to mattheson / Fed EX
1600	Return from Fed EX / mattheson
1630	Finish at field trailer

RW

Riley Wittler
Name

Signature

Justin Fitch
Reviewed By

3/5/21
Reviewed Date

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/5/21

WEATHER: Sunny, Hi 60°

WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bonkirab	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chatkin	Cascade
Lloyd Mahaffey	
Mark Green	

2. OPERATING EQUIPMENT

ARCH drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Pulled 120' of 11 3/4" casing from the borehole, including the two 10' joints with the damaged threads.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0710	Safety meeting
0750	Start pulling casing
1135	Have pulled 120' of 11 3/4" casing from

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/5/21

4. WORK PERFORMED (Continued)	
	the borehole. The grapple isn't biting on
	the inside of the casing anymore so
	Cascade will trip the grapple out of
	the casing to assess the problem.
1330	Grapple is no longer working. Instead
	of wasting time trying to fix it, Mark
	has decided to try to pull the last
	two joints with the rig.
1430	Last two 10' joints pulled successfully
	with the rig. A total of 140' of 11 3/4"
	casing pulled from the borehole,
	including the two joints with the
	damaged threads.
1440	Removing subs from grapple, loading
	casing onto pipe truck.
1645	Heading to the Truman Yard to unload
	pipe, casing, grapple. Will decon the
	grapple so it can be picked up in the
	morning.
1720	Leaving Truman Yard.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: 5560

DATE: 3/6/21

WEATHER: Sunny, Hi 62°

WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

	- Drilled to 480' bgs

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site at Truman Yard
0710	Safety meeting
0735	Stabbing casing, loading up equipment to start redrilling.

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 3-9-21

DATE: 3/6/21

4. WORK PERFORMED (Continued)

1035	Back at the drilling site; setting up to drill.
1215	Tripping in bit and drill pipe.
1320	Start drilling.
1436	Hammer broke. Heading to Truman Yard to pick up the spare and bring it back to install.
1452	Back at the drilling site with the hammer. Will trade out hammers.
1552	Hammer installed. To reduce the amount of water generated tomorrow, Cascade has decided to stop drilling today and resume in the morning. The more we drill tonight, the more open hole to fill up with water overnight, which will generate a higher waste stream tomorrow - both cuttings and water.
1605	Drilled to 480' bgs. Clean up and secure the site for the night. Will drop off hammer at Truman Yard and wait for security.
1730	EA, Cascade off site.

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/7/21

WEATHER: Sunny, Hi 67° WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT
ARCH Drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Drilled to TD of 538' bgs
	- Installed 2" PVC for piezometer, screen 515-525' bgs
	- Installed 4" PVC for deep well, bottom of 2' sump set at 467' bgs
	- 10/20 sand placed from 538-509.9' bgs
	- 1/4" bentonite pellets placed from 509.9-504.8' bgs
	- 10/20 silica sand placed from 504.8-468' bgs

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0850	EA, Cascade on site
0900	Safety meeting
0926	Start drilling
1055	AT TD of 538' bgs. Cleaning out borehole.

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM Reviewed date: 3-9-21

DATE: 3/7/21

4. WORK PERFORMED (Continued)

1120	ACT on site to pick up open top roll-off #0542-20 and take to the IDW yard (~3 yd³ of soil cuttings). Earl will meet ACT at the IDW yard.
1147	Done cleaning out borehole. Tripping out drill pipe. Call Martin with ACT to come out with the vac truck to pump off free liquid from hard top roll-off # HTB-1. Approximately 1,000 gal removed from borehole and approximately 900 gal injected into borehole.
1220	Martin with ACT on site to pump off free liquid from hard top roll of #HTB-1.
1250	Approximately 1,300 gal pumped off. Martin headed to IDW yard to meet Earl and pump liquid into the new 2,500 gal poly tank.
1300	Tripping in 2" PVC casing for the piezometer.
1345	Set up casing jacks.
1401	Begin placing filter pack (10/20 silica sand)
1405	ACT on site to pick up hard top roll-off #HTB-1 and take it to the

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 3

Reviewed by:

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/7/21

4. WORK PERFORMED (Continued)

	IDW yard.
1440	10/20 silica sand placed from 538'-509.9' bgs (30 bags)
1512	1/4" bentonite pellets placed from 509.9'-504.8' bgs (6 buckets)
1600	10/20 silica sand placed from 504.8'-468' bgs (41 bags)
1606	Tripping in 4" PVC casing for deep well to 467' bgs (bottom of 2' sump)
1710	Cleaning up site and securing for the night, fueling rig and compressor.
1730	Cascade off site
1740	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3of3

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/8/21

WEATHER: Cloudy, Hi: 65°

WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
Forrest Chuttin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, casing jacks, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Installed deep filter pack from 468-423' bgs
- Installed 4" PVC casing for shallow well
- Installed bentonite chip seal from 423-418' bgs, hydrated
- Installed shallow filter pack from 418-388.4' bgs
- Installed bentonite chip seal from 388.4-358' bgs, hydrated
- Set up to begin grouting in the morning

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0715	Safety meeting
0735	Resume well construction
0920	10/20 silica sand placed from 468'-423' bgs

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/8/21

4. WORK PERFORMED (Continued)

	Will swab the well to settle filter pack.
0940	Sand settled ~.5' to 423.6' bgs. Will add sand to bring it back up to 423' bgs (total of 51 bags of sand)
0943	Tagged sand at 423' bgs
0948	Tripping in 4" PVC casing for shallow well to 417.5' bgs (bottom of 2' sump).
1031	Completed 4" PVC casing installation for shallow well.
1124	3/8" bentonite chips placed from 423'-418' bgs, hydrate
1226	Shallow filter pack placed from 418'-388.4' bgs
1347	3/8" bentonite chips placed from 388.4'-358' bgs, hydrate
1355	Loading up drill pipe, casing, PVC casing, sand, bentonite, etc. to take to the Truman Yard.
1431	Heading to Truman Yard to unload drilling materials and equipment and load up grouting materials and equipment.
1637	Back at drilling site, unloading.
1715	EA, Cascade off site.
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 3-9-21

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring – 62599DM01~~ Data Gap Drilling Proj. – 62735DM02 JM

Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-9-2021

WEATHER: Overcast/Mild

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
Bernie Bockisch	EA - Site Manager/Supervisor
Earl Morse/Mike McVey	EA - Site Health and Safetly Office
Josh Messenger	EA Geologist
Mark Green	Cascade
Forrest Chalstrom	Cascade
Lloyd Mahaffey	Cascade
Bryant Jones	Cascade

2. OPERATING EQUIPMENT

Team #1		Team #2		Spare	
YSI Professional Plus 15K101398 Wh0003	☐	YSI Professional Plus 15K101396 Wh0001	☐	YSI Professional Plus 15L100541 Wh0002	☐
MiniRAE 3000 592-915778 Wh0005	☐	MiniRAE 3000 592-915790 Wh0004	☐	MiniRAE 3000 592-915579 Wh0006	☐
Hach 2100Q 15100C045034 Wh0008	☐	Hach 2100Q 15100C044633 Wh0009	☐	Hach 2100Q 15100C045025 Wh0007	☐
Solinst Water Level Meter 253054	☐	Solinst Water Level Meter 253053	☐	Solinst Water Level Meter 253056	☐

3. DAILY SUMMARY (include QC samples collected, deviations from planning documents, converstations with the the public and governmental employees, and problems encountered and remedies applied)

- Tripped out all of the 11 3/4" casing
- Placed grout to 34' bgs
- Placed chips from 34-28' bgs
- Topped off borehole with cement
- Checked the shallow and deep 4" wells for grout instrusion; none found
- Cut off 4" wells and piezometer below grade
- Cleaned up site, moved all equipment and materials to Truman Yard.

4. WORK PERFORMED (Indicate location, time, and description of work performed by prime and/or subcontractors)

0710	Safety Brief
0728	Site set up for grouting - Took Mark to 106248 site to identify location
0740	Return to 106252 site.

Reviewed by: JM

DQCR Page 1 of ~~2~~ 3

Initials:

Reviewed date: 5-25-21

2 of 3

Data Gaps Drilling Proj. – 62735DM02

Kirtland AFB Bulk Fuels Facility ~~GWTS Expansion/Monitoring -- 62599DM01~~ JM

Daily Quality Control Report – Non-Construction

KAFB-106252

4. WORK PERFORMED (Continued) DATE: 3-9-2021

1130	All of the 11 3/4" casing tripped out of
	borehole. Grout tagged at 62' bgs.
1220	Joseph Valdez (City of ABQ inspector)
	on site to look at area where casing
	jacks have damaged asphalt. He said
	that we can pour the well pad and
	damaged area in concrete or a mix
	of concrete for well pad and asphalt,
	whichever we choose. They will inspect
	before we pour.
1235	Grout tagged at 34' bgs. Placed chips
	from 34-28' bgs. Top off borehole
	with cement.
1256	Bailer sent down shallow 4" well - no
	evidence of grout intrusion
1300	Bailer sent down deep 4" well -
	no evidence of grout intrusion
1312	Towering down, loading up materials
	and equipment to take to the
	Truman Yard. Demobing rig and pipe
	truck to the yard.
1401	Back at site. Continue clean up,
	loading of materials and equipment.
1520	Cut off PVC wells and piezometer
	below grade.
1612	Finished cleaning up the site, loading

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

Reviewed by: JM

DQCR Page 2 of ~~2~~ 3

Initials: ___

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/9/21

4. WORK PERFORMED (Continued)	
	materials and equipment to take to the
	Truman Yard. Called Southwest Safety
	to pick up unnecessary signs.
1712	Finished unloading.
1720	Cascade off site.
1730	EA off site.

NA

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3 of 3

Reviewed by:

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/10/21

WEATHER: Sunny, windy, Hi 54°

WELL ID: 106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey/E. Morse	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade
Bryant Jones	Cascade

2. OPERATING EQUIPMENT

Steam cleaner

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

	Steam clean equipment, assenble casing, service equipment

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	Cascade on site at Truman Yard.
0655	EA on site at Truman Yard.
0705	Safety meeting
0715	Cascade will be deconing rig, equipment,

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: JM 5-4-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/10/21

4. WORK PERFORMED (Continued)

	pipe, and casing. Subs will be coming on
	site to service rig and compressor,
	change tires on compressor, and perform
	maintenance on other equipment as
	necessary.
0848	Purcell on site to change tires on the
	compressor.
1000	Rush Truck Centers (NMDOT inspector)
	on site
1012	Purcell off site
1300	Earl Morse on site, M. McVey off
	site
1320	Rush Truck Centers off site
1400	Cascade assembling short joints of 11¾" pipe. Mark Green
	arrives back on-site. Working on compressor electrical
1600	Cascade continues to assembly casing joints and service
	equipment.
1745	Everyone off-site

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Earl Morse
Name

[signature]
Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-4-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-11-21

WEATHER: low 60s(°F); clear; breezy

WELL ID: KAFB-106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bochisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
F. Chattin / B. Jones	Cascade
Manuel D / Angel T	CCE
G. Cordova / Fernandez S.	CCE
A. Suarez / S. Gridde	CCE

2. OPERATING EQUIPMENT
Fork lift, concrete saw

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Well pad & road work completed @ KAFB-106252

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0730	EA on site
0740	Cascade on site + CCE → 0745 H&S briefing
0755	CCE began cutting asphalt + Cascade began clearing road
0708	CCE has pad prepped - will call inspector + let us (EA + Cascade)

DQCR Page 1 of 2

Reviewed by: A K Brown

Reviewed date: 3/17/21

DATE: 3-11-21

4. WORK PERFORMED (Continued)

	when the inspector will be out.
0915	Cascade off site – EA providing site security (open hole)
0945	Cascade on site
0950	Inspector on site – took pictures + said it was good to go –
	he will release green tag to CCE to complete pad.
0952	Cascade offsite – 0958 Inspector (COA) off site
1100	Cascade on site – 1132 Cascade said CCE would be on site
	~ noon – Cascade off site to off load trailer
1207	Cascade + CCE onsite w/materials to complete Wellhead
1300	Pad completed CCE off site – EA + Cascade collapse
	TCP
1310	Forrest off site – 1315 EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Joshua Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

Reviewed by: A K Bram

DQCR Page 2 of 2

Reviewed date: 3/17/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3-12-21

WEATHER: low 60s (°F); partly cloudy WELL ID: KAFB-106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Leroy M. / Dallas F.	HMCG

2. OPERATING EQUIPMENT
Hydrovac Equipment

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Hydrovac completed (~~[illegible]~~ 8') @ KAFB-106248 location

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0645	Met HMCG @ Truman lay down yard – Mob to KAFB-106252
0706	left KAFB-106252 – 0714 Arrived @ KAFB-106248 to pothole
0715	H&S Briefing – 0728 Hydrovac began @ KAFB-106248
0840	Reached depth w/ hydrovac (14" diameter) @ KAFB-106248

DQCR Page 1 of 2

Reviewed by: A K Braun Reviewed date: 3/17/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-12-21

4. WORK PERFORMED (Continued)

0913	EA + HMCG off site to Truman Yard
0922	At Truman Yard
0932	EA + HMCG off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

Reviewed by: A K Bran

DQCR Page 2 of 2

Reviewed date: 3/17/21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3-15-21

WEATHER: high 50s (°F); mostly sunny WELL ID: KAFB-106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Danny Moore	Cascade

2. OPERATING EQUIPMENT
Pulstar Rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Swabbed + Bailed KAFB-106252
	– 110 gallons of waste containerized
–	NO ISSUES
–	NO VISITORS

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0645	EA on site – 0720 Cascade on site
0730	H&S briefing – 0735 Site Setup
0800	Boom up
0850	Swabbing ~~began~~ setup – 0905 Swabbing began

DQCR Page 1 of 2

Reviewed by: ______________________ Reviewed date: ______________

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-15-21

4. WORK PERFORMED (Continued)

~~0905~~	~~S Jm~~ 0925 Swabbing completed – setup to bail
0944	Begin bailing
1000	Initial bail had ≈ 20 mg/L fine sand ~~Jm~~
1020	Volumes 1 & 2 had ≈ 2 mg/L fine sand ~~≈ 500 mg/L silt Jm~~
1022	Cascade switches to swabbing – 1054 Swabbing completed; switch to bailing
1100	Pumped waste to EA steel drum – 1115 bailer deployed
1140	Switch back to swabbing after 4 volumes (40 gal) – 1208 Swabbing complete
1215	Lunch – 1255 off lunch – 1256-1259 pumped waste to drum
1300	bailer deployed – 1420 after 11 volumes (110 gallons) bailed,
	all parameters have stabilized and sediment reduced to 0.5 mg/L
1430	piezometer tagged @ 524.3 ft TOC; site clean up
1445	Boom down – Cascade off site @ 1510
1520	EA off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger   Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: ____________   Reviewed date: ____________

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-16-21

WEATHER: mid 50s(°F), sunny

WELL ID: KAFB-106252

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bechisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Danny Moore	Cascade

2. OPERATING EQUIPMENT
Pulstar Development Rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Continued well development @ KAFB-106252 by pump methodology
–	IDW: Pumped 90 gallons of water — containerized
–	Could not get bailers to depth in piezometer
–	ISSUES: NONE
–	VISITORS: NONE
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0700	EA + Cascade on site - 0705 H&S briefing
0710	Site setup
0750	Boom up — 0810 pump connected to wire harness
0937	Pump tripped in to ≈2ft above bottom of screen (≈463 ft bgs)

DQCR Page 1 of 2

Reviewed by: ______________________

Reviewed date: ______________

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-16-21

4. WORK PERFORMED (Continued)

0943	DTW = 451.65' TOC
0950	pumping began
1025	pumping ended - began tripping out pump
1150	pump removed & disconnected
1156	1½" S.S. bailer attached to bail piezometer
1210	DTW = 451.25' TOC piezometer TD = 524.30' TOC
1222	1½" S.S. bailer couldn't go to depth — switched to a 1½" PVC bailer
1227	1½" PVC bailer couldn't make it to depth - switched to 1" S.S. bailer
1232	1" S.S. bailer made it to 310.8 ft TOC
1253	Well secured
1256	Boom down; site clean up
1324	Traffic control collapsed around well head - EA +
	Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name J. Messenger

Signature [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: ______________________ Reviewed date: ______________

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/16/21

WEATHER: Partly cloudy, windy, Hi 50° WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffay	Cascade
Mark Green	Cascade
Bryant Jones	Cascade
J. Messenger	EA

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled and advanced 13 3/8" casing to 200' bgs.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site at Truman Yard
0705	Safety meeting
0720	Stabbing pipe, loading equipment and drilling materials to take to 106248

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 5-25-21

DATE: 3/16/21

4. WORK PERFORMED (Continued)	
	well location.
1055	Mob rig, equipment, and materials to 106248 well location and set up to begin drilling.
1245	Replacing control switch for sand line
1305	Start drilling
1721	Drilled and advanced 13 3/8" casing to 200'.
1730	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

Reviewed by: Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO   DATE: 3/17/21

WEATHER: Partly cloudy, Hi 56°   WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade
Bryant Jones	Cascade
Mark Green	Cascade
J. Messenger	EA

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Drilled and advanced 11 3/4" casing to 380' bgs.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site
0710	Safety meeting
0740	Cleaning out borehole
0750	Tripping out drill pipe

DQCR Page 1 of 2

Reviewed by: JM   Reviewed date: 5-25-21

DATE: 3/17/21

4. WORK PERFORMED (Continued)	
0935	At Truman Yard to load 11 3/4" casing.
1010	Back on site at drilling location for
	well 106248.
1027	Begin tripping in 11 3/4" casing. 11 3/4"
	casing will be telescoped inside of
	the 13 3/8" casing to 200' bgs.
1130	At Truman Yard to load 11 3/4" ~~casing~~
	and drill pipe.
1215	Back at the drilling site.
1327	Start drilling
1725	Drilled and advanced 11 3/4" casing to
	380' bgs.
	- Open top roll off # ACT2072 is full
	(~17yd³) and ready to go to the
	IDW yard.
	- Open top roll off # RO2220 BWT has
	~12 yd³ in it.
	- ACT is supposed to deliver another
	open top roll off to the site by
	noon tomorrow.
1735	Clean up site and secure for the night;
	Cascade off site
1745	EA off site.
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/18/21

WEATHER: Partly cloudy, Hi 59°

WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	**Organization**
B. Beckisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chaffin	Cascade
Bryant Jones	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, fork lift, casing jacks

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Advanced 11 3/4" casing to TD of 508' bgs
- Completed cleanout of borehole
- Will begin well construction in the morning.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0655	EA, Cascade on site
0710	Safety meeting
0740	Start drilling
0820	Hammer chain broke. Will repair on site

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/18/21

4. WORK PERFORMED (Continued)

0911	Hammer repaired; resume drilling.
0943	ACT on site to drop off empty open top roll off (#22023) and pick up full open top roll off #ACT2072 (with 17yd^3 of soil cuttings) for transport to the IDW yard.
1040	ACT on site to pick up full open top roll off #R02220 BWT (17 yd^3 soil cuttings) for transport to the IDW yard.
1445	AT TD of 508' bgs; cleaning out borehole.
1533	Completed cleanout of borehole. 800 gal water injected, 900 gal removed.
	300 gal injected for hydrostatic head.
1540	Tripping out drill pipe.
1610	Screwing together 4" PVC pipe and well screen, preparing to trip in PVC for the deep well in the morning. Servicing pump.
1730	Cleaning up site and securing for the night.
1745	EA, Cascade off site
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/19/21

WEATHER: Sunny, Hi 65°

WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
J. Messenger	EA
Forrest Chattin	Cascade
Bryant Jones	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, casing jacks, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Tripped out all 13 3/8" casing from the borehole
- Filter pack for the deep well placed from 499.8' - 450.6' bgs
- Lower bentonite chip seal placed from 450.6' - 445.6' bgs
- Upper filter pack placed from 445.6' - 435.0' bgs. Will finish placing upper filter pack in the morning.

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	EA, Cascade on site
0705	Safety meeting
0728	J. Messenger tagging water level in 106252 (DTW = 452.67' MRP)

DQCR Page 1 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/19/21

4. WORK PERFORMED (Continued)

0737	Tagging water level in 106248
	(DTW = 440.62' bgs after injecting
	300 gal yesterday afternoon)
0745	Tagging water level in 106019
	(DTW = 479.01' MRP)
0749	Begin tripping in 4" PVC for the 106248
	Deep well
0900	Setting up casing jacks.
0930	Pulling one 10' joint of 11 3/4" casing.
0943	Pulling 13 3/8" casing.
1052	ACT on site to pump free liquid from
	the roll off bins.
1115	Finished pulling the 13 3/8" casing
	from the borehole.
1132	ACT off site to dispose of the liquid
	in the 2,500 gal poly tank at the
	laydown yard by the GWTS.
1305	ACT on site to pick up open top roll off
	#22023 (3yd³ soil cuttings) and drop
	it off at the IDW yard.
1400	Filter pack for the deep well placed from
	499.8' - 450.6' bgs
1403	ACT on site to pick up hard top roll
	off #6001 (6yd³ wet soil cuttings) and
	drop it off at the IDW yard.
1410	Tripping in 4" PVC for the 106248 shallow

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of ~~2~~ 3

Reviewed by: JM

Reviewed date: 5-25-21

DATE: 3/19/21

4. WORK PERFORMED (Continued)

	Well.
1620	Lower bentonite chip seal placed from 450.6' – 445.6' bgs.
1715	Upper sand pack placed from 445.6' – 435.0' bgs. Will finish placing upper sand pack in the morning.
1717	Clean up site and secure for the night
1730	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page ~~2 of 2~~ 3 of 3

Reviewed by:

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO
DATE: 3/20/21
WEATHER: Partly cloudy, Hi 71°
WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Backisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
J. Messenger	EA
Forrest Chattin	Cascade
Bryant Jones	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT
ARCH drilling rig, compressor, casing jacks, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Installed Upper filter pack to 415.8 ft bgs
–	Installed Upper seal to 378 ft bgs
–	Installed grout to 200 ft bgs

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0650	EA, Cascade on site
0714	Safety meeting
0730	Continue placing upper filter pack.
0820	Upper filter pack installed from 445.6 – 415.8 ft bgs

DQCR Page 1 of 2

Reviewed by: JM
Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-20-21

4. WORK PERFORMED (Continued)

—	began installing upper seal
0835	Cascade on water break — 0855 off water break
1010	Upper Seal installed 415.8 – 378 ftbgs
1020	Cascade on water break — 1040 Cascade off water break
1055	At Truman Yard to offload 13 3/8" casing and
	drill pipe, fill up with water, load grout.
1158	Back on site; preparing to grout.
1320	Start grouting borehole.
1651	Placed grout from 378' – 200' bgs. Will finish
	grouting the borehole tomorrow.
1655	Pulling one more joint of casing.
1705	Cleaning up site and securing for the night,
	filling up with water
1730	EA, Cascade off site.

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/21/21

WEATHER: Mostly sunny, Hi 66° WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)

Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
J. Messenger	EA
Forrest Chaffin	Cascade
Bryant Jones	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT

ARCH drilling rig, compressor, casing jacks, fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Grout installed from 200' - 23' bgs
- Cement installed from 23' bgs to ground surface
- All equipment and materials demobed from the site
- Will finish the surface completion for 106248 tomorrow

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0650	EA, Cascade on site
0710	Safety meeting
0725	Setting up to resume grouting
0747	Resume grouting

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Reviewed by: JM Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/21/21

4. WORK PERFORMED (Continued)

1113	Grout placed from 200' - 15' bgs; let settle.
1120	Filling up with water.
1230	At Truman Yard unloading 11 3/4" casing
1314	Grout tagged at 23' bgs; cement placed from 23' bgs to ground surface. Deep and shallow wells tagged - no sign of grout intrusion.
	TD of deep well = 494.6' bgs
	TD of shallow well = 445.2' bgs
1330	Towering down, removing casing jacks, loading equipment and excess materials to take to the Truman Yard.
1537	At Truman Yard to unload equipment and materials; decon equipment, casing, and drill pipe.
1715	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey

Signature:

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by:

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/22/21

WEATHER: Cloudy, cool, chance of showers WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safety Office
Forrest Chattin	Cascade
Bryant Jones	Cascade
Lloyd Mahaffey	Cascade
Mark Green	Cascade

2. OPERATING EQUIPMENT
Fork lift, steam cleaner, cement mixer

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
	- Finished surface completion for 106248
	- Cascade will finish demobing all equipment and materials from the Truman Yard tomorrow
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0645	EA, Cascade on site
0710	Safety meeting
0720	Continue deconing, loading, preparing to demob all equipment and materials

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 5-25-21

DATE: 3/22/21

4. WORK PERFORMED (Continued)

	from the Truman Yard.
0750	At drilling site to install surface completion for well 106248.
1208	Surface completion done. Rebar installed in concrete pad. Heading to the GWTS field trailer to get a lock for the well.
1400	Rig deconed and demobed from the yard.
1635	Everything deconed. Will finish loading tomorrow for transport off site
1645	EA, Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Mike McVey
Name

Signature

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3/23/21

WEATHER: Partly cloudy, cool

WELL ID: 106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Mark Green	Cascade
Bryant Jones	Cascade
Forrest Chattin	Cascade
Lloyd Mahaffey	Cascade

2. OPERATING EQUIPMENT

Fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Will finish removing remaining drill pipe and casing from the Truman Yard tomorrow.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0645	Cascade on site
0700	EA on site; Safety meeting
0715	Continue loading equipment and materials
0823	Semi with flatbed trailer on site to load
1030	Semi with flatbed trailer off site with load

DQCR Page 1 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3/23/21

4. WORK PERFORMED (Continued)	
1208	Semi with flatbed trailer back on site to load
1230	Forrest Chattin on site with trailer to load
1340	Forrest Chattin off site with loaded pipe truck and loaded trailer
1410	Semi with flatbed trailer back on site to pick up another load
1534	Lloyd Mahaffey off site with loaded trailer
1547	Semi with flatbed off site with load; M. Green, B. Jones off site
1730	Forrest Chattin on site with trailer to load
1800	EA, Forrest Chattin off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: Mike McVey
Signature:

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: JM

Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3/25/21

WEATHER: Cloudy, cold WELL ID: N/A

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Boskisch	EA - Site Manager/Supervisor
M. McVey	EA - Site Health and Safetly Office
Forrest Chaffin	Cascade
Bryant Jones	Cascade

2. OPERATING EQUIPMENT

Fork lift

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

- Cascade completed demob from Truman Yard.

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA, Cascade on site
0705	Safety meeting
0715	Load up final items from the Truman Yard
0800	Call AAA to pick up porta-potty and sink
1000	EA, Cascade off site.

DQCR Page 1 of 2

Reviewed by: JM Reviewed date: 5-25-21

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO DATE: 3-26-21

WEATHER: low-mid 50s (°F); cloudy WELL ID: KAFB-106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safety Office
Danny Moore	Cascade

2. OPERATING EQUIPMENT
Pulstar Development Rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Began development @KAFB-106248: Noticed well was drying up ≈ 1 well
	volume; decided to go back to swab/bail till filter pack becomes unclogged
–	Generated ≈ 60 gallons IDW – containerized in steel drums
–	Mark Phaneuf visited site (USACE)

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0700	EA + Cascade on site – 0715 H&S briefing
0757	Boom up – 0830 began bailing to find bottom before swabbing
0855	Bailed about 6 gallons – switched to swabbing
0910	Swabbing began

DQCR Page 1 of 2

Reviewed by: A K Brand Reviewed date: 5/4/2021

DATE: 3-26-21

4. WORK PERFORMED (Continued)	
0935	Swabbing complete - switch to bailing
0952	Began bailing - post-swab initial ≈ 70 mg/L sediment
1016	Switching to swabbing — 1025 swabbing began
1040	Swabbing ended - switched back to bailing
1045	Bailing began — 1057 bailing ended — switched to swabbing
1100	Swabbing began - 1117 Swabbing ended - switched to bailing
1123	Bailing Began - 1144 after multiple failures to retrieve water, Danny
	decides to set pump
1350	Pump tripped in to ≈ 496.5 ft
1414	Mark Phaneuf on site / Danny got water level meter tied up ≈ 296 ft
	- can't record drawdown during pumping; will get lost purge
1417	Pumping began — 1435 pumping stopped; rested pump + well for 10 min
1447	Pump back on - 1459 lost purge
1511	Called Bernie and discussed what was happening - relayed to
	Danny that we need to go back to swabbing screen to unclog
	filter pack
1520	began tripping out pump
1600	Mark Phaneuf off site
1655	Pump tripped out
1705	Boom down
1730	EA + Cascade off site

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: A K Brand

Reviewed date: 5/4/2021

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-27-21

WEATHER: low 60s(°F); mostly sunny; breezy

WELL ID: KAFB-106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Danny Moore	Cascade

2. OPERATING EQUIPMENT

Pulstar Development Rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)

–	Completed bailing/swabbing portion of well development at KAFB-106248 @ 1.5mg/L sediment
–	Generated 190 gallons of IDW – containerized
–	No ISSUES
–	NO VISITORS

JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)

0700	EA + Cascade on site
0720	H&S briefing
0734	Boom up
0753	Deployed Bailer – new bailer retrieves ≈ 2 gal./bail (5' bailer)

DQCR Page 1 of 2

Reviewed by: A K Brand

Reviewed date: 5/4/2021

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-27-21

4. WORK PERFORMED (Continued)

0800	Switch to swabbing w/new rubber seal — 0838 Can't get swab to depth; keeps getting stuck ≈ 200 ft - deepened notches
0845	Swab deployed to depth - swabbing began — 0915 Switch to bailing
0956	2 volumes bailed - switched to swabbing; DTW = 480.4' TOC
1030	Swabbing complete - switched to bailing
1145	5 volumes bailed, switched to swabbing — 1205 Swabbing complete, switch to bailing
1250	Bailing complete - last bail ≈ 5 mg/L sediment; switched to swabbing
1315	Swabbing complete; switch to bailing
1403	Bailing Complete; switch to swabbing - DTW = 480.4' TOC TD = 497.9' TOC
1435	Swabbing Complete; switch to bailing — 1637 bailing complete @ 1.5 mg/L sediment
1648	DTW post bail development = 480.3' TOC
	T.D post bail development = 497.9' TOC
1653	Boom down - site cleanup
	EA + Cascade off site

JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger

Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: L K Bland

Reviewed date: 5/4/2021

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

ROLE: SSHO

DATE: 3-28-21

WEATHER: mid 60s (°F); sunny

WELL ID: KAFB-106248

1. ONSITE PERSONNEL (including subcontractors and government employees)	
Name	Organization
B. Bockisch	EA - Site Manager/Supervisor
J. Messenger	EA - Site Health and Safetly Office
Danny Moore	Cascade

2. OPERATING EQUIPMENT
Pulstar Development Rig

3. DAILY SUMMARY (include QC samples collected, deviations from plans, converstations with the public and government employees, and problems encountered and remedies applied)	
–	Completed well development @ KAFB-106248 according to Work Plan
–	Generated 95 gallons IDW (340 total gallons)
–	NO ISSUES
–	NO VISITORS
	JM

4. WORK PERFORMED (Indicate time, and description of work performed by prime and/or subcontractors)	
0650	EA + Cascade on site
0705	H&S briefing - site setup
0718	Boom Up
0745	Began tripping in pump

DQCR Page 1 of 2

Reviewed by: A.K. Brand

Reviewed date: 5/4/2021

Kirtland AFB Bulk Fuels Facility - Data Gaps Drilling Project -- 62735DM02
Daily Quality Control Report – Non-Construction

DATE: 3-28-21

4. WORK PERFORMED (Continued)

0915	Pump tripped in to ≈ 496 ft TOC
0928	DTW w/pump downhole = 480.48 ' TOC; ~~TD = 'TOC~~ JM can't record
	TD because pump in well - assumed to be last TD measure at end
	of day yesterday after bailing completed (497.9 'TOC)
0934	pumping began
0938	Water @ surface — DTW dropped to 481.9 ' TOC @ 1 gpm pump rate
0946	480.16 ' TOC = DTW ~~0953 478.15 ' TOC = DTW~~ JM
0953	water level meter got stuck again; cannot record DTW
1112	Parameters stabilized; 0 mg/L sediment, 1.67 NTUs
1113	Pumping ended
1252	Pump tripped out
1257	Post development DTW = 480.46 ' TOC TD = 497.9 ' TOC
1315	Boom down; site cleanup
~~1315~~	~~B~~ JM 1330 EA + Cascade offsite
	JM

5. CONTRACTOR'S VERIFICATION: I certify that to the best of my knowledge the above report is complete and correct. All equipment used, and work performed during this reporting period is in compliance with the contract plans and specifications noted above.

Name: J. Messenger Signature: [signature]

EA Engineering, Science and Technology Inc., PBC

DQCR Page 2 of 2

Reviewed by: A K Brand Reviewed date: 5/4/2021

APPENDIX D

LITHOLOGIC LOGS

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **3-16-2021**
Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**	Boring Depth (ft): **508**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **14" nominal**	
Drill Bit: **Tricone**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Mark Green / Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
0					Hydrovac for utilities clearance to 8 ft bgs. Not logged above 10 ft bgs.	Neat Portland Cement, 0-23 ft bgs
10	1.2		ML		Silt: 7.5YR 5/3, brown; soft; slightly moist; nonplastic; 80% silt; 15% clay; 5% fine-medium sand (70% fine, 30% medium); trace coarse sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments. Note: clay exists as nodules to 3/8"; very stiff; slightly plastic.	4.5" OD Sch. 80 PVC Blank 0-418.5 ft bgs; 4.5" OD Sch. 80 PVC Blank 0-452.5 ft bgs
20	1.4		ML		Silt with sand: 7.5YR 5/4, brown; soft; slightly moist; nonplastic; 80% silt; 20% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace clay; subangular-subrounded; sand is quartz, feldspar, caliche, and lithic fragments. At 25 ft, no trace clay. At 30 ft, 7.5YR 5/6, strong brown.	High Solids Bentonite Grout, 23-378 ft bgs
30	0.8		ML			
35			ML		Silt: 7.5YR 5/6, strong brown; soft; slightly moist; nonplastic; 90% silt; 10% fine-medium sand (30% fine, 70% medium); subangular-subrounded; sand is quartz, feldspar, caliche, and lithic fragments.	
40						

Notes:

(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs

(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs

bgs = below ground surface

ft = foot(feet)

N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **3-16-2021**
Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Tricone**
Driller: **Mark Green / Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **508**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
45, 50, 55	2.0; 0.9		ML		Silt with sand: 7.5YR 5/4, brown; soft; slightly moist; nonplastic; 85% silt; trace clay; 15% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 1/2", trace clay; subangular-subrounded; sand is quartz, feldspar, caliche, and lithic fragments; gravel is lithic fragments. At 45 ft, 70% silt; 10% clay; 15% fine to medium sand (50% fine, 50% medium); trace coarse sand; 5% gravel to 1 1/8"; gravel is caliche and lithic fragments; cuttings are hard nodules to 1". At 50 ft, 20% fine to coarse sand (30% fine, 60% medium, 10% coarse); no gravel.	
60			SM		Silty sand: 7.5YR 5/4, brown; loose; slightly moist; 80% silt, soft, nonplastic; 5% clay, hard, slightly plastic; 60% fine to coarse sand (20% fine, 65% medium, 15% coarse); trace coarse sand; subangular to subrounded; sand is quartz, feldspar, and lithic fragments; clay exists and nodules to 1".	
65	2.7		ML		Silt with sand: 7.5YR 5/4, brown; soft; slightly moist; 80% silt, nonplastic; 5% clay, hard, slightly plastic; 15% fine to medium sand (40% fine, 60% medium); trace coarse sand; subangular to subrounded; clay is present as nodules to 1/2"; sand is quartz, feldspar, and lithic fragments.	
70			SW-SM		Well-graded sand with silt: 7.5YR 5/3, brown; soft; slightly moist; 85% fine to coarse sand (20% fine, 65% medium, 15% coarse); 5% gravel to 1/2"; subangular to subrounded; 20% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
75, 80	0.6		ML		Sandy silt: 7.5YR 5/6; strong brown; soft; slightly moist; 70% silt, nonplastic; 25% fine to coarse sand (40% fine, 50% medium, 10% coarse); 5% gravel to 1/2"; subangular to subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 75 ft, 7.5YR 6/4, light brown; 65% silt; 25% fine to coarse sand; 10% gravel to 1".	

