APPENDIX A

Summary of SVE System Operation, Maintenance, Repair, and Hydrocarbon Recovery Calculations
January – March 2011

A-1. SVE and Treatment System Maintenance Repair and Downtime Summary

A-2. SVE and Treatment System Hydrocarbon Recovery Calculations

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS AND ABBREVIATIONS

C	vapor concentration
CO	carbon monoxide
CO_2	carbon dioxide
K	Kelvin
KAFB	Kirtland Air Force Base
kg	kilogram
kg/m^3	kilograms per cubic meter
m^3/hr	cubic meters per hour
O_2	oxygen
ppmv	parts per million by volume
SVE	soil-vapor extraction

THIS PAGE INTENTIONALLY LEFT BLANK

A-1. SVE and Treatment System Maintenance Repair and Downtime Summary

The primary maintenance interval for the soil-vapor extraction (SVE) and treatment systems is every 360 hours (approximately 2 weeks), as recommended by the system manufacturer. Routine biweekly maintenance includes checking and changing the oil, filters, spark plugs and spark plug wires; checking the coolant level and adding coolant as needed; cleaning the air filter; and checking all belts, hose connections, battery connections and emergency contact switches. Monthly maintenance includes all bi-weekly maintenance, and includes replacing distributer caps, rotors, polyvinyl chloride valves and cleaning the radiators. All bi-weekly and monthly maintenance requires each unit being serviced, to be shut down for approximately 4 hours.

During the reporting period, biweekly maintenance was performed on the SVE and treatment systems on the following dates:

- January 10, 2011
- January 11, 2011
- January 24, 2011
- January 25, 2011
- February 7, 2011
- February 8, 2011
- February 21, 2011
- February 22, 2011
- March 8, 2011
- March 9, 2011
- March 21, 2011
- March 22, 2011

During the reporting period, monthly maintenance was performed on the SVE and treatment systems on the following dates:

- January 24, 2011
- January 25, 2011
- February 21, 2011

- February 22, 2011
- March 21, 2011
- March 22, 2011

During this reporting period, in addition to the standard biweekly and monthly planned maintenance activities, the following maintenance or repairs were performed for the various SVE and treatment systems that are operating at the Bulk Fuels Facility.

For the ST-106, Former Fuel Offloading Rack SVE and treatment system associated with the Stage 2 abatement action the following maintenance and repair activities were conducted during the first quarter of 2011:

- January 11, 2011 – Changed E1 carburetor.

For the KAFB-1065 SVE and treatment system operating as an interim remedial action for SS-111, the following maintenance and repair activities were conducted during the first quarter of 2011:

- January 23, 2011 – Changed E2 crankshaft pulley.
- February 22, 2011 – Changed E2 carburetor.
- February 28, 2011 – Changed E1 carburetor.

For the KAFB-1066 SVE and treatment system operating as an interim remedial action for SS-111, the following maintenance and repair activities were conducted during the first quarter of 2011:

- January 22, 2011 – Changed E2 catalytic converter.
- February 19, 2011 – Changed E2 starter and starter solenoids.
- March 30, 2011 – Changed E1 catalytic converter.

For the KAFB-1068 SVE and treatment system operating as an interim remedial action for SS-111, the following maintenance and repair activities were conducted during the first quarter of 2011:

- February 19, 2011 – Changed E2 starter and starter solenoids.
- February 26, 2011 – Changed E2 catalytic converter.
- March 27, 2011 – Changed E2 catalytic converter.
- March 24, 2011 – Changed E2 water pump.
- March 25-27, 2011 – KAFB-1068 down for E2 engine change out (approximately 72 hours).

THIS PAGE INTENTIONALLY LEFT BLANK

A-2. SVE and Treatment System Hydrocarbon Recovery Calculations

As part of the ongoing Stage 2 abatement action for ST-106 and the interim remedial actions for SS-111, vapor samples from the SVE and treatment systems' inlets and exhausts are regularly analyzed on site using a Horiba Mexa 554J emissions analyzer for petroleum hydrocarbon concentration in parts per million by volume (ppmv) and for percent oxygen (O_2), carbon monoxide (CO), and carbon dioxide (CO_2). The hydrocarbon concentrations from the SVE system influent as measured in the field with the Horiba instrument are used in the hydrocarbon recovery calculations. The paragraphs below describe the basic equations and constants that are used, along with the Horiba field measurements, to calculate total hydrocarbon recovery volumes.

For the SVE and treatment system associated with the Stage 2 abatement action at ST-106, the Horiba-measured influent hydrocarbon vapor concentration is used along with the molecular weight of the influent vapor stream, the gas constant, and the standard temperature to calculate the vapor concentration (C) in kilogram per cubic meter (kg/m^3). Vapor stream concentrations are measured by the Horiba instrument in parts per million by volume (ppmv), which can be converted into kg/m^3 for use in the following equation:

$$C = \frac{(conc)(MW)}{\mathrm{RT}}$$

Where:

Conc = vapor concentration (Horiba ppmv reading x 10^{-6})
MW = molecular weight of the vapor (98)
R = gas constant (0.0821) (L·atm/mol·K)
T = temperature (Kelvin [K]) (290)

The measured well gas inlet flow rate (cubic meters per hour [m^3/hr]) and hours of operation are then used to calculate recovered mass. Mass removal is estimated using the following conversion:

$$M = CQT$$

Where:

M	=	cumulative mass removed (kilogram [kg])
C	=	vapor concentration (kg/m^3)
Q	=	extraction flow rate (m^3/hr)
T	=	operational period (hour)

The recovered mass is then converted to equivalent gallons. The hydrocarbon recovery is calculated for each engine, and cumulatively summed over the operational period. As an example, the mass (kg) of recovered hydrocarbons for engine E1 during a given period can be calculated using the measured influent vapor concentration from a measurement date in that period (such as 32,400 ppmv), the well-gas inlet flow rate (such as 74.8 m3/hr), the engine E1 operational hours during the period (539.9 hours), and the constants defined above as follows:

$$C = \frac{(32{,}400 \times 10^{-6}) \times 980.0821 \times 290}{} = 0.075 \text{ kg/m}^3$$

$$M = (0.075)\ (74.9)\ (539.9) = 3{,}058 \text{ kg}$$

The gallons of equivalent hydrocarbon recovery are calculated using a mass to volume conversion of 6 pounds per gallon of hydrocarbon product and a conversion factor of 1 kg equals 2.205 pounds:

$$\text{Volume (gallons)} = (3{,}058 \text{ kg}) \times \frac{(2.205 \text{ pounds})}{1 \text{ kg}} \times \frac{1 \text{ gallon}}{6 \text{ pounds}} = 1{,}124 \text{ gallons}$$

The SVE and treatment systems at wells KAFB-1065, KAFB-1066, and KAFB-1068 have on-board telemetry that allows remote downloads of the SVE system data. The data that can be downloaded include the systems' running calculation of hydrocarbon recovery volumes that are made using the same basic equations outlined above.