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**	Boring Depth (ft): **508**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **14" nominal**	
Drill Bit: **Tricone**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Mark Green / Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
80–85	1.3		ML		Sandy silt: 7.5YR 6/4; light brown; soft; slightly moist; 65% silt, nonplastic; 25% fine to coarse sand (40% fine, 50% medium, 10% coarse); 10% gravel to 1/2"; subangular to subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
85–110	1.7; 1.9		ML		Silt: 7.5YR 5/4, brown; soft; slightly moist; 85% silt, nonplastic; 5% clay, very stiff, slightly plastic; 10% fine to medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 1/2"; subangular to subrounded; clay exists as nodules to 3/8"; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 90 ft; 90% silt; 10% fine to medium sand (60% fine, 40% medium); no coarse sand; no gravel. At 95 ft, 7.5YR 5/6, brown; trace lithic gravel to 5/8". At 100 ft, 85% silt; 5% clay as nodules to 3/8"; 10% fine to coars sand (30% fine, 60% medium, 10% coarse). At 105 ft, 7.5YR 5/6, strong brown; 90% silt; trace clay; 10% fine to medium sand (35% fine, 65% medium); trace coarse sand.	
110–115	1.9		ML		Sandy silt: 7.5YR 5/4, brown; soft; slightly moist; 70% silt, nonplastic; 10% clay, slightly plastic; 20% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; clay is nodules to 1/2"; sand is quartz, feldspar, and lithic fragments.	
115–120			SM		Silty sand: 7.5YR 5/6, strong brown; loose, soft, slightly moist; 70% fine to medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 1/2"; subangular to subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **3-16-2021** Completion Date: **3-22-2021**	**WELL LOG** Well ID: **KAFB-106248** Page: **4 of 13**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Tricone** Driller: **Mark Green / Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **508** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
120–125	2.2		SM		Silty sand: 7.5YR 5/6, strong brown; loose, soft, slightly moist; 70% fine to medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 1/2"; subangular to subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
125–140	2.6		ML		Silt: 7.5YR 5/6, strong brown; soft; slightly moist; 95% silt, nonplastic; 5% fine sand, subangular to subrounded; sand is quartz, feldspar, and lithic fragments. At 130 ft, 7.5YR 5/3, 90% silt; 5% clay, slightly plastic; 5% fine sand. At 135 ft, 85% silt; 10% clay; 5% fine sand.	
140–145	3.6		SC		Clayey sand: 7.5YR 5/4, brown; loose; soft; slightly plastic; 75% fine to coarse sand (25% fine, 60% medium, 15% coarse); subangular to subrounded; 25 % clay, slightly plastic; sand is quartz, feldspar, and lithic fragments.	
145–150			CL		Sandy clay: 7.5YR 5/3, brown; soft; slightly to medium plastic; 70% clay; 30% fine to medium sand (40% fine, 60% medium); trace coarse sand; subangular to subrounded; sand is quartz, feldspar, and lithic fragments.	
150–155	2.3		CL		Clay: 7.5YR 5/4, brown; medium to very stiff; medium plastic; slightly moist; 90% clay; 10% fine to medium sand (50% fine, 50% medium); trace coarse sand; subangular to subrounded; sand is quartz, feldspar, and lithic fragments.	
155–160			ML		Silt: 7.5YR 5/6, strong brown; soft; nonplastic; slightly moist; 100% silt; trace fine sand.	

Notes:

(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs

(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs

bgs = below ground surface

ft = foot(feet)

N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **3-16-2021** Completion Date: **3-22-2021**	**WELL LOG** Well ID: **KAFB-106248** Page: **5 of 13**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Tricone** Driller: **Mark Green / Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **508** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	2.3		ML		Silt: 7.5YR 5/6, strong brown; soft; nonplastic; slightly moist; 100% silt; trace fine sand.	
165					Sandy silt: 10YR 5/6, yellowish brown; soft; slightly moist; nonplastic; 70% silt; 30% fine to medium sand (25% fine, 75% medium); trace coarse sand; subangular to subrounded; sand is quarts, feldspar, and lithic fragments.	
170	2.8					
175			SM		Silty sand: 10YR 4/4, dark yellowish brown; soft; loose; slightly moist; 60% fine to medium sand (25% fine, 75% medium); subangular to subrounded; 40% silt, nonplastic; sand is quartz, feldspar, lithic fragments, and caliche.	
180	2.5		SP-SM		Poorly graded sand with silt: 10YR 5/3, brown; loose; slightly moist; 90% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
185			SC		Clayey sand: 10YR 5/3, brown; loose; slightly moist; 65% fine to coarse sand (20% fine, 65% medium, 15% coarse); 5% gravel to 1"; subanbular to subrounded; 30% clay to 1 1/4", medium plasticity, medium stiff; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments; clay is nodules to 1 1/4".	
190	0.9		SP-SM		Poorly graded sand with silt: 10YR 5/3, brown; loose; slightly moist; 90% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
195			SW-SC		Well-graded sand with clay and gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 75% fine to coarse sand (20% fine, 60% medium, 20% coarse); 15% gravel to 1 1/4"; subangular to subrounded; 10% clay, medium stiff, medium plasticity; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments; clay is nodules to 1".	
200						

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**

Location: **Kirtland AFB, New Mexico**

Start Date: **3-16-2021**

Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Tricone**
Driller: **Mark Green / Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **508**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
200–220 (205, 210, 215)	1.1; 4.6		SP		Poorly graded sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine to medium sand (40% fine, 60% medium); subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. From 205 to 210 ft, 10YR 5/3, brown; 100% fine to medium sand (30% fine, 70% medium); trace coarse sand; no slight; sand includes caliche.	
220	4.0		SW		Well-graded sand: 10YR 6/3, pale brown; loose; slightly moist; 85% fine to coarse sand; sand is quartz, feldspar, and lithic fragments.	
			GC		Clayey gravel: 5Y 6/3, pale olive; slightly moist, 50% gravel to 1 1/2"; 20% fine to coarse sand (20% fine, 60% medium, 20% coarse); subangular to subrounded; 30% clay, medium plasticity; gravel is lithic fragments and caliche; sand is quartz, feldspar, lithic fragments, and caliche; clay is present as a coating on the gravel.	
225, 230	4.5		SP		Poorly graded sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine to medium sand (40% fine, 60% medium); subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
			GW		Well-graded gravel with sand: 10YR 6/3, pale brown; loose; slightly moist; 70% gravel to 1"; 30% fine to coarse sand (20% fine, 70% medium, 10% coarse); subangular to subrounded; gravel and sand are quartz, feldspar, and lithic fragments.	
235–240			SW		Well-graded sand with gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 65% fine to coarse sand (20% fine, 65% medium, 15% coarse); 30% gravel to 1/2"; subangular to subrounded; 5% clay, medium plastic, medium stiff; sand and gravel are quartz, feldspar, and lithic fragments; clay is nodules to 3/8". At 240 ft, 75% sand; 20% gravel to 5/8"; 5% silt, nonplastic.	

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **3-16-2021**
Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**	Boring Depth (ft): **508**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **14" nominal**	
Drill Bit: **Tricone**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Mark Green / Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details
	3.1		SW			(1) (2)
245	3.2		GW		Well-graded gravel with sand: 10YR 6/3, pale brown; loose; slightly moist; 65% gravel to 1/2"; 35% fine to coarse sand (20% fine, 60% medium, 20% coarse); subangular to subrounded; gravel and sand are quartz, feldspar, and lithic fragments.	
250						
255	4.8		SW		Well-graded sand: 10YR 5/3, brown; loose; slightly moist; 85% fine to coarse sand (25% fine, 50% medium, 25% coarse); 10% gravel to 1/2"; subangular to subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, lithic fragments, and caliche. At 260 ft, no caliche.	
260						
265	4.7		SP		Poorly graded sand: 10YR 6/2, light brownish gray; loose; slightly moist; 100% fine to medium sand (35% fine, 65% medium); trace coarse sand; subangular to subrounded; sand is quartz, feldspar, and lithic fragments.	
270						
275			SW		Well-graded sand with gravel: 10YR 5/4, yellowish brown; loose; slightly moise; 65% fine to coarse sand (25% fine, 60% mediume, 15% coarse); 30% gravel to 1"; subangular to subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
280						

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **3-16-2021**
Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Tricone**
Driller: **Mark Green / Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **508**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
285	2.6		SP		Poorly graded sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine to medium sand (30% fine, 70% medium); trace coarse sand; 10% gravel to 1 1/8"; subangular to subrounded; trace clay; sand is quartz, feldspar, lithic fragments, and caliche; gravel is lithic fragments; clay is present as a coating on the gravel. At 285 ft, 10YR 6/2, light browninsh gray; 100% fine to medium sand (20% fine, 80% medium); trace coarse sand; no gravel or clay.	
290	1.7		CL		Clay with gravel and sand: 10YR 5/3, brown; soft to medium stiff; slightly moist; 50% clay, medium plasticity; 30% gravel to 1"; 20% fine to medium sand (50% fine, 50% medium); trace coarse sand; gravel and sand are quartz, feldspar, and lithic fragments.	
295, 300	1.5		SP		Poorly graded sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine to medium sand (25% fine, 75% medium); trace coarse sand; 5% gravel to 3/8"; subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
305, 310	1.5		CL		Sandy clay: 7.5YR 4/2, brown; soft to medium stiff; slightly moist; 60% clay, medium plasticity; 40% fine to coarse sand (20% fine, 80% medium); trace coarse sand; trace gravel to 3/8"; subangular to subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments	
315, 320			SC		Clayey sand: 10YR 5/3, brown; loose; slightly moist; 85% fine to medium sand (20% fine, 80% medium); trace coarse sand; subangular to subrounded; 15% clay, medium stiff, medium plasticity; sand is quartz, feldspar, and lithic fragments; clay is present as nodules to 1/2".	

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Tricone**
Driller: **Mark Green / Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **508**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	0.6		SP-SM		Poorly graded sand with silt: 10YR 5/3, brown; loose; slightly moist; 95% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
325			SP		Poorly graded sand: 10YR 5/3, brown; loose; slightly moist; 95% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
330	0.8		SW		Well-graded sand with gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 70% fine to coarse sand (20% fine, 60% medium, 20% coarse); 30% gravel to 1/2"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments.	
335						
340	0.4		SP		Poorly graded sand: 10YR 6/3, pale brown; loose; slightly moist; 100% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; sand is quartz, feldspar, and lithic fragments.	
345			SW		Well-graded sand: 10YR 6/3, pale brown; loose; slightly moist; 100% fine to coarse sand (25% fine, 60% medium, 15% coarse); subangular to subrounded; sand is quartz, feldspar, and lithic fragments.	
350	0.3					
355			GW		Well-graded gravel with sand: 10YR 6/3, pale brown; loose; slightly moist; 50% gravel to 1 1/2"; 20% fine to coarse sand (30% fine, 55% medium, 15% coarse); subangular to subrounded; gravel and sand are quartz, feldspar, and lithic fragments.	
360						

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **3-16-2021**
Completion Date: **3-22-2021**

WELL LOG

Well ID: **KAFB-106248**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Tricone**
Driller: **Mark Green / Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **508**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Sample Description	Completion Details (1) (2)
360–380	1.1 (near top); 1.1 (~370)		SP	Poorly graded sand: 10YR 6/4, pale brown; loose; slightly moist; 95% fine to medium sand (35% fine, 65% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic.	Hydrated 3/8" Bentonite Chips, 378-415.8 ft bgs
380–390	3.5		SW	Well-graded sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine to coarse sand (30% fine, 60% medium, 10% coarse); 10% gravel to 1/2"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments. At 385 ft, sand is 20% fine, 65% medium, 15% coarse.	
390–392	3.2		SP	Poorly graded sand: 10YR 6/4, pale brown; loose; slightly moist; 95% fine to medium sand (35% fine, 65% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic.	
392–395			SW	Well-graded sand with gravel: 10YR 6/3, pale brown; loose, slightly moist; 80% fine to coarse sand (20% fine, 65% medium, 15% coarse); 15% gravel to 1"; subangular to subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
395–400			SW	Well-graded sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine to coarse sand (20% fine, 65% medium, 15% coarse); 10% gravel to 3/8"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments.	

Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: Cascade
Drilling Method: Air Rotary Casing Hammer
Drill Bit: Tricone
Driller: Mark Green / Forrest Chattin
Geologist: J. Messenger

Boring Depth (ft): 508
Boring Diameter (in): 14" nominal
Well Diameter: See Notes Section
DTW After Completion (ft bgs): N/A
Riser Material: See Notes Section

Screen Material: See Notes Section
Seal Material(s): Cement; Bentonite Chips; High Solids Bentonite Grout
Filter Pack: 10/20 Silica Sand

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details
	3.2		SP		Poorly graded sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine to medium sand (30% fine, 70% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic.	
405 410 415 420 425	3.5 2.4		SW		Well-graded sand with Gravel: 10YR 6/3, pale brown; loosel, slightly moist; 60% fine to coarse sand (25% fine, 60% medium, 15% coarse); 35% gravel to 5/8"; subangular to subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 410 ft, 10YR 6/2, light brownish gray; 80% sand; 15% gravel to 3/8", 5% silt. At 420 ft, 75% sand; 20% gravel to 1"; 5% silt.	(1) (2) 10/20 Silica Sand, 415.8-445.6 ft bgs 4.5" OD Sch. 80 PVC Screen, 0.010" Slots, 418.5-443.5 ft bgs
430			SW		Well-graded sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine to coarse sand (25% fine, 55% medium, 20% coarse); 5% gravel to 3/8"; subangular to subrounded; trace silt; sand and gravel are quartz, feldspar, and lithic fragments.	
435	8.1		SW		Well-graded sand with gravel: 10YR 6/2, light brownish gray; loose; slightly moist; 80% fine to ocarse sand (25% fine, 55% medium, 20% coarse); 15% gravel to 5/8"; subangular to subrounded; 5% silt; sand and gravel are quartz, feldspar, and lithic fragments.	
440			SW-SM		Well-graded sand with silt and gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 75% fine to coarse sand (30% fine, 60% medium, 10% coarse); 15% gravel to 3/4"; subangular to subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	

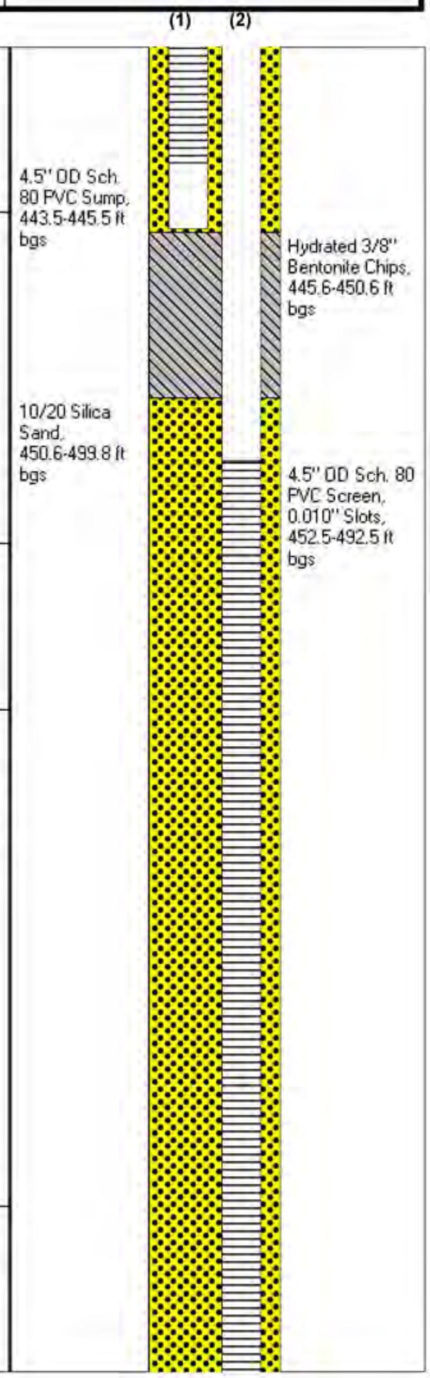
Notes:
(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs
(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **3-16-2021** Completion Date: **3-22-2021**	**WELL LOG** Well ID: **KAFB-106248** Page: **12 of 13**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Tricone** Driller: **Mark Green / Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **508** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description
440–445	0.9		SW		Well-graded sand with gravel: 10YR 6/3, pale brown; loose; slightly moist; 80% fine to coarse sand (30% fine, 60% medium, 10% coarse); 15% gravel to 1"; subangular to subrounded; 5% silt.
445–455	6.5		SW-SM		Well-graded sand with silt and gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 75% fine to coarse sand (30% fine, 60% medium, 10% coarse); 15% gravel to 5/8"; subangular to subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.
455–460			SW		Well-graded sand: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine to coarse sand (20% fine, 65% medium, 15% coarse); 10% gravel to 5/8"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments
460–475	3.8 2.2		SP		Poorly graded sand: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine to medium sand (30% fine, 70% medium); trace coarse sand; 5% gravel to 3/8"; subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 460 ft, 95% sand; 5% silt; no gravel.
475–480			SW		Well-graded sand with gravel: 10YR 5/2, grayish brown; loose; slightly moist; 60% fine to coarse sand (25% fine, 60% medium, 15% coarse); 40% gravel to 5/8"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments.

Completion Details



Notes:

(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs

(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs

bgs = below ground surface

ft = foot(feet)

N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**	**WELL LOG**
Location: **Kirtland AFB, New Mexico**	Well ID: **KAFB-106248**
Start Date: **3-16-2021**	
Completion Date: **3-22-2021**	

Drilling Company: **Cascade**	Boring Depth (ft): **508**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **14" nominal**	
Drill Bit: **Tricone**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Mark Green / Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details
	4.0		SW		Well-graded sand with gravel: 10YR 5/2, grayish brown; loose; slightly moist; 60% fine to coarse sand (25% fine, 60% medium, 15% coarse); 40% gravel to 5/8"; subangular to subrounded; sand and gravel are quartz, feldspar, and lithic fragments.	(1) (2)
485			SP		Poorly graded sand: 10YR 5/2, grayish brown; loose; moist; 95% fine to medium sand (50% fine, 60% medium); trace coarse sand; subangular to subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
490	3.0		SP-SM		Poorly graded sand with silt: 10YR 5/2, grayish brown; loose; moist; 90% fine to medium sand (40% fine, 60% medium); trace coarse sand; subangular to subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	4.5" OD Sch. 80 PVC Sump, 492.5-494.5 ft bgs
495						
500	1.0		ML		Silt: 10YR 5/6, yellowish brown; soft; slightly moist; nonplastic to slightly plastic; 90% silt; 10% clay.	Native Backfill / Slough 499.8-508 ft bgs
505	0.8		SM		Silty sand: 7.5YR 4/3, brown; loose; soft; moist; 0% fine to medium sand (35% fine, 65% medium); trace coarse sand; subangular to subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments	

Notes:

(1) KAFB-106248-418: 4.5" OD Sch. 80 PVC; blank riser, 0-418.5 ft bgs; 0.01" slot screen, 418.5-443.5 ft bgs

(2) KAFB-106248-452: 4.5" OD Sch. 80 PVC; blank riser, 0-452.5 ft bgs; 0.01" slot screen, 452.5-492.5 ft bgs

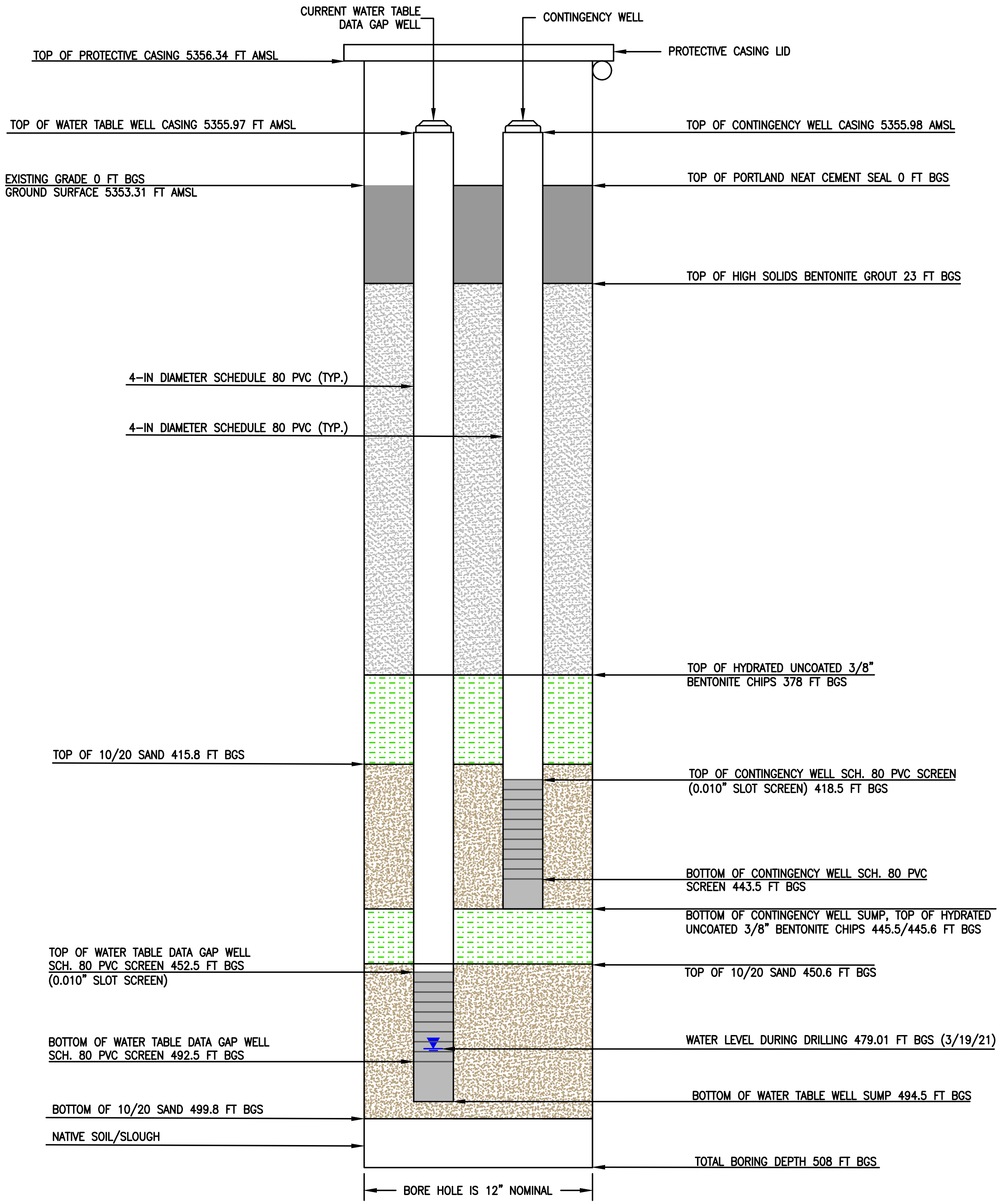
bgs = below ground surface

ft = foot(feet)

N/A = not applicable

NESTED MONITORING WELL CONSTRUCTION
KAFB-106248

KAFB-106248



FT BGS = FEET BELOW GROUND SURFACE
FT AMSL = FEET ABOVE MEAN SEA LEVEL
PVC = POLYVINYL CHLORIDE
SCH = SCHEDULE

NOT TO SCALE

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC
320 Gold Avenue, SW Suite 1300
Albuquerque, NM 87102
Phone: (505) 224-9013
Fax: (505) 224-9016

KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 03-16-2021/1305	INSTALLATION END DATE/TIME: 3-22-2021/1208
PROJECT NO.: 62735DM02.1015	WELL ID: KAFB-106248	GEOLOGIST: J. MESSENGER	DRILLER: M. GREEN

CAD FILE: C:\Users\ecarpio\Desktop\DATA_GAP_WC\Well Completion Diagram-KAFB-106248.dwg PLOT DATE/TIME: 5/20/2021 - 5:26am

LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
SWMUs ST-106/SS-111	Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Kirtland AFB, Albuquerque, NM	Rig	: Speedstar 50K	Geologist	: Justin Fitch
	Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
	Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
0	AR				Surface disturbed via hydrovac pot-holing.
5	ML		0% CL 20% F 15G	70% Q 15% F 15% L	Silt with sand and gravel (ML), 7.5 YR 6/3; soft; dry; medium plasticity; 65% silt; 20% fine sands; 15% gravel (up to 4cm)
10	CL	0	95% CL 5% F Tr-G	80% Q 10% F 10% L	Clay (CL); 7.5 YR 5/4; soft; dry; medium plasticity; 95% clay; 5% fine sand; trace gravel
15			95% CL 5% F	80% Q 10% F 10% L	Clay (CL); 7.5 YR 5/4; soft; dry; medium plasticity; 95% clay; 5% fine sand
20		0.2	85% CL 15% F Tr-G	80% Q 10% F 10% L	Clay with sand (CL); 7.5 YR 4/4; soft; moist; medium plasticity; 85% clay; 15% fine sand; trace gravel; sub-rounded to sub-angular. Notes: clay present in lumps; moisture provided by dust suppression system NOTE: Began using dust suppression
25	CL		70% CL 20% F 5% M 5% C	50% Q 30% F 20% L	Clay with sand (CL); 7.5 YR 4/6; firm; moist; high plasticity; 70% clay; 20% fine sand; 5% medium sand; 5% coarse sand; sub-rounded to sub-angular
30		0.1	55% CL 25% F 10% M 10% C	70% Q 20% F 10% L	Sandy clay (CL); 7.5 YR 4/6; soft; moist; medium plasticity; 55% clay; 25% fine sand; 10% medium sand; 10% coarse sand; angular to sub-angular
35			55% CL 45% F	60% Q 30% F 10% L	Sandy clay (CL); 7.5 YR 4/6; soft; moist; medium plasticity; 55% clay; 45% fine sand; sub-rounded
40					

Well construction labels: Portland Cement; 4" Sch. 80 PVC; 4" Sch. 80 PVC; Bentonite Grout

Sundance Consulting Inc. 15 YEARS

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

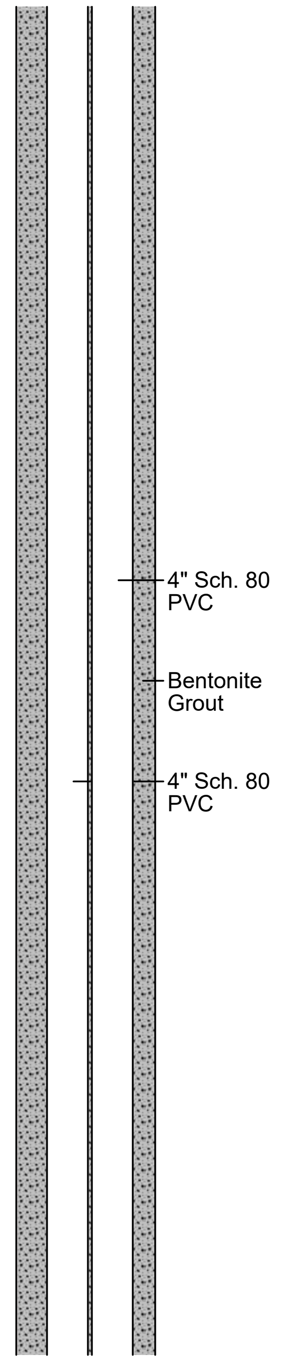
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
40	SM	0.1	30% ML 70% F	80% Q 10% F 10% L		Silty sand (SM); 7.5 YR 4/6; moist; loose; 30% silt; 70% fine sand; sub-rounded
45	CL		95% CL 5% F	25% Q 10% F 65% L		Clay (CL); 7.5YR 4/4; moist; hard; high plasticity; 95% clay; 5% fine sand; sub-rounded
50	SW-SM	0.2	15% ML 55% F 25% M 5% C	40% Q 30% F 30% L		Well-graded sand with silt (SW-SM); 7.5 YR 4/4; moist; loose; 15% silt; 55% fine sand; 25% medium sand; 5% coarse sand; sub-rounded to sub-angular
55	GC			40% Q 20% F 40% L		Clayey gravel with sand (GC); 7.5 YR 4/4; moist; compact; 40% clay; 5% fine; 5% medium; 10% coarse; 40% gravel; Sub-angular to sub-rounded sand; Sub-angular gravel; well-graded
60	CL	0.1	70% CL 30% F	50% Q 20% F 30% L		Clay with sand (CL); 7.5 YR 4/4; firm, moist, medium plasticity; 70% clay; 30% fine sand; sub-rounded
65	SC		30% CL 20% F 20% M 20% C 10% G	40% Q 30% F 30% L		Clayey sand (SC); 7.5 YR 4/4; moist; loose; 30% clay; 20% fine sand; 20% medium sand; 20% coarse sand; 10% gravel; sub-rounded to sub-angular; Note: clay balls .25-1.5" cm in diameter.
70	SC	0.1	20% CL 70% F 5% M 5% C Tr-G	60% Q 25% F 15% L		Clayey sand (SC); 7.5 YR 4/4; moist; loose; 20% clay; 70% fine sand; 5% medium sand; 5% coarse sand; Trace gravel; Sub-angular to sub-rounded sand; Sub-rounded to rounded gravel
75	SW-SM		15% ML 65% F 15% M 5% C	60% Q 30% F 10% L		Well-graded sand with silt (SW-SM); 7.5 YR 4/6, moist, loose, 15% silt; 65% fine sand; 15% medium sand; 5% coarse sand; sub-rounded to sub-angular
80						



Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

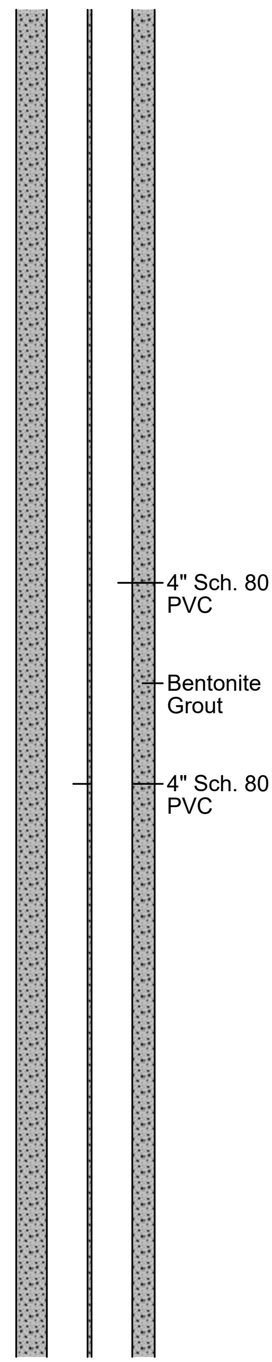
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
80	SW-SM	0.3	10% ML 50% F 40% M	50% Q 35% F 15% L		Well-graded sand with silt (SW-SM); 7.5 YR 4/4; moist; loose; 10% silt, 50% fine sand; 40% medium sand; sub-rounded
85			10% ML 50% F 40% M	50% Q 35% F 15% L		Same as above (80 ft)
90		2.2	10% ML 50% F 40% M	50% Q 35% F 15% L		Same as above (80 ft)
95	SP-SM		10% ML 80% F 10% M	50% Q 40% F 10% L		Poorly-graded sand with silt (SP-SM); 7.5 YR 4/4; moist; loose; 10% silt; 80% fine sand; 10% medum sand; sub-rounded to sub-angular; Note: after collecting this sample, driller had to pause to clear clay plugs out of cyclone and hose NOTE: Paused to clean clay plugs out of cyclone/hose
100	CL	0.9	75% CL 10% F 5% M 5% C 5% G	50% Q 25% F 25% L		Clay with sand (CL); 7.5 YR 4/4; moist; hard; high plasticity; 75% clay, 10% fine sand; 5% medium sand; 5% coarse sand; 5% gravel; sub-rounded to sub-angular; Note: Clay in <0.5cm balls
105			75% CL 10% F 10% M 5% C	50% Q 25% F 25% L		Clay with sand (CL); 7.5YR 4/4; moist, firm, high plasticity; 75% clay; 10% fine sand; 10% medium sand; 5% coarse sand; sub-rounded to sub-angular; Note: clay in <0.25cm balls.
110	SC	2.5	25% CL 40% F 20% M 10% C 5% G	50% Q 40% F 10% L		Clayey sand (SC); 7.5 YR 4/6; moist; loose; 25% clay; 40% fine sand; 20% medium sand; 10% coarse sand; 5% gravel; sub-rounded sand; sub-rounded to sub-angular gravel (<2cm); Note: Clay present in balls <3cm
115	ML		50% ML 40% F 10% M	50% Q 40% F 10% L		Sandy silt (ML); 7.5 YR 5/6; moist; soft; medium plasticity; 50% silt; 40% fine sand; 10% medium sand; sub-rounded to sub-angular
120						



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LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility		
SWMUs ST-106/SS-111		
Kirtland AFB, Albuquerque, NM		

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
120	SW-SC	1.6	10% ML 20% F 70% M	50% Q 30% F 20% L		Well-graded sand with clay (SW-SC); 7.5 YR 4/4; moist; loose; 10% clay; 20% fine sand; 70% medium sand; sub-rounded to sub-angular NOTE: Paused to clean clay plugs out of cyclone/hose
125	SC		25% CL 5% F 20% M 50% C	50% Q 25% F 25% L		Clayey sand (SC); 7.5 YR 4/4; moist; loose; 25% clay; 5% fine sand; 20% medium sand; 50% coarse sand; sub-rounded to sub-angular
130	CL	0.9	90% CL 10% F	40% Q 20% F 40% L		Clay (CL); 7.5 YR 4/4; moist; firm; high plasticity; 90% clay; 10% fine sand; sub-rounded to sub-angular
135			90% CL 10% F	40% Q 20% F 40% L		Same as above (130 ft)
140		2.4	80% CL 10% F 10% M	40% Q 20% F 40% L		Clay with sand (CL); 7.5 YR 4/4, moist, firm, medium plasticity; 80% clay, 10% fine sand, 10% medium sand; Sub-angular; Note: clay in 1-5mm balls
145	ML		0% CL 80% ML 20% F 0% M 0% C 0% G	34% Q 33% F 33% L		Silt with sand (ML); 7.5 YR 4/6; moist; soft; medium plasticity; 80% silt; 20% fine sand; sub-rounded to sub-angular; Note: some <3mm clay balls, possibly remnants from above
150		1.8	80% ML 10% F 10% M Tr-C	60% Q 20% F 20% L		Silt with sand (ML); 7.5 YR 4/6; moist; soft; medium plasticity; 80% silt; 10% fine sand; 10% medium sand; Trace coarse sand; Sub-angular
155			80% ML 10% F 10% M Tr-C	60% Q 20% F 20% L		Same as above (150 ft)
160						

Well construction labels:
4" Sch. 80 PVC
Bentonite Grout
4" Sch. 80 PVC

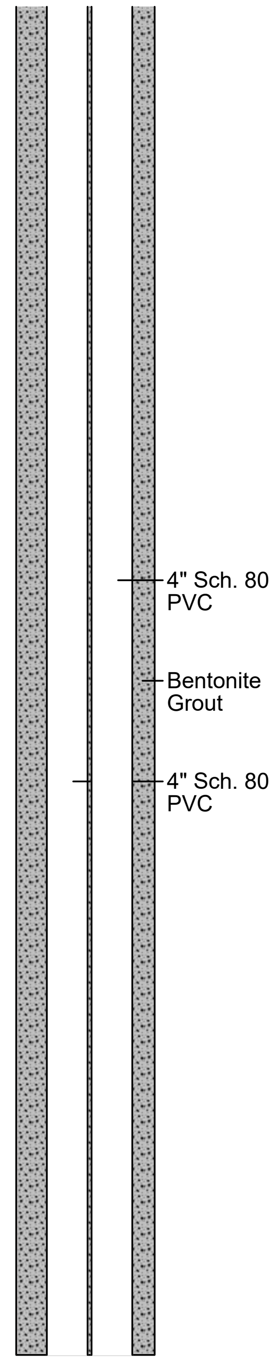
LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	
SWMUs ST-106/SS-111	
Kirtland AFB, Albuquerque, NM	

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
160	ML	0.9	80% ML 10% F 10% M Tr-C	60% Q 20% F 20% L		Same as above (150 ft)
165	ML		58% ML 30% F 10% M 2% C	30% Q 10% F 60% L		Sandy silt (ML); 7.5 YR 4/4; soft; dry; Low plasticity; 58% silt; 30% fine sand; 10% medium sand; 2% coarse sand; Sub-rounded to sub-angular
170	SP	1.6	95% F 5% M	60% Q 25% F 15% L		Poorly-graded sand (SP); 10 YR 5/3; dry; loose; 95% fine sand; 5% medim sand; Sub-rounded to sub-angular
175	SP		95% F 5% M	60% Q 25% F 15% L		Same as above (170 ft)
180	SP	0.6	95% F 5% M	60% Q 25% F 15% L		Same as above (170 ft)
185	SW		70% F 10% M 10% C 10% G	75% Q 15% F 10% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 70% fine sand; 10% medium sand; 10% coarse sand, 10% gravel; Sub-rounded to sub-angular; Note: Gravel < 1cm
190	SW	0.5	70% F 10% M 10% C 10% G	75% Q 15% F 10% L		Same as above (185 ft)
195	SW		70% F 10% M 10% C 10% G	75% Q 15% F 10% L		Same as above (185 ft)
200						



LOG OF BORING KAFB-106249

Sundance Consulting Inc.