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX B

Data Quality Evaluation Report and Analytical Data
January – March 2011

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS AND ABBREVIATIONS

%	percent
%D	percent difference
BFF	Bulk Fuels Facility
CCV	continuing calibration verification
CN	cyanide
DoD	U.S. Department of Defense
EDB	1,2-dibromoethane/ethylene dibromide
EPA	U.S. Environmental Protection Agency
Hg	mercury
ICP	inductively coupled plasma
ICS	interference check sample
ICV	initial calibration verification
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
OSRTI	Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
PAH	polycyclic aromatic hydrocarbon
ppb	parts per billion
ppm	parts per million
QAPjP	BFF Spill site-specific quality assurance/quality control plan
QC	quality control
QSM	Quality Systems Manual
quarterly report	*Quarterly Pre-Remedy Monitoring and Site Investigation Report for January – March 2011, Bulk Fuels Facility, Solid Waste Management Units ST-106 and SS-111*
RPD	relative percent difference
RRF	relative response factor
SDG	sample delivery groups
SM	Standard Method
SVOC	semivolatile organic compound

ACRONYMS AND ABBREVIATIONS (concluded)

TPH	total petroleum hydrocarbon
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

DATA QUALITY EVALUATION REPORTS & ANALYTICAL DATA, JANUARY – MARCH 2011

1.1 Laboratory Data Quality Summary

This laboratory data quality summary describes the findings of the review of data from the first-quarter 2011 groundwater monitoring event and is provided to document the quality of the analytical data used in the *Quarterly Pre-Remedy Monitoring and Site Investigation Report for January – March 2011, Bulk Fuels Facility, Solid Waste Management Units ST-106 and SS-111* (quarterly report). Sampling procedures and overall quality control (QC) and quality assurance protocols for the first-quarter 2011 groundwater monitoring event are presented in the draft *Quality Assurance Project Plan (QAPjP), Bulk Fuels Facility Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico* (U.S. Army Corps of Engineers [USACE], 2011).

Thirty-eight groundwater samples, two field duplicates, two equipment rinse blanks, two ambient blanks, and twenty trip blanks were collected during the period from January 25 through March 9, 2011, and sent to Empirical Laboratories LLC, Nashville, Tennessee for analyses. The laboratory holds a current U.S. Department of Defense (DoD) Environmental Laboratory Accreditation Program certification to perform the listed analyses.

Groundwater samples were analyzed for the following list of parameters:

- Volatile organic compounds (VOCs) - SW8260B;
- 1,2-dibromoethane (EDB) - SW8011;
- Semivolatile organic compounds (SVOCs) – SW8270C (new wells only);
- Polynuclear aromatic hydrocarbons (PAHs) – SW8270C low-level (VA-2 well only);
- Total petroleum hydrocarbons (TPH) as gasoline (C6-C10) - SW8015B;
- TPH as diesel (C10-C28) - SW8015B;
- Total and dissolved metals - SW6010B;
- Anions – U.S. Environmental Protection Agency (EPA) 300.0;
- Ammonia as nitrogen - Standard Method (SM) 4500 NH3BG;
- Sulfide - SM 4500 S2CF; and
- Carbonate and bicarbonate alkalinity - SM2320B.

All analytical results obtained from the first-quarter 2011 groundwater monitoring vent were submitted in sample deliverable groups Kirtland-001 through Kirtland-006. An EPA Level III data review was performed on analytical results for the six sample delivery groups (SDGs). The review was performed in accordance with the guidelines and control criteria specified in the following documents:

- The site-specific Bulk Fuels Facility (BFF) Spill QAPjP (USACE, 2011);
- *DoD Quality Systems Manual for Environmental Laboratories, Version 4.2* (DoD, 2010);
- *USEPA Contract Laboratory Program, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (2006) (SW-846, 2006 and updates);
- American Public Health Association et al., *Standard Methods for the Examination of Water and Wastewater (21st Edition)* (2005);
- USACE 200-1-10, *Environmental Quality – Guidance for Evaluating Performance-Based Chemical Data* (2005);
- *USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review* (June 2008); and
- EPA Contract Laboratory Program, *National Functional Guidelines for Inorganic Superfund Data Review*, Final (January 2010).

The following QC elements were included in the EPA Level III data review:

- Sample preservation and sample extraction and analysis holding times;
- Laboratory method blanks;
- Initial and continuing calibration blanks (metals, anions, and ammonia analysis only);
- Surrogate recoveries (organic analyses);
- Laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) recoveries;
- Matrix spike (MS)/matrix spike duplicate (MSD) recoveries;
- Relative percent differences (RPDs);
- Initial calibration and verifications;
- Continuing calibration verifications;
- Inductively coupled plasma (ICP) interference check samples (metal analysis only);
- ICP serial dilution (metal analysis only);
- Sample confirmation (EDB analysis only);
- Field blanks; and
- Field duplicates.

Analytical data were reviewed in terms of precision, bias, representativeness, comparability, and completeness as follows:

- *Bias* is demonstrated by recovery of target analytes from fortified blank and sample matrices, LCS/LCSD, and MS/MSD, respectively. For organic methods, bias is also demonstrated through recovery of surrogates from each field and QC sample. The recovery of target analytes from fortified samples is compared to the acceptance criteria defined in the QAPjP and DoD Quality Systems Manual (QSM) (DoD, 2010). When the acceptance criteria are not available in the DoD QSM, results are compared to the laboratory in-house control limits. When these criteria are not met, the data are flagged accordingly.
- *Precision* is expressed as the RPD between the results of replicate sample analyses: sample duplicates, LCSDs, and MSDs. When analyte RPDs exceed the acceptance criteria, the data are flagged accordingly.
- *Representativeness* of the samples submitted for analysis is ensured by adherence to standard sampling techniques and protocols.
- *Comparability* of sample results is ensured through the use of approved sampling and analysis methods.
- *Completeness* is expressed as a ratio of the number of usable data to total of analytical data results.

The following presents EPA Level III data review findings. The discussion summarizes data quality exceedances and their potential impact on the data quality and usability of analytical results. Table 1 (at the end of this report) presents definitions of data qualification and reason codes applied to the analytical results.

1.2 Sample Preservation, Sample Extraction and Analysis Holding Times (Reason Code H)

The sample coolers and samples received within were received intact at the laboratory and were within the required 0-6 degrees Celsius, and in compliance with EPA and Standard Method preservation requirements.

Sample holding times were evaluated by comparing the sample collection dates to the sample extraction dates and analysis dates. Extraction and analysis holding times were reviewed for all samples to

determine the validity of the sample results. Holding time exceedances were noted in SW8270C and SW8011 Methods and EPA Method 300.0 and listed below:

Analytical Method	Holding Time Outliers	Holding Time Requirement	Qualifier
SW8270C	14 days for extraction	7 days for extraction	UJ for all non-detected SVOCs in GW0034
SW8270C, Low Level	8 days for extraction	7 days for extraction	UJ for all non-detected PAHs in GW0037
SW8270C, Low Level	8 days for extraction	7 days for extraction	UJ for all non-detected PAHs in GW0036
EPA 300.0, Nitrate	53 hours for analysis	48 hours	UJ for non-detected nitrate in GW0038
EPA 300.0, Nitrate	52 hours for analysis	48 hours	UJ for non-detected nitrate in GW0037
EPA 300.0, Nitrate	52 hours for analysis	48 hours	UJ for non-detected nitrate in GW0036
EPA 300.0, Nitrate	4 days for analysis	48 hours	J- for detected nitrate in GW0033
SW8011	17 days for analysis	14 days	UJ for non-detected EDB in GW0016
SW8011	16 days for analysis	14 days	J- for detected EDB in GW0018

A request for SVOC analysis for one sample (GW0034) and PAH analysis for two samples (GW0036 and GW0037) was made after the 7-day extraction holding time had expired. The affected samples were extracted as soon as the request was received and were analyzed within the 40-day analysis holding time. SVOCs and PAHs were not detected in the mentioned samples, and their limits of quantitation (LOQs) were qualified as estimated (UJ) as a result of the extraction holding time violations. During the first-quarter 2011 groundwater monitoring event, SVOCs, including PAHs, were analyzed in order to determine TPH fuel related contamination in groundwater. A review of VOCs and TPH gasoline and diesel in the same three samples indicated that TPH gasoline in sample GW0034 was detected slightly above the detection limit and therefore the detected level is considered estimated. TPH-related VOCs and TPH diesel were not detected in sample GW0034, and further TPH-related VOCs, and TPH gasoline and diesel were not present in samples GW0036 and GW0037. Based on the analytical results of the VOC and TPH analyses, it appears that the non-detected SVOCs and PAHs results in the three samples were consistent with the associated VOCs and TPH data, and that significant low biased SVOCs and PAH results were not reported as a result of additional sample storage.

Sample GW0033 for nitrate analysis was collected on February 4, 2011 and shipped to the laboratory on the same day. However, due to weather issues on the East Coast, samples were received by the laboratory on February 8, 2011, which was after the required 48-hour analysis holding time had expired for nitrate analysis. The sample was analyzed for nitrate on the same day that the sample was received. Although the analysis holding time was exceeded by two times the requirement, the analyte was still detected and was qualified as estimated (J-) with a potential low bias.

Nitrate in three additional samples was also analyzed outside the holding time requirement. Three samples (GW0036, 0037 and 0038) were collected and shipped to the laboratory on the same day, and were received by the laboratory on the following day. As a result of laboratory oversight, the 48- hour analysis holding time for nitrate in these samples was missed by 4 to 5 hours. Nitrate was not detected in the samples, and the LOQ was qualified as estimated (UJ). Since the degree of holding time exceedance was minor, the data usability of the sample results is not affected.

Due to an instrument malfunction, two EDB samples were analyzed 2 to 3 days outside the 14-day analysis holding time requirement. Due to the analysis holding time outliers, the detected result and non-detected LOQ for the analyte were qualified as estimated (J-) and (UJ), respectively. During the first-quarter 2011 groundwater monitoring event, the same samples were also analyzed for VOCs by SW8260B Method within the holding time requirement. The EDB results from the two methods were compared and found to be comparable.

1.3 Laboratory Method Blanks (Reason Code B1)

The field sample results were evaluated with respect to the laboratory method blank prepared and analyzed for each analytical batch and for each analytical method. Positive results in the laboratory method blanks for SW8260B and SW8270C Methods were observed and are summarized below:

Analytical Method	Laboratory QC Batch #	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	IB09001	Hexachlorobutadiene	0.471	1.0	U for the analyte in GW8004-TB
SW8260B	IB15004	Hexachlorobutadiene	0.754	1.0	U for the analyte in GW0026
SW8260B	IB17009	Acetone	3.62	10	U for the analyte in GW0020
SW8260B	IB24021	Hexachlorobutadiene	0.317	1.0	U for the analyte in GW8018-TB
SW8270C	IB18006	1-Methylnaphthalene	0.0749	0.187	U for the analyte in GW0039-R
SW8270C	IB18006	2-Methylnaphthalene	0.259	0.187	U for the analyte in GW0039-R
SW8270C	IB18006	Naphthalene	0.184	0.187	U for the analyte in GW0039-R

Based on the DoD QSM requirements, laboratory method blank levels are considered acceptable when contaminant levels in the blank are less than one-half the LOQ for target analytes and less than the LOQ for common laboratory contaminants, such as acetone and methylene chloride. Except for batch IB15004 for hexachlorobutadiene and batch IB18006 for 2-methylnaphthalene and naphthalene, the listed laboratory method blank levels met the blank acceptance criteria. As a result of the blank detections, the detected results for hexachlorobutadiene, 1-methylnaphthalene, 2-methylnaphthalene, and naphthalene in the associated samples were qualified as non-detected (U) at their respective LOQs as the detected concentrations in the samples were less than or equal to five times their corresponding level detected in the blank. The detected result for acetone was also qualified as non-detected (U) at the LOQ when the detected sample result was less than ten times the blank level. The blank qualification has no impact on the data usability.

In addition to the above, hexachlorobutadiene was reported at trace levels below the LOQ in 11 other laboratory method blanks. Because the analyte was not detected in any samples processed with those laboratory method blanks, the sample results were not affected by the blank detections. Chloride was also reported at a level below the LOQ in one laboratory method blank. The detected chloride results in all associated samples exceeded five times the blank level, and thus the results were not affected by the blank

detection. No data qualification was applied to the sample results because of the hexachlorobutadiene and chloride detections. All laboratory method blanks were free of EDB, TPH gasoline and diesel, metals, sulfide, and alkalinity.

1.4 Initial and Continuing Calibration Blanks (Reason Code B2)

In addition to the laboratory method blank for metals, anions, and ammonia analyses, initial and continuing calibration blank results were reviewed to ensure that the instrument was free of contamination prior to the analyses. Positive results in calibration blanks were observed for EPA Method 300.0 and SW6010B Method and are shown below:

Analytical Method	Laboratory QC Batch #	Contaminant	Contaminant Level (ppm)	LOQ (ppm)	Qualifier
EPA 300.0	IB04712-CCB3	Chloride	0.578	1.0	None
EPA 300.0	IB03813-CCB1	Chloride	0.354	1.0	None
EPA 300.0	IB03813-CCB3	Chloride	0.366	1.0	None
EPA 300.0	IB04809-CCB2	Chloride	0.207	1.0	None
SW6010B	IB03704-CCB1	Iron	39.8	LOD: 60	None

Except for batch (IB04712-CCB3) for chloride, the chloride detections in all other calibration blanks were below one-half the LOQ, and the iron detection in one calibration blank was less than the limit of detection (LOD), and thus met the calibration blank acceptance criteria. All listed calibration blank detections did not affect the quality of the sample results as the detected chloride results in the associated samples were greater than five times the level reported in the continuing calibration blank, and iron was not detected in any associated samples. No data qualification was warranted because of the calibration blank detections. All initial and continuing calibration blanks were free of ammonia as nitrogen.

1.5 Surrogate Recoveries (Reason Code S)

Surrogate standards are organic compounds added to field and laboratory QC samples for organic analysis to evaluate matrix effect and method performance on an individual sample basis. Biased surrogate recoveries were noted for SW8260B and SW8015B Methods as summarized below:

Analytical Method	Sample	Surrogate Recovery Outlier (%)	Control Limit (%)	Qualifier
SW8260B	GW0038	Dibromofluoromethane: 116%	85-115%	None
SW8015B TPH Diesel (C10-C28)	GW005	o-Terphenyl: diluted out	30-140%	None
SW8015B TPH Diesel (C10-C28)	GW006	o-Terphenyl: diluted out	30-140%	None

In sample GW0038, the surrogate dibromofluoromethane was recovered slightly above the upper control limit, however the recoveries of the remaining surrogates bromofluorobenzene, 1,2-dichloroethane-d4, and toluene-d8 in the same sample were within the control range. Since no VOCs were detected in the sample, the high biased surrogate recovery of dibromofluoromethane did not affect the sample results. In samples GW005 and GW006 for TPH diesel analysis, elevated TPH diesel concentrations were observed and exceeded the instrument upper calibration range. In order to bring the sample results within the range, samples GW005 and GW006 were diluted at 100 and 200 dilution factors, respectively, and consequently, the surrogate o-terphenyl was diluted out. Data qualification was not applied to the TPH diesel results because of the dilutions.