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	Started : 1/22/21 / 1255	Drilling Co. : Cascade Drilling L.P.	
SWMUs ST-106/SS-111	Completed : 2/7/21 / 1400	Lead Driller : Forrest Chattin-Evans	
Kirtland AFB, Albuquerque, NM	Rig : Speedstar 50K	Geologist : Justin Fitch	
	Casing Diam : 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid) : 1473604.18	
	Drilling Method : ARCH (rotary/under-reamer bit)	Easting (Grid) : 1542864.62	

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
200	SP	1.4	50% F 50% M	60% Q 20% F 20% L		Poorly-graded sand (SP); 10 YR 5/4; moist; loose; 50% fine sand; 50% medium sand; Sub-rounded NOTE: Stopped using dust suppression
205			50% F 50% M	60% Q 20% F 20% L		Same as above (200 ft)
210	SW	1	40% F 50% M 5% C 5% G	60% Q 30% F 10% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 40% fine sand; 50% medium sand; 5% coarse sand; 5% gravel; Sub-rounded
215			70% F 20% M 5% C 5% G	60% Q 30% F 10% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 70% fine sand; 20% medium sand; 5% coarse sand; 5% gravel; Sub-rounded
220	CL	2.1	60% CL 25% F 5% M 5% C 5% G	60% Q 20% F 20% L		Sandy clay (CL); 10 YR 5/4; moist; soft; medium plasticity; 60% clay; 25% fine sand; 5% medium sand; 5% coarse sand; 5% gravel (< 2cm); sub-rounded sand; sub-rounded to rounded gravel;
225	SW		10% CL 40% F 40% M 10% C Tr-% G	50% Q 30% F 20% L		Well-graded sand with clay (SW-SC); 10 YR 5/4; moist; loose; 10% clay; 40% fine sand; 40% medium sand; 10% coarse sand; trae gravel; sub-rounded to sub-angular
230		2.3	65% F 25% M 10% C	70% Q 10% F 20% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 65% fine sand; 25% medium sand; 10% coarse sand; sub-rounded to sub-angular
235	SW-SM		35% ML 30% F 10% M 15% C 10% G	80% Q 10% F 10% L		Silty sand (SM); 10 YR 6/3; dry; loose; 35% silt; 30% fine sand; 10% medium sand; 15% coarse sand; 10% gravel (< 1 cm); sub-angular to subrounded sand; sub-rounded gravel
240						

4" Sch. 80 PVC

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106249

Sundance Consulting Inc. 15 Years

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
240	SW	1.7	60% F 20% M 10% C 10% G	70% Q 15% F 15% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 60% fine sand; 20% medium sand; 10% coarse sand; 10% gravel; sub-rounded to sub-angular sand; sub-angular gravel
245			70% F 20% M 10% C	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 70% fine sand; 20% medium sand; 10% coarse sand; sub-rounded to sub-angular
250		1.3	70% F 20% M 10% C	70% Q 20% F 10% L		Same as above (245 ft)
255			90% F 8% M 2% C	80% Q 10% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 90% fine sand; 8% medium sand; 2% coarse sand; sub-rounded to sub-angular
260	SP	0.4	90% F 10% M	90% Q 5% F 5% L		Poorly-graded sand (SP); 10 YR 6/3; dry; loose; 90% fine sand; 10% medium sand; sub-angular to sub-rounded
265	SW		45% F 20% M 10% C 25% G	70% Q 20% F 10% L		Well-graded sand with gravel (SW); 10 YR 4/4; moist; loose; 45% fine sand; 20% medium sand; 10% coarse sand; 25% gravel; sub-rounded
270	SC	0.3	20% CL 55% F 5% M 5% C 15% G	85% Q 10% F 5% L		Clayey sand with gravel (SC); 10 YR 5/3; moist; loose; 20% clay; 55% fine sand; 5% medium sand; 5% coarse sand; 15% gravel (< 2cm); sub-rounded; Note: clay present loose and in balls < 1.5cm
275	SW		80% F 10% M 10% G	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 80% fine sand; 10% medium sand; 10% gravel (< 2cm); sub-rounded to sub-angular sand; sub-rounded to rounded gravel
280						

Well construction labels: 4" Sch. 80 PVC; Bentonite Grout; 4" Sch. 80 PVC

LOG OF BORING KAFB-106249

Sundance Consulting Inc.

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
280	SW	0.4	50% F 25% M 10% C 15% G	60% Q 20% F 20% L	Well-graded sand with gravel (SW); 10 YR 5/3; moist; loose; 50% fine sand; 25% medium sand; 10% coarse sand; 15% gravel; sub-rounded to sub-angular
285	CL		90% CL 5% F 5% G	50% Q 20% F 30% L	Clay (CL); 10 YR 4/4; moist; soft; medium plasticity; 90% clay; 5% fine sand; 5% gravel; sub-angular to sub-rounded
290	SW	1.9	10% CL 70% F 10% M 10% C	50% Q 25% F 25% L	Well-graded sand with clay (SW-SC); 10 YR 4/4; moist; loose; 10% clay; 70% fine sand; 10% medium sand; 10% coarse sand; sub-rounded to sub-angular
295			60% F 15% M 15% C 10% G	60% Q 20% F 20% L	Well-graded sand (SW); 10 YR 5/4; moist; loose; 60% fine sand; 15% medium sand; 15% coarse sand; 10% gravel (< 1cm); sub-angular to sub-rounded sand; sub-rounded gravel
300	CL	0	75% CL 5% F 5% M 10% C 5% G	50% Q 25% F 25% L	Clay with sand (CL); 10 YR 5/3; soft; moist; medium plasticity; 75% clay; 5% fine sand; 5% medium sand; 10% coarse sand; 5% gravel (< 0.5cm); sub-angular sand; sub-angular to angular gravel; Note: clay loose and in balls < 1cm.
305	SW		75% F 10% M 10% C 5% G	70% Q 20% F 10% L	Well-graded sand (SW); 10 YR 5/3; moist; loose; 75% fine sand; 10% medium sand; 10% coarse sand; 5% gravel (< 0.5cm); sub-rounded to sub-angular sand; sub-angular to angular gravel
310		0	50% F 50% M	60% Q 20% F 20% L	Well-graded sand (SW); 10 YR 5/3; dry; loose; 50% fine sand; 50% medium sand; sub-angular to sub-rounded
315			40% F 35% M 20% C 5% G	50% Q 20% F 30% L	Well-graded sand (SW); 10 YR 5/3; moist; loose; 40% fine sand, 35% medum sand; 20% coarse sand; 5% gravel; sub-rounded sand; sub-angular to angular gravel NOTE: Slow progress. 60' drive casing pulled back. 260'-320' MD re-drilled with under-reamer bit. Continued with the under-reaming bit to TD.
320					

Well construction labels: 4" Sch. 80 PVC; Bentonite Grout; 4" Sch. 80 PVC

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Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
320	SP	0.3	90% M 10% C	70% Q 15% F 15% L		Poorly-graded sand (SP); 10 YR 6/3; dry; loose; 90% fine sand; 10% medium sand; sub-angular to sub-rounded
325	SW		50% F 20% M 20% C 10% G	60% Q 20% F 20% L		Well-graded sand (SW); 10 YR 6/3, dry, loose, 50% fine sand; 20% medium sand; 20% coarse sand; 10% gravel; sub-angular to sub-rounded
330	GW	0.5	15% F 5% M 15% C 65% G	80% Q 15% F 5% L		Well-graded gravel with sand (GW); 10 YR 6/3; dry; loose; 15% fine sand; 5% medium sand; 15% coarse sand; 65% gravel (< 1cm); sub-rounded sand; sub-rounded to sub-angular gravel
335	SW		30% F 15% M 15% C 40% G	85% Q 10% F 5% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 30% fine sand; 15% medium sand; 15% coarse sand; 40% gravel (< 1cm); sub-rounded to rounded sand; sub-angular gravel
340		0.1	10% F 45% M 45% C Tr-G	30% Q 30% F 40% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 10% fine sand; 45% medium sand; 45% coarse sand; trace gravel; sub-angular
345			10% F 45% M 45% C Tr-G	30% Q 30% F 40% L		Same as above (340 ft)
350	GW	0.3	30% F 10% C 60% G	70% Q 20% F 10% L		Well-graded gravel with sand (GW); 10 YR 6/3; dry; loose; 30% fine sand; 10% coarse sand; 60% gravel (< 1cm); sub-angular to sub-rounded
355	SW		15% F 15% M 30% C 40% G	70% Q 20% F 10% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 15% fine sand; 15% medium sand; 30% coarse sand; 40% gravel (< 1 cm); sub-rounded sand; sub-rounded to sub-angular gravel
360						

Well construction: 4" Sch. 80 PVC; Bentonite Grout; 4" Sch. 80 PVC

LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

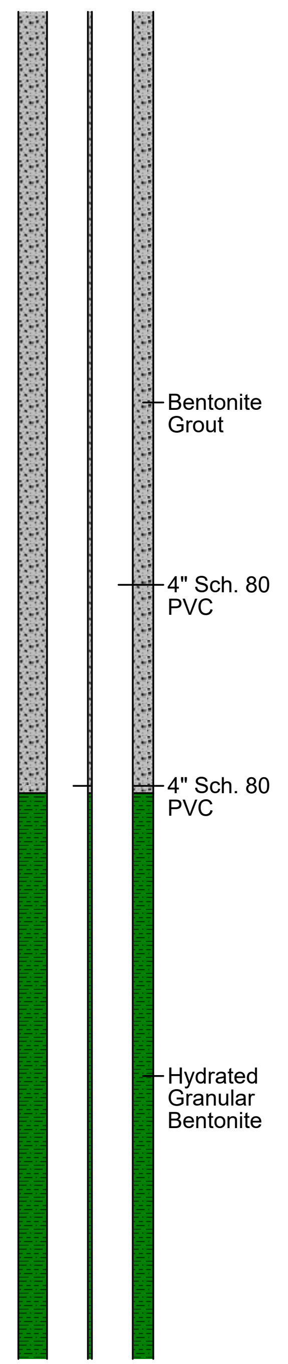
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
360	SP	1.6	100% F	70% Q 20% F 10% L		Poorly-graded sand (SP); 10 YR 6/4; dry; loose; 100% fine sand; sub-rounded to rounded
365	SW		50% F 50% M	60% Q 25% F 15% L		Well-graded sand (SW); 10 YR 6/4; dry; loose; 50% fine sand; 50% medium sand; sub-rounded to sub-angular
370	SP	0.4	100% F	70% Q 20% F 10% L		Poorly-graded sand (SP); 10 YR 6/4; dry; loose; 100% fine sand; sub-rounded to rounded
375	SP		100% F	70% Q 20% F 10% L		Same as above (370 ft)
380	SW	1.7	60% F 20% M 20% C	75% Q 15% F 10% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 60% fine sand; 20% medium sand; 20% coarse sand; sub-rounded to rounded
385	SW		40% F 30% M 30% C Tr-G	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 40% fine sand; 30% medium sand; 30% coarse sand; trace gravel (< 0.75cm); sub-rounded to sub-angular sand; sub-angular gravel
390	SW	1.8	25% F 25% M 20% C 30% G	60% Q 20% F 20% L		Well-graded sand with gravel (SW); 10 YR 6/2; dry; loose; 25% fine sand; 25% medium sand; 20% coarse sand; 30% gravel (< 0.5cm); sub-rounded to sub-angular
395	SW		40% F 20% M 15% C 25% G	80% Q 15% F 5% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 40% fine sand; 20% medium sand; 15% coarse sand; 25% gravel (< 0.5 cm); sub-rounded to sub-angular
400						



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LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

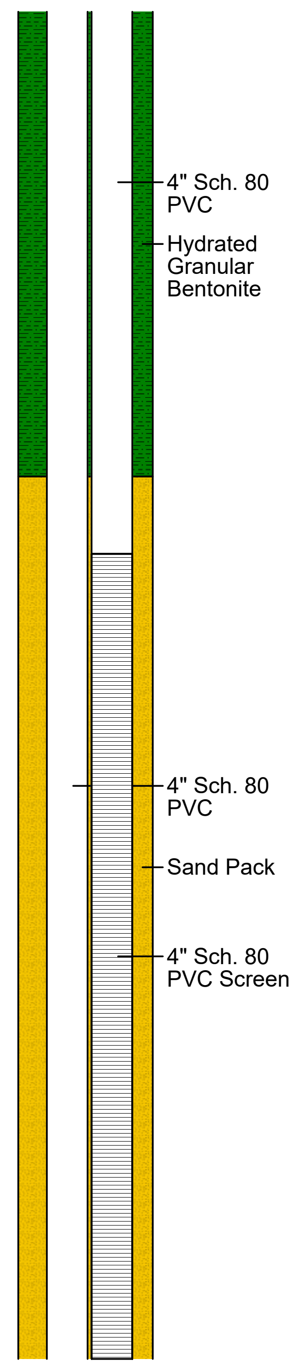
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
400	SW	0.6	10% F, 40% M, 30% C, 20% G	50% Q, 30% F, 20% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 10% fine sand; 40% medium sand; 30% coarse sand; 20% gravel (< 1cm); sub-rounded to sub-angular
405	SW		10% F, 35% M, 35% C, 20% G	60% Q, 25% F, 15% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 10% fine sand; 35% medium sand; 35% coarse sand; 20% gravel (< 1cm); sub-rounded to sub-angular sand; sub-rounded gravel
410	SW	0.3	10% F, 35% M, 35% C, 20% G	60% Q, 25% F, 15% L		Same as above (405 ft)
415	SW		10% F, 45% M, 40% C, 5% G	70% Q, 20% F, 10% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 10% fine sand; 45% medium sand; 40% coarse sand; 5% gravel (< 0.5cm); sub-rounded to sub-angular
420	SW	2.5	50% F, 50% M	75% Q, 15% F, 10% L		Well-graded sand (SW); 10 YR 6/3; moist; loose; 50% fine sand; 50% medium sand; sub-rounded to sub-angular
425	SW		10% F, 40% M, 50% C	50% Q, 30% F, 20% L		Well-graded sand (SW); 10 YR 6/3; moist; 10% fine sand; 40% medium sand; 50% coarse sand; sub-rounded to sub-angular
430	SP	0.3	95% F, 5% M	75% Q, 15% F, 10% L		Poorly-graded sand (SP); 10 YR 6/3; dry; loose; 95% fine sand; 5% medium sand; sub-rounded to rounded
435	SW		10% F, 30% M, 30% C, 30% G	60% Q, 25% F, 15% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 10% fine sand; 30% medium sand; 30% coarse sand; 30% gravel (< 1cm); sub-rounded to sub-angular sand; sub-angular gravel
440						



LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

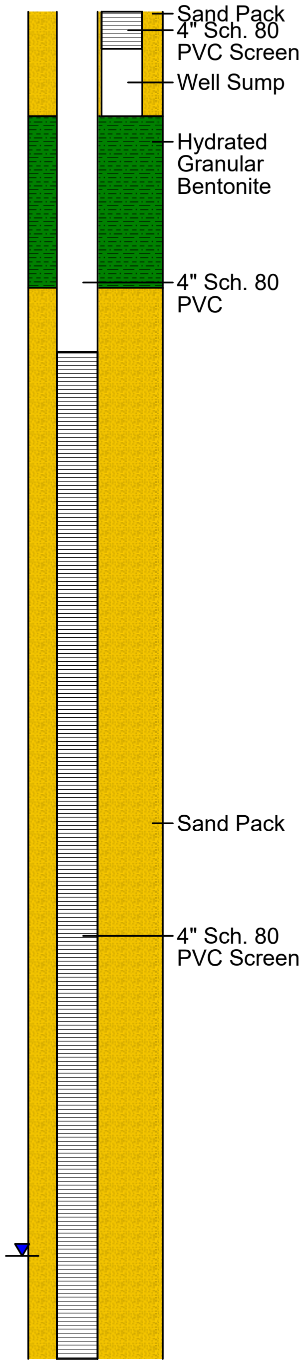
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
440		0.3	80% F 20% M	85% Q 10% F 5% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 80% find sand; 20% medium sand; sub-rounded
445	SW		80% F 20% M	85% Q 10% F 5% L		Same as above (440 ft)
450		0.6	100% F	80% Q 10% F 10% L		Poorly-graded sand (SP); 10 YR 6/2; dry; loose; 100% fine sand; sub-rounded
	SP					
455			10% F 20% M 40% C 30% G	40% Q 30% F 30% L		Well-graded sand with gravel (SW); 10 YR 6/3; dry; loose; 10% fine sand; 20% medium sand; 40% coarse sand; 30% gravel (< 1 cm); sub-angular; Note: Most gravel < 0.5cm
460		0.3	25% F 25% M 20% C 30% G	50% Q 30% F 20% L		Well-graded sand with gravel (SW); dry; loose; 25% fine sand; 25% medium sand; 20% coarse sand; 30% gravel (< 1cm); sub-angular to sub-rounded sand; sub-rounded to rounded gravel
465			25% F 25% M 20% C 30% G	50% Q 30% F 20% L		Same as above (460 ft)
	SW					
470		0.1	20% F 25% M 35% C 20% G	40% Q 30% F 30% L		Well-graded sand with gravel (SW); dry; loose; 20% fine sand; 25% medium sand; 35% coarse sand; 20% gravel; sub-angular to sub-rounded
475			80% F 15% M 5% C	80% Q 15% F 5% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 80% fine sand; 15% medium sand; 5% coarse sand; rounded to sub-rounded
						NOTE: First moist cuttings at 475'; Static water level later confirmed via a water level meter at 476.95'
480						

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27



LOG OF BORING KAFB-106249

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

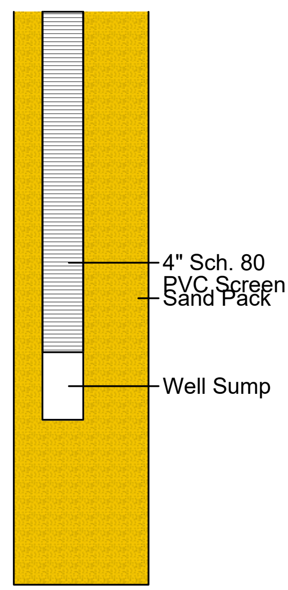
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

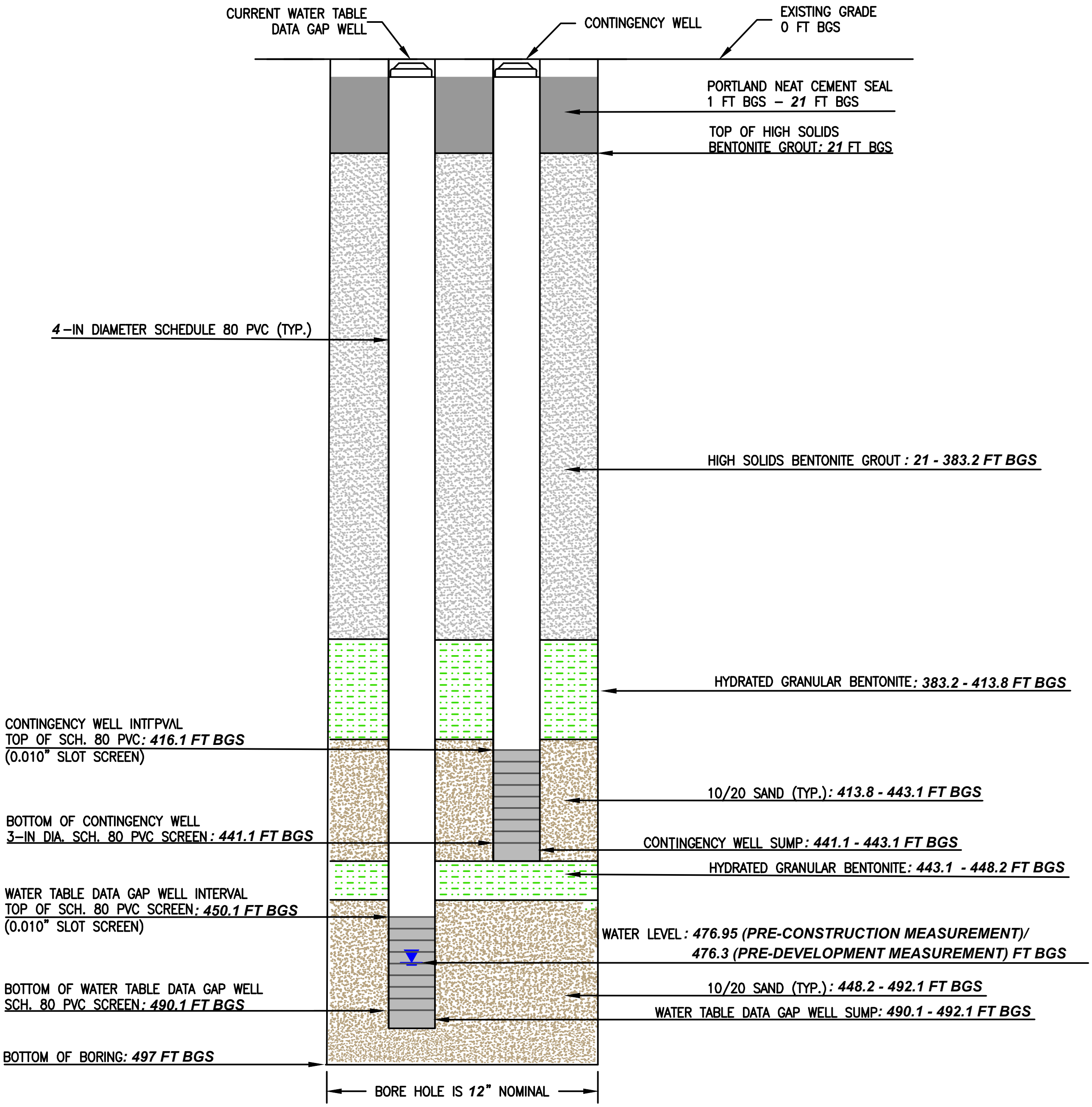
Started	: 1/22/21 / 1255	Drilling Co.	: Cascade Drilling L.P.
Completed	: 2/7/21 / 1400	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diam	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473604.18
Drilling Method	: ARCH (rotary/under-reamer bit)	Easting (Grid)	: 1542864.62

Well1: KAFB-106249-450
Well2: KAFB-106249-416
Elev.: 5353.27

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
480	SW	1.3	75% F 15% M 10% C	75% Q 15% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 75% fine sand; 15% medium sand; 10% coarse sand; sub-rounded to rounded
485			80% F 15% M 5% C	75% Q 15% F 10% L		Well-graded sand (SW); 10 YR 5/3; moist; loose; 80% fine sand; 15% medium sand; 5% coarse sand; sub-rounded
490		0.9	80% F 15% M 5% C	75% Q 15% F 10% L		Same as above (485 ft)
495			80% F 15% M 5% C	75% Q 15% F 10% L		Same as above (485 ft) NOTE: Flooded well with approx. 400 gal water
500						
505						
510						
515						
520						



KAFB-106249 Nested Monitoring Well Construction



Northing: 1473604.18
Easting: 1542864.62
Elev: 5353.27

NOT TO SCALE
BGS=BELOW GROUND SURFACE
FT=FEET

DATA GAP MONITORING WELL INSTALLATION KAFB-106248 TO KAFB-106252 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106/SS-111 KIRTLAND AIR FORCE BASE, NEW MEXICO	KIRTLAND AIR FORCE BASE	INSTALLATION START DATE/TIME: 01/22/2021 - 1255 Hours	INSTALLATION END DATE/TIME: 02/10/2021 - 1400 Hours
	Contract NO.: W912PP-17-C-0028 / WELL ID: KAFB-106249	GEOLOGIST: Justin Fitch	DRILLER: Forrest Chattin-Evans

CAD FILE: Y:\Active Projects\62599DM01 Kirtland BFF_USACE\01_Work Plan\19.0 Data Gap Wells WP\Figures\Natives\Nested Monitoring well_KAFB-106240-245.dwg PLOT DATE/TIME: 12/18/2017 – 4:39pm

LOG OF BORING KAFB-106250

Sundance Consulting Inc.

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

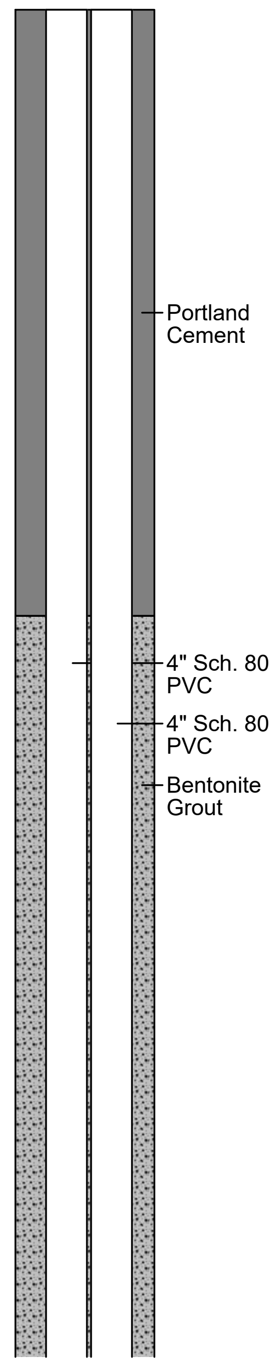
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
0	AR				The upper 10' were not logged due to disturbance during utility locate activities.
10	ML	0.8	80% ML 10% F 5% M 5% C	70% Q 15% F 15% L	Silt with sand (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 80% silt; 10% fine sands; 5% medium sands; 5% coarse sands; sub-angular to sub-rounded.
15	ML		80% ML 10% F Tr-M 5% C 5% G	70% Q 15% F 15% L	Silt with sand (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 80% silt; 10% fine sands; 5% coarse sands; 5% gravel sub-angular to sub-rounded. Note: Trace amounts of medium sands and gravel (< 2cm). Gravel Q/F/L: 25/25/50.
20	CL	1.3	95% CL 5% F Tr-G	85% Q 5% F 10% L	Clay (CL); 7.5 YR 5/6; firm; moist; high plasticity; 95% clay; 5% fine sands; rounded to sub-rounded. Note: Trace amounts of gravel (< 0.75cm) and clay clumps (< 0.5cm). Gravel100% lithics.
25	ML		40% CL 45% ML 10% F 5% C	80% Q 10% F 10% L	Silt with sand (ML); 7.5 YR 5/6; firm; moist; medium to high plasticity; 40% clay; 45% silt; 10% fine sands; 5% coarse sands; sub-angular to sub-rounded. Note: Clay clumps up to 2cm.
30	ML	1	70% ML 10% F 5% M 5% C 10% G	60% Q 20% F 20% L	Silt with sand (ML); 7.5 YR 5/6; soft; moist; low plasticity; 70% silt; 10% fine sands; 5% medium sands; 5% coarse sands; 10% gravel; sub-angular to angular. Note: Gravel < 3cm. Gravel 100% lithics.
35	ML		85% ML 10% F 5% M	70% Q 10% F 20% L	Silt with sand (ML); 7.5 YR 5/6; soft; moist; low plasticity; 85% silt; 10% fine sands; 5% medium sands; sub-angular to angular.
40					



LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	Started : 2/11/21 / 0800 Completed : 2/18/21 / 1600 Rig : Speedstar 50K Casing Diameter : 13-3/8" (0-200')/11-3/4" (to TD) Drilling Method : ARCH (tri-cone bit)
SWMUs ST-106/SS-111	Drilling Company : Cascade Drilling L.P. Lead Driller : Mark Green Geologist : Justin Fitch Northing (Grid) : 1473154.90 Easting (Grid) : 1542509.92
Kirtland AFB, Albuquerque, NM	

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
40	CL	1.5	75% CL 10% F 5% M 10% C Tr-G	70% Q 20% F 10% L		Clay with sand (CL): 7.5 YR 4/6; firm; moist; medium plasticity; 75% clay; 10% fine sands; 5% medium sands; 10% coarse sands; sub-angular to sub-rounded. Note: Trace amounts of gravel (< 1.5 cm). Gravel 100% lithics.
45	ML		85% ML 10% F 5% M Tr-C	70% Q 20% F 10% L		Silt with sand (ML); 7.5 YR 4/6; soft; moist; low plasticity; 85% silt; 10% fine sands; 5% medium sands; sub-angular to angular. Note: Trace amounts of coarse sands.
50	CL	1.2	40% CL 30% ML 15% F 10% M 5% C	60% Q 25% F 15% L		Clay with sand (CL): 7.5 YR 4/6; soft; moist; low plasticity; 40% clay; 30% silt; 15% fine sands; 10% medium sands; 5% coarse sands; sub-angular to sub-rounded. Note: Clay clumps up to 4 cm, but most approx 1 cm.
55	ML		10% CL 55% ML 15% F 10% M 10% C	80% Q 15% F 5% L		Sandy silt (ML); 7.5 YR 4/6; firm; moist; medium plasticity; 10% clay; 55% silt; 15% fine sands; 10% medium sands; 10% coarse sands; sub-angular to sub-rounded.
60	GW-GM	0.3	10% ML 15% F 5% M 20% C 50% G	60% Q 20% F 20% L		Well-graded gravel with silt (GW-GM); 7.5 YR 4/6; loose; moist; 10% silt; 15% fine sands; 5% medium sands; sub-angular to sub-rounded. Note: Gravel Q/F/L: 20/20/60.
65			10% ML 15% F 5% M 20% C 50% G	60% Q 20% F 20% L		Same as above (65 ft).
70	SM	2.7	40% ML 25% F 20% M 15% C	40% Q 20% F 40% L		Silty sand (SM); 7.5 YR 5/6; loose; moist; 40% silt; 25% fine sands; 20% medium sands; 15% coarse sands; sub-angular to sub-rounded.
75			40% ML 25% F 20% M 15% C	40% Q 20% F 40% L		Same as above (70 ft).
80						