Except where noted, surrogate recoveries in other samples analyzed for VOCs, SVOCs, TPH gasoline, and TPH diesel met the acceptance criteria. No surrogates were spiked into any samples analyzed for EDB before purging. The bias of the EDB analysis was assessed through LCS/LCSD and MS/MSD analyses.

1.6 Laboratory Control Sample/Laboratory Control Sample Duplicate Recoveries (Reason Code L)

The LCS is an aliquot of analyte-free matrix spiked with target analytes and is prepared with each analytical batch for each analytical method. The recovery of target analytes from the LCS analysis is a measurement of method performance in an interference-free sample matrix. LCS recovery biases were reported for SW8260B and SW8270C Methods as presented below:

Analytical Method	Laboratory QC Batch #	LCS Recovery Outliers (%)	Control Limit (%)	Qualifier
SW8260B	IB09001	2,2-Dichloropropane: 68%	70-135%	UJ for non-detected analyte in GW0034, GW8004-TB
SW8260B	IB14003	2,2-Dichloropropane: 84/65.5%	70-135%	UJ for non-detected analyte in GW0025, GW0027, GW8001-AB, GW8001-RB, GW8001-TB
SW8260B	IC12006	Isopropylbenzene: 127%	75-125%	J+ for detected analyte in GW0018
SW8270C	IB11003	Caprolactam: 18/17%	20-110%	UJ for non-detected analyte in GW0033 and GW0034
SW8270C	IB11003	Hexachlorobudatiene: 19/28%	25-105%	UJ for non-detected analyte in GW0033 and GW0034
SW8270C	IB11003	Hexachloroethane: 17/21%	30-100%	UJ for non-detected analyte in GW0033 and GW0034

Due to the low LCS/LCSD recovery biases, the LOQs for the non-detected results 2,2-dichloropropane, caprolactam, hexachlorobutadiene, and hexachloroethane were qualified as estimated (UJ). As a result of the high LCS/LCSD recovery bias, the detected result for isopropylbenzene was qualified as estimated (J+). This data qualification was applied to all samples in the non-compliant batches. As shown above, the reported LCS recovery biases did not significantly deviate from their respective lower or upper control limit, and therefore the data usability is not affected. As discussed above, surrogate recoveries in the qualified samples met the accuracy (bias) requirements and demonstrated acceptable laboratory method performance on a sample basis.

In addition to the above, high LCS recovery biases were noted for other VOCs and SVOCs in several batches. The non-compliant analytes included bromodichloromethane, dichlorodifluoromethane,

1,1,1,2-tetrachloroethane, 1,2-dichloroethane, bromomethane, and bromoform analyzed by SW8260B Method, and butylbenzylphthalate and 4-nitroaniline analyzed by SW8270C Method. Because these analytes were not detected in any samples, the sample results were not affected by the high LCS recovery biases and no data qualification was warranted.

The LCS bias and precision results met the acceptance criteria for EDB, TPH gasoline and diesel, metals, ammonia, anions, sulfide, and alkalinity analyses.

1.7 Matrix Spike/Matrix Spike Duplicate Recoveries (Reason Code M)

The MS and MSD samples are a portion of a field sample spiked with target analytes and are prepared with each analytical batch. The MS/MSD results are used to evaluate any bias introduced to the method due to matrix interference, and to measure bias and precision for each analytical batch.

In accordance with the QAPjP requirements (Shaw, 2011), the MS/MSD samples are to be collected at a rate of one per 20 groundwater samples. During the first-quarter 2011 groundwater monitoring event, two MS/MSD samples were collected from locations KAFB-10610 and KAFB-10624, and therefore met the MS/MSD sample frequency requirement. The laboratory performed additional MS/MSD analyses on Kirtland site-specific groundwater samples to verify presence of a matrix effect and its potential impact on the precision and bias of the analytical results.

The following Kirtland site-specific groundwater samples were spiked for MS/MSD analysis:

Well Location	Sample Number	MS/MSD Analysis
KAFB10610	GW0011	VOCs, EDB, TPH gasoline and diesel, metals, anions, ammonia as nitrogen, sulfide, and alkalinity
KAFB10624	GW0026	VOCs, EDB, TPH gasoline and diesel, metals, anions, ammonia as nitrogen, sulfide, and alkalinity
KAFB1064	GW0004	Metals, TPH gasoline, and metals
KAFB3411	GW0032	Ammonia as nitrogen and alkalinity
KAFB1062	GW0002	Anions

Well Location	Sample Number	MS/MSD Analysis
KAFB10623	GW0025	Anions
KAFB10645	GW0034	TPH gasoline and anions
KAFB10612	GW0013	Alkalinity
KAFB10644	GW0033	Alkalinity

The RPDs between the MS and MSD recoveries met the precision acceptance criteria for all the listed analyses, however MS recovery biases were observed for alkalinity, anions, sulfide, metals, EDB, TPH gasoline and diesel, and VOCs analyses, as summarized below:

Analytical Method	Spiked Sample	MS Recovery Outliers (%)	Control Limit (%)	Qualifier
SM2300B	GW0032	Alkalinity: 149/148%	80-120%	J+ for detected analyte in GW0032
EPA 300.0	GW0034	Chloride: 108/125%	80-120%	J+ for detected analyte in GW0034
SW8260B	GW0011	Bromodichloromethane: 145/129%	75-120%	None
SW8260B	GW0011	Dichlorodifluoromethane: 185/175%	30-155%	None
SW8260B	GW0011	1,2-Dichloroethane: 131/117%	70-130%	None
SW8260B	GW0011	1,1,1,2-Tetrachloroethane: 134/122%	80-130%	None
SW8260B	GW0011	1,1,1-Trichloroethane: 133/122%	65-130%	None
SW8260B	GW0011	Trichlorofluoromethane: 146/125%	60-145%	None
SW8260B	GW0011	Toluene: 88/74%	75-120%	J- for detected analyte in GW0011
SW8015B	GW0011	TPH gasoline: -1555/-1280%	50-150%	None
SW8015B	GW0011	TPH diesel: -343/292%	50-150%	None
SW8011	GW0011	EDB: 4660/4700%	70-130%	None
SM4500S2CF	GW0011	Sulfide: 71/67%	75-125%	UJ for non-detected analyte in GW0011
SM4500S2CF	GW0026	Sulfide: 60.7/60.7%	75-125%	UJ for non-detected analyte in GW0026
SM2320B	GW0033	Alkalinity: 127/126%	75-125%	J+ for detected analyte in GW0033
SW6010B	GW0026	Calcium: 49/43%	80-120%	None
SW6010B	GW0026	Sodium: 57/65%	80-120%	None
SW8260B	GW0026	Bromodichloromethane: 127/132%	75-120%	None
SW8260B	GW0026	Dichlorodifluoromethane: 167/169%	30-155%	None

As a result of the MS recovery biases, the LOQ for the non-detected result sulfide and the detected results for alkalinity, chloride, and toluene in the spiked samples were qualified as estimated UJ and J+/J-, respectively. There is no impact on the data usability because of the minor MS/MSD recovery biases. The

associated LCS recoveries for sulfide, alkalinity, anions, and VOCs analyses met the acceptance criteria indicating acceptable laboratory method performance for all the samples in the batch.

In addition, high MS/MSD recovery biases were reported for EDB; while low MS/MSD recovery biases were observed for TPH gasoline, diesel, and metals analyses as listed above. In those spiked samples, concentrations for TPH gasoline and diesel, EDB, and metals well exceeded four times their spike levels. These elevated sample concentrations produced a matrix effect which led to the MS/MSD recovery biases. Since sample concentrations were greater than four times the spike levels, no data qualification was applied to the TPH gasoline, diesel, EDB, and metals results.

The analytes bromodichloromethane, dichlorodifluoromethane, 1,2-dichloroethane, 1,1,1,2-tetrachloroethane, 1,1,1-trichloroethane, and trichlorofluoromethane were not detected in the spiked samples, and thus the sample results were not affected by the high MS/MSD recovery biases and no data qualification was necessary.

Except where noted, the MS precision and bias results were acceptable for all other analyses.

1.8 Initial Calibration (Reason Code G)

Instrument calibration is performed for VOCs, PAHs, SVOCs, EDB, TPH gasoline and diesel, metals, anions, and ammonia analyses according to the EPA method requirements. The linear analytical range is established for each method by analysis of standards prepared at increasing concentrations that cover the expected sample concentrations. The acceptability of the initial calibration is determined by calculation of a percent relative standard deviation or coefficient. The initial calibration results were acceptable for all the listed methods.

Immediately after the initial calibration for each method, an initial calibration verification (ICV) was conducted at the mid-point of instrument calibration range by using a second source calibration standard to verify the accuracy of the initial calibration. A percent difference (%D) between the reported concentration and expected concentration for VOC analysis exceeded the acceptance criteria as summarized below:

Analytical Method	Instrument#	ICV Outliers (%)	Control Limit (%)	Qualifier
SW8260B	MSVOA3	Dichlorodifluoromethane: +43%	<20%	None

Because the analyte dichlorodifluoromethane was not detected in any associated samples, the high biased %D did not affect the sample results and no data qualification was warranted. Except where noted, the ICV results met the acceptance criteria for all other analyses.

1.9 Continuing Calibration Verification (Reason Code C)

Routinely during sample analysis, the stability of the analytical system is monitored by analysis of continuing calibration standards at concentrations near the mid-point of the linear range. Percent differences between the relative response factor (RRF) in the initial calibration and the RRF in the continuing calibration exceeded the acceptance criteria for VOCs, SVOCs, TPH diesel, and anions analyses. The continuing calibration outliers that resulted in data qualification are summarized below:

Analytical Method	Calibration ID	CCV Outlier (%)	Control Limit (%)	Qualifier
SW8260B	IB03303-CCV1	Bromomethane: -41.4%	<20%	UJ for non-detected analyte in GW0002, GW0003, GW0004, and GW8003-TB
SW8260B	IB03303-CCV1	Chloromethane: -24.2%	<20%	UJ for non-detected analyte in GW0002, GW0003, GW0004, and GW8003-TB
SW8260B	IB03303-CCV1	Dichlorodifluoromethane: -21.4%	<20%	UJ for non-detected analyte in GW0002, GW0003, GW0004, and GW8003-TB
SW8260B	IB03305-CCV1	Bromomethane: -40.7%	<20%	UJ for non-detected analyte in GW0001, GW0017, GW0032,

Analytical Method	Calibration ID	CCV Outlier (%)	Control Limit (%)	Qualifier
				GW8001-TB, and GW8002-TB
SW8260B	IB03305-CCV1	Chloromethane: -20.5%	<20%	UJ for non-detected analyte in GW0001, GW0017, GW0032, GW8001-TB, and GW8002-TB
SW8260B	IB05006-CCV1	Bromomethane: -43%	<20%	UJ for non-detected analyte in GW0020, GW0021, and GW8013-TB
SW8260B	IB05006-CCV2	Acetone: +29.4%	<20%	J+ for detected analyte in GW0019
SW8260B	IB05006-CCV2	Bromomethane: -39.9%	<20%	UJ for non-detected analyte in GW0019
SW8260B	IB050401-CCV1	Acetone: +39%	<20%	J+ for detected analyte in GW0011 and GW0031
SW8260B	IB050401-CCV1	Bromomethane: -28.8%	<20%	UJ for the analyte in GW0011 and GW0031
SW8260B	IB050401-CCV1	2-Butanone: +35.6%	<20%	J+ for detected analyte in GW0011
SW8260B	IB050401-CCV1	4-Methyl-2-Pentanone: +47.2%	<20%	J+ for detected analyte in GW0011 and GW0031
SW8260B	IB05611-CCV1	Acetone: +52.6%	<20%	J+ for detected analyte in GW0009
SW8260B	IB05611-CCV1	2-Butanone: +23.2%	<20%	J+ for detected analyte in GW0009
SW8260B	IB05611-CCV1	2-Hexanone: +23.2%	<20%	J+ for detected analyte in GW0009
SW8260B	IB05611-CCV1	4-Methyl-2-Pentanone: +35.5%	<20%	J+ for detected analyte in GW0009
SW8260B	IB05612-CCV1	Acetone: +55%	<20%	J+ for detected analyte in GW0015, GW0005, GW0006, and GW0007
SW8260B	IB05612-CCV1	2-Butanone: +30.4%	<20%	J+ for detected analyte in GW0015, GW0005, GW0006
SW8270C	IB04714-CCV1	Benzaldehyde: - 40.8%	<20%	UJ for non-detected analyte GW0033 and GW0034
SW8270C	IB04714-CCV1	Benzidine: - 54.5%	<20%	UJ for non-detected analyte GW0033 and GW0034
SW8015B	IC06012-CCV2	TPH diesel: +40.7%	<20%	J+ for detected analyte in GW0005, GW0006, and GW0007
EPA 300.0	IB03813-CCV1	Sulfate: +11%	<10%	J+ for detected analyte GW0001

As a result of the low biased percent differences, the LOQs for the non-detected results bromomethane, chloromethane, and dichlorodifluoromethane analyzed by SW8260B Method, and benzaldehyde and benzidine analyzed by SW8270C Method were qualified as estimated (UJ) in all samples associated with the non-compliant continuing calibrations. The high biased percent differences led to qualification of the detected results for acetone, 2-butanone, 2-hexanone, 4-methyl-2-pentanone, TPH diesel, and sulfate as estimated (J+) in the affected samples. There is no impact on the data usability because of the continuing calibration outliers.

Additionally, high biased percent differences were reported for other VOCs and SVOCs. Because these analytes were not detected in samples associated with the calibration outliers, the high biased percent differences did not affect the sample results and therefore did not lead to any data qualification.

Except where noted above, the continuing calibration results were acceptable for all other analyses.

1.10 Interference Check Samples (Reason Code O)

The ICP interference check sample (ICS) verifies the interelement and background correction factors. An ICS was analyzed at the beginning and end of each analytical sequence. All ICS results were within the established control limit.