Bentonite Grout

4" Sch. 80 PVC

4" Sch. 80 PVC

LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

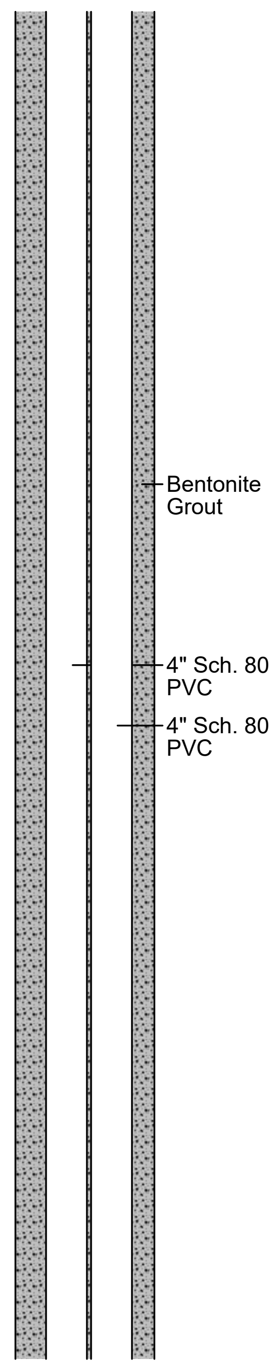
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
80	ML	0.3	55% ML 15% F 10% M 15% C 5% G	60% Q 10% F 30% L	Silt with sand (ML); 7.5 YR 4/6; soft; moist; low plasticity; 55% silt; 15% fine sands; 10% medium sands; 15% coarse sands; 5% gravel; sub-angular to angular. Note: Gravel < 0.5 cm. Gravel Q/F/L: 33/33/34.
85			90% ML 10% F	90% Q 5% F 5% L	Silt (ML); 7.5 YR 4/6; firm; moist; medium plasticity; 90% silt; 10% fine sands; sub-rounded.
90		1.7	95% ML 3% F 2% M	80% Q 10% F 10% L	Silt (ML); 7.5 YR 5/6; firm; moist; medium plasticity; 95% silt; 3% fine sands; 2% medium sands; sub-rounded.
95			15% CL 55% ML 15% F 10% M 5% C	50% Q 25% F 25% L	Silt with sand (ML); 7.5 YR 5/6; firm; moist; medium plasticity; 15% clay; 55% silt; 15% fine sands; 10% medium sands; 5% coarse sands; sub-angular to angular. Note: Clay clumps up to 1cm.
100		1.1	95% ML 3% F 2% MG	80% Q 10% F 10% L	Silt (ML); 7.5 YR 5/6; firm; moist; medium plasticity; 95% silt; 3% fine sands; 2% medium sands; sub-angular to sub-rounded.
105	SP-SM		5% ML 70% F 20% M 5% C	80% Q 15% F 5% L	Poorly-graded sand with silt (SP-SM); 7.5 YR 4/6; loose; moist; 5% silt; 70% fine sands; 20% medium sands; 5% coarse sands; sub-angular to sub-rounded.
110		1.4	5% ML 70% F 20% M 5% C	80% Q 15% F 5% L	Same as above (105 ft).
115			5% ML 70% F 20% M 5% C	80% Q 15% F 5% L	Same as above (105 ft).
120					



LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
120	ML	2.1	90% ML 5% F 3% M 2% C	85% Q 10% F 5% L		Silt (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 90% silt; 5% fine sands; 3% medium sands; 2% coarse sands; sub-rounded to sub-angular.
125			95% ML 5% F	85% Q 10% F 5% L		Silt (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 95% silt; 5% fine sands; sub-rounded to sub-angular.
130		0.6	100% ML	N/A		Silt (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 100% silt; sub-rounded to sub-angular.
135			100% ML	N/A		Same as above (130 ft).
140		1.3	90% ML 5% F 5% M	90% Q 10% F Tr% L		Silt (ML); 7.5 YR 5/6; firm; moist; medium plasticity; 95% silt; 5% fine sands; 5% medium sands; sub-rounded to sub-angular.
145	CL		100% CL	N/A		Clay (CL); 7.5 YR 5/6; firm; moist; high plasticity; 100% clay.
150	ML	0.9	98% ML 2% F Tr-C	90% Q 10% F Tr% L		Silt (ML); 7.5 YR 5/6; soft; moist; medium plasticity; 98% silt; 2% fine sands; sub-rounded. Trace amounts of coarse sands.
155			100% ML	N/A		Silt (ML); 7.5 YR 5/6; soft; moist; low plasticity; 100% silt.
160						

Well construction: Bentonite Grout; 4" Sch. 80 PVC; 4" Sch. 80 PVC

LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

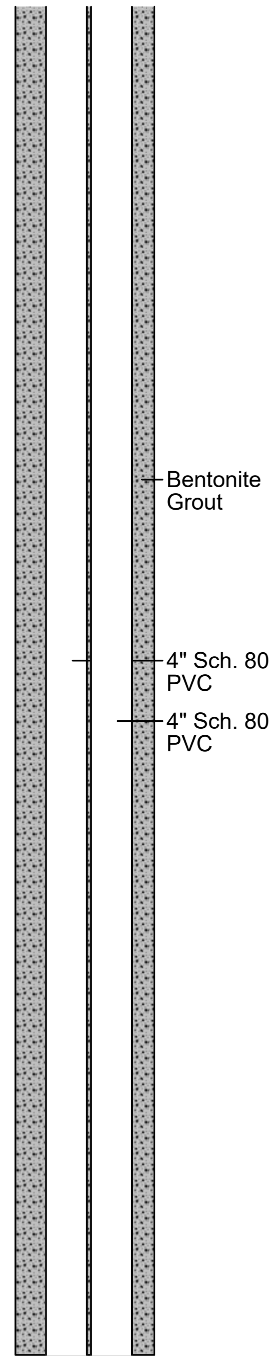
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
160	ML	0.6	90% ML 8% F 2% M	80% Q 5% F 15% L		Silt (ML); 7.5 YR 5/4; soft; moist; low plasticity; 90% silt; 8% fine sands; 2% medium sands; sub-rounded.
165			85% ML 10% F 5% M	80% Q 5% F 15% L		Silt with sand (ML); 7.5 YR 5/4; soft; moist; low plasticity; 85% silt; 10% fine sands; 5% medium sands; sub-rounded.
170	SP	0.3	90% F 10% M Tr-C	80% Q 10% F 10% L		Poorly-graded sand (SP); 10 YR 5/4; loose; moist; 90% fine sands; 10% medium sands; sub-rounded to sub-angular. Note: Trace amounts of coarse sands.
175			90% F 10% M Tr-C	80% Q 10% F 10% L		Same as above (170 ft).
180		0.1	90% F 10% M Tr-C	80% Q 10% F 10% L		Same as above (170 ft).
185	SW		50% F 20% M 15% C 15% G	90% Q 5% F 5% L		Well-graded sand (SW); 10 YR 6/4; loose; moist; 50% fine sands; 20% medium sands; 15% coarse sands; 15% gravel; sub-rounded to sub-angular. Note: Gravel < 2cm. Gravel Q/F/L: 20/20/60.
190	SP	1.2	95% F 5% M	90% Q 5% F 5% L		Poorly-graded sand (SP); 10 YR 6/4; loose; moist; 95% fine sands; 5% medium sands; sub-rounded.
195	SW		65% F 15% M 15% C 5% G	80% Q 10% F 10% L		Well-graded sand (SW); 10 YR 6/4; loose; moist; 65% fine sands; 15% medium sands; 15% coarse sands; 5% gravel; sub-rounded to sub-angular. Gravel 100% lithics.
200						



LOG OF BORING KAFB-106250

Sundance Consulting Inc. 15 YEARS

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

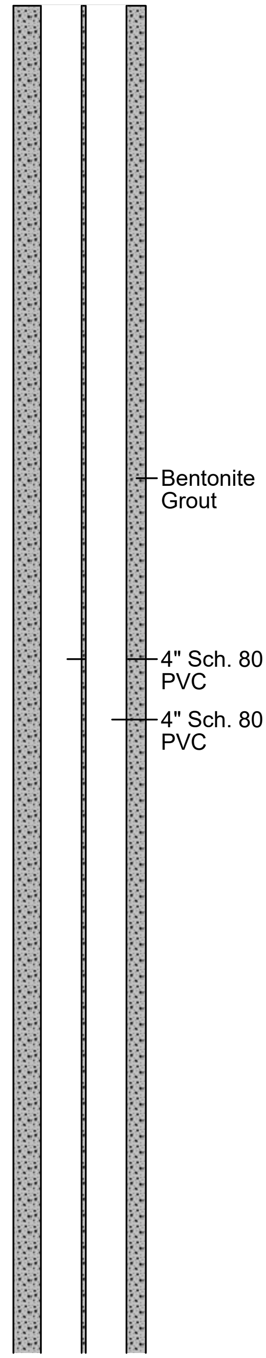
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
200	SW	2.5	50% F 25% M 15% C 10% G	60% Q 20% F 20% L	Well-graded sand (SW); 10 YR 6/4; loose; moist; 65% fine sands; 15% medium sands; 15% coarse sands; 5% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 15/15/70.
205			20% F 35% M 40% C 5% G	40% Q 30% F 30% L	Well-graded sand (SW); 10 YR 5/4; loose; moist; 20% fine sands; 35% medium sands; 40% coarse sands; 5% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 30/35/35.
210		0.5	50% F 25% M 25% C Tr-G	60% Q 15% F 25% L	Well-graded sand (SW); 10 YR 5/4; loose; moist; 50% fine sands; 25% medium sands; 25% coarse sands; sub-rounded to sub-angular. Note: Trace amounts of gravel (50/50 quartz/lithic).
215			20% F 40% M 40% C Tr-G	35% Q 30% F 35% L	Well-graded sand (SW); 10 YR 5/4; loose; moist; 20% fine sands; 40% medium sands; 40% coarse sands; sub-rounded to sub-angular. Note: Trace amounts of gravel (50/50 quartz/lithic).
220	CL	1.3	60% CL 20% F 15% M 5% C	35% Q 30% F 35% L	Sandy clay (CL); 10 YR 4/4; hard; moist; high plasticity; 60% clay; 20% fine sands; 15% medium sands; 5% coarse sands; sub-rounded to sub-angular. Note: Clay stuck together in large clumps.
225	SW		45% F 40% M 15% C Tr-G	40% Q 40% F 20% L	Well-graded sand (SW); 10 YR 5/4; loose; moist; 45% fine sands; 40% medium sands; 15% coarse sands;sub-rounded to sub-angular. Note: Gravel < 0.5 cm. Gravel 100% lithic.
230	SC	0.3	20% CL 30% M 20% C 30% G	40% Q 40% F 20% L	Clayey sand with gravel (SC); 10 YR 4/4; loose; moist; 20% clay; 30% medium sands; 20% coarse sands; 30% gravel; sub-rounded to sub-angular. Note: Gravel < 1 cm. Gravel Q/F/L: 20/30/50.
235	GW		15% F 15% M 20% C 50% G	60% Q 15% F 25% L	Well-graded gravel with sand (GW); 10 YR 5/4; loose; moist; 15% fine sands; 15% medium sands; 20% coarse sands; 50% gravel; sub-rounded to sub-angular. Note: gravel < 2.5 cm. Gravel Q/F/L: 20/30/50.
240					



LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
240	ML	1.9	60% ML 40% F	90% Q 5% F 5% L		Sandy silt (ML); 7.5 YR 5/4; firm; moist; low plasticity; 60% silt; 40% fine sands; sub-rounded.
245	CL		75% CL 25% M	75% Q 15% F 10% L		Clay with sand (CL); 10 YR 4/4; firm; moist; medium plasticity; 75% clay; 25% medium sands. Note: Clay clumps <1cm.
250	SP	0.9	75% F 25% M	75% Q 15% F 10% L		Poorly-graded sand (SP); 10 YR 5/3; loose; dry; 75% fine sands;2 5% medium sands; sub-rounded to sub-angular.
255	SW		40% F 30% M 30% C	80% Q 10% F 10% L		Well-graded sand (SW); 10 YR 5/3; dry; moist; 40% fine sands; 30% medium sands; 30% coarse sands; sub-rounded to sub-angular.
260	CL	0.5	60% CL 5% F 10% M 25% G	70% Q 15% F 15% L		Clay with sand with gravel (CL); 10 YR 4/4; firm; moist; high plasticity; 60% clay; 5% fine sands; 10% medium sands; 25% gravel. Note: Clay clumps up to 2.5 cm and gravel < 1cm. Gravel Q/F/L: 20/20/60.
265			85% CL 10% F 5% M	60% Q 10% F 30% L		Clay with sand (CL); 10 YR 5/4; hard; moist; high plasticity; 85% clay; 10% fine sands; 5% medium sands. Note: Clay clumps up to 3 cm.
270	CL	2.1	55% CL 15% F 15% M 15% C Tr-G	40% Q 30% F 30% L		Sandy clay (CL); 10 YR 6/4; firm; moist; 55% clay; 15% fine sands; 15% medium sands; 15% coarse sands; sub-rounded to sub-angular. Note: Trace amounts of lithic gravel.
275			55% CL 15% F 15% M 15% C Tr-G	40% Q 30% F 30% L		Same as above (270 ft).
280						

Bentonite Grout
4" Sch. 80 PVC
4" Sch. 80 PVC

Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
280	SW-SM	1.7	10% ML 60% F 20% M 10% C	50% Q 35% F 15% L		Well-graded sand with silt (SW-SM); 10 YR 5/4; loose; moist; 10% silt; 60% fine sands; 20% medium sands; 10% coarse sands; sub-rounded to sub-angular.
285			10% ML 60% F 20% M 10% C	50% Q 35% F 15% L		Same as above (280 ft).
290	SM	0.8	30% ML 35% F 15% M 10% C 10% G	50% Q 20% F 30% L		Silty sand (SM); 10 YR 4/4; loose; moist; 30% silt; 35% fine sands; 15% medium sands; 10% coarse sands; 10% gravel; sub-angular to sub-rounded. Note: Gravel Q/F/L: 10/20/70.
295	ML		100% ML	N/A		Silt (ML); 10 YR 5/4; soft; dry; low plasticity; 100% silt; sub-rounded.
300	SP	0.6	100% F	40% Q 20% F 40% L		Poorly-graded sand (SP); 10 YR 5/4; loose; dry; 100% fine sands; sub-rounded.
305	SW		80% F 15% M 5% C	60% Q 15% F 25% L		Well-graded sand (SW); 10 YR 4/4; dry; loose; 80% fine sands; 50% medium sands; 5% coarse sands; sub-rounded to sub-angular.
310	CL	2.2	60% CL 10% C 30% G	10% Q 25% F 65% L		Gravelly clay (CL); 10 YR 4/4; hard; moist; 60% clay; 10% coarse sands; 30% gravel; sub-rounded to sub-angular. Note: Clay clumps < 2 cm and gravel < 2 cm. Gravel Q/F/L: 10/25/65.
315	SW		85% F 15% M Tr-C	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 5/4; dry; loose; 85% fine sands; 15% medium sands; coarse grains are 70% quartz, 20% feldspar and 10% lithics; sub-rounded to sub-angular. Note: Trace amounts of coarse sands.
320						

Bentonite Grout
4" Sch. 80 PVC
4" Sch. 80 PVC

LOG OF BORING KAFB-106250

Sundance Consulting Inc.

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
320	SW	0.3	40% F 30% M 20% C 10% G	40% Q 30% F 30% L		Well-graded sand (SW); 10 YR 5/4; dry; loose; 40% fine sands; 30% medium sands; 20% coarse sands; 10% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 30/30/40.
325			40% F 30% M 20% C 10% G	40% Q 30% F 30% L		Same as above (320 ft).
330	GW	0.5	5% F 95% G	40% Q 30% F 30% L		Well-graded gravel (GW); 10 YR 4/4; loose; dry; 5% fine sands; 95% gravel; sub-rounded to sub-angular. Note: Gravel < 3 cm. Gravel Q/F/L: 10/10/80.
335	SW		30% F 10% M 10% C 50% G	70% Q 20% F 10% L		Well-graded sand with gravel (SW); 10 YR 4/4; dry; loose; 30% fine sands; 10% medium sands; 10% coarse sands; 50% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 25/35/40.
340		0.2	30% F 10% M 10% C 50% G	70% Q 20% F 10% L		Same as above (335 ft).
345			30% F 10% M 10% C 50% G	70% Q 20% F 10% L		Same as above (335 ft).
350		0.5	60% F 20% M 10% C 10% G	60% Q 20% F 20% L		Well-graded sand (SW); 10 YR 5/3; dry; loose; 60% fine sands; 20% medium sands; 10% coarse sands; 10% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 20/40/40.
355			60% F 20% M 10% C 10% G	60% Q 20% F 20% L		Same as above (350 ft).
360						

Well construction: Bentonite Grout; 4" Sch. 80 PVC; 4" Sch. 80 PVC

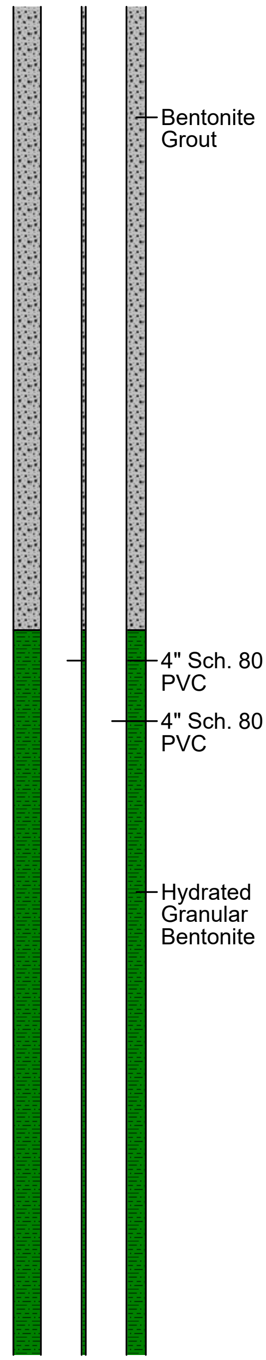
LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
360	SW	0.3	70% F 15% M 15% C	75% Q 15% F 10% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 70% fine sands; 15% medium sands; 15% coarse sands; sub-rounded to sub-angular.
365	GW		20% F 10% M 10% C 60% G	60% Q 20% F 20% L		Well-graded gravel with sand (GW); 10 YR 4/4; loose; moist; 20% fine sands; 10% medium sands; 10% coarse sands; 60% gravel; sub-rounded to sub-angular. Note: Gravel <1.5cm. Gravel Q/F/L: 15/20/65.
370		0.3	20% F 10% M 10% C 60% G	60% Q 20% F 20% L		Same as above (365 ft).
375	SW		60% F 20% M 10% C 10% G	70% Q 15% F 15% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 60% fine sands; 20% medium sands; 10% coarse sands; 10% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 20/40/40.
380		1.5	80% F 15% M 5% C	80% Q 10% F 10% L		Well-graded sand (SW); 10 YR 5/4; dry; loose; 80% fine sands; 15% medium sands; 5% coarse sands; sub-rounded to sub-angular.
385			30% F 10% M 15% C 45% G	50% Q 30% F 20% L		Well-graded sand with gravel (SW); 10 YR 5/3; dry; loose; 30% fine sands; 10% medium sands; 15% coarse sands; 45% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 10/20/70.
390		0.8	30% F 10% M 15% C 45% G	50% Q 30% F 20% L		Same as above (385 ft).
395	SW-SC		5% CL 70% F 15% M 10% C	75% Q 10% F 15% L		Well-graded sand with clay (SW-SC); 10 YR 6/3; loose; dry; 5% clay; 70% fine sands; 15% medium sands; 10% coarse sands; sub-rounded to sub-angular. Note: Clay clumps observed.
400						



LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

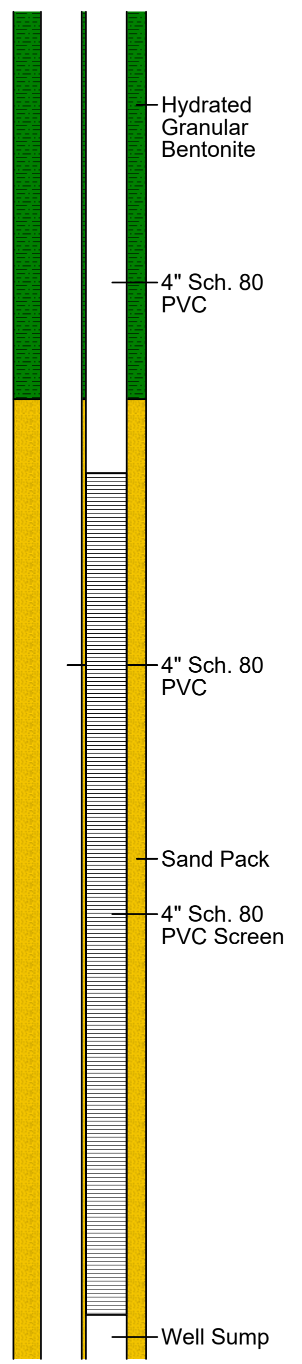
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
400	SW	0.6	50% F 30% M 20% C	50% Q 30% F 20% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 50% fine sands; 30% medium sands; 20% coarse sands; sub-rounded to sub-angular.
405	SP		80% F 20% M	70% Q 20% F 10% L		Poorly-graded sand (SP); 10 YR 6/4; loose; dry; 80% fine sands; 20% medium sands; sub-rounded to sub-angular.
410	SW	1.6	75% F 10% M 10% C 5% G	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 5/4; moist; loose; 75% fine sands; 10% medium sands; 10% coarse sands; 5% gravel; sub-rounded to sub-angular. Note: Gravel <0.5cm. Gravel Q/F/L: 25/25/50.
415	SP		90% F 10% M	65% Q 25% F 10% L		Poorly-graded sand (SP); 10 YR 5/4; loose; dry; 90% fine sands; 10% medium sands; sub-rounded to sub-angular.
420		0.8	50% M 50% C	40% Q 30% F 30% L		Poorly-graded sand (SP); 10 YR 5/4; loose; dry; 50% medium sands; 50% coarse sands; sub-rounded to sub-angular.
425	SP		50% F 50% M	50% Q 30% F 20% L		Poorly-graded sand (SP); 10 YR 5/4; loose; dry; 50% fine sands; 50% medium sands; sub-rounded to sub-angular.
430		1.1	50% F 50% M	50% Q 30% F 20% L		Same as above (425 ft).
435	SW		85% F 10% M 5% C	70% Q 20% F 10% L		Well-graded sand (SW); 10 YR 6/4; dry; loose; 85% fine sands; 10% medium sands; 5% coarse sands; sub-rounded to sub-angular.
440						



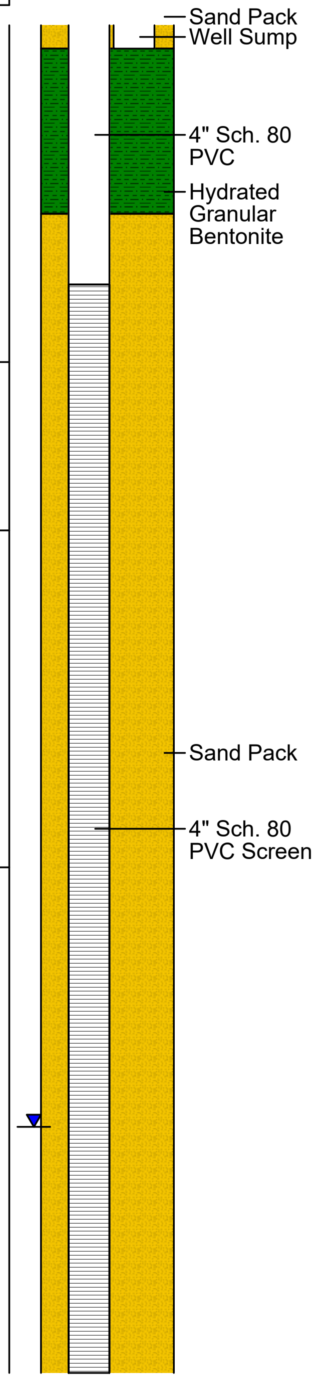
LOG OF BORING KAFB-106250

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
440	SW	1.3	20% F 30% M 45% C 5% G	50% Q 30% F 20% L		Well-graded sand (SW); 10 YR 5/3; dry; loose; 20% fine sands; 30% medium sands; 45% coarse sands; 5% gravel;sub-rounded to sub-angular. Note: Gravel Q/F/L: 30/30/40.
445			80% F 15% M 5% C	60% Q 25% F 15% L		Well-graded sand (SW); 10 YR 5/3; dry; loose; 80% fine sands; 15% medium sands; 5% coarse sands; sub-rounded to sub-angular.
450	SP	0.8	100% F	75% Q 15% F 10% L		Poorly-graded sand (SP); 10 YR 6/3; loose; dry; 100% fine sands; sub-rounded.
455	SW		65% F 20% M 10% C 5% G	65% Q 20% F 15% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 35% fine sands; 20% medium sands; 10% coarse sands; 5% gravel; sub-rounded to sub-angular. Gravel Q/F/L: 25/35/40.
460		0.9	85% F 5% M 5% C 5% G	80% Q 15% F 5% L		Well-graded sand (SW); 10 YR 6/3; dry; loose; 85% fine sands; 5% medium sands; 5% coarse sands; 5% gravel; sub-rounded to sub0angular. Gravel Q/F/L: 25/25/50.
465	SP		100% F	80% Q 15% F 5% L		Poorly-graded sand (SP); 10 YR 6/4; loose; moist; 100% fine sands; sub-rounded. Note: Hydrocarbon smell.
470		1.2	100% F	80% Q 15% F 5% L		Poorly-graded sand (SP); 10 YR 5/4; loose; moist; 100% fine sands; sub-rounded. Note: Hydrocarbon smell.
475			100% F	80% Q 15% F 5% L		Same as above (470 ft).
480						



LOG OF BORING KAFB-106250

Sundance Consulting Inc. 15 YEARS

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

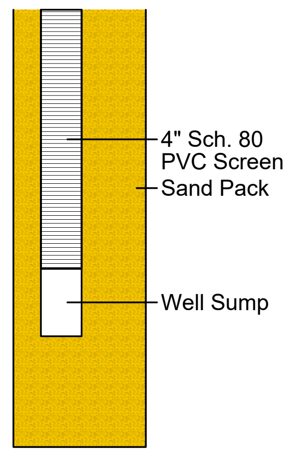
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

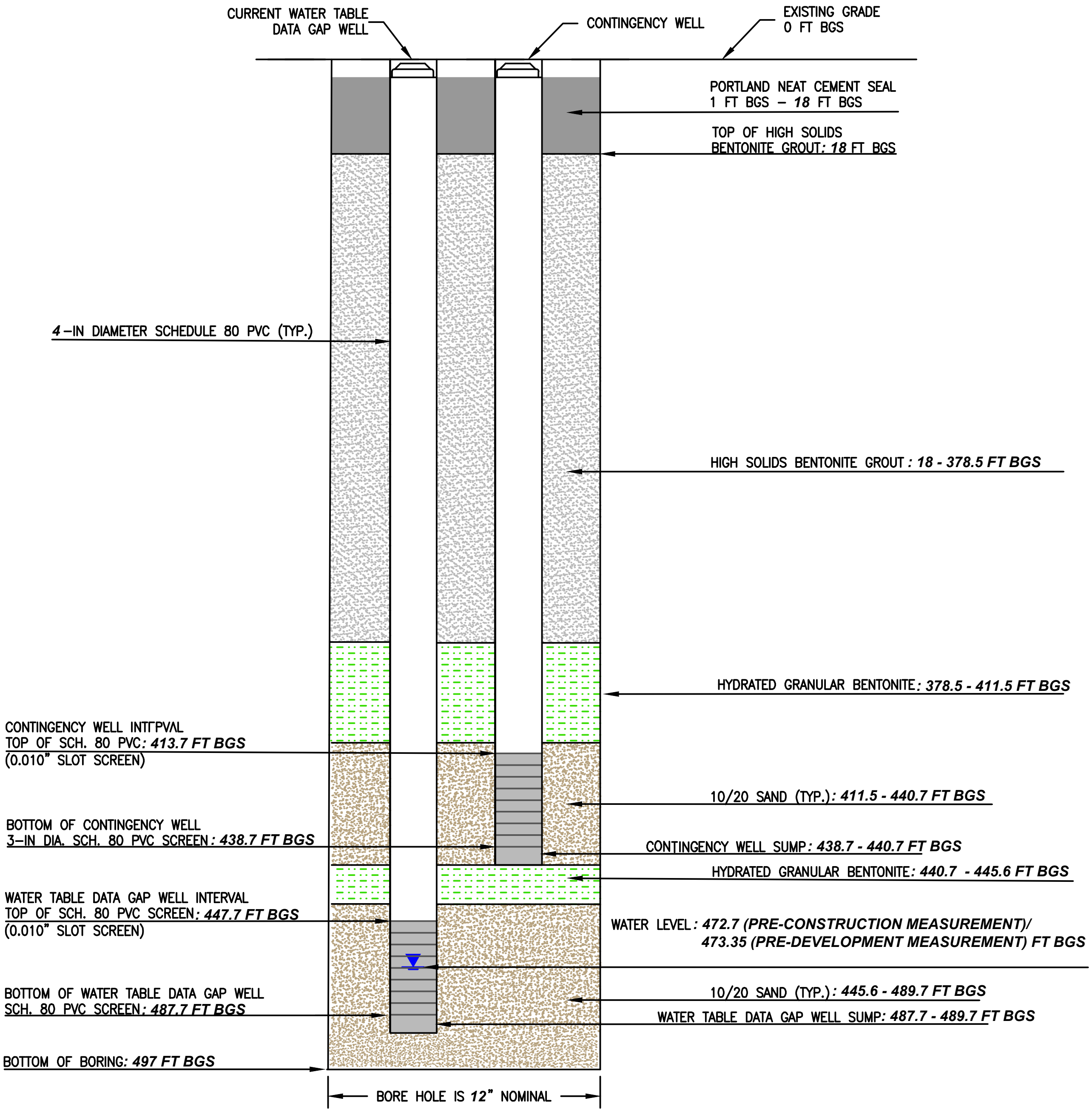
Started	: 2/11/21 / 0800	Drilling Company	: Cascade Drilling L.P.
Completed	: 2/18/21 / 1600	Lead Driller	: Mark Green
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1473154.90
Drilling Method	: ARCH (tri-cone bit)	Easting (Grid)	: 1542509.92

KAFB-106250-447
KAFB-106250-413
Elev:: 5349.55

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
480	SP	1.4	100% F	80% Q 15% F 5% L		Same as above (470 ft).
485	SP		100% F	80% Q 15% F 5% L		Same as above (470 ft).
490	SP	1.3	100% F	80% Q 15% F 5% L		Same as above (470 ft).
495	SW		75% F 10% M 10% C 5% G	70% Q 15% F 15% L		Well-graded sand (SW); 10 YR 5/; wet; loose; 75% fine sands; 10% medium sands; 10% coarse sands; 5% gravel; sub-rounded to sub-angular. Note: Hydrocarbon smell. Gravel Q/F/L: 20/25/55.
500						
505						
510						
515						
520						



KAFB-106250 Nested Monitoring Well Construction



Northing: 1473154.90
Easting: 1542509.92
Elev: 5349.55

NOT TO SCALE
BGS=BELOW GROUND SURFACE
FT=FEET

DATA GAP MONITORING WELL INSTALLATION KAFB-106248 TO KAFB-106252 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106/SS-111 KIRTLAND AIR FORCE BASE, NEW MEXICO	KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 02/11/2021 - 0730 Hours	INSTALLATION END DATE/TIME: 02/21/2021 - 1700 Hours
	Contract NO.: W912PP-17-C-0028	WELL ID: KAFB-106250	GEOLOGIST: Justin Fitch	DRILLER: Mark Green

CAD FILE: Y:\Active Projects\62599DM01 Kirtland BFF_USACE\01_Work Plan\19.0 Data Gap Wells WP\Figures\Natives\Nested Monitoring well_KAFB-106240-245.dwg PLOT DATE/TIME: 12/18/2017 – 4:39pm

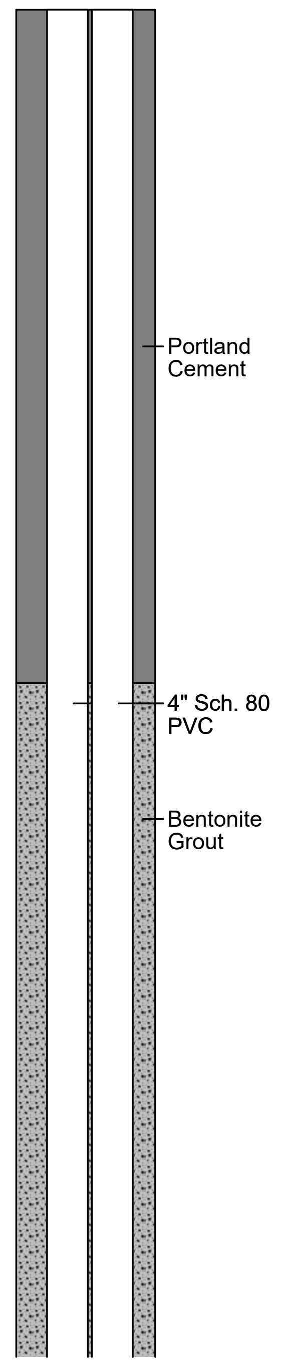
LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	
SWMUs ST-106/SS-111	
Kirtland AFB, Albuquerque, NM	

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
0	AR				No samples collected due to pot-holing of drill site to 7'.
10	ML	0.7	90% ML 10% F Tr-M	30% Q 20% F 50% L	Silt (ML): 7.5 YR 4/4; firm; moist; low plasticity; 10% fine sands; trace medium sands; sub-rounded to rounded.
15	ML		60% ML 30% F 10% M	30% Q 10% F 60% L	Sandy Silt (ML): 7.5 YR 4/4; firm; moist; low platicity; 30% fine sands, 10% medium sands; sub-rounded.
20	SM	0.4	30% ML 40% F 20% M 10% C	40% Q 30% F 30% L	Silty Sand (SM): 7.5 YR 4/4; moist; loose; 30% silt; 40% fine sands; 20% medium sands; 10% coarse sands; sub-angular;
25	SW-SM		10% ML 20% F 20% M 30% C 20% G	10% Q 20% F 70% L	Well-graded sand with silt (SW-SM): 7.5 YR 5/4; dry; loose; 10% silt; 20% fine sands; 20% medium sands; 30% coarse sands; 20% gravel; sub-angular.
30	ML	18.6	80% ML 20% F	50% Q 30% F 20% L	Silt with sand (ML): 7.5 YR 4/4; soft; moist; low plasticity; 80% silt; 20% fine sands; sub-rounded to sub-angular.
35	ML		80% ML 20% F	50% Q 30% F 20% L	Same as above (30 ft).
40					



Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
40	ML	5.5	80% ML 20% F Tr-M	20% Q 10% F 70% L	Silt with sand (ML): 7.5 YR 4/4; soft; moist; low plasticity; 80% silt; 20% fine sands; trace medium sands; sub-rounded to sub-angular.
45	CL		90% CL 5% F 5% M Tr-C	20% Q 10% F 70% L	Clay (CL): 7.5 YR 4/4; hard; moist; high plasticity; 90% clay, 5% fine sands; 5% medium sands; trace coarse sands; sub-rounded to sub-angular.
50		0.1	50% CL 10% F 10% M 20% C 10% G	20% Q 10% F 70% L	Sandy Clay (CL): 7.5 YR 4/6; hard; dry; high plasticity; 50% clay; 10% fine sands; 10% medium sands; 20% coarse sands; 10% gravel; sub-angular to sub-rounded. Note: clay present in tight balls. Gravel Q/F/L: 20/10/70
55	ML		55% ML 20% F 25% M Tr-C	65% Q 10% F 25% L	Sandy Silt (ML): 7.5 YR 4/4; soft; moist; low plasticity; 55% silt; 20% fine sands; 25% medium sands; trace coarse sands; sub-angular to sub-rounded.
60		1.6	55% ML 20% F 25% M Tr-C	65% Q 10% F 25% L	Same as above (55 ft).
65	SW-SM		15% ML 12.5% F 12.5% M 50% C 10% G	30% Q 10% F 60% L	Well-graded sand with silt (SW-SM): 7.5 YR 4/6; dry; loose; 15% silt; 12.5% fine sands; 12.5% medium sands; 20% coarse sands; 40% gravel; sub-angular. Note: Gravel Q/F/L: 30/10/60.
70	SM	36.5	20% ML 10% F 10% M 50% C 10% G	30% Q 10% F 60% L	Silty Sand (SM): 7.5 YR 4/6; dry; soft; 20% silt; 10% fine sands; 10% medium sands, 50% coarse sands; 10% gravel; sub-angular. Note: Gravel Q/F/L: 30/10/60.
75	ML		60% ML 10% F 10% M 20% C Tr-G	40% Q 20% F 40% L	Sandy Silt (ML): 7.5 YR 4/6; dry; soft; low plasticity; 60% silt; 10% fine sands; 10% medium sands; 20% coarse sands; trace gravel; sub-angular. Note: Gravel Q/F/L: 30/10/60.
80					

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility
SWMUs ST-106/SS-111
Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
80	ML	3.9	80% ML 20% F	70% Q 20% F 10% L		Silt with Sand (ML): 7.5 YR 4/6; soft; dry; medium plasticity; 80% silt; 20% fine sands; sub-rounded to sub-angular.
85	ML		75% ML 20% F 5% G	70% Q 20% F 10% L		Silt with Sand (ML): 7.5 YR 4/6; soft; dry; medium plasticity; 75% silt; 20% fine sands; 5% gravel; sub-rounded to sub-angular.
90	ML	28.1	75% ML 20% F 5% G	70% Q 20% F 10% L		Same as above (85 ft).
95	ML		75% ML 20% F 5% G	70% Q 20% F 10% L		Same as above (85 ft).
100	SM	1.3	20% ML 80% F Tr-M	50% Q 30% F 20% L		Silty Sand (SM): 7.5 YR 5/4; dry; loose; 20% silt; 80% fine sands, trace medium sands; sub-rounded.
105	SM		20% ML 80% F Tr-M	50% Q 30% F 20% L		Same as above (100 ft).
110	SM	1.6	45% ML 30% F 10% M 10% C 5% G	50% Q 30% F 20% L		Silty Sand (SM): 7.5 YR 6/4; moist; loose; 45% silt; 30% fine sands; 10% medium sands; 10% coarse sands; 5% gravel; sub-rounded. Note: Gravel Q/F/L: 5/0/95.
115	ML		95% ML 2.5% M 2.5% C	50% Q 30% F 20% L		Silt (ML): 7.5 YR 6/6; soft; dry; medium plasticity; 95% silt; 2.5% medium sands; 2.5% coarse sands; sub-rounded.
120						

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
120	ML	2.3	95% ML 2.5% M 2.5% C	50% Q 30% F 20% L		Same as above (115 ft).
125	ML		95% ML 2.5% M 2.5% C	50% Q 30% F 20% L		Same as above (115 ft).
130	CL	2.2	95% CL 5% ML	N/A		Clay (CL): 7.5 YR 5/4; hard; moist; high plasticity; 95% clay; 5% silt.
135	N/A		N/A	N/A		No Sample - Clay Plug in casing/hammer - Pumped 200 gal water to clean it out
140	SW	1.3	5% F 45% M 45% C 5% G	60% Q 20% F 20% L		Well-graded sand (SW): 10 YR 4/4; wet; loose; 5% fine sands; 45% medium sands; 45% coarse sands; 5% gravel; sub-angular to angular. Note: Cuttings are wet from water injection to remove clay plug.
145	SP		20% F 80% M	60% Q 20% F 20% L		Poorly-graded sand (SP): 10 YR 4/3; wet; loose; 20% fine sands; 80% medium sands; sub-rounded to sub-angular.
150	SC	0.1	20% CL 75% F 2.5% M 2.5% C Tr-G	70% Q 10% F 20% L		Clayey sand (SC): 10 YR 5/4; moist; loose; 20% clay; 75% fine sands; 2.5% medium sands; 2.5% coarse sands; trace gravel; sub-rounded; well-graded.
155	CL		50% CL 35% F 10% M 5% C Tr-G	60% Q 15% F 25% L		Sandy Clay (CL): 10 YR 4/4; moist; firm; medium plasticity; 50% clay; 35% fine sands; 10% medium sands; 5% coarse sands; trace gravel; sub-angular to sub-rounded.
160						

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
160	SP	3.9	100% F	55% Q 30% F 15% L	Poorly-graded sand (SP): 10 YR 6/3; dry; loose; 100% fine sands, sub-rounded.
165			100% F	55% Q 30% F 15% L	Same as above (160 ft).
170	SP-SM	2.5	5% ML 95% F	55% Q 30% F 15% L	Poorly-graded sand with silt (SP-SM): 10 YR 4/4; moist; loose; 5% silt; 95% fine sands; sub-rounded.
175	SW		95% F 5% M Tr-C Tr-G	70% Q 20% F 10% L	Well-graded sand (SW): 10 YR 4/4; moist; loose; 95% fine sands; 5% medium sands; trace coarse sands; trace gravel. Note: Gravel is 100% lithic.
180	SP	3	100% F	55% Q 30% F 15% L	Poorly-graded sand (SP): 10 YR 4/4; moist; loose; 100% fine sands, sub-rounded.
185			100% F	55% Q 30% F 15% L	Same as above (180 ft).
190	SP-SM	1	5% ML 90% F 5% M	50% Q 40% F 10% L	Poorly-graded sand with silt (SP-SM): 10 YR 5/3; moist; loose; 5% silt; 90% fine sands; 5% medium sands; sub-rounded.
195			5% ML 95% F	70% Q 20% F 10% L	Poorly-graded sand with silt (SP-SM): 10 YR 5/3; moist; loose; 5% silt; 95% fine sands; sub-rounded.
200					

Bentonite Grout

4" Sch. 80 PVC

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
200	SW-SM	9.9	5% ML 90% F 5% G	70% Q 20% F 10% L		Well-graded sand with silt (SW-SM): 10 YR 5/4; moist; loose; 5% silt; 90% fine sands; 5% gravel; sub-angular to sub-rounded. Note: Gravel Q/F/L: 5/0/95
205	SP		3% ML 97% F	70% Q 20% F 10% L		Poorly-graded sand (SP): 10 YR 5/4; moist; loose; 3% silt; 97% fine sands; sub-rounded to sub-angular. Note: Some pumice present.
210	SW-SM	0.6	5% ML 85% F 5% M 5% C	60% Q 30% F 10% L		Well-graded sand wilth silt (SW-SM): 10 YR 6/3; moist; loose; 5% silt; 85% fine sands; 5% medium sands; 5% coarse sands; sub-angular to sub-rounded. Note: Some pumice grains present.
215	SP-SM		5% CL 5% ML 85% F 5% M Tr-C	50% Q 35% F 15% L		Poorly-graded sand (SP): 10 YR 6/4; moist; loose; 5% clay; 5% silt; 85% fine sands; 5% medium sands; trace coarse sands; sub-rounded to sub-angularNote: Some pumice grains present.
220	SW-SM	1.7	5% CL 20% F 65% M 10% C	30% Q 30% F 40% L		Well-graded sand (SW): 10 YR 4/4; moist; loose; 5% clay; 20% fine sands; 65% medium sands; 10% coarse sands; sub-angular to sub-rounded. Note: Some pumice grains present.
225	SC		20% CL 60% F 10% M 5% C 5% G	50% Q 25% F 25% L		Clayey Sand (SC): 10 YR 4/4; moist; loose; 20% clay; 60% fine sands; 10% medium sands; 5% coarse sands; 5% gravel; sub-angular to sub-rounded. Note: Some pumice grains present. Gravel Q/F/L: 10/10/80.
230	SW	1.6	3% ML 82% F 10% M 5% C	70% Q 20% F 10% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 3% silt; 82% fine sands; 10% medium sands; 5% coarse sands; sub-angular to sub-rounded. Note: Some pumice grains present.
235			3% ML 62% F 15% M 15% C 5% G	35% Q 30% F 35% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 3% silt; 57% fine sands; 15% medium sands; 15% coarse sands; 5% gravel; sub-angular to sub-roundedNote: Some pumice grains present. Gravel Q/F/L: 10/10/80.
240						

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
240	SP	3.5	3% ML 97% F	80% Q 10% F 10% L	Poorly-graded sand (SP): 10 YR 6/4; dry; loose; 3% silt; 97% fine sands; sub-rounded.
245	CL		70% CL 30% G	N/A	Clay with gravel (CL): 10 YR 5/4; dry; hard; high plasticity; 70% clay; 30% gravel. Note: Gravel is 100% lithic.
250	CL	4.5	90% CL 10% G	N/A	Clay (CL): 10 YR 5/4; dry; firm; medium plasticity; 90% clay; 10% gravel; sub-rounded. Note: Gravel is 100% lithic.
255	CL		90% CL 10% F Tr-C	40% Q 40% F 20% L	Clay (CL): 10 YR 5/4; moist; soft; medium plasticity; 90% clay; 10% fine sands; trace coarse sands; sub-angular to sub-rounded. Note: Trace amounts of coarse sands were predominately pumice.
260	SP-SM	1.5	15% ML 80% F 5% M	40% Q 40% F 20% L	Poorly-graded sand with silt (SP-SM): 10 YR 6/4; dry; loose; 15% silt; 80% fine sands; 5% medium sands; sub-rounded. Note: Most larger grains are rounded pumice.
265	SP-SM		15% ML 80% F 5% M	40% Q 40% F 20% L	Same as above (260 ft).
270	SP-SM	0.7	15% ML 80% F 5% M	40% Q 40% F 20% L	Same as above (260 ft).
275	SM		25% ML 70% F 5% C Tr-G	40% Q 40% F 20% L	Silty Sand (SM): 10 YR 5/4; moist; loose; 25% ML; 70% fine sands; 5% coarse sands; trace gravel; sub-angular to sub-rounded.
280					

Bentonite Grout

4" Sch. 80 PVC

Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
280	CL	1.3	70% CL 10% F 10% M 5% C 5% G	60% Q 20% F 20% L	Clay with sand (CL): 10 YR 5/4; moist; firm; high plasticity; 70% clay; 10% fine sands; 10% medium sands; 5% coarse sands; 5% gravel; sub-angular to sub-rounded. Note: Gravel Q/F/L: 15/25/60.
285	CL		90% CL 5% C 5% G	60% Q 20% F 20% L	Clay (CL): 10 YR 5/4; dry; firm; medium plasticity; 90% clay; 5% coarse grains; 5% gravel; sub-angular to sub-rounded. Note: Gravel < 1cm. Clay present in tight balls. Gravel Q/F/L: 20/0/80.
290	SC	0.7	40% CL 60% F Tr-M Tr-C	50% Q 20% F 30% L	Clayey sand (SC): 10 YR 5/4; moist; loose; 40% clay; 60% fine sands; trace medium/coarse sands; sub-rounded to sub-angular. Note: Clay balls up to 0.5 cm.
295	SW-SC		15% CL 70% F 10% M 5% C Tr-G	40% Q 30% F 30% L	Well-graded sand with clay (SW-SC): 10 YR 5/4; moist; loose; 15% clay; 70% fine sands; 10% medium sands; 5% coarse sands; trace gravel. Note: Clay balls up to 0.5 cm. Gravel Q/F/L: 0/50/50.
300	SW	0.9	80% F 10% M 5% C 5% G	60% Q 30% F 10% L	Well-graded sand (SW): 10 YR 5/4; moist; loose; 80% fine sands; 10% medium sands; 5% coarse sands; 5% gravel; sub-angular to sub-rounded sand; rounded to sub-rounded gravel. Note: Gravel < 1.5cm. Gravel Q/F/L: 10/40/50.
305	SW		80% F 10% M 5% C 5% G	70% Q 20% F 10% L	Well-graded sand (SW): 10 YR 5/4; moist; loose; 80% fine sands; 10% medium sands; 5% coarse sands; 5% gravel; sub-rounded. Note: Gravel < 2 cm. Gravel Q/F/L: 20/10/70.
310	SW-SC	1.3	5% CL 80% F 10% M 5% C Tr-G	40% Q 40% F 20% L	Well-graded sand with clay (SW-SC): 10 YR 5/4; moist; loose; 5% clay; 80% fine sands; 10% medium sands; 5% coarse sands; trace gravel; sub-rounded to sub-angular. Note: Clay balls up to 0.5 cm.
315	SW-SC		5% CL 45% F 25% M 25% C	40% Q 30% F 30% L	Well-graded sand with clay (SW-SC): 10 YR 4/4; moist; loose; 5% clay; 45% fine sands; 25% medium sands; 25% coarse sands; sub-rounded to sub-angular.
320					

Bentonite Grout

4" Sch. 80 PVC

LOG OF BORING KAFB-106251

Sundance Consulting Inc.

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

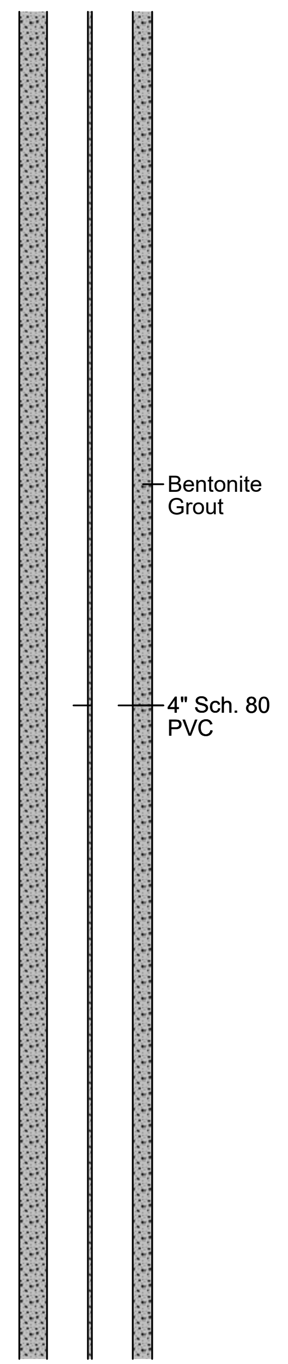
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	DESCRIPTION
320	SW	1.2	75% F 10% M 10% C 5% G	50% Q 20% F 30% L	Well-graded sand (SW): 10 YR 5/4; moist; loose; 75% fine sands; 10% medium sands; 10% coarse sands; 5% gravel; sub-rounded to sub-angular.
325	SW		75% F 10% M 10% C 5% G	50% Q 20% F 30% L	Same as above (320 ft).
330	GW	2.9	30% F 10% M 10% C 50% G	50% Q 25% F 25% L	Well-graded gravel (GW): 10 YR 5/4; moist; loose; 30% fine sands; 10% medium sands; 10% coarse sands; 50% gravel; sub-rouned to sub-angular sands; sub-rounded to rounded gravel. Note: Gravel up to 3cm. Gravel Q/F/L: 20/30/50.
335	SW		60% F 20% M 20% C Tr-G	40% Q 30% F 30% L	Well-graded sand (SW): 10 YR 6/3; dry; loose; 60% fine sands; 20% medium sands; 20% coarse sands; trace gravel; sub-rounded to sub-angular sand; sub-angular to angular gravel. Note: Gravel Q/F/L: 30/30/40.
340	SW	0.4	75% F 15% M 5% C 5% G	70% Q 20% F 10% L	Well-graded sand (SW): 10 YR 5/4; moist; loose; 75% fine sands; 15% medium sands; 5% coarse sands; 5% gravel; sub-rounded to sub-angular sands; sub-rounded gravels. Note: Gravel Q/F/L: 10/10/80.
345	SW		75% F 15% M 5% C 5% G	70% Q 20% F 10% L	Same as above (340 ft).
350	SW	0.7	55% F 15% M 15% C 15% G	60% Q 20% F 20% L	Well-graded sand (SW): 10 YR 5/4; moist; loose; 55% fine sands; 15% medium sands; 15% coarse sands; 15% gravel; sub-rounded to sub-angular. Note: Gravel Q/F/L: 10/10/80.
355	GW		30% F 10% M 10% C 50% G	60% Q 20% F 20% L	Well-graded gravel (GW): 10 YR 4/4; moist; loose; 30% fine sands; 10% medium sands; 10% coarse sands; 50% gravel; Note: Gravel Q/F/L: 10/10/80. Gravel up to 3 cm; largest grains are all lithic.
360					



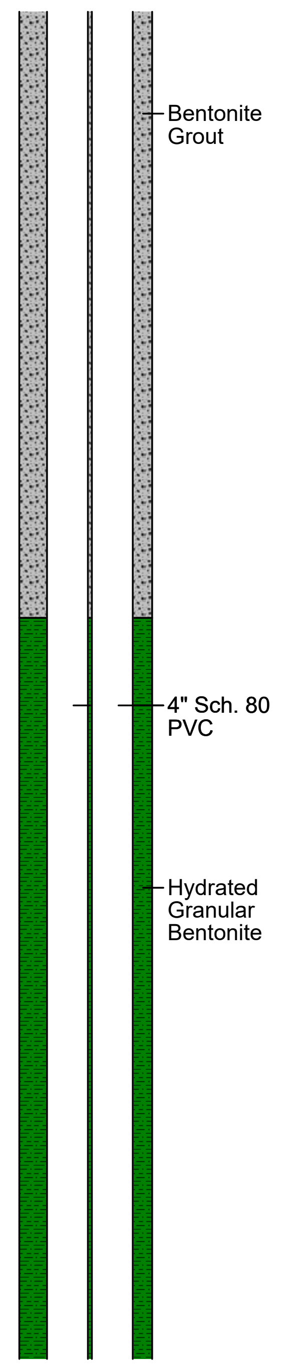
LOG OF BORING KAFB-106251

Sundance Consulting Inc. 15 Years

Data Gap Monitoring Well Installation KAFB-106248 to KAFB-106252 Bulk Fuels Facility	Date/Time Started: 1/6/21 / 0815; Date/Time Completed: 1/11/21 / 1730; Rig: Speedstar 50K; Casing Diameter: 13-3/8" (0-200')/11-3/4" (to TD); Drilling Method: ARCH
SWMUs ST-106/SS-111	Drilling Company: Cascade Drilling L.P.; Lead Driller: Forrest Chattin-Evans; Geologist: Justin Fitch; Northing (Grid): 1472784.57; Easting (Grid): 1541930.92
Kirtland AFB, Albuquerque, NM	

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
360	SW	0.4	70% F 10% M 10% C 10% G	70% Q 15% F 15% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 70% fine sands; 10% medium sands; 10% coarse sands; 10% gravel; sub-rounded to sub-angular sands; sub-rounded gravel. Note: Gravel Q/F/L: 20/20/60.
365			55% F 15% M 10% C 20% G	50% Q 20% F 30% L		Well-graded sand (SW): 10 YR 4/4; dry; loose; 55% fine sands; 15% medium sands; 10% coarse sands; 20% gravel; sub-rounded to sub-angular. Note: Gravel up to 2 cm. Gravel Q/F/L: 0/20/80.
370		0.5	60% F 10% M 15% C 15% G	50% Q 20% F 30% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 60% fine sands; 10% medium sands; 15% coarse sands; 15% gravel; sub-rounded to sub-angular. Note: Gravel up to 1 cm. Gravel Q/F/L: 20/20/60.
375			35% F 20% M 10% C 35% G	50% Q 20% F 30% L		Well-graded sand (SW): 10 YR 4/4; dry; loose; 35% fine sands; 20% medium sands; 10% coarse sands; 35% gravel; sub-rounded to sub-angular. Note: Gravel up to 3 cm. Gravel Q/F/L: 10/20/70.
380	GW	0.6	35% F 10% M 5% C 50% G	50% Q 25% F 25% L		Well-graded gravel (GW): 10 YR 6/4; dry; loose; 35% fine sands; 10% medium sands; 5% coarse sands; 50% gravel; sub-rounded to sub-angular. Note: Gravel up to 3 cm. Gravel Q/F/L: 10/10/80.
385			35% F 10% M 5% C 50% G	50% Q 25% F 25% L		Same as above (380 ft).
390	SW	1	40% F 25% M 20% C 15% G	60% Q 30% F 10% L		Well-graded sand (SW): 10 YR 6/3; dry; loose; 40% fine sands; 25% medium sands; 20% coarse sands; 15% gravel; sub-rounded to sub-angular. Note: Gravel up to 0.75 cm. Gravel Q/F/L: 20/20/60.
395	SW-SC		5% CL 70% F 15% M 10% C	60% Q 30% F 10% L		Well-graded sand with clay (SW-SC): 10 YR 5/3; dry; loose; 5% clay; 70% fine sands; 15% medium sands; 10% coarse sands; sub-rounded to sub-angular. Note: Clay balls approx. 0.25 cm.
400						



LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

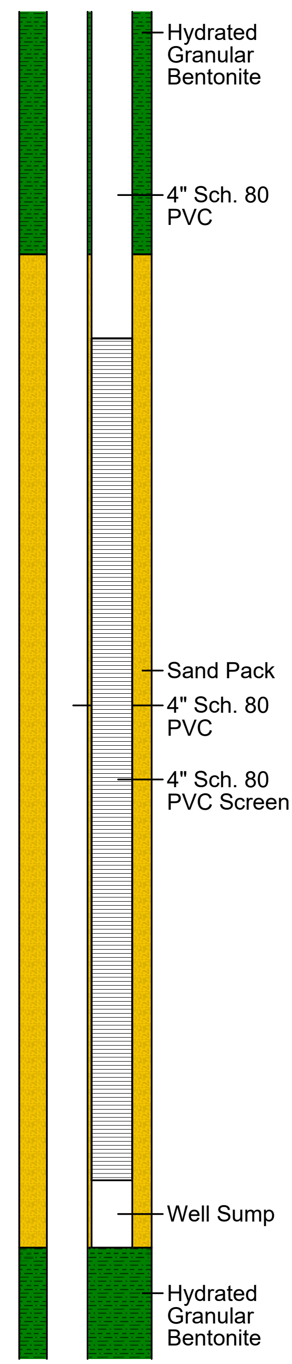
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
400	SW	2.5	3% ML 72% F 20% M 5% C	70% Q 20% F 10% L		Well-graded sand (SW): 10 YR 5/4; dry; loose; 3% silt; 72% fine sands; 20% medium sands; 5% coarse sands; rounded to sub-rounded. Note: Clay present as a handful of approx .25 cm clay balls.
405			3% ML 72% F 20% M 5% C	70% Q 20% F 10% L		Same as above (405 ft).
410		1.2	3% ML 72% F 20% M 5% C	70% Q 20% F 10% L		Same as above (405 ft).
415	SP		90% F 10% M	70% Q 25% F 5% L		Poorly-graded sand (SP): 10 YR 5/4; dry; loose; 90% fine sands; 10% medium sands; sub-rounded to rounded.
420		0.5	95% F 5% M Tr-C	70% Q 20% F 10% L		Poorly-graded sand (SP): 10 YR 6/3; dry; loose; 95% fine sands; 5% medium sands; trace coarse sands; sub-rounded to sub-angular.
425			25% F 75% M	40% Q 30% F 30% L		Poorly-graded sand (SP): 10 YR 6/3; dry; loose; 25% fine sands; 75% medium sands; sub-rounded to sub-angular.
430		0.3	100% F	70% Q 20% F 10% L		Poorly-graded sand (SP): 10 YR 6/3; dry; loose; 100% fine sands, sub-rounded to sub-angular; coarse grains are 70% quartz, 20% feldspar and 10% lithics.
435	SW		50% F 50% M	50% Q 20% F 30% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 50% fine sands; 50% medium sands; sub-rounded to angular.
440						



LOG OF BORING KAFB-106251

Sundance Consulting Inc. 15 YEARS

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

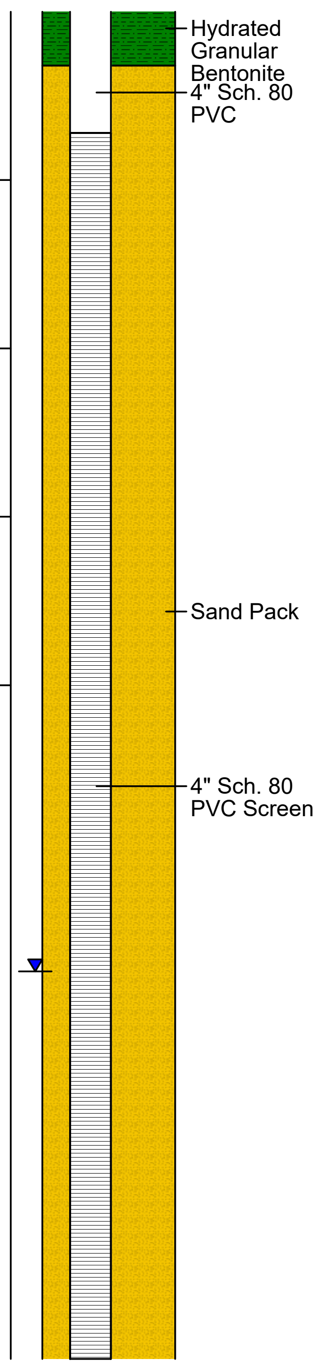
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
440	SW	0.9	20% F 40% M 40% C	50% Q 20% F 30% L		Well-graded sand (SW): 10 YR 6/3; dry; loose; 20% fine sands; 40% medium sands; 40% coarse sands; sub-angular to sub-rounded.
445	SP		100% F Tr-M	75% Q 15% F 10% L		Poorly-graded sand (SP): 10 YR 6/3; dry; loose; 100% fine sands; trace medium sands; sub-rounded.
450	GP	0.3	45% F 55% G	70% Q 25% F 5% L		Poorly-graded gravel with sand (GP): 10 YR 6/4; dry; loose; 45% fine sands; 55% gravel; sub-angular to sub-rounded.
455	SW		90% F 10% M	55% Q 35% F 10% L		Well-graded sand (SW): 10 YR 6/4; dry; loose; 90% fine sands; 10% medium sands; sub-angular to sub-rounded. Note: Strong degraded hydrocarbon odor.
460	SP	1.5	100% F Tr-M	60% Q 30% F 10% L		Poorly-graded sand (SP): 10 YR 6/4; dry; loose; 100% fine sands; trace medium sands; sub-angular to sub-rounded. Note: Hydrocarbon odor.
465			100% F	50% Q 30% F 20% L		Poorly-graded sand (SP): 10 YR 6/4; moist; loose; 100% fine sands; sub-angular to sub-rounded. Note: Hydrocarbon odor.
470	SP	1.1	100% F	50% Q 30% F 20% L		Poorly-graded sand (SP): 10 YR 5/4; moist; loose; 100% fine sands; sub-angular to sub-rounded. Note: Increasing moisture. Hydrocarbon odor.
475			100% F	50% Q 30% F 20% L		Same as above (470 ft).
480						



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Sundance Consulting Inc. 15 YEARS

LOG OF BORING KAFB-106251

Data Gap Monitoring Well Installation
KAFB-106248 to KAFB-106252
Bulk Fuels Facility

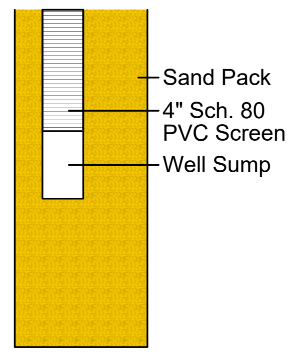
SWMUs ST-106/SS-111

Kirtland AFB, Albuquerque, NM

Date/Time Started	: 1/6/21 / 0815	Drilling Company	: Cascade Drilling L.P.
Date/Time Completed	: 1/11/21 / 1730	Lead Driller	: Forrest Chattin-Evans
Rig	: Speedstar 50K	Geologist	: Justin Fitch
Casing Diameter	: 13-3/8" (0-200')/11-3/4" (to TD)	Northing (Grid)	: 1472784.57
Drilling Method	: ARCH	Easting (Grid)	: 1541930.92

Well1: KAFB-106251-443
Well2: KAFB-106251-409
Elev:: 5345.06

Depth in Feet	USCS	PID (ppm)	Grain Size Distribution	Mineralogy Q/F/L	GRAPHIC	DESCRIPTION
480	SP	1	100% F	50% Q 30% F 20% L		Same as above (470 ft).
485	SP		100% F	50% Q 30% F 20% L		Same as above (470 ft).
490	GP	1.2	15% F 5% C 80% G	60% Q 30% F 10% L		Poorly-graded gravel with sand (GP): 10 YR 3/4; moist; loose; 15% fine sands; 5% coarse sands; 80% gravel; sub-angular to sub-rounded. Note: gravel up to 1 cm. Gravel Q/F/L: 15/15/70.
495	SW-SM		10% ML 40% F 30% M 15% C 5% G	50% Q 30% F 20% L		Well-graded sand with silt (SW-SM): 10 YR 3/4; wet; loose; 10% silt; 40% fine sands; 30% medium sands; 15% coarse sands; 5% gravel; sub-rounded to sub-angular sand; rounded to sub-angular gravel. Note: gravel up to 2 cm. Gravel is 100% lithic.
500						
505						
510						
515						
520						



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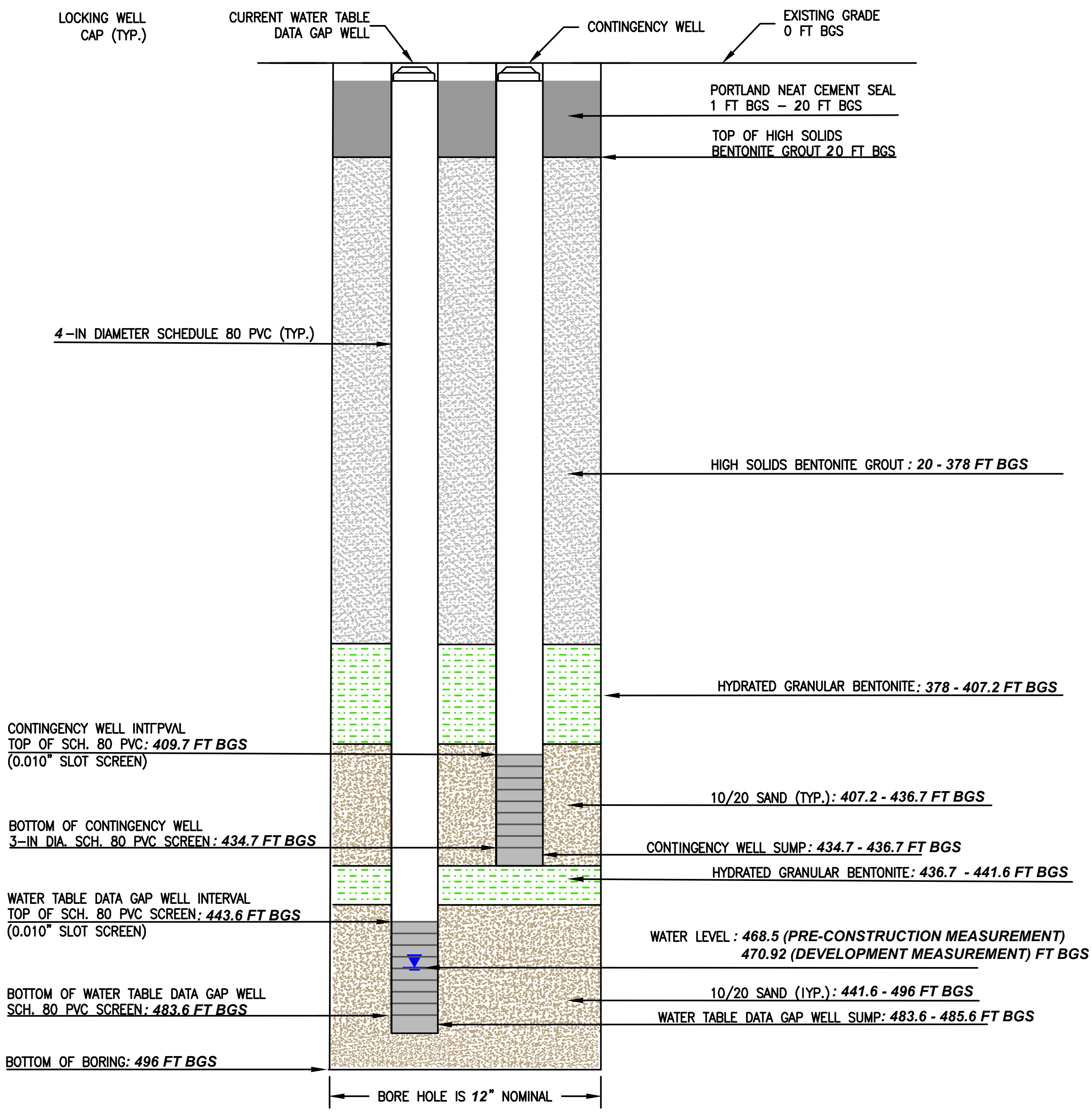
KAFB-106251 Nested Monitoring Well Construction



Northing: 1472784.57
Easting: 1541930.92
Ground Elev: 5345.06 ft
Riser Elev: 5348.06 ft

NOT TO SCALE
BGS=BELOW GROUND SURFACE
FT=FEET

DATA GAP MONITORING WELL INSTALLATION KAFB-106248 TO KAFB-106252 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNITS ST-106/SS-111 KIRTLAND AIR FORCE BASE, NEW MEXICO	KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 01/06/2021 - 0815 Hours	INSTALLATION END DATE/TIME: 01/21/2021 - 1600 Hours
	Contract NO.: W912PP-17-C-0028	WELL ID: KAFB-106251	GEOLOGIST: Justin Fitch	DRILLER: Forrest Chattin-Evans

CAD FILE: Y:\Active Projects\62599DM01 Kirtland BFF_USACE\01_Work Plan\19.0 Data Gap Wells WP\Figures\Natives\Nested Monitoring well_KAFB-106240-245.dwg PLOT DATE/TIME: 12/18/2017 – 4:39pm