1.11 ICP Serial Dilution (Reason Code A)

The ICP serial dilution determines whether significant physical or chemical interferences exist due to sample matrix. An ICP serial dilution was performed on two project samples GW0011 and GW0026. The ICP serial dilution results were acceptable for both samples.

1.12 Sample Confirmation

As required by the DoD and EPA, when samples are analyzed by either a gas chromatography or high-performance liquid chromatography method, all positive results with the exception of TPH gasoline and diesel, must be confirmed by a second column or a different detector. As indicated in all six SDGs for the sampling event, all positive EDB results for SW8011 method were confirmed by a second column, and the precision results between the primary and secondary columns were within the precision control limit for all the detected samples. In all cases, the higher detection from either the primary or secondary column was reported.

1.13 Ambient Blanks (Reason Code K2)

Ambient blanks serve as a check on environmental contamination from contaminants in air at a sampling location. The ambient blank is prepared by pouring distilled water into a clean sample container in the field, and exposing this blank in the field at the time of sample collection and at a particular well location.

During the first-quarter 2011 groundwater monitoring event, one ambient blank sample (GW8001-AB) was collected on February 8, 2011 from location KAFB-10623 and a second ambient blank (GW8002-AB) was collected on February 15, 2011 from location KAFB-10620. Both ambient blanks were submitted to the laboratory for VOC analysis. One positive result in the blank is reported and summarized below:

Analytical Method	Well Location	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	KAFB-10620	Acetone	9.75	1.0	U for the analyte in GW0022

On February 15, a groundwater sample GW0022 was collected from well KAFB-10620 where the ambient blank (GW8002-AB) was collected. Acetone was reported at 3.26 ppb and 9.75 ppb in the groundwater sample and the ambient blank, respectively. Although acetone is a common laboratory contaminant, the analyte in the laboratory method blank processed with the groundwater and ambient blank samples was not detected. Due to the ambient blank detection, the detected result for acetone in sample GW0022 was qualified as non-detected (U) at the LOQ. There is no impact on the data usability because of the blank qualification. Except for acetone, no other VOCs were detected in the ambient blank (GW8002-AB). The second ambient blank was free of any VOCs.

1.14 Trip Blanks (Reason Code K3)

Trip blanks were prepared by the laboratory and stored with the groundwater samples collected for VOC analysis. Samples for VOC analysis were maintained in as few coolers as possible to minimize the number of required trip blanks. One trip blank was submitted with VOC samples collected on each day from January 25 through March 9, 2011, which resulted in a total of 20 trip blanks for the entire sampling event. Positive results in the trip blanks are summarized below:

Analytical Method	Trip Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	GW8001-TB	Isopropylbenzene	0.701	1.0	U for the analyte in GW0001
SW8260B	GW8002-TB	Isopropylbenzene	0.706	1.0	U for the analyte in GW0017, GW0032
SW8260B	GW8004-TB	Hexachlorobutadiene	0.373	1.0	None
SW8260B	GW8005-TB	Hexachlorobutadiene	0.453	1.0	None
SW8260B	GW8011-TB	Hexachlorobutadiene	0.349	1.0	None
SW8260B	GW8014-TB	Hexachlorobutadiene	0.279	1.0	None
SW8260B	GW8014-TB	Methylene Chloride	1.52	10	None
SW8260B	GW8015-TB	Trichloroethene	0.265	1.0	None
SW8260B	GW8017-TB	Trichloroethene	0.298	1.0	None
SW8260B	GW80013-TB	Hexachlorobutadiene	0.352	1.0	none
SW8260B	GW8020-TB	Methylene Chloride	0.567	10	None

As indicated above, the majority of the trip blank levels were less than one-half the LOQs for target analytes and less than the LOQ for laboratory common contaminants, such as methylene chloride. Therefore these blank levels met the blank acceptance criteria. Due to the trip blank detections, the detected results for isoproplybenzene in three samples shipped with the trip blanks were qualified as non-detected (U). Although hexachlorobudadiene, methylene chloride, and trichloroethene were also reported in the trip blanks, these analytes were not detected in any associated groundwater samples, and therefore the sample results were not affected by the trip blank detections. The remaining 10 trip blanks were free of any VOCs. Overall, the trip blank results were acceptable, indicating good sample storage and shipping procedures.

1.15 Equipment Rinse Blanks (Reason Code K1)

Equipment rinse blanks are designed to check for contamination from sampling equipment and the results of the equipment rinse blanks are used for evaluating the efficiency of equipment decontamination procedures.

During the first-quarter 2011 groundwater monitoring event, two equipment rinse blanks (GW8001-RB and GW8002-RB) were collected on February 8 and 15, respectively when non-dedicated sampling equipment was used to collect groundwater samples. These two equipment rinse blank samples were prepared by rinsing the decontaminated pump with the distilled water obtained from the laboratory and then collecting the final rinse into appropriate sample containers. Both equipment rinse blank samples were analyzed for VOCs, TPH gasoline and diesel, and metals.

Positive results observed in the equipment rinse blanks are presented below:

Analytical Method	Equipment Rinse Blank	Contaminant	Contaminant Level (ppb)	LOQ (ppb)	Qualifier
SW8260B	GW8001-RB	Benzene	0.6	1.0	None
SW8260B	GW8001-RB	Ethylbenzene	0.332	1.0	None
SW8260B	GW8001-RB	Toluene	2.52	1.0	U for the analyte in GW0025 and GW0027
SW8260B	GW8001-RB	m,p-xylene	0.751	2.0	None
SW8260B	GW8002-RB	Acetone	14.3	10	U for the analyte in GW0022
SW8260B	GW8002-RB	Toluene	3.84	1.0	U for the analyte in GW0022
SW6010B	GW8002-RB	Iron	36.0	100	None
SW6010B	GW8002-RB	Manganese	6.84	15	U for the analyte in GW0022

As noted by the sampling team, the equipment rinse blank detections may be attributed to vehicle exhaust from vehicles in the areas of sampling. As a result of the blank detections, the detected results for acetone, toluene, and manganese in the associated groundwater samples were qualified as non-detected (U) at their reported value. There is no impact on the data usability because of the blank qualification. Since benzene, ethylbenzene, m,p-xylene, and iron were not detected in the associated samples, the blank detections did not affect the sample results. Both equipment rinse blanks were free of TPH gasoline and diesel.

A portable pump was used to collect a majority of the groundwater samples for the first-quarter 2011 groundwater monitoring event; however, no additional equipment rinse blanks were collected to verify equipment decontamination procedure.

1.16 Field Duplicates

In accordance with the site-specific BFF Spill QAPjP (Shaw, 2011) requirements, field duplicate samples are to be collected at a minimum rate of 10 percent of the total number of groundwater samples. Field duplicate samples are evaluated by calculating the RPD between the sample and its duplicate. The RPD is calculated using the following equation:

$$RPD = |(S-D)/[(S+D)/2]| x\ 100$$

where:

S = sample result
D = duplicate result

Acceptable precision control criteria are established at less than or equal 35 percent for water samples. The RPD is calculated between pairs of field duplicate samples when both results are reported above the LOQ.

Two duplicate pairs were collected for the first-quarter 2011 groundwater monitoring event. Therefore, the 10 percent field duplicate frequency requirement was missed. The duplicate pairs were collected from locations KAFB-10626 and KAFB-10618 and analyzed for VOCs, EDB, TPH gasoline and diesel, metals, anions, sulfide, ammonia, and alkalinity. The field duplicate results are presented below:

Analytical Method	**Analyte**	**KAFB10626 Sample ID: GW0028 and Concentration**	**KAFB10626 Duplicate ID: GW0029 and Concentration**	**RPD%**	**Control Limit**
SW8260B	Toluene, ppb	5.10	4.98	2.4%	<35%
SW6010B	Calcium, ppb	77,100	76,500	0.8%	<35%
SW6010B	Magnesium, ppb	10,600	10,400	1.9%	<35%
SW6010B	Sodium, ppb	38,800	36,700	5.6%	<35%
SM2320B	Alkalinity, ppm	86.2	86.6	0.5%	<35%
EPA 300.0	Chloride, ppm	96.8	96.9	0.1%	<35%
EPA 300.0	Nitrate, ppm	4.52	4.52	0%	<35%
EPA 300.0	Sulfate, ppm	83.9	84.1	0.2%	<35%
Analytical Method	Analyte	KAFB-10618 Sample ID: GW0019 and Concentration	KAFB-10618 Duplicate ID: GW0020 and Concentration	RPD%	Control Limit
SW8260B	1,2-Dichloroethane, ppb	2.29	2.03	12%	<35%
SW8260B	1,2,4-Trimethylbenzene, ppb	30.6	29.5	3.7%	<35%
SW8260B	1,3,5-Trimethylbenzene, ppb	10.4	10.4	0.0%	<35%
SW8260B	4-Methyl-2-Pentanone, ppb	9.79	8.35	15.9%	<35%
SW8260B	Benzene, ppb	34.9	26.8	26.3%	<35%
SW8260B	Isopropylbenzene, ppb	17.4	12.1	35.9%	<35%
SW8260B	Naphthalene, ppb	1.33	1.24	7.0%	<35%
SW8260B	Toluene, ppb	12.7	9.74	26.4%	<35%
SW8260B	m,p-Xylene, ppb	65.7	62.9	4.4%	<35%
SW8260B	n-Propylbenzene, ppb	4.04	2.33	53.7%	<35%

Analytical Method	Analyte	KAFB10626 Sample ID: GW0028 and Concentration	KAFB10626 Duplicate ID: GW0029 and Concentration	RPD%	Control Limit
SW8260B	o-Xylene, ppb	5.22	4.66	11.3%	<35%
SW8260B	sec-Butylbenzene, ppb	1.87	1.42	27.4%	<35%
SW8260B	tert-butylbenzene, ppb	1.11	1.06	4.6%	<35%
SW8015B	TPH-gasoline, ppm	1.02	1.03	1.0%	<35%
SW8015B	TPH-diesel, ppm	4.48	4.05	10.1%	<35%
SW8011	EDB, ppb	0.864	0.95	9.5%	<35%
SW6010B	Calcium, ppb	42,000	44,6000	6.0%	<35%
SW6010B	Magnesium, ppb	5,990	6,380	6.3%	<35%
SW6010B	Sodium, ppb	24,700	26,600	7.4%	<35%
SW6010B	Iron, ppb	120	125	4.1%	<35%
SW6010B	Manganese, ppb	844	844	0.0%	<35%
EPA 300.0	Chloride, ppm	18.3	18.6	1.6%	<35%
EPA 300.0	Sulfate, ppm	39.2	39.9	1.8%	<35%
SM2300B	Alkalinity, ppm	129	129	0.0%	<35%

Except for isopropylbenzene and n-propylbenzene at location KAFB-10618, the RPDs for all other listed parameters were between 0 and 27.4 percent, well within the 35 percent field duplicate precision goal. The RPDs for isopropylbenzene and n-propylbenzene were 35.9 and 53.7 percent, respectively, exceeding the field duplicate precision limit. Approximately 94 percent of the field duplicate results were within the field duplicate precision limit, indicating overall acceptable field and analytical procedures.

1.17 Completeness

The following sections present a discussion of contractual, analytical, and technical completeness for the first-quarter 2011 groundwater monitoring event. Completeness calculations were performed only for the groundwater samples that were used for project decisions.

1.17.1 Contractual Completeness

Contractual completeness is a quantitative expression of how closely the laboratory adhered to the project requirements. The contractual completeness goal is 95 percent. Contractual completeness is calculated as follows:

$$\% \text{ Contractual Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \text{ X } 100$$

Contractual completeness is based on data qualified for QC outliers that are related to method performance and laboratory procedures only. These include data qualified for calibration or preparation blank contamination, missed holding times, and non-compliant LCS recovery and/or precision.

For the first-quarter 2011 groundwater monitoring event, the contractual completeness was 100 percent for TPH gasoline and diesel, metals, sulfide, ammonia as nitrogen, and alkalinity analyses. The 95-percent contractual completeness goal was also met for VOCs (99.8 percent), EDB (95 percent), and anions (96.7 percent). The contractual completeness goal was missed for SVOCs (47.8 percent) and PAHs (27.8 percent). As discussed previously, one SVOC sample and two PAH samples were extracted outside the 7-day extraction holding time requirement. Additional SVOCs and PAHs were qualified as non-detected or estimated due to laboratory method blank contamination and non-compliant LCS recoveries. The data usability is not affected because of these data quality issues.

1.17.2 Analytical Completeness

Analytical completeness is a quantitative expression of how closely the results adhered to all QC requirements based on the number of data points qualified for any reason. The analytical completeness goal is 90 percent. Analytical completeness is calculated as follows:

$$\% \text{ Analytical Completeness} = \frac{\text{Number of Unqualified Results}}{\text{Total Number of Results}} \text{ X } 100$$

Analytical completeness is based on samples qualified for any reason and includes all target analytes.

For the first-quarter 2011 groundwater monitoring event, the analytical completeness was 100 percent for TPH gasoline and ammonia as nitrogen analyses. The 90-percent analytical completeness objective was achieved for VOCs (98 percent), TPH diesel (92.5 percent), EDB (95 percent), metals (99.6 percent), sulfide and anions (95 percent), and alkalinity (97.5 percent). The 90-percent analytical completeness goal was not met for SVOCs (46.3 percent) and PAHs (27.8 percent) due to a combination of holding time exceedances, laboratory blank contamination, and calibration and LCS recovery outliers.

1.17.3 Technical Completeness

Technical completeness is a quantitative expression of the data usability based on the number of rejected data. For this project, the technical completeness for each method is established at equal to or greater than 95 percent. The technical completeness calculation considers all data that is not rejected to be usable and technical completeness is calculated as follows:

$$\% \text{ Technical Completeness} = \frac{\text{Number of Useable Results}}{\text{Total Number of Results}} \quad X\ 100$$

The technical completeness was 100 percent for all methods for the first-quarter 2011 groundwater monitoring event. Sufficient acceptable results were obtained to meet the project objectives.

1.18 Summary

The analytical data reported for this event have been reviewed for completeness, bias, and precision. Data quality issues observed consisted of holding time violations, biased surrogate, LCS/LCSD, MS/MSD recoveries, initial and continuing calibration outliers, and laboratory and field blank contamination. The

affected data was qualified as estimated or non detected. The 95-percent technical completeness goal was exceeded for all methods. All data are usable for their intended purposes.

REFERENCES

American Public Health Association, American Water Works Association, and Water Environment Federation. 2005. *Standard Methods for the Examination of Water and Wastewater, 21st Edition.* American Public Health Association: Washington, DC. ISBN: 9780875530475.