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **2-23-2021**
Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
0					Hydrovac for utilities 0-8 ft bgs. At 0 to 0.5 ft, asphalt. At 0.5 to 1.5 ft, road base. No samples taken.	Cement, 0-28 ft bgs
10	0.5		SM		Silty Sand: 7.5YR 4/4, brown; loose; slightly moist; 60% fine-coarse sand (30% fine, 40% medium, 30% coarse); 20% gravel to 5/8"; subangular-subrounded; 15% silt, nonplastic; 5% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
15			ML		Silt: 7.5YR 6/4, light brown; soft; slightly moist; nonplastic; 100% silt.	
20	0.0		SM		Silty Sand: 7.5YR 4/4, brown; loose; slightly moist; 60% fine-coarse sand (30% fine, 40% medium, 30% coarse); 20% gravel to 1-1/8"; subangular-subrounded; 20% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
25			GW		Well-Graded Gravel with Sand: 7.5YR 5/4, brown; loose; slightly moist; 80% gravel to 1"; 15% fine-coarse sand (30% fine, 40% medium, 30% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments. At 30 ft, gravel to 1-1/2". At 35 ft, gravel to 2".	Hydrated 3/8" Bentonite Chips, 28-34 ft bgs
30	0.0					
35						High Solids Bentonite Grout, 34-358 ft bgs
40						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
40–45	0.0		SW-SM		Well-Graded Sand with Silt: 7.5YR 5/3, brown; loose; slightly moist; 90% fine-coarse sand (10% fine, 40% medium, 50% coarse); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
45–50			SW		Well-Graded Sand with Gravel: 7.5YR 5/3, brown; loose; slightly moist; 65% fine-coarse sand (10% fine, 40% medium, 50% coarse); 30% gravel to 2-1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
50–55	0.3		GM		Silty Gravel with Sand: 7.5YR 4/4, brown; loose; slightly moist; 60% gravel to 1-1/2"; 20% fine-coarse sand (40% fine, 40% medium, 20% coarse); subangular-subrounded; 20% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
55–60			SW		Well-Graded Sand with Gravel: 7.5YR 5/4, brown; loose; slightly moist; 65% fine-coarse sand (40% fine, 40% medium, 20% coarse); 30% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
60–65	0.0		GW-GM		Well-Graded Gravel with Silt and Sand: 7.5YR 4/4, brown; loose; slightly moist; 70% gravel to 5/8"; 20% fine-coarse sand (40% fine, 40% medium, 20% coarse); subangular-subrounded; 10% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
65–70			GM		Silty Gravel with Sand: 7.5YR 4/4, brown; loose; slightly moist; 50% gravel to 1-1/2"; 20% fine-coarse sand (40% fine, 40% medium, 20% coarse); subangular-subrounded; 30% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
70–75	0.2		ML		Silt: 7.5YR 4/4, brown; soft; slightly moist; nonplastic; 90% silt; 10% fine-coarse sand (40% fine, 40% medium, 20% coarse); trace gravel to 3/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
75–80			SW		Well-Graded Sand with Gravel: 7.5YR 5/4, brown; loose; slightly moist; 75% fine-coarse sand (20% fine, 30% medium, 50% coarse); 20% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **2-23-2021** Completion Date: **3-11-2021**	**WELL LOG** Well ID: **KAFB-106252** Page: **3 of 14**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Long-Tooth Mill** Driller: **Mark Green** Geologist: **J. Messenger**	Boring Depth (ft): **538** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	1.2		SW-SM		Well-Graded Sand with Silt: 7.5YR 4/4, brown; loose; slightly moist; 70% fine-coarse sand (35% fine, 50% medium, 15% coarse); 20% gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
85			SP-SM		Poorly Graded Sand with Silt: 7.5YR 6/4, light brown; loose; slightly moist; 90% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. Note: drill chatter at 87 ft.	
90	1.1		SW		Well-Graded Sand with Gravel: 7.5YR 5/4, brown; loose; slightly moist; 55% fine-coarse sand (30% fine, 50% medium, 20% coarse); 40% gravel to 2-1/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
95			SP-SM		Poorly Graded Sand with Silt: 7.5YR 6/4, light brown; loose; slightly moist; 90% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
100	0.4		SP		Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
105			SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 65% fine-coarse sand (40% fine, 30% medium, 30% coarse); 30% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
110	0.1		CL		Clay: 7.5YR 5/4, brown; medium stiff; medium plastic; slightly moist; 90% clay; 5% silt; 5% gravel to 1-1/4"; trace fine-medium sand; subangular-subrounded; gravel is quartz and lithic fragments.	
115			CL		Sandy Clay: 7.5YR 5/4, brown; medium stiff; medium plastic; slightly moist; 60% clay; 20% fine-coarse sand (40% fine, 40% medium, 20% coarse); 20% gravel to 1-1/4"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
120						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **2-23-2021**
Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	0.2		CL		Clay: 7.5YR 5/4, brown; soft; slightly plastic-medium plastic; slightly moist; 60% clay; 30% silt; 10% fine-medium sand (60% fine, 40% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
125			ML		Silt: 7.5YR 5/4, brown; soft; slightly moist; slightly plastic; 85% silt; 10% clay; 5% fine sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments. At 130 ft, 80%silt; 10% clay; 10% fine-medium sand, trace coarse sand. At 135 ft, 7.5YR 5/6, strong brown; 70% silt; 20% clay; 10% fine-medium sand, trace coarse sand.	
130	0.2					
135						
140	1.7					
145						
150	1.2					
155			SP		See description below.	
160						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **2-23-2021**
Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
160–180 (165, 170, 175, 180)	1.3; 1.8		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 160 ft, 95% sand (30% fine, 70% medium), trace coarse sand; 5% silt.	
180–185	1.4		SC		Clayey Sand: 10YR 4/3, brown; loose; nonplastic-slightly plastic; slightly moist; 75% fine-coarse sand (40% fine, 40% medium, 20% coarse); trace gravel to 1/2"; subangular-subrounded; 25% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
185–200 (190, 195, 200)	1.0		SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 85% fine-coarse sand (30% fine, 60% medium, 10% coarse); 10% gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 190 ft, gravel to 5/8".	

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **2-23-2021**
Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
200–205	6.3		SP-SM		Poorly Graded Sand with Silt: 10YR 5/4, yellowish brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
205–215	2.5		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments.	
215–230	3.4		SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-coarse sand (25% fine, 65% medium, 10% coarse); trace gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is caliche and lithic fragments.	
230–235	2.3		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments.	
235–240			SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 85% fine-coarse sand (25% fine, 65% medium, 10% coarse); 10% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is quartz and lithic fragments.	

Depth scale: 205, 210, 215, 220, 225, 230, 235, 240

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **2-23-2021** Completion Date: **3-11-2021**	**WELL LOG** Well ID: **KAFB-106252** Page: **7 of 14**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Long-Tooth Mill** Driller: **Mark Green** Geologist: **J. Messenger**	Boring Depth (ft): **538** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	1.7		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
245			SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 85% fine-coarse sand (25% fine, 50% medium, 25% coarse); 10% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is quartz and lithic fragments. Note: drill chatter at 247 ft.	
250	0.9		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; 5% gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is quartz and lithic fragments. Note: drill chatter at 258 ft.	
255						
260	2.6		GW		Well-Graded Gravel with Sand: 10YR 6/3, pale brown; loose; slightly moist; 60% gravel to 2"; 40% fine-coarse sand (30% fine, 40% medium, 30% coarse); subangular-subrounded; gravel is quartz, caliche, and lithic fragments; sand is quartz, feldspar, caliche, and lithic fragments.	
265			CL		Clay: 10YR 5/3, brown; soft; medium plastic; slightly moist; 90% clay; 10% fine sand; subangular-subrounded; sand is quartz, feldspar, caliche, and lithic fragments.	
270	2.9		SC		Clayey Sand: 10YR 4/3, brown; loose/slightly cohesive; slightly plastic; slightly moist; 70% fine-coarse sand (40% fine, 50% medium, 10% coarse); subangular-subrounded; 30% clay; sand is quartz, feldspar, caliche, and lithic fragments.	
275					Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
280						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: Cascade
Drilling Method: Air Rotary Casing Hammer
Drill Bit: Long-Tooth Mill
Driller: Mark Green
Geologist: J. Messenger

Boring Depth (ft): 538
Boring Diameter (in): 14" nominal
Well Diameter: See Notes Section
DTW After Completion (ft bgs): N/A
Riser Material: See Notes Section

Screen Material: See Notes Section
Seal Material(s): Cement; Bentonite Chips; High Solids Bentonite Grout
Filter Pack: 10/20 Silica Sand

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	2.0		SP		Same as above.	
285–290	1.4		SW		Well-Graded Sand with Gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 70% fine-coarse sand (30% fine, 50% medium, 20% coarse); 25% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
295			SP		Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
300	2.3		SW		Well-Graded Sand: 10YR 5/3, brown; loose; slightly moist; 90% fine-coarse sand (25% fine, 50% medium, 25% coarse); 5% gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
305–310	1.7		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
315–320			SP-		Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 320 ft, 10YR 6/3, pale brown; 40% fine, 60% medium, no trace coarse sand.	

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **2-23-2021** Completion Date: **3-11-2021**	**WELL LOG** Well ID: **KAFB-106252** Page: **9 of 14**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Long-Tooth Mill** Driller: **Mark Green** Geologist: **J. Messenger**	Boring Depth (ft): **538** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	2.6		SP-SM		Same as above.	
325			SW-SM		Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 80% fine-coarse sand (30% fine, 60% medium, 10% coarse); 10% gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
330	1.6		GW-GM		Well-Graded Gravel with Silt and Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 70% gravel to 1"; 20% fine-coarse sand (30% fine, 50% medium, 20% coarse); subangular-subrounded; 10% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
335			SM		Silty Sand: 10YR 5/3, brown; loose/slightly cohesive; slightly moist; 70% fine sand; trace medium sand; subangular-subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
340	2.4		SP		Poorly Graded Sand: 10YR 5/4, brown; loose; slightly moist; 90% fine-medium sand (25% fine, 75% medium); trace coarse sand; 5% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
345			SW		Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 70% fine-coarse sand (25% fine, 50% medium, 25% coarse); 30% gravel to 1"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
350	0.9		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 100% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments. At 355 ft, 95% sand; 5% silt, nonplastic.	
355						
360						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**

Location: **Kirtland AFB, New Mexico**

Start Date: **2-23-2021**

Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details
360–365	3.7		SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	Hydrated 3/8" Bentonite Chips, 358-388.4 ft bgs
365–375	5.1		SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 100% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments. At 370 ft, 90% sand; 5% gravel to 3/8"; 5% silt; gravel is quartz and lithic fragments.	
375–380			GW		Well-Graded Gravel with Sand: 10YR 4/4, dark yellowish brown; loose; slightly moist; 60% gravel to 1-1/4"; 35% fine-coarse sand (30% fine, 40% medium, 30% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments.	
380–385	5.2		SW		Well-Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-coarse sand (30% fine, 60% medium, 10% coarse); trace gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
385–390			SP-SM		Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	10/20 Silica Sand, 388.4-418 ft bgs
390–400	2.5		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	4.5" OD Sch. 80 PVC Screen, 0.010" Slots 390.5-415.5 ft bgs

Completion columns: (1) (2) (3)

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **2-23-2021** Completion Date: **3-11-2021**	**WELL LOG** Well ID: **KAFB-106252**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Long-Tooth Mill** Driller: **Mark Green** Geologist: **J. Messenger**	Boring Depth (ft): **538** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Sample Description	Completion Details (1) (2) (3)
	1.1		SW	Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-coarse sand (25% fine, 60% medium, 15% coarse); 5% gravel to 3/8"; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
405			SP	Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
410	1.1		SW	Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-coarse sand (25% fine, 60% medium, 15% coarse); 5% gravel to 3/8"; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
415			GC	Clayey Gravel with Sand: 7.5YR 6/3, light brown; loose/slightly cohesive; slightly moist; 50% gravel to 1-1/4"; 35% fine-coarse sand (35% fine, 55% medium, 10% coarse); subangular-subrounded; 15% clay; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments. Note: clay exists as nodules to 1"; 7.5YR 5/3, brown; medium stiff; medium plastic.	4.5" OD Sch. 80 PVC Sump 41.5-417.5 ft bgs Hydrated 3/8" Bentonite Chips, 418-423 ft bgs
420	1.3		ML	Sandy Silt: 7.5YR 4/6, strong brown; soft; slightly moist; nonplastic; 70% silt; 30% fine-medium sand (50% fine, 50% medium); trace coarse sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	10/20 Silica Sand, 423-504.8 ft bgs
425			SP	Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-medium sand (30% fine, 70% medium); trace coarse sand; 10% gravel to 5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	4.5" OD Sch. 80 PVC Screen, 0.010" Slots 425-465 ft bgs
430	1.0		SP-SM	Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (25% fine, 75% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
435			SP	Poorly Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
440					

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**

Location: **Kirtland AFB, New Mexico**

Start Date: **2-23-2021**

Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**	Boring Depth (ft): **538**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **14" nominal**	
Drill Bit: **Long-Tooth Mill**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Mark Green**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
440–445	0.8		SM		Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 70% fine sand; trace medium sand; 5% gravel to 1-1/4"; subangular-subrounded; 25% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
445–460	2.1		SP		Poorly Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 450 ft, 40% fine sand, 60% medium sand. At 455 ft, 10YR 5/3, brown; 100% sand (30% fine, 70% medium), trace coarse sand.	
460–480	2.7 1.5		SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; moist; 95% fine-coarse sand (20% fine, 50% medium, 30% coarse); 5% gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 470 ft, 10YR 4/4, dark yellowish brown. At 475 ft, 90% sand, 10% gravel. At 480 ft, 75% sand, 20% gravel to 1", 5% nonplastic silt.	4.5" OD Sch. 80 PVC Sump 465-467 ft bgs

Notes:

(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs

(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs

(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs

bgs = below ground surface

ft = foot(feet)

N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **2-23-2021** Completion Date: **3-11-2021**	**WELL LOG** Well ID: **KAFB-106252** Page: **13 of 14**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **Long-Tooth Mill** Driller: **Mark Green** Geologist: **J. Messenger**	Boring Depth (ft): **538** Boring Diameter (in): **14" nominal** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	2.4				Same as above.	
485			SP		Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
490	2.1		GC		Clayey Gravel with Sand: 10YR 4/3, brown; loose/slightly cohesive; moist; 50% gravel to 1-5/8"; 20% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 30% clay; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments. Note: clay exists as nodules to 2"; 7.5YR 4/4, brown; medium stiff; medium plastic.	
495						
500	1.9		GM		Silty Gravel with Sand: 10YR 4/3, brown; loose/slightly cohesive; moist; 50% gravel to 2"; 20% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 30% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	Hydrated 1/4" Bentonite TR-30 Pellets, 504.8-509.9 ft bgs
505						
510	2.4					10/20 Silica Sand, 509.9-538 ft bgs
515					See description below.	2.5" OD Sch. 80 PVC Screen, 0.010" Slots 515-525 ft bgs
520						

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**

Location: **Kirtland AFB, New Mexico**

Start Date: **2-23-2021**

Completion Date: **3-11-2021**

WELL LOG

Well ID: **KAFB-106252**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **Long-Tooth Mill**
Driller: **Mark Green**
Geologist: **J. Messenger**

Boring Depth (ft): **538**
Boring Diameter (in): **14" nominal**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

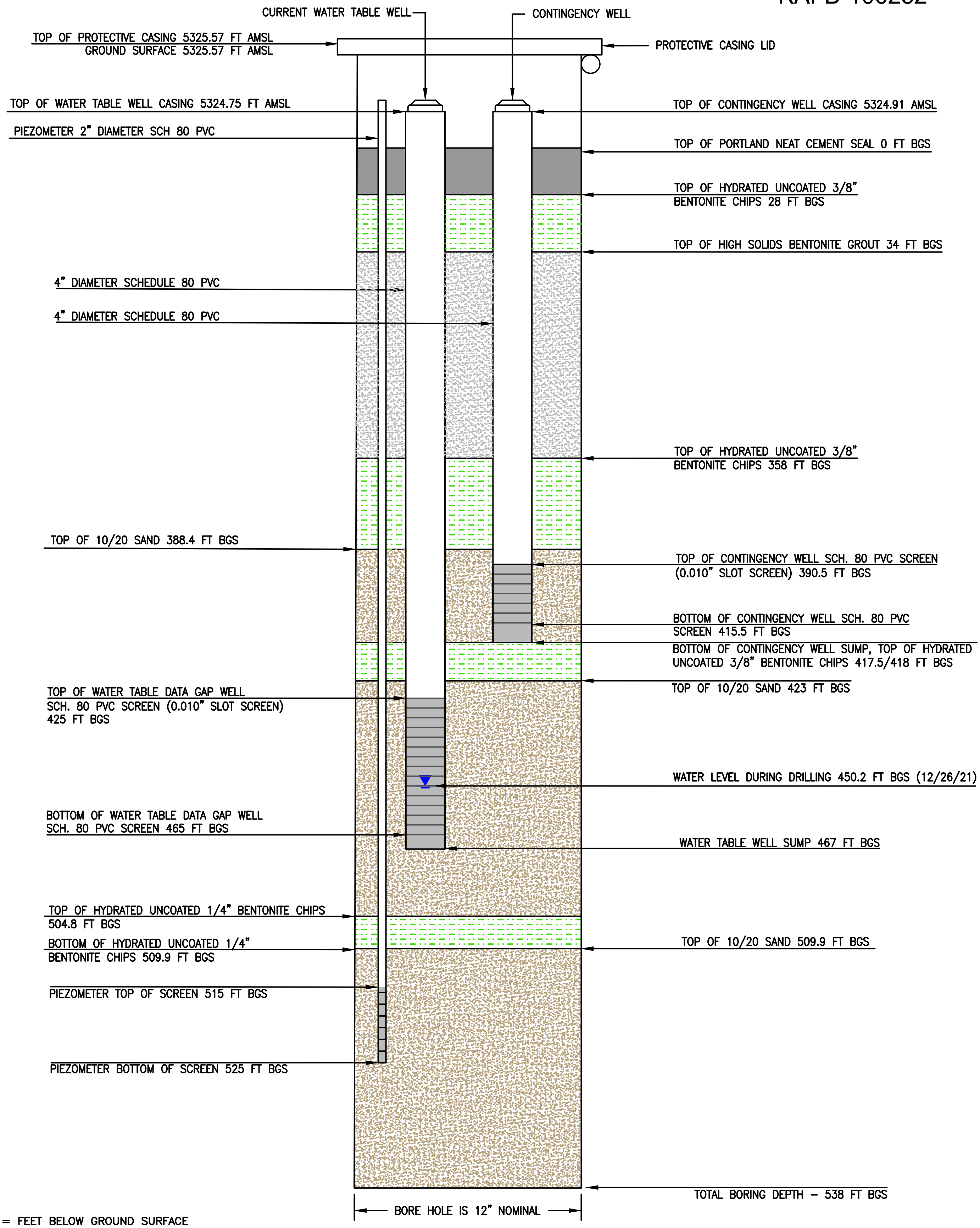
Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	2.0		GW		Well-Graded Gravel with Sand: 10YR 4/3, brown; loose; moist; 70% gravel to 5/8"; 30% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; gravel and sand are quartz, feldspar, and lithic fragments. At 535 ft, 10YR 5/3, brown; wet; 75% gravel to 2"; 25% sand (30% fine, 50% medium, 20% coarse).	
525						
	1.7					
530	1.8					
535						
	1.3		SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; wet; 80% fine-coarse sand (25% fine, 50% medium, 25% coarse); 15% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
					TD = 538 ft bgs	

Notes:
(1) KAFB-106252-515: 2.5" OD Sch. 80 PVC; blank riser, 0-515 ft bgs; 0.01" slot screen, 515-525 ft bgs
(2) KAFB-106252-425: 4.5" OD Sch. 80 PVC; blank riser, 0-425 ft bgs; 0.01" slot screen, 425-465 ft bgs
(3) KAFB-106252-390: 4.5" OD Sch. 80 PVC; blank riser, 0-390.5 ft bgs; 0.01" slot screen, 390.5-415.5 ft bgs
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

NESTED MONITORING WELL CONSTRUCTION

KAFB-106252



FT BGS = FEET BELOW GROUND SURFACE
FT AMSL = FEET ABOVE MEAN SEA LEVEL
PVC = POLYVINYL CHLORIDE
SCH = SCHEDULE

NOT TO SCALE

CAD FILE: C:\Users\ecarpio\Desktop\DATA_GAP_WC\Well Completion Diagram–KAFB-106252.dwg PLOT DATE/TIME: 5/20/2021 – 5:29am

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC
320 Gold Avenue, SW Suite 1300
Albuquerque, NM 87102
Phone: (505) 224-9013
Fax: (505) 224-9016

KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 02-23-2021/1455	INSTALLATION END DATE/TIME: 3-11-2021/1300
PROJECT NO.: 62735DM02.1015	WELL ID: KAFB-106252	GEOLOGIST: J. MESSENGER	DRILLER: M. GREEN

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **1 of 36**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **8 1/2" Long-Tooth Mill** Driller: **Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **9 5/8** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1)	Completion Details (2)
0					Hydrovac for utilities 0-8 ft bgs. No samples taken from 0-10 ft bgs.	4" Sch. 80 PVC Blank 0-409 ft bgs	4" Sch. 80 PVC Blank 0-443 ft bgs
10	5.0		CL		Clay: 7.5YR 5/4, brown; soft-medium stiff; slightly moist; medium plasticity; 80% clay; 5% silt; 15% fine to coarse sand (50% fine, 40% medium, 10% coarse); trace gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 15 ft, 90% clay, 5% silt, 5% sand.	Cement, 0-20 ft bgs	
20	6.2		ML		Silt with Sand: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic; 70% silt; 10% clay; 20% fine to coarse sand (50% fine, 40% medium, 10% coarse); trace gravel to 5/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.		High Solids Bentonite Grout, 20-373.6 ft bgs
25			CL		Clay: 7.5YR 5/4, reddish brown; soft-medium stiff; slightly moist; medium plasticity; 90% clay; 5% silt; 5% fine to coarse sand (50% fine, 40% medium, 10% coarse); trace gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 30 ft, 100% clay, plastic, trace silt and fine sand.		
30	4.5						
33			ML		Silt with Sand: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic-slightly plastic; 55% silt; 20% clay; 20% fine to coarse sand (40% fine, 40% medium, 20% coarse); 5% gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 40 ft, 75% silt, 10% clay, 15% sand (40% fine, 50% medium, 10% coarse), trace lithic gravel to 5/8".		
40							

Notes: (1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Project: 62735DM02	WELL LOG
Location: **Kirtland AFB, New Mexico**	Well ID: **KAFB-106S10**
Start Date: **11-21-2020**	
Completion Date: **12-20-2020**	

EA Engineering, Science, and Technology, Inc., PBC

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **9 5/8**	
Drill Bit: **8 1/2" Long-Tooth Mill**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	2.0		ML		Same as above.	
45						
50	1.5		ML		Silt: 7.5YR 6/4, light brown; soft; slightly moist; nonplastic; 100% silt; trace fine sand and lithic gravel to 5/8". At 50 ft, gravel up to 1". At 55 ft, gravel to 1/2".	
55						
60	1.8		SM		Silty Sand: 7.5YR 5/3, brown; loose; slightly moist; 65% fine-coarse sand (20% fine, 50% medium, 30% coarse); 10% gravel up to 1/2"; subangular-subrounded; 25% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
65			ML		Silt with Sand: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic-slightly plastic; 70% silt; 10% clay; 15% fine to coarse sand (40% fine, 40% medium, 20% coarse); 5% gravel to 5/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
70	3.5		ML		Silt: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic; 85% silt; 5% clay; 10% fine to coarse sand (40% fine, 40% medium, 20% coarse); trace lithic gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 75 ft, 80% silt, 10% clay, 10% fine-medium sand (50% fine, 50% medium), trace coarse sand. Note: clay exists as slightly plastic-medium plastic nodules up to 5/8". At 80 ft, 80% silt, 5% clay, 15% sand.	
75						
80						

Notes: (1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **9 5/8**	
Drill Bit: **8 1/2" Long-Tooth Mill**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	5.7		ML		Same as above.	
85			CL		Clay: 7.5YR 5/4, brown; medium stiff; slightly moist; medium plasticity; 80% clay; 10% silt; 10% fine to coarse sand (40% fine, 50% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
90	5.5		ML		Silt: 5YR 5/4, light brown; soft; slightly moist; nonplastic; 80% silt; 10% clay; 10% fine to medium sand (50% fine, 50% medium); trace coarse sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
95			SP-SM		Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (50% fine, 50% medium); trace coarse sand; trace gravel to 1-1/4"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
100	8.4		SW-SM		Well-Graded Sand with Silt: 10YR 5/2, grayish brown; loose; slightly moist; 85% fine-coarse sand (30% fine, 50% medium, 20% coarse); 5% gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
105			SW		Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-coarse sand (30% fine, 40% medium, 30% coarse); 10% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
110	5.3		ML		Silt: 10YR 5/4, yellowish brown; soft; slightly moist; nonplastic plastic; 70% silt; 20% clay; 10% fine-medium sand (50% fine, 50% medium); trace coarse sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments. Note: clay exists as slightly-medium plastic nodules up to 5/8".	
115			ML		Silt: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic; 85% silt; 5% clay; 10% fine to medium sand (50% fine, 50% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
120						

Notes: (1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: 62735DM02
Location: Kirtland AFB, New Mexico
Start Date: 11-21-2020
Completion Date: 12-20-2020

WELL LOG

Well ID: KAFB-106S10

Drilling Company: Cascade
Drilling Method: Air Rotary Casing Hammer
Drill Bit: 8 1/2" Long-Tooth Mill
Driller: Forrest Chattin
Geologist: J. Messenger

Boring Depth (ft): 517
Boring Diameter (in): 9 5/8
Well Diameter: See Notes Section
DTW After Completion (ft bgs): N/A
Riser Material: See Notes Section

Screen Material: See Notes Section
Seal Material(s): Cement; Bentonite Chips; High Solids Bentonite Grout
Filter Pack: 10/20 Silica Sand

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	5.7		ML		Same as above. At 120 ft, 60% silt, 30% clay, 10% sand, nonplastic-slightly plastic.	
125			CL		Clay: 7.5YR 5/4, brown; soft-medium stiff; slightly moist; medium plasticity; 80% clay; 10% silt; 10% fine to coarse sand (40% fine, 50% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
130	5.0		SC		Clayey Sand: 10YR 5/3, brown; soft-loose; slightly moist; 75% fine-medium sand (50% fine, 50% medium); trace coarse sand; subangular-subrounded; 20% clay, slightly plastic; 5% silt; sand is quartz, feldspar, and lithic fragments. Note: clay exists as nodules up to 1/2".	
135			SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
140	3.3		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
145			SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
150	5.2		CL		Clay: 7.5YR 5/4, brown; soft-medium stiff; slightly moist; medium plasticity; 90% clay; 5% silt; 5% fine to medium sand (50% fine, 50% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
155			SC		Clayey Sand: 7.5YR 5/3, brown; soft-loose; slightly moist; 50% fine-coarse sand (30% fine, 50% medium, 20% coarse); 15% gravel to 5/8"; subangular-subrounded; 35% clay, medium plastic; 5% silt; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. Note: clay exists as nodules up to 5/8".	
160						

Notes:
(1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **8 1/2" Long-Tooth Mill**
Driller: **Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **9 5/8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	8.4		SW-SC		Well-Graded Sand with Clay: 7.5YR 5/3, brown; soft-loose; slightly moist; 85% fine-coarse sand (30% fine, 50% medium, 20% coarse); 5% gravel to 3/8"; subangular-subrounded; 10% clay, medium plastic; sand is quartz, feldspar lithic fragments; gravel is lithic fragments. Note: clay exists as nodules to 1".	
165			SP-SC		Poorly Graded Sand with Clay: 7.5YR 5/3, brown; soft-loose; slightly moist; 80% fine-medium sand (25% fine, 75% medium); trace coarse sand; 5% gravel to 3/8"; subangular-subrounded; 10% clay, medium plastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. Note: clay exists as very stiff nodules to 1-5/8".	
170	10.3		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
175			SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. Note: clay exists as nodules to 3/8".	
180			SW-SM		Well-Graded Sand with Silt: 10YR 5/4, yellowish brown; loose; slightly moist; 90% fine-coarse sand (30% fine, 60% medium, 10% coarse); 5% gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is quartz, feldspar, and lithic fragments.	
185					Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-coarse sand (30% fine, 50% medium, 20% coarse); subangular-subrounded; 5% clay, medium plastic; sand is quartz, feldspar, and lithic fragments. Note: clay exists as nodules to 1/2".	
190			SW		Well-Graded Sand with Gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 60% fine-coarse sand (30% fine, 50% medium, 20% coarse); 35% gravel to 1-1/8"; subangular-subrounded; 5% clay, medium plastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is quartz, caliche, and lithic fragments. Note: clay exists as nodules to 1/2". At 195 ft, 90% sand, 5% gravel to 3/8", 5% clay.	
195						
200						

Notes: (1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **6 of 36**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **8 1/2" Long-Tooth Mill** Driller: **Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **9 5/8** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2)
	10.0		SM		Silty Sand: 10YR 5/6, yellowish brown; loose; slightly moist; 75% fine-coarse sand (45% fine, 45% medium, 10% coarse); trace gravel up to 1/4"; subangular-subrounded; 25% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz, feldspar, and lithic fragments.	
205			SW-SM		Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 80% fine-coarse sand (65% fine, 15% medium, 20% coarse); 10% gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz, feldspar, and lithic fragments.	
210	10.3		SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 80% fine-coarse sand (10% fine, 20% medium, 70% coarse); 15% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; trace clay; sand and gravel are quartz, feldspar, and lithic fragments. Note: clay exists as plastic nodules to 1/2".	
215						
220	10.4		SW-SM		Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (50% fine, 50% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 225 ft, 95% sand, 5% silt. Total Depth = 227 ft bgs.	
225						

Notes:
(1) KAFB-106S10-409: 4.5" OD Sch. 80 PVC; blank riser, 0-409 ft bgs; 0.01" slot screen, 409-434 ft bgs
(2) KAFB-106S10-443: 4.5" OD Sch. 80 PVC; blank riser, 0-443 ft bgs; 0.01" slot screen, 443-483 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: 62735DM02
Location: Kirtland AFB, New Mexico
Start Date: 11-21-2020
Completion Date: 12-20-2020

WELL LOG

Well ID: KAFB-106S10

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Filter Pack: **10/20 Silica Sand**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
									Cleanout from 227-230 ft; no sample recovery.	(1) 4.5" OD Schedule 80 PVC Riser, 0-409 ft bgs; (2) 4.5" OD Schedule 80 PVC Riser, 0-443 ft bgs
230	5.4	16.7	None	G, D	230-235	Complete	SW-SM		Well-Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 80% fine-coarse sand (40% fine, 40% medium, 20% coarse); 10% gravel to 1-1/4"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	High Solids Bentonite Grout, 20-373.6 ft bgs
235	4.6	14.1	None			Complete	SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (35% fine, 65% medium); trace coarse sand; 5% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
							GW		Well-Graded Gravel with Sand: 10YR 5/2, grayish brown; loose; slightly moist; 55% gravel to 1-1/4"; 40% fine-coarse sand (15% fine, 60% medium, 25% coarse); subangular-subrounded; 5% silt, nonplastic; gravel is quartz and lithic fragments; sand is	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: Cascade
Drilling Method: Sonic Coring
Drill Bit: Sonic Core Barrel, 6" and 8"
Driller: Justen Maples
Geologist: J. Messenger

Boring Depth (ft): 517
Boring Diameter (in): 8
Well Diameter: 4.5" OD
DTW After Completion (ft bgs): N/A
Riser Material: 4.5" OD Sch. 80 PVC

Screen Material: 4.5" OD Sch. 80 PVC 0.010" slot screen
Seal Material(s): Cement; Bentonite; High Solids Bentonite Grout
Filter Pack: 10/20 Silica Sand

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					235-240		SP		quartz, feldspar, and lithic fragments. Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (35% fine, 65% medium); trace coarse sand; trace gravel to 5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
							SW		Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 50% medium, 20% coarse); 20% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
240	4.1	24.8		G, D	240-245		GW-GM		Well-Graded Gravel with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 50% gravel to 1-1/2"; 40% fine-coarse sand (40% fine, 40% medium, 20% coarse); subangular-subrounded; 10% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
							CL		Clay: 10YR 5/3, brown; very stiff-hard; dry; slightly plastic; 80% clay; 20% silt. Note: clay is weakly mottled to 10YR 6/3, pale brown; secondary calcium carbonate present.	
							ML		Clayey Silt: 10YR 5/4, yellowish brown; soft; slightly moist; nonplastic-slightly plastic; 80% silt; 20% clay. Note: clay exists as nodules to 1-1/2".	
							CL		Clay: 10YR 5/2, grayish brown; very stiff-hard; slightly moist; plastic; 100% clay. Note: clay is moderately mottled to 10YR 8/2, very pale brown; 2.5Y 5/3, light olive brown; 2.5Y 7/6, yellow; secondary calcium carbonate present.	
245	52.2	22.7		G, D			ML		Silt: 10YR 6/3, pale brown; soft; slightly moist; nonplastic-slightly plastic; 75% silt; 25% clay. At 247.5 ft, 10YR 6/2, light brownish gray, 90% silt, 10% clay.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested; None; Interval Fluoresced

Core Recovery
No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					245-250		ML		Silt: 10YR 6/2, light brownish gray; soft; slightly moist; nonplastic-slightly plastic; 90% silt; 10% clay.	
250	132.9	18.1		G, D	250-255		CL		Clay: 2.5YR 7/3, pale brown; very stiff-hard; slightly moist; plastic; 90% clay; 10% silt. At 251.5 ft, 70% clay, 30% silt. Note: weak hydrocarbon odor present.	
	133.2									
							SM		Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 60% fine-medium sand (70% fine, 30% medium); subangular-subrounded; 40% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. Note: At 254-254.3 ft, hard caliche stringers present.	
255	165.4	15.9					SW-SM		Well-Graded Sand with Silt: 10YR 7/2, light gray; loose; slightly moist; 80% fine-coarse sand (30% fine, 50% medium, 20% coarse); 10% gravel to 1-1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, caliche, and lithic fragments; gravel is caliche and lithic fragments.	
							ML		See description below.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested
None
Interval Fluoresced

Core Recovery
No Recovery
Complete
Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Filter Pack: **10/20 Silica Sand**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
			None		255-260	Complete	ML		Silt with Sand: 10YR 5/4, yellowish brown; soft; slightly moist; nonplastic-slightly plastic; 60% silt; 20% clay; 20% fine to medium sand (40% fine, 60% medium); subangular-subrounded; sand is quartz, feldspar, and lithic fragments. At 260 ft, 10YR 6/3, pale brown, 70% silt, 30% silt. At 261 ft, nonplastic, 90% silt, 10% clay.	
260	178.7	21.2	None	G, D	260-264	Complete				
			None			Complete	SM		Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 80% fine-medium sand (40% fine, 60% medium); subangular-subrounded; 15% silt, nonplastic; 5% clay; sand is quartz, feldspar, and lithic fragments. At 264 ft, 80% sand, 20% silt, trace clay. At 264.8 to 265 ft, very hard caliche stringer.	
		21.4	None		264-	Complete				
265			None			Complete	SW		Well-Graded Sand with Gravel: 10YR 5/4, light yellowish brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 55% medium, 15% coarse); 20% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**

Location: **Kirtland AFB, New Mexico**

Start Date: **11-21-2020**

Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					270		SP-SM		Poorly Graded Sand with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine-medium sand (60% fine, 40% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
							SP		Poorly Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
270	183.1	19.8		G, D	270-274		SP-SM		Poorly Graded Sand with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine-medium sand (20% fine, 80% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
275	202.7	23.0			274-		CL		Clay: 10YR 5/3, brown; very stiff-hard; slightly moist; slightly plastic; 100% clay. Note: moderatly mottled to 5YR 6/4, pale olive. At 276 ft, weakly mottled to 10YR 8/1, white and minor secondary calcium carbonate present. At 280 ft, 10YR 5/3, brown, medium stiff, medium plastic.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **12 of 36**

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **8** Well Diameter: **4.5" OD** DTW After Completion (ft bgs): **N/A** Riser Material: **4.5" OD Sch. 80 PVC**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					280		CL		Clay: 10YR 5/3, brown; very stiff-hard; slightly moist; slightly plastic; 100% clay. Note: moderately mottled to 5YR 6/4, pale olive. At 276 ft, weakly mottled to 10YR 8/1, white and minor secondary calcium carbonate present. At 280 ft, 10YR 5/3, brown, medium stiff, medium plastic.	
280	24.6	9.2		G, D						
				G, D			SP-SM		Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (40% fine, 60% medium); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
					280-285		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (40% fine, 60% medium); subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 285 ft, trace lithic gravel to 1/2". At 286 ft, trace lithic gravel to 1-1/2".	
285	9.4	22.6								

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested | None | Interval Fluoresced

Core Recovery
No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: 62735DM02
Location: Kirtland AFB, New Mexico
Start Date: 11-21-2020
Completion Date: 12-20-2020

WELL LOG

Well ID: KAFB-106S10

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Filter Pack: **10/20 Silica Sand**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					284-290		SP		Same as above.	
							SW-SM		Well-Graded Sand with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 75% fine-coarse sand (30% fine, 50% medium, 20% coarse); 15% gravel to 2-1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 290 ft, gravel to 1-3/4". At 291 ft, 10YR 7/1, light gray, dry, 80% sand, 10% gravel, 10% silt.	
290	13.1	65.2			290-291					
		21.8		G, D	291-295					
							SW		Well-Graded Sand: 10YR 7/3, very pale brown; loose; slightly moist; 85% fine-coarse sand (50% fine, 20% medium, 30% coarse); 10% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
							GW		Well-Graded Gravel with Sand: 10YR 7/3, very pale brown; loose; slightly moist; 65% gravel to 3"; 30% fine-coarse sand (15% fine, 40% medium, 45% coarse); subangular-subrounded; 5% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments. At 295 ft, trace lithic cobble to 3-1/2".	
295	3.6	24.3								

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					295-300		SW-SC		Well-Graded Sand with Clay and Gravel: 10YR 7/2, light gray; loose; slightly moist; 65% fine-coarse sand (30% fine, 50% medium, 20% coarse); 25% gravel to 1-3/8"; subangular-subrounded; 10% clay, medium plastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as 10YR 5/3, brown, nodules to 2".	
300	7.5	16.3		G, D	300-305		SP		Poorly Graded Sand: 10YR 6/2, pale ; loose; slightly moist; 95% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. Note: clay exists as nodules to 1-1/2".	
							CL		Clay: 7.5YR 5/3, brown; very stiff-hard; slightly plastic-medium plastic; 100% clay.	
							SW-SM		Well-Graded Sand with Silt and Gravel: 10YR 7/2, light gray; loose; slightly moist; 65% fine-coarse sand (25% fine, 50% medium, 25% coarse); 25% gravel to 2-3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
305	5.6	13.8					GW		Well-Graded Gravel with Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 60% gravel to 2-3/4"; 35% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz and lithic fragments. At 310 ft, gravel to 3".	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Filter Pack: **10/20 Silica Sand**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					305-310		GW		Well-Graded Gravel with Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 60% gravel to 2-3/4"; 35% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz and lithic fragments. At 310 ft, gravel to 3".	(1) (2)
310	**20.2**	13.9		G, D	310-315					
315	**26.6**	21.5					CL		Sandy Clay: 10YR 5/2, grayish brown; very stiff-hard; slightly moist; medium plastic; 60% clay; 15% silt; 25% fine sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
					315-		SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 70% fine-coarse sand (35% fine, 35% medium, 30% coarse); 15% gravel to 1-1/2"; subangular-subrounded; 10% silt, nonplastic; 5% clay, medium plastic; sand and gravel are quartz, feldspar, and lithic fragments. Note: clay exists as 10YR 4/3, brown, nodules.	
							SP-SM			

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					319		SP		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-medium sand (60% fine, 40% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; 5% clay, medium plastic; sand is quartz, feldspar, and lithic fragments. Note: clay exists as 10YR 4/3, brown, nodules to 2-1/2"	(1) (2)
									Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (60% fine, 40% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
320	62.0	19.4		G, D	319-325		SM		Silty Sand: 10YR 5/2, grayish brown; loose; slightly moist; 85% fine-coarse sand (45% fine, 45% medium, 10% coarse); trace gravel to 3/4"; subangular-subrounded; 15% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
							SW		Well-Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 95% fine-coarse sand (40% fine, 40% medium, 20% coarse); trace gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
							GW		Well-Graded Gravel with Sand: 10YR 5/2, grayish brown; loose; slightly moist; 60% gravel to 2-1/2"; 35% fine-coarse sand (30% fine, 30% medium, 40% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments.	
325	8.4	24.6					SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (60% fine, 40% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 325 ft, clay nodules, 7.5YR 5/3, brown, to 3" in a 2" lense, hard-stiff, highly plastic.	
							SW		Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist;	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested
None
Interval Fluoresced

Core Recovery
No Recovery
Complete
Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **17 of 36**

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **8** Well Diameter: **4.5" OD** DTW After Completion (ft bgs): **N/A** Riser Material: **4.5" OD Sch. 80 PVC**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					325-330				90% fine-coarse sand (20% fine, 35% medium, 45% coarse); 5% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
							SP-SM		Poorly Graded Sand with Silt: 10YR 6/4, light yellowish brown; loose; slightly moist; 80% fine-medium sand (80% fine, 20% medium); trace coarse sand; 10% gravel to 1-1/2"; subangular-subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
330	8.5	30.1		G, D	330-335					
							SW		Well-Graded Sand: 10YR 5/3, brown; loose; slightly moist; 85% fine-coarse sand (20% fine, 35% medium, 45% coarse); 10% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 331 ft, 95% sand, 5% silt, trace gravel to 1/2".	
							CL		Clay: 5YR 4/6, yellowish red; very stiff-hard; slightly moist; highly plastic; 100% clay. Note: moderately motted to 5YR 3/1, very dark gray.	
335	87.7	14.5					ML		Clayey Silt: 10YR 5/4, yellowish brown; medium dense; slightly moist; slightly plastic; 60% silt; 30% clay; 10% fine sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
							CL		Clay: 7.5YR 4/3, brown; stiff-hard; slightly moist; medium plastic; 90% clay; 10% silt. Note: moderately motted to 7.5YR 8/1, white, 2.5Y 7/6, yellow, 2.5Y 3/1, very dark gray.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					335-340		CL		Clay: 7.5YR 4/3, brown; stiff-hard; slightly moist; medium plastic; 90% clay; 10% silt. Note: moderately motted to 7.5YR 8/1, white, 2.5Y 7/6, yellow, 2.5Y 3/1, very dark gray.	
							SP		Poorly Graded Sand: 10YR 6/4, light yellowish brown; loose; slightly moist; 95% fine-medium sand (60% fine, 40% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
340	**20.8**	19.5		G, D	340-345		SW		Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-coarse sand (20% fine, 50% medium, 30% coarse); 10% gravel to 3"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 342.5 ft, 4" lense of 10YR 5/4, yellowish brown, clay nodules.	
							SW		Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 80% fine-coarse sand (25% fine, 35% medium, 40% coarse); 15% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 345 ft, 85% sand (30% fine, 40% medium, 30% coarse), 10% gravel to 1-3/4", 5% silt.	
345	**26.1**	12.7							Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 60% fine-coarse sand (25% fine, 25% medium,	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details
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N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description
					345-350		SW	50% coarse); 40% gravel to 2"; subangular-subrounded; trace silt; sand and gravel are quartz, feldspar, and lithic fragments.
				G, D			GW	Well-Graded Gravel with Sand: 10YR 6/3, pale brown; loose; slightly moist; 60% gravel to 2-3/4"; 35% fine-coarse sand (30% fine, 30% medium, 40% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments.
350	8.3	8.2			350-355		SW	Well-Graded Sand: 10YR 6/4, light yellowish brown; loose; slightly moist; 90% fine-coarse sand (5% fine, 80% medium, 15% coarse); 10% gravel to 1-3/4"; subangular-subrounded; sand and gravel are quartz, feldspar, and lithic fragments. At 351 ft, 80% sand (5% fine, 65% medium, 30% coarse), 20% gravel. At 353 ft, 90% sand (30% fine, 50% medium, 20% coarse), 5% gravel to 1-7/8", 5% nonplastic silt.
355	256.7	17.3					GW-GM	Well-Graded Gravel with Silt and Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 50% gravel to 2-1/2"; 40% fine-coarse sand (40% fine, 30% medium, 30% coarse); subangular-subrounded; 10% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments. At 356 ft, a 0.25-foot lense of clay, 10YR 5/4, yellowish brown, soft-medium stiff, medium plastic.

Completion Details (1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

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ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					355-360		GW-GM		Well-Graded Gravel with Silt and Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 50% gravel to 2-1/2"; 40% fine-coarse sand (40% fine, 30% medium, 30% coarse); subangular-subrounded; 10% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments. At 356 ft, a 0.25-foot lense of clay, 10YR 5/4, yellowish brown, soft-medium stiff, medium plastic.	
							GM		Silty Gravel with Sand: 10YR 7/2, light gray; loose; slightly moist; 45% gravel to 1-3/4"; 35% fine-coarse sand (30% fine, 30% medium, 40% coarse); subangular-subrounded; 20% silt, nonplastic; trace clay; gravel and sand are quartz, feldspar, and lithic fragments.	
360	43.9	13.5		G, D	360-365		GW		Well-Graded Gravel with Sand: 10YR 7/4, very pale brown; loose; slightly moist; 60% gravel to 2-1/8"; 35% fine-coarse sand (30% fine, 35% medium, 35% coarse); subangular-subrounded; 5% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments.	
365	314	17.0					SW		Well-Graded Sand: 10YR 6/4, light yellowish brown; loose; slightly moist; 95% fine-coarse sand (30% fine, 50% medium, 20% coarse); trace gravel to 3/4"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested
None
Interval Fluoresced

Core Recovery
No Recovery
Complete
Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					365-370		SW		Same as above.	
							SW-SM		Well-Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-coarse sand (70% fine, 25% medium, 5% coarse); trace gravel to 5/8"; subangular-subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 369.5 ft, 80% sand (35% fine, 40% medium, 25% coarse), 10% gravel to 1-1/8", 10% silt.	
370	825.7	14.4		G, D	370-375		SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 55% fine-coarse sand (35% fine, 30% medium, 35% coarse); 40% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
							SW		Well-Graded Sand: 10YR 5/3, brown; loose; slightly moist; 100% fine-coarse sand (30% fine, 60% medium, 10% coarse); trace gravel to 1-1/8"; subangular-subrounded; trace silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
							SP		Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 373.5 ft, clay, 10YR 4/4, dark yellowish brown, stiff-very stiff, medium plastic.	
							SW		Well-Graded Sand with Gravel: 10YR 6/4, light yellowish brown; loose; slightly moist; 55% fine-coarse sand (20% fine, 60% medium, 20% coarse); 40% gravel to 1-3/4"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	Hydrated Bentonite Chips, 1/4-3/8", 373.6-405.5 ft bgs
							SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (65% fine, 35% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
375	835.7	8.8					SP		Poorly Graded Sand: 10YR 5/3, brown; loose; slightly moist; 95% fine-medium sand (80% fine, 20% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description
					375-380		ML	Sandy Silt: 10YR 7/2, light gray; loose; slightly moist; 60% silt, nonplastic; 40% fine-coarse sand (60% fine, 30% medium, 10% coarse); trace gravel to 1/2"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.
							SW	Well-Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-coarse sand (20% fine, 45% medium, 35% coarse); 5% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.
380	47.4	20.3		G, D	380-385		GM	Silty Gravel with Sand: 10YR 6/2, light grayish brown; loose; slightly moist; 65% gravel to 2-1/2"; 20% fine-coarse sand (20% fine, 30% medium, 50% coarse); subangular-subrounded; 15% silt, nonplastic; gravel and sand are quartz, feldspar, and lithic fragments.
							SW	Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 55% fine-coarse sand (20% fine, 35% medium, 45% coarse); 40% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 383.5 ft, 55% sand (25% fine, 50% medium, 25% coarse), 40% gravel to 2-1/2", 5% silt.
385								No sample recovered.

Completion Details: (1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description
					385-390			
390	11.3	47.7	None	G, D	390-395	Complete	ML	Silt: 10YR 7/1, light gray; soft; dry; nonplastic; 95% silt; 5% fine-coarse sand (10% fine, 35% medium, 55% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.
			None			Complete	SW	Well-Graded Sand: 10YR 6/4, light yellowish brown; loose; slightly moist; 90% fine-coarse sand (10% fine, 40% medium, 50% coarse); 10% gravel to 7/8"; subangular-subrounded; sand and gravel are quartz, feldspar, and lithic fragments.
			None			Complete	SP	Poorly Graded Sand: 7.5YR 6/4, light brown; loose; slightly moist; 100% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 7/8"; subangular-subrounded; trace silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.
			None			Complete	ML	Silt with Sand: 10YR 7/2, light gray; soft; dry; nonplastic; 80% silt; 20% fine-coarse sand (20% fine, 50% medium, 30% coarse); subangular-subrounded; trace clay; sand is quartz, feldspar, and lithic fragments. Note: clay exists as 10YR 6/3, pale brown, nodules to 1-3/8".
395								No sample recovered.

Completion Details (1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description	Completion Details (1) (2)
					395-400				
400	226.1	4.9	None	G, D	400-404	Complete	SW	Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 60% fine-coarse sand (15% fine, 60% medium, 25% coarse); 35% gravel to 1-3/8"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 401 ft, 10YR 6/3, pale brown, 70% sand, 25% gravel, 5% silt.	
			None		400-404	Complete	GW	Well-Graded Gravel with Sand: 10YR 6/3, pale brown; loose; slightly moist; 75% gravel to 1-7/8"; 25% fine-coarse sand (20% fine, 60% medium, 20% coarse); subangular-subrounded; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
405	18.8	21.8	None		404-407.5	Complete	SW	Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 80% fine-coarse sand (15% fine, 60% medium, 25% coarse); 15% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 405.25 ft, clay lense, 7.5YR 4/6, strong brown to 10YR 5/4, yellowish brown, medium stiff-very stiff, medium plastic.	10/20 Silica Sand, 405.5-436.2 ft bgs

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
							SW		Same as above.	
		14.2			407.5-414		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (30% fine, 70% medium); subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 411.5 ft, 90% sand, 5% gravel to 1-3/8", 5% silt, nonplastic.	4.5" OD Schedule 80 PVC Screen, 0.010" slot 409-434 ft bgs
410	86.4			G, D						
							SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 55% medium, 15% coarse); 20% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as nodules to 3/8". At 413 ft, 65% sand, 30% gravel, 5% silt, trace clay.	
							CL		Gravely Clay with Sand: 7.5YR 5/3, brown; stiff; slightly moist; medium plastic; 65% clay; 15% fine-coarse sand (40% fine, 40% medium, 20% coarse); 20% gravel to 2-7/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: weakly mottled to 5Y 6/4, pale olive.	
		19.1			414-		SW-SC		Well-Graded Sand with Clay and Gravel: 7.5YR 5/2, brown; loose; slightly moist; 60% fine-coarse sand (25% fine, 60% medium, 15% coarse); 30% gravel to 1-1/2"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
415	5903			G, D			SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 55% medium, 15% coarse); 20% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as nodules to 3/8". At 413 ft, 65% sand, 30% gravel, 5% silt,	
							SW-SC			

(1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description
					420			trace clay. Note: strong hydrocarbon odor present.
							CL	Well-Graded Sand with Clay and Gravel: 7.5YR 5/2, brown; loose; slightly moist; 60% fine-coarse sand (25% fine, 60% medium, 15% coarse); 30% gravel to 1-1/2"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.
							SW-SM	Clay: 7.5YR 5/3, brown; stiff- very stiff; slightly moist; medium plastic; 100% clay. At 417.5 ft, 2" lense of caliche (f-m sand cemented with secondary calcium carbonate).
								Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 70% fine-coarse sand (25% fine, 60% medium, 15% coarse); 20% gravel to 1-3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 419 ft, 60% sand, 30% gravel to 1-1/2", 10% silt.
420	5513	11.1		G, D	420-425		SP	Poorly Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; 5% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.
							SP-SM	Poorly Graded Sand with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 85% fine-medium sand (30% fine, 70% medium); trace coarse sand; 5% gravel to 1"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.
							CL	Clay: 7.5YR 5/3, brown; medium stiff; slightly moist; medium plastic; 100% clay.
425	306.9	16.2					SP-SM	Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 80% fine-medium sand (30% fine, 70% medium); trace coarse sand; 10% gravel to 2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 426 ft, 90% sand, 10% silt, trace gravel to 3/8".

Completion Details: (1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **27 of 36**	

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **8** Well Diameter: **4.5" OD** DTW After Completion (ft bgs): **N/A** Riser Material: **4.5" OD Sch. 80 PVC**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					425-430					(1) (2)
							SW		Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 75% fine-coarse sand (25% fine, 60% medium, 15% coarse); 20% gravel to 3"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 428 ft, 4" lense of hard, slightly plastic, slightly moist clay, 7.5YR 5/3, brown.	
430	390.1	14.7			430-435		SW-SC		Well-Graded Sand with Clay and Gravel: 10YR 6/3, pale brown; loose; slightly moist; 70% fine-coarse sand (25% fine, 60% medium, 15% coarse); 20% gravel to 2-1/4"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
							SC		Clayey Sand: 7.5YR 5/4, brown; loose/soft; moist; slightly plastic; 70% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; 30% clay; sand is quartz, feldspar, and lithic fragments.	
	303.3			G, D			SP		Poorly Graded Sand: 10YR 5/4, yellowish brown; loose; slightly moist; 85% fine-medium sand (20% fine, 80% medium); trace coarse sand; 10% gravel to 5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 435.5 ft, 75% sand, 20% gravel to 2", 5% silt.	
							SW		Well-Graded Sand with Gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 65% fine-coarse sand (20% fine, 60% medium, 20% coarse); 30% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	4.5" OD Schedule 80 PVC Sump, 434-436 ft bgs
435	17.2	23.1					SW-SC		Well-Graded Sand with Clay and Gravel: 10YR 5/4, yellowish brown; loose; slightly moist; 50% fine-coarse sand (20% fine, 60% medium, 20% coarse); 40% gravel to 3"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is caliche and lithic fragments. Note: clay exists as plastic, medium stiff nodules to 2".	
							CL		Clay: 7.5YR 5/2, brown; stiff; slightly moist; plastic; 85% clay; 10% fine-medium sand (70% fine, 30% medium); trace coarse sand; 5% gravel to 3"; subangular-subrounded; sand is quartz,	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **28 of 36**

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **8** Well Diameter: **4.5" OD** DTW After Completion (ft bgs): **N/A** Riser Material: **4.5" OD Sch. 80 PVC**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description	Completion Details
					435-440			feldspar, and lithic fragments; gravel is caliche and lithic fragments. Note: secondary calcium carbonate present.	
							SP-SM	Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	Hydrated Uncoated Bentonite Chips, 1/4-3/8", 436.2-440.5 ft bgs
440	287.4	18.0		G, D	440-445		SM	Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 70% fine-medium sand (30% fine, 70% medium); subangular-subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	10/20 Silica Sand, 440.8-497 ft bgs
							SP	Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; trace gravel to 1-1/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	4.5" OD Schedule 80 PVC Screen, 0.010" slot, 443-483 ft bgs
							SP-SM	Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (25% fine, 75% medium); trace coarse sand; trace gravel to 1-5/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 445 ft, no trace gravel.	
445	361.8	20.7					SP-SM		

(1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

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ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **29 of 36**

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **517** Boring Diameter (in): **8** Well Diameter: **4.5" OD** DTW After Completion (ft bgs): **N/A** Riser Material: **4.5" OD Sch. 80 PVC**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					445-450		SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (25% fine, 75% medium); trace coarse sand; trace gravel to 1-5/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 445 ft, no trace gravel.	
450	**392.2**	21.7		G, D	450-455					
							SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 95% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
							SW-SC		Well-Graded Sand with Clay and Gravel: 10YR 5/3, brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 60% medium, 10% coarse); 15% gravel to 2-1/2"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as slightly plastic, very stiff 5Y 5/6, olive, nodules to 2"; secondary calcium carbonate present.	
455	**321.6**	22.0			455-458		SP		Poorly Graded Sand: 10YR 5/3, brown; loose; moist; 95% fine-medium sand (20% fine, 80% medium); trace coarse sand; trace gravel to 5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 457.5 ft, trace clay as nodules to 1/2".	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **30 of 36**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
							SP		Same as above.	
		19.8					CL		Clay: 10YR 7/2, light gray; hard; dry-slightly moist; slightly plastic; 100% clay. Note: clay strongly mottled to 5Y 4/2, olive gray, and 5Y 5/3, olive. At 458 ft, silty clay, 10YR 5/3, brown; soft; slightly plastic; 70% clay; 30% silt; trace lithic gravel to 1".	
							GW		Well-Graded Gravel with Sand: 10YR 5/3, brown; loose; slightly moist; 60% gravel to 3"; 35% fine-coarse sand (25% fine, 55% medium, 20% coarse); subangular-subrounded; 5% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	
460	**242.5**			G, D	458-465		SW		Well-Graded Sand with Gravel: 10YR 5/2, grayish brown; loose; slightly moist; 65% fine-coarse sand (20% fine, 70% medium, 10% coarse); 30% gravel to 2-5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 460 ft, gravel to 1-1/2". At 461 ft, 55% sand, 40% gravel, 5% silt.	
							SW		Well-Graded Sand with Gravel: 10YR 5/2, light brownish gray; loose; slightly moist; 80% fine-coarse sand (30% fine, 45% medium, 25% coarse); 15% gravel to 1-3/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 465 ft, 85% sand (30% fine, 60% medium, 10% coarse), 10% gravel to 1", 5% silt. Note: strong hydrocarbon odor present.	
465	**3473**	15.9								

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

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ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
					465-470		GW		Well-Graded Gravel with Sand: 10YR 5/2, light brownish gray; loose; moist; 60% gravel to 3"; 40% fine-coarse sand (20% fine, 60% medium, 20% coarse); subangular-subrounded; 5% silt, nonplastic; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments. At 467.5 ft, 55% gravel, 35% sand, 10% clay as medium plastic, soft-medium stiff nodules to 1/2", 7.5YR 5/2, brown. At 468.5 ft, secondary calcium carbonate present.	
470	4481	17.0		G, D	470-480		SW		Well-Graded Sand with Gravel: 10YR 5/2, light brownish gray; loose; moist; 75% fine-coarse sand (20% fine, 60% medium, 20% coarse); 20% gravel to 3"; subangular-subrounded; 5% clay, medium plastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as medium stiff nodules to 1/2"; strong hydrocarbon odor present.	
							SW-SC		Well-Graded Sand with Clay and Gravel: 10YR 5/3, brown; loose; slightly moist; 75% fine-coarse sand (30% fine, 60% medium, 10% coarse); 15% gravel to 2-1/2"; subangular-subrounded; 10% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
475	4787						CL		Clay: 10YR 6/2, pinkish gray; very stiff-hard; slightly moist; medium plastic; 70% clay; 30% silt. Note: secondary calcium carbonate present.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description	Completion Details (1) (2)
							CL	Same as above.	
480	5900	19.6		G, D	480-490		SP-SM	Poorly Graded Sand with Silt: 10YR 5/2, grayish brown; loose; moist; 90% fine-medium sand (20% fine, 80% medium); trace coarse sand; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. Note: strong hydrocarbon odor present. At 480 ft, 90% sand, 10% silt, 10YR 5/3, brown.	
							SW	Well-Graded Sand: 10YR 5/2, grayish brown; loose; moist; 90% fine-coarse sand (10% fine, 80% medium, 10% coarse); 5% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	4.5" OD Schedule 80 PVC Sump, 483-485 ft bgs
485	5720								
							SW	Well-Graded Sand with Gravel: 10YR 5/2, grayish brown; loose; moist; 70% fine-coarse sand (10% fine, 60% medium, 30% coarse); 30% gravel to 1"; subangular-subrounded; sand and gravel are quartz, feldspar, and lithic fragments. Note: minor staining to 2.5Y 6/8, olive yellow.	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test: Not Tested; None; Interval Fluoresced

Core Recovery: No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **517**
Boring Diameter (in): **8**
Well Diameter: **4.5" OD**
DTW After Completion (ft bgs): **N/A**
Riser Material: **4.5" OD Sch. 80 PVC**

Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
							SW			
							SW		Well-Graded Sand: 10YR 5/2, grayish brown; loose; moist; 85% fine-coarse sand (20% fine, 65% medium, 15% coarse); 10% gravel to 1"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
490	5383	19.3		G, D	490-500		SW		Well-Graded Sand: 10YR 4/1, dark gray; loose; moist; 90% fine-coarse sand (20% fine, 60% medium, 20% coarse); 5% gravel to 3/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: highly stained; strong hydrocarbon odor present. At 492 ft, 10YR 4/3, brown; minor staining present. At 495 ft, 10YR 5/2, grayish brown. At 496 ft, gravel to 2-1/4". At 497 ft, gravel to 1".	
495	8.5									

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested; None; Interval Fluoresced

Core Recovery
No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-21-2020**
Completion Date: **12-20-2020**

WELL LOG

Well ID: **KAFB-106S10**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
							SW		Well-Graded Sand: 10YR 4/1, dark gray; loose; moist; 90% fine-coarse sand (20% fine, 60% medium, 20% coarse); 5% gravel to 3/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: highly stained; strong hydrocarbon odor present. At 492 ft, 10YR 4/3, brown; minor staining present. At 495 ft, 10YR 5/2, grayish brown. At 496 ft, gravel to 2-1/4". At 497 ft, gravel to 1".	Native Backfill/ Slough, 497-517 ft bgs
500	178.8	18.3		G, D	500-510		SW		Well-Graded Sand: 10YR 5/2, grayish brown; loose; moist; 90% fine-coarse sand (15% fine, 75% medium, 10% coarse); 10% gravel to 1-3/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 502.5 ft, 10YR 5/3, brown, 85% sand, 10% gravel to 1", 5% nonplastic silt.	
505	13.6						SW		Well-Graded Sand with Gravel: 10YR 5/2, grayish brown; loose; moist; 80% fine-coarse sand (10% fine, 60% medium, 30% coarse); 20% gravel to 1-1/2"; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 506 ft, 75% sand, 25% gravel to 1-1/4".	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested; None; Interval Fluoresced

Core Recovery
No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC

Project: 62735DM02
Location: Kirtland AFB, New Mexico
Start Date: 11-21-2020
Completion Date: 12-20-2020

WELL LOG

Well ID: KAFB-106S10

Drilling Company: Cascade
Drilling Method: Sonic Coring
Drill Bit: Sonic Core Barrel, 6" and 8"
Driller: Justen Maples
Geologist: J. Messenger

Boring Depth (ft): 517
Boring Diameter (in): 8
Well Diameter: 4.5" OD
DTW After Completion (ft bgs): N/A
Riser Material: 4.5" OD Sch. 80 PVC

Screen Material: 4.5" OD Sch. 80 PVC 0.010" slot screen
Seal Material(s): Cement; Bentonite; High Solids Bentonite Grout
Filter Pack: 10/20 Silica Sand

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (1) (2)
				G, D	500-517		SW		Well-Graded Sand with Gravel: 10YR 5/2, grayish brown; loose; moist; 80% fine-coarse sand (10% fine, 60% medium, 30% coarse); 20% gravel to 1-1/2"; subangular-subrounded; trace silt; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 506 ft, 75% sand, 25% gravel to 1-1/4".	
510	17.0	28.0					GC		Clayey Gravel with Sand: 10YR 6/2, light brownish gray; loose; moist; 50% gravel to 2"; 20% fine-coarse sand (30% fine, 45% medium, 25% coarse); trace cobble to 4"; subangular-subrounded; 30% clay, slightly plastic; gravel and sand are quartz, feldspar, and lithic fragments. Note: clay exists as stiff nodules to 2"; secondary calcium carbonate throughout.	
							SP-SC		Poorly Graded Sand with Clay: 10YR 5/3, brown; loose; moist; 90% fine-medium sand (25% fine, 75% medium); trace coarse sand; subangular-subrounded; 10% clay, medium plastic; sand is quartz, feldspar, and lithic fragments. Note: clay exists as soft-medium stiff nodules to 1/2", 10YR 5/4, yellowish brown.	
515	22.2						SP		Poorly Graded Sand: 10YR 5/3, brown; loose; moist; 95% fine-medium sand (20% fine, 80% medium); trace coarse sand; trace gravel to 5/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
	9.6			G, D			SP-SC		Poorly Graded Sand with Clay: 10YR 5/3, brown; loose; moist; 80% fine-medium sand (25% fine, 75% medium); trace coarse sand; 10% gravel to 1-7/8"; subangular-subrounded; 10% clay, medium plastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as	

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details

bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

UV Fluorescence Field Test
Not Tested
None
Interval Fluoresced

Core Recovery
No Recovery
Complete
Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-21-2020** Completion Date: **12-20-2020**	**WELL LOG** Well ID: **KAFB-106S10** Page: **36 of 36**

Drilling Company: **Cascade**	Boring Depth (ft): **517**	Screen Material: **4.5" OD Sch. 80 PVC 0.010" slot screen**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **4.5" OD**	
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **4.5" OD Sch. 80 PVC**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
									soft-medium stiff nodules to 2", 10YR 5/4, yellowish brown.	(1) (2)

Notes: (1) KAFB-106S10-409: see completion details
(2) KAFB-106S10-443: see completion details
bgs = below ground surface
ft = foot(feet)
N/A = not applicable
ppmv = parts per million by volume
UV = ultraviolet fluorescence

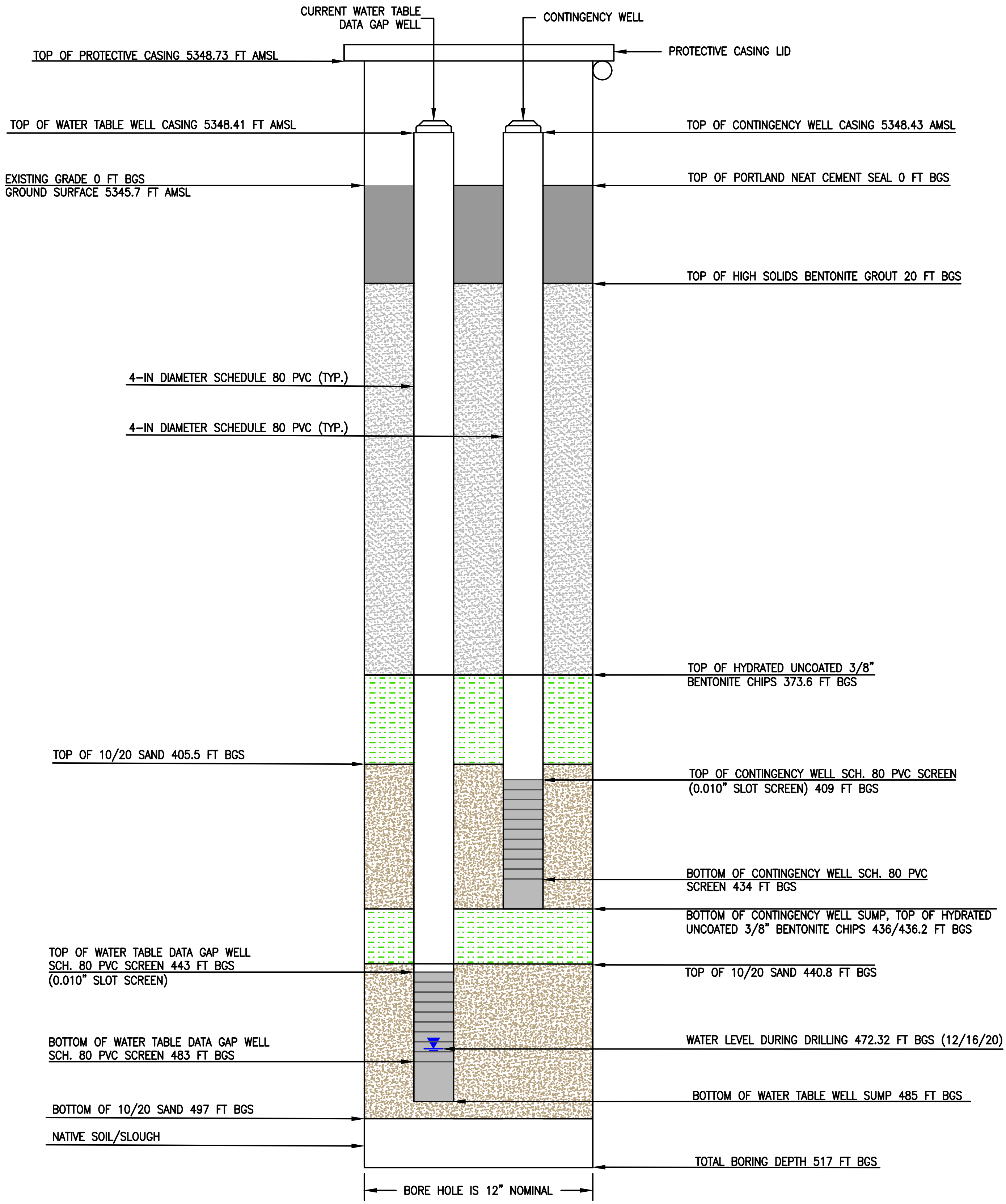
UV Fluorescence Field Test
Not Tested; None; Interval Fluoresced

Core Recovery
No Recovery; Complete; Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics

NESTED MONITORING WELL CONSTRUCTION

KAFB-106S10



FT BGS = FEET BELOW GROUND SURFACE
FT AMSL = FEET ABOVE MEAN SEA LEVEL
PVC = POLYVINYL CHLORIDE
SCH = SCHEDULE

NOT TO SCALE

320 Gold Avenue, SW Suite 1300
Albuquerque, NM 87102
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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 11-21-2020/0740	INSTALLATION END DATE/TIME: 12-20-2020/1520
PROJECT NO.: 62735DM02.1016	WELL ID: KAFB-106S10	GEOLOGIST: J. MESSENGER	DRILLER: F. CHATTIN

CAD FILE: C:\Users\ecarpio\Desktop\DATA_GAP_WC\Well Completion Diagram-KAFB-106S10.dwg PLOT DATE/TIME: 5/20/2021 - 5:22am

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**		**WELL LOG**
Location: **Kirtland AFB, New Mexico**		Well ID: **KAFB-106V3**
Start Date: **11-8-2020**		
Completion Date: **12-23-2020**		

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **9 5/8**	
Drill Bit: **8 1/2" Long-Tooth Mill**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details
0					Hydrovac for utilities 0-8 ft bgs. No samples taken.	Cement, 0-2 ft bgs; Hydrated 1/4-3/8" Bentonite Chips, 2-4 ft bgs; 10/20 Silica Sand, 4-9.1 ft bgs
10	1.3		CL		Clay: 5YR 5/4, reddish brown; soft-medium stiff; slightly moist; medium plasticity; 85% clay; 15% fine to coarse sand (40% fine, 50% medium, 10% coarse); trace gravel to 1"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 15 ft, 70% clay, 15% silt, 15% sand.	Hydrated 1/4-3/8" Bentonite Chips, 9.1-12 ft bgs; 10/20 Silica Sand, 12-17 ft bgs; Hydrated 1/4-3/8" Bentonite Chips, 17-27.8 ft bgs
20	0.7		ML		Silt: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic-slightly plastic; 65% silt; 10% clay; 25% fine to coarse sand (40% fine, 30% medium, 30% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments. At 25 ft, 55% silt, 25% clay, 20% sand. At 30 ft, trace lithic gravel to 3/8". At 40 ft, 7.5YR 5/4, brown; trace lithic gravel to 5/8". At 45 ft, no trace gravel. At 55 ft, 70% silt, 15% clay, 15% sand.	High Solids Bentonite Grout, 27.8 to 235.2 ft bgs
30	0.7					

Notes:

(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs

Samples: D = diesel-range organics; G = gasoline-range organics

bgs = below ground surface

ft = foot(feet)

N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-8-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade** Drilling Method: **Air Rotary Casing Hammer** Drill Bit: **8 1/2" Long-Tooth Mill** Driller: **Forrest Chattin** Geologist: **J. Messenger**	Boring Depth (ft): **300** Boring Diameter (in): **9 5/8** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
40–60	0.5 (≈41); 0.4 (≈50)		ML		Same as above.	
60–65	0.5		CL		Clay: 7.5YR 5/3, brown; soft-medium stiff; slightly moist; medium plasticity; 70% clay; 10% silt; 20% fine-coarse sand (60% fine, 30% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
65–75	0.0		ML		Silt: 7.5YR 5/4, brown; soft; slightly moist; nonplastic-slightly plastic; 65% silt; 10% clay; 25% fine to coarse sand (40% fine, 30% medium, 30% coarse); trace gravel to 5/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragment. At 70 ft, 5YR 5/4, reddish brown.	
75–80			CL		Clay with Sand: 7.5YR 5/4, brown; soft-medium stiff; slightly moist; plastic; 65% clay; 15% silt; 20% fine-coarse sand (50% fine, 30% medium, 20% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	

Notes:
(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: 62735DM02
Location: Kirtland AFB, New Mexico
Start Date: 11-8-2020
Completion Date: 12-23-2020

WELL LOG

Well ID: KAFB-106V3

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Air Rotary Casing Hammer**	Boring Diameter (in): **9 5/8**	
Drill Bit: **8 1/2" Long-Tooth Mill**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Driller: **Forrest Chattin**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
85	0.5		ML		Silt: 5YR 5/4, reddish brown; soft; slightly moist; nonplastic-slightly plastic; 65% silt; 10% clay; 25% fine to coarse sand (40% fine, 30% medium, 30% coarse); trace gravel to 5/8"; subangular-subrounded; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragment.	
90	0.1		CL		Clay: 7.5YR 5/2, brown; soft; slightly moist; nonplastic-slightly plastic; 90% clay; 10% fine-coarse sand (50% fine, 40% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
95, 100	1.0		SW-SM		Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-coarse sand (30% fine, 60% medium, 10% coarse); trace gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
105			CL		Clay: 7.5YR 5/2, brown; soft; slightly moist; nonplastic-slightly plastic; 90% clay; 10% fine-coarse sand (50% fine, 40% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
110, 115, 120	1.2		ML		Silt: 7.5YR 5/4, brown; soft; slightly moist; nonplastic-slightly plastic; 70% silt; 20% clay; 10% fine-medium sand (50% fine, 50% medium); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	

Notes:
(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **8 1/2" Long-Tooth Mill**
Driller: **Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **9 5/8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
125			CL		Clay: 7.5YR 5/2, brown; soft; slightly moist; nonplastic-slightly plastic; 90% clay; 10% fine-coarse sand (50% fine, 40% medium, 10% coarse); subangular-subrounded; sand is quartz, feldspar, and lithic fragments. Note: secondary calcium carbonate present throughout.	
130	0.5		SM		Silty Sand: 10YR 5/3, brown; loose; slightly moist; 80% fine-medium sand (70% fine, 30% medium); subangular-subrounded; 20% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
135			SP-SM		Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (40% fine, 60% medium); trace coarse sand; trace gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
140	0.0		SW		Well-Graded Sand: 10YR 5/3, brown; loose; slightly moist; 90% fine-coarse sand (30% fine, 60% medium, 10% coarse); 5% gravel to 1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
145			ML		Silt: 7.5YR 5/3, brown; soft; slightly moist; nonplastic; 70% silt; 30% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
150 / 155 / 160	2.4		SW-SM		Well-Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-coarse sand (40% fine, 50% medium, 10% coarse); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments. At 155 ft, 85% sand; 5% quartz and lithic gravel to 5/8"; 10% silt. At 160 ft, 80% sand; 10% gravel to 1"; 10% silt. At 165 ft, gravel to 1-1/8". At 170 ft, 60% sand; 30% gravel to 1"; 10% silt.	

Notes:
(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **8 1/2" Long-Tooth Mill**
Driller: **Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **9 5/8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Sample Description	Completion Details (1) (2) (3)
	3.5		SW-SM	Same as above.	
165					
170	1.6				
175			SM	Silty Sand: 10YR 5/3, brown; loose; slightly moist; 75% fine-medium sand (40% fine, 60% medium); subangular-subrounded; 25% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
180	1.4		SW-SM	Well Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 80% fine-coarse sand (40% fine, 50% medium, 10% coarse); 5% gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; 5% clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as nodules to 1-1/4"; medium stiff; medium plastic.	
185			SP-SM	Poorly Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
190	1.2				
195			SW-SM	Well Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 60% fine-coarse sand (30% fine, 40% medium, 30% coarse); 30% gravel to 5/8"; subangular-subrounded; 10% silt, nonplastic; trace clay as nodules to 3/8"; sand is quartz, feldspar lithic fragments; gravel is quartz and lithic fragments.	
200					

Notes:
(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-8-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade**
Drilling Method: **Air Rotary Casing Hammer**
Drill Bit: **8 1/2" Long-Tooth Mill**
Driller: **Forrest Chattin**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **9 5/8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite Chips; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Samples Collected	USCS	Lithology	Sample Description	Completion Details (1) (2) (3)
	0.6		SM		Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 75% fine-medium sand (40% fine, 60% medium); trace coarse sand; subangular-subrounded; 25% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
205, 210	0.4		SW-SM		Well Graded Sand with Silt: 10YR 5/3, brown; loose; slightly moist; 70% fine-coarse sand (30% fine, 40% medium, 30% coarse); 20% gravel to 5/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar lithic fragments; gravel is quartz and lithic fragments. At 210 ft, trace clay.	
215			SW		Well Graded Sand: 10YR 5/3, brown; loose; slightly moist; 70% fine-coarse sand (30% fine, 40% medium, 30% coarse); 25% gravel to 1-1/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar lithic fragments; gravel is quartz and lithic fragments.	
220, 225	0.2		SW-SM		Well Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 80% fine-coarse sand (20% fine, 60% medium, 20% coarse); 10% gravel to 7/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar lithic fragments; gravel is quartz and lithic fragments. At 225 ft, 10YR 5/3, brown; 90% sand (20% fine, 75% medium, 5% coarse); trace gravel to 3/4"; 10% silt; sand and gravel are quartz, feldspar, and lithic fragments.	
					TD = 227 ft bgs reached on 11-10-2020	

Notes:
(1) KAFB-106V3-07: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 5-7 ft bgs
(2) KAFB-106V3-272: 3.5" OD Sch. 80 PVC; blank riser, 0-267 ft bgs; 0.01" slot screen, 267-272 ft bgs
(3) KAFB-106V3-15: 1" OD Sch. 80 PVC; blank riser, 0-5 ft bgs; 0.01" slot screen, 13-15 ft bgs
Samples: D = diesel-range organics; G = gasoline-range organics
bgs = below ground surface
ft = foot(feet)
N/A = not applicable

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-11-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details (2)
									No cuttings returned.	3.5" OD Schedule 80 PVC Riser, 0-267 ft bgs; High Solids Bentonite Grout, 27.8-235.2 ft bgs
230	6.5	16.5	None	G, D	230-235	Complete	SW		Well-Graded Sand with Gravel: 10YR 5/3, brown; loose; slightly moist; 60% fine-coarse sand (30% fine, 45% medium, 25% coarse); 35% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
			None			Complete	SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
235	11.2	22.4	None	G, D		Complete	SW		Well-Graded Sand with Gravel: 10YR 6/2, light brownish gray; 70% fine-coarse sand (30% fine, 45% medium, 25% coarse); 25% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 235 ft, 10YR 7/3, very pale brown.	Hydrated Bentonite Chips, 1/4-3/8", 235.2 to 262.7 ft bgs
			None			Complete	GW-GM		See description below.	

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test

Not Tested | None | Interval Fluoresced

Core Recovery

No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-11-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					235-240		GW-GM		Well-Graded Gravel with Silt and Sand: 10YR 7/3, very pale brown; loose; slightly moist; 60% gravel to 2-1/2"; 30% fine-coarse sand (25% fine, 50% medium, 25% coarse); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 239.8 ft, trace plastic and medium stiff clay.	(2)
240	0.4	29.7		G, D	240-245		SP		Poorly Graded Sand: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-medium sand (40% fine, 60% medium); trace coarse sand; 10% gravel to 1-1/2"; subangular-subrounded; 5% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Note: clay exists as stiff, medium plastic nodules to 1-7/8", 10YR 5/4, yellowish brown.	
							SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-medium sand (40% fine, 60% medium); trace coarse sand; 5% gravel to 1/2"; subangular-subrounded; 10% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 245 ft, 10YR 7/3, very pale brown, 90% sand, 10% silt, trace gravel to 5/8". At 246.5 ft, trace gravel to 1/2".	
245	43.8	36.2								

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test

Not Tested | None | Interval Fluoresced

Core Recovery

No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-11-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					245-252.5		SP-SM		Same as above.	(2)
							ML		Silt: 10YR 6/2, light brownish gray; soft-medium stiff; slightly moist; nonplastic-slightly plastic; 60% silt; 20% clay; 20% fine-medium sand (60% fine, 40% medium); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
250	4.6			G, D			SM		Silty Sand: 10YR 6/2, light grayish brown; loose; slightly moist; 65% fine-coarse sand (30% fine, 50% medium, 20% coarse); trace gravel to 5/8"; subangular-subrounded; 35% silt, nonplastic; trace clay; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
		23.0			252.5-255		SW-SM		Well-Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 85% fine-coarse sand (30% fine, 55% medium, 15% coarse); 5% gravel to 3/4"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments.	
							SM		Silty Sand: 10YR 7/2, light gray; loose; slightly moist; 70% fine-medium sand (40% fine, 60% medium); subangular-subrounded; 30% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
255	639.6	20.5					ML		Silt: 10YR 6/2, light brownish gray; soft-medium stiff; slightly moist; nonplastic-slightly plastic; 60% silt; 20% clay; 20% fine-medium sand (60% fine, 40% medium); subangular-subrounded; sand is quartz, feldspar, and lithic fragments.	
							CL		Clay: 10YR 5/3, brown; stiff; slightly moist; medium	

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test
Not Tested | None | Interval Fluoresced

Core Recovery
No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

Drilling Company: **Cascade**
Drilling Method: **Sonic Coring**
Drill Bit: **Sonic Core Barrel, 6" and 8"**
Driller: **Justen Maples**
Geologist: **J. Messenger**

Boring Depth (ft): **300**
Boring Diameter (in): **8**
Well Diameter: **See Notes Section**
DTW After Completion (ft bgs): **N/A**
Riser Material: **See Notes Section**

Screen Material: **See Notes Section**
Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					255-260				plasticity; 80% clay; 20% silt.	(2)
							SW-SM		Well-Graded Sand with Silt: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine-coarse sand (30% fine, 60% medium, 10% coarse); trace gravel to 5/8"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is lithic fragments. At 257.5 ft, trace clay as nodules to 3/8".	
260	1444	24.7		G, D	260-265		SC		Clayey Sand: 7.5YR 5/3, brown; loose; slightly moist; 70% fine-medium sand (65% fine, 35% medium); subangular-subrounded; 30% clay, medium stiff, slightly plastic; sand is quartz, feldspar, and lithic fragments.	
							SW		Well-Graded Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 60% fine-coarse sand (25% fine, 60% medium, 15% coarse); 35% gravel to 2-1/2"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	
							SW-SM		Well-Graded Sand with Silt: 10YR 7/1, light gray; loose; slightly moist; 85% fine-coarse sand (20% fine, 70% medium, 10% coarse); 5% gravel to 1-1/4"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	10/20 Silica Sand, 262.7-273 ft bgs
265	866.7	24.2					SP-SM		Poorly Graded Sand with Silt: 10YR 6/3, pale brown; loose; slightly moist; 90% fine-medium sand (30% fine, 70% medium); subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	
							SW-SM		See description below.	

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test
Not Tested
None
Interval Fluoresced

Core Recovery
No Recovery
Complete
Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

EA Engineering, Science, and Technology, Inc., PBC

Project: **62735DM02**
Location: **Kirtland AFB, New Mexico**
Start Date: **11-11-2020**
Completion Date: **12-23-2020**

WELL LOG

Well ID: **KAFB-106V3**

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					265-270		SW-SM		Well-Graded Sand with Silt: 10YR 7/2, light gray; loose; slightly moist; 85% fine-coarse sand (25% fine, 60% medium, 15% coarse); 5% gravel to 3/4"; subangular-subrounded; 10% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments.	(2) 3.5" OD Schedule 80 PVC Screen, 0.010" slot, 267-272 ft bgs
270	546.6	25.1		G, D	270-275					
	796.6			G, D			CL		Clay: 7.5YR 5/2, brown; very stiff-hard; slightly moist; medium plasticity; 100% clay. Note: moderate alteration to 10YR 2/1, black and 2.5Y 6/3, light yellowish brown; minor secondary calcium carbonate present. At 276 ft, moderately mottled to 10YR 8/2, very pale brown; moderate secondary calcium carbonate present; moderate-strong reaction with acid.	3.5" OD Schedule 80 PVC Sump, 272-274 ft bgs; Hydrated Uncoated Bentonite Chips, 1/4-3/8", 273-281.1 ft bgs
275	72.8	45.8								

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test
Not Tested | None | Interval Fluoresced

Core Recovery
No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

EA Engineering, Science, and Technology, Inc., PBC	Project: **62735DM02** Location: **Kirtland AFB, New Mexico** Start Date: **11-11-2020** Completion Date: **12-23-2020**	**WELL LOG** Well ID: **KAFB-106V3** Page: **12 of 14**

Drilling Company: **Cascade** Drilling Method: **Sonic Coring** Drill Bit: **Sonic Core Barrel, 6" and 8"** Driller: **Justen Maples** Geologist: **J. Messenger**	Boring Depth (ft): **300** Boring Diameter (in): **8** Well Diameter: **See Notes Section** DTW After Completion (ft bgs): **N/A** Riser Material: **See Notes Section**	Screen Material: **See Notes Section** Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout** Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Sample Description	Completion Details (2)
					275-280		CL	Same as above.	
280	247.8	14.6		G, D	280-284		SM	Silty Sand: 10YR 6/3, pale brown; loose; slightly moist; 80% fine sand; subangular-subrounded; 20% silt, nonplastic; sand is quartz, feldspar, and lithic fragments.	10/20 Silica Sand, 281.1-285 ft bgs
							SC	Clayey Sand: 10YR 6/3, pale brown; loose; slightly moist; 75% fine sand; subangular-subrounded; 25% clay, plastic; sand is quartz, feldspar, and lithic fragments. Note: clay exists as soft nodules to 1-1/2".	
		25.3					SP	Poorly Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 95% fine-medium sand (85% fine, 15% medium); trace coarse sand; trace gravel to 3/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 284 ft, trace lithic gravel to 1".	
285	63.4				284-		SW	Well-Graded Sand with Gravel: 10YR 6/4, light yellowish brown; loose; slightly moist; 70% fine-coarse sand (30% fine, 30% medium, 40% coarse); 25% gravel to 2"; subangular-subrounded; 5% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments. At 286 ft, 85% sand (20% fine, 40% medium, 40% coarse), 10% gravel to 1", 5% silt.	Native Backfill/ Slough, 285-300 ft bgs

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test

Not Tested — None — Interval Fluoresced

Core Recovery

No Recovery — Complete — Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					290		SW		Same as above.	(2)
							SC		Clayey Sand with Gravel: 10YR 6/3, pale brown; loose; slightly moist; 50% fine-coarse sand (30% fine, 25% medium, 45% coarse); 20% gravel to 1"; subangular-subrounded; 15% silt, nonplastic; 15% clay; sand and gravel are quartz, feldspar, and lithic fragments. Note: clay exists as plastic nodule centers encompassed with silt.	
							SP-SM		Poorly Graded Sand with Silt: 10YR 7/2, light gray; loose; slightly moist; 80% fine-coarse sand (70% fine, 15% medium, 15% coarse); 10% gravel to 3/4"; subangular-subrounded; 10% silt, nonplastic; sand and gravel are quartz, feldspar, and lithic fragments.	
290	22.4	21.8		G, D	290-295		SW		Well-Graded Sand: 10YR 6/2, light brownish gray; loose; slightly moist; 90% fine-coarse sand (30% fine, 60% medium, 10% coarse); 5% gravel to 1-1/4"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. At 291.75 ft, 55% sand, 40% gravel to 2-1/8", 5% silt. At 292.5 ft, 85% sand, 10% gravel to 1", 5% silt.	
295	79.6	23.2								
							GW		Well-Graded Gravel with Sand: 10YR 6/3, pale brown; loose; slightly moist; 65% gravel to 2-7/8"; 30% fine-coarse sand (30% fine, 45% medium, 25%	

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test

Not Tested | None | Interval Fluoresced

Core Recovery

No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

Project: **62735DM02**	**WELL LOG**
Location: **Kirtland AFB, New Mexico**	Well ID: **KAFB-106V3**
Start Date: **11-11-2020**	Page: **14 of 14**
Completion Date: **12-23-2020**	

EA Engineering, Science, and Technology, Inc., PBC

Drilling Company: **Cascade**	Boring Depth (ft): **300**	Screen Material: **See Notes Section**
Drilling Method: **Sonic Coring**	Boring Diameter (in): **8**	
Drill Bit: **Sonic Core Barrel, 6" and 8"**	Well Diameter: **See Notes Section**	Seal Material(s): **Cement; Bentonite; High Solids Bentonite Grout**
Driller: **Justen Maples**	DTW After Completion (ft bgs): **N/A**	
Geologist: **J. Messenger**	Riser Material: **See Notes Section**	Filter Pack: **10/20 Silica Sand**

Depth (ft)	PID (ppmv)	Temp (oC)	Field UV	Samples Collected	Core Run (ft)	Recovery	USCS	Lithology	Sample Description	Completion Details
					295-300				coarse); subangular-subrounded; 5% silt, nonplastic; trace clay; gravel is quartz and lithic fragments; sand is quartz, feldspar, and lithic fragments.	(2)
300	22.3			G, D			SW		Well-Graded Sand with Gravel: 10YR 6/2, light brownish gray; loose; slightly moist; 55% fine-coarse sand (30% fine, 60% medium, 10% coarse); 40% gravel to 2-1/8"; subangular-subrounded; 5% silt, nonplastic; sand is quartz, feldspar, and lithic fragments; gravel is quartz and lithic fragments. Total Depth = 300 ft bgs reached on 11-12-2020	

Notes:

(2) KAFB-106V3-272: see completion details
UV = ultraviolet fluorescence
NA = Not Applicable
bgs = below ground surface
ft = foot(feet)
ppmv = parts per million by volume
USCS = Unified Soil Classification System

UV Fluorescence Field Test

Not Tested | None | Interval Fluoresced

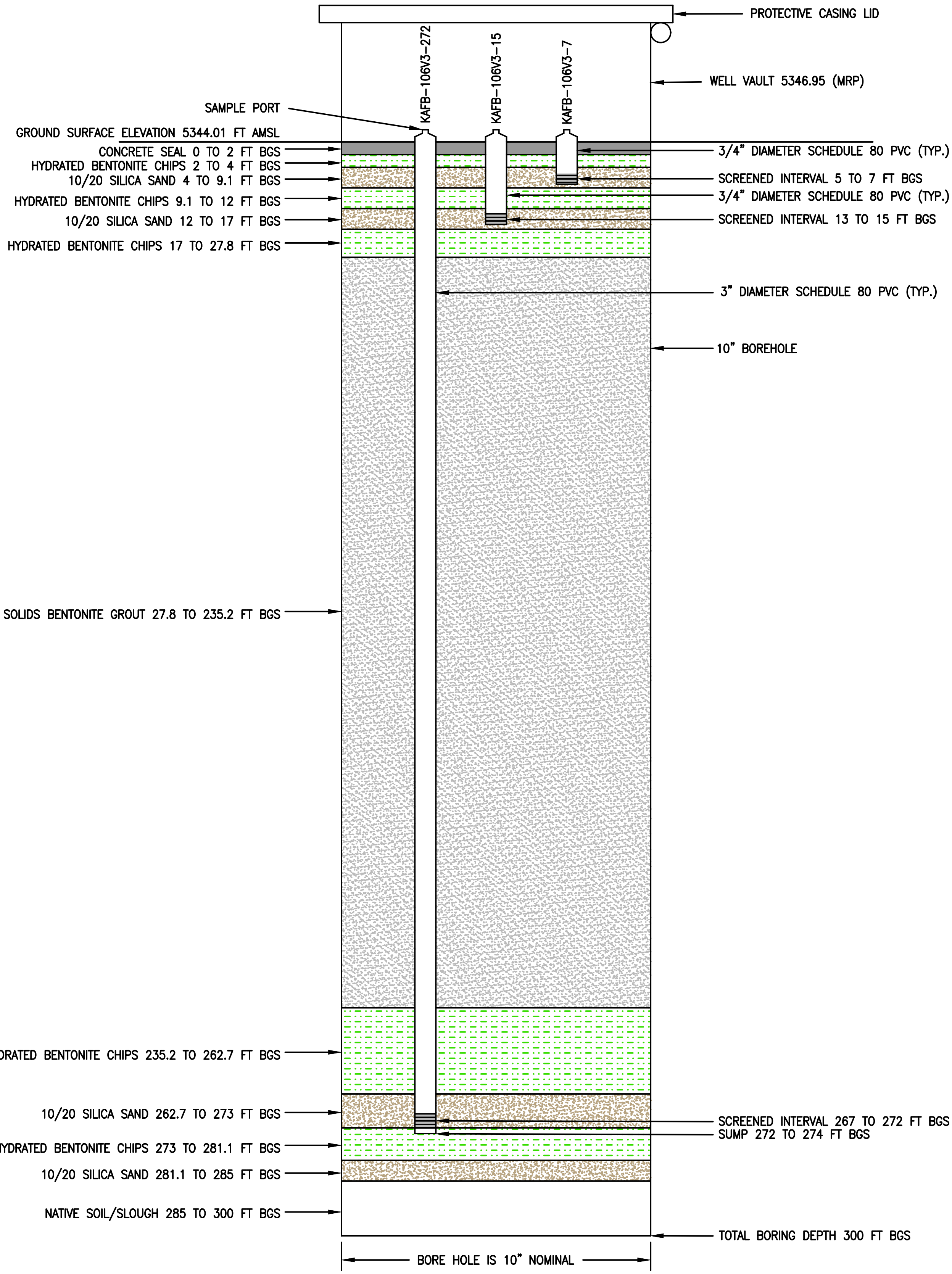
Core Recovery

No Recovery | Complete | Disturbed Core

Samples: D = diesel-range organics; G = gasoline-range organics
UV = ultraviolet

NESTED MONITORING WELL CONSTRUCTION

KAFB-106V3



FT BGS = FEET BELOW GROUND SURFACE
FT AMSL = FEET ABOVE MEAN SEA LEVEL
PVC = POLYVINYL CHLORIDE
SCH = SCHEDULE

NOT TO SCALE

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KIRTLAND AIR FORCE BASE		INSTALLATION START DATE/TIME: 11-06-2020/1420	INSTALLATION END DATE/TIME: 12-23-2020/1045
PROJECT NO.: 62735DM02.1016	WELL ID: KAFB-106V3	GEOLOGIST: J. MESSENGER	DRILLER: F. CHATTIN

CAD FILE: C:\Users\ecarpio\Desktop\KAFB_DATA_GAP_WC_2021\Well Completion Diagram – KAFB-106V3.dwg PLOT DATE/TIME: 5/20/2021 – 5:46am

APPENDIX E

CORE TEMPERATURE LOGS

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company: Cascade	Start Time/Date: 0930 11-11-2020
Lead Driller: JM ~~Forrest Chatlin~~	Completion Time/Date:
Drilling Method: SONIC	Final Depth:
Boring/Well ID: KAFB-106S10	Logged By: JM + DS Page 1 of ____

(KAFB-106V3)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	* Temperature Mitigation/Dominant Lithology/Comments
230	~~235~~ * 232.5	230-235	5'	16.5	-27°C deployment temp.
232.5	235	230-235	5'	16.5	
235 ~~23~~ *	237.5	235-240	5'	22.4°	-25°C deployment temp.
237.5	240				
240	242.5	240-245	5'	29.7	-5°C deployment temp.
242.5	245				
245	247.5	245-252.5	7.5'	36.2	-35.0°C deployment temp. — attempted a 10' run, was able to get 7.25' — temp slightly high — will scale back to 5 ft runs
247.5	250				
250	252.5				
252.5	255	252.5-255	2.5	23	-20°C deployment temp.
255	257.5	255-260	5'	20.5	-20°C deployment temp
257.5	260		5'		
260	262.5	260-265	5'	24.7	-20°C deployment temp
~~26~~ * 262.5	265				
265	267.5	265-270	5'	24.2	-20°C deployment temp.

* Temperatures measured before deployment with samplers cooled using dry ice.

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: (KAFB-106V3)	Logged By: Page 2 of ____

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
267.5	270	265-270	5'	24.2	-20°C deployment temp.
270	272.5	270-275	5'	25.1	-35°C deployment temp
272.5	275				
275	277.5	275-280	5'	45.8	-34°C deployment temp.
277.5	280				
280	282	280-284	4'	14.6	-33°C deployment Temp
282	284				
284	286	284-290	6'	25.3	-29°C deployment Temp.
286	288				
288	290				
290	292.5	290-295	5'	21.8	-35°C deployment Temp
292.5	295				
295	297.5	295-300	5'	23.2	-20°C deployment Temp
297.5	300				

11-11-2020

11-12-2020

* deployment temps taken w/ FLUKE 59 MAX + IR thermometer

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company: Cascade	Start Time/Date:
Lead Driller: Justen Maples	Completion Time/Date:
Drilling Method: SONIC 4" core barrel	Final Depth: 517 ft bgs
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page ~~1~~ ~~5~~ of ___ 1 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
230	232.5	230-235	5'	16.7	-33°C deployment temp
232.5	235				
235-	237.5	235-240	5'	14.1	-29°C deployment temp
237.5	240				
240	242.5	240-245	5'	24.8	-28°C deployment temp
242.5	245				
245	247.5	245-250	5'	22.7	-25°C deployment temp
247.5	250				~~-24°C deployment temp.~~ X
250	252.5	250-255'	5'	18.1	-24°C deployment temp
252.5	255				
255	257.5	255-260	5'	15.9	-25°C deployment temp
257.5	260				
260	262	260-264	4'	21.2	-33°C deployment temp.
262	264				
264	266	264-270	6'	21.4	-29°C deployment temp

1630 11-21-2020

11-22-2020

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page 2 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments	
266	268	264-270	6'	21.4	-29°C deployment temp.	11-22-2020
268	270					
270	272	270-274	4'	19.8	-35°C deployment temp.	
272	274					
274	276	274-280	6'	23.0	-26°C deployment Temp	
276	278					
278	280					
280	282.5	280-285	5'	9.2	-25°C deployment temp	11-24-2020
282.5	285					
285	287.5	285-290	5'	22.6	-24°C deployment temp	
287.5	290					
290	291	290-291	1'	65.2	-21°C deployment temp	
291	293	291-295	4'	21.8	-20°C deployment temp	
293	295					
295	297.5	295-300	5'	24.3	-20°C deployment temp	

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: Page ~~1~~ 3 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
297.5	300	295-300	5'		deployment temp -20°C
300	302.5	300-305	5'	16.3	-26°C deployment temp
302.5	305				
305	307.5	305-310	5'	13.8	-28°C deployment temp
307.5	310				
310	312.5	310-315	5'	13.9	-30°C deployment temp
312.5	315				
315	317	315-319	4'	21.5	-31°C deployment temp.
317	319				
319	321	319-325	6'	19.4	-34°C deployment temp
321	323				
323	325				
325	327.5	325-330	5'	24.6	-34°C deployment temp
327.5	330				
330	332.5	330-335	5'	30.1	-33°C deployment temp

11-24-2020

11-25-2020

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page ~~1~~ 4 of 8

(KAFB-106S10)

Date	Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
11-25-2020	332.5	335	330-335	5'	30.1	
	335	337.5	335-340	5'	14.5	-27°C deployment temp.
	337.5	340				
	340	342.5	340-345	5'	19.5	-25°C deployment temp
	342.5	345				
	345	347.5	345-350	5'	12.4	-22°C deployment temp
	347.5	350				
12-1-2020	350	352.5	350-355	5'	~~12.7~~ 8.2	JM -27°C deployment temp 12-1-2020
	352.5	355				
	355	357.5	355-360	5'	17.3	-30°C deployment temp
	357.5	360				
	360	362.5	360-365	5'	13.5	-18°C deployment temp
	362.5	365				
	365	367.5	365-370	5'	17.0	-20°C deployment temp
	367.5	370				

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page ~~1~~ of ___ 5 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
370	372.5	370-375	5'	14.4	-26°C deployment Temp 12-1-2020
372.5	375	↓	↓	↓	
375	377.5	375-380	5'	8.8	-34°C deployment temp
377.5	380	↓	↓	↓	
380	382.5	380-385	5'	20.3	-33°C deployment temp.
382.5	385	↓	↓	↓	
* 390	392.5	390-395	5'	47.7	-35°C deployment temp 12-2-2020
392.5	395	↓	↓	↓	
12-12-2020 400	402	400-404	4'	4.9	~~-23°C~~ -31°C deployment temp. 12-12-2020
402	404	↓	↓	↓	
404	405	404-407.5	3.5'	21.8	-34°C deployment temp
405	407.5	↓	↓	↓	
407.5	410	407.5-414	6.5'	14.2	-28°C deployment Temp
410	412	↓	↓	↓	
412	414	↓	↓	↓	

* 385-390' no recovery; sample lost

* 395-400' no recovery

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page ~~1~~ 6 JM of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
414	416	414'-420	6'	19.1	-30°C deployment temp
416	418	↓	↓	↓	
418	420	↓	↓	↓	
420	422.5	420-425	5'	11.1	-26°C deployment temp
422.5	425	↓	↓	↓	-25°C deployment temp
425	427.5	425-430	5'	16.2	-26°C deployment temp
427.5	430	↓	↓	↓	
430	432.5	430'-435	5'	14.7	-30°C deployment temp
432.5	435	↓	↓	↓	
435	437.5	435-440	5	23.1	-25°C deployment temp
437.5	440	↓	↓	↓	
440	442.5	440-445	5'	18.0	-35°C deployment temp
442.5	445	↓	↓	↓	
445	447.5	445'-450	5'	20.7	-23°C deployment temp
447.5	450	↓	↓	↓	

12-13-2020   12-13-2020

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page 7 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
450	452.5	450-455	5'	21.7	-35°C deployment temp
452.5	455				
455	456	455-458	3'	22.0	-24°C deployment temp
456	458				
458	460	458-465	458'-465	19.8	-26°C deployment temp
460	462.5				
462.5	465				
465	467.5	465-470	5'	15.9	-22°C deployment temp
467.5	470				
470	472.5	470-480	10'	17.0	-35°C deployment temp
472.5	475				
475	477.5				
477.5	480				
480	482.5	480-490	10'	19.6	-34°C deployment temp
482.5	485				

12-14

12-14-2020

CORE TEMPERATURE LOG

Project: **Kirtland BFF**	Project Number: **62735DM02**
Drilling Company:	Start Time/Date:
Lead Driller:	Completion Time/Date:
Drilling Method:	Final Depth:
Boring/Well ID: KAFB-106S10A	Logged By: JM + DS Page 8 of 8

(KAFB-106S10)

Interval top (ft bgs)	Interval bottom (ft bgs)	Core run (ft bgs)	Core recovery (ft/ft)	Temperature (°C)	Temperature Mitigation/Dominant Lithology/Comments
485	487.5	480'-490	10'	19.6	
487.5	490				
490	492.5	490'-500	10'	19.3	~19°C deployment temp
492.5	495				
495	497.5				
497.5	500				
500	502.5	500'-510	10'	18.3	~24°C deployment temp
502.5	505				
505	507.5				
507.5	510				
510	512.5	510-517	7'	28.0	~27°C deployment temp
512.5	515				
515	517				
					TD = 517 ft bgs