DoD. 2010. *DoD Quality Systems Manual for Environmental Laboratories, Version 4.2.* October 25.

EPA. 2010. *USEPA Contract Laboratory Program, National Functional Guidelines for Inorganic Superfund Data Review, Final.* Office of Superfund Remediation and Technology Innovation (OSRTI). Office of Solid Waste and Emergency Response (OSWER) 8240.1-51 and USEPA-540-R-10-011. January.

EPA. 2008. *USEPA Contract Laboratory Program, National Functional Guidelines for Superfund Organic Methods Data Review, Final.* OSRTI. OSWER 9240.1-48 and USEPA-540-R-08-01. June.

EPA. 2006. *USEPA Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods.* SW-846 (see 2008 update). Office of Solid Waste, Washington D.C. Online at http://www.epa.gov/osw/hazard/testmethods/sw846.

USACE. 2011. *Quality Assurance Project Plan, Bulk Fuels Facility (BFF) Spill, Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico.* Prepared by Shaw Environmental & Infrastructure, Inc. for the USACE Albuquerque District under USACE Contract No. W912DY-10-D-0014, Delivery Order 0002. April.

USACE. 2005. *Environmental Quality – Guidance for Evaluating Performance-Based Chemical Data,* EM 200-1-10. June 30.

THIS PAGE INTENTIONALLY LEFT BLANK

Table 1. Data Qualification Flags and Reason Codes

Data Qualifier Definitions for Organic Data Review

Qualifier	Definition
	No Qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the reported sample quantitation limit.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
J-	The analyte was positively identified; associated numerical value is its approximate concentration with a low bias in the sample.
J+	The analyte was positively identified; associated numerical value is its approximate concentration with a high bias in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated value represents its approximate concentration.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The analyte was analyzed for, but the presence or absence of the analyte has not been verified. Resampling and reanalysis may be necessary to confirm or deny the presence of the analyte. Results are rejected and data are unusable for any purposes.

Data Qualifier Definitions For Inorganic Data Review

Qualifier	Definition
	No Qualifier indicates that the data are acceptable both qualitatively and quantitatively.
U	The analyte was analyzed for but was not detected above the level of the reported value. The reported value is the instrument detection limit for waters and the method detection limit (MDL) for soils for all the analytes except cyanide (CN) and mercury (Hg). For CN and Hg, the reported value is the contract-required detection limit.
J	The analyte was analyzed for and was positively identified, but the reported numerical value may not be consistent with the amount actually present in the environmental sample. Results are estimated although the data are considered usable and may be used as appropriate to meet project objectives. Results are qualitatively acceptable and quantitatively uncertain.
J-	The analyte was positively identified; associated numerical value is its approximate concentration with a low bias in the sample.
J+	The analyte was positively identified; associated numerical value is its approximate concentration with a high bias in the sample.
UJ	The analyte was analyzed for but was not detected above the reported value. The reported value may not accurately or precisely represent the sample reporting limit.
R	The analyte was analyzed for, but the presence or absence of the analyte has not been verified. Resampling and reanalysis may be necessary to confirm or deny the presence of the analyte. Results are rejected and data are unusable for any purposes.

Table 1. Data Qualification Flags and Reason Codes (concluded)

Reason Codes for Data Review and Validation

Reason Code	Description
A	Serial dilution outside criteria (Level IV).
B1	Method blank contaminants above reporting limit.
B2	Calibration blank contaminants above reporting limit.
B2, Bias Flag "-"	Calibration blank indicates negative interference, false negatives may be present.
C	Calibration outside control limits.
D1	Sample duplicate RPD outside control limit.
D2	Matrix duplicate RPD outside control limit.
E	The sample results exceed the linear calibration range of the instrument.
F	Hydrocarbon pattern does not match hydrocarbon pattern in the standard.
G1	Initial calibration relative standard deviation outside control limit.
G2	Initial continuing calibration RRF outside control limit.
G3	Continuing calibration RRF outside control limit.
H	Holding time exceeded.
I	Internal standard recovery outside control limit.
K1	Equipment rinsate contamination.
K2	Ambient blank contamination.
K3	Trip blank contamination.
L	LCS outside control limits.
M	MS outside control limits.
O	Interference check sample outside acceptance criteria.
P	Analyte qualified based on the professional judgement of the reviewer.
S	Surrogate recovery outside control limit.
T	Temperature outside acceptance criteria.
Tr	Value reported detected between the MDL and practical quantitation limit.
W	Pesticide breakdown outside criteria (Level IV).
X	Raised reporting limit due to matrix interference or high analyte concentration.
Y	Analyte was not confirmed by a second column.
Y1	Primary and confirmation sample duplicate RPD outside control limit.

APPENDIX F

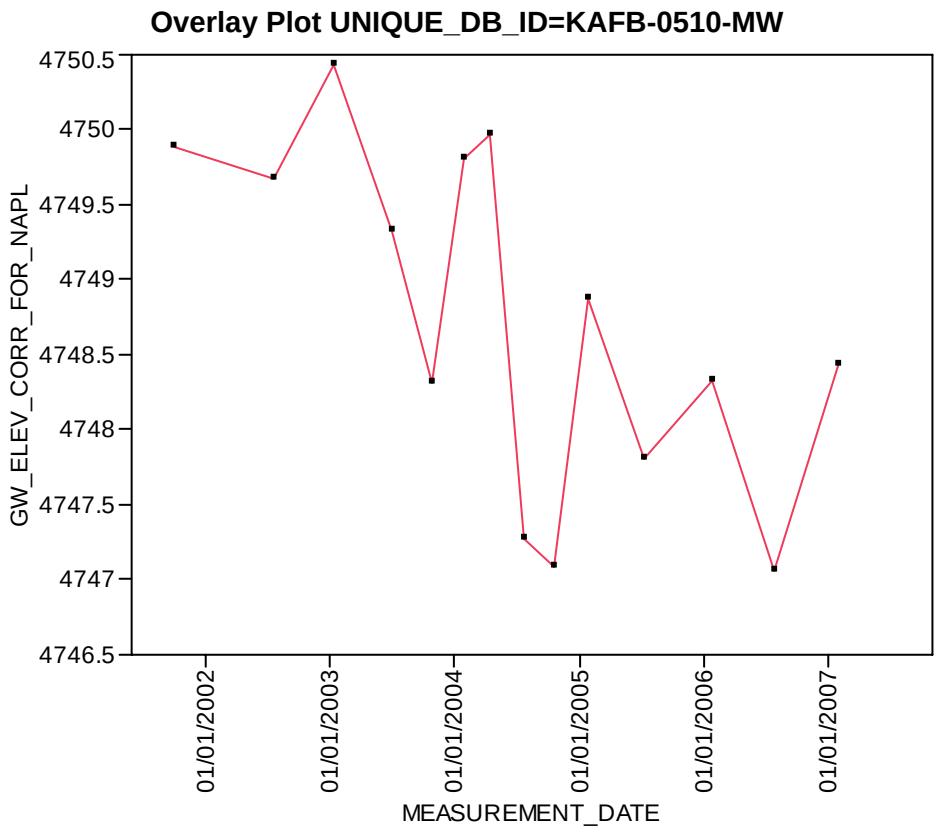
Hydrographs
January – March 2011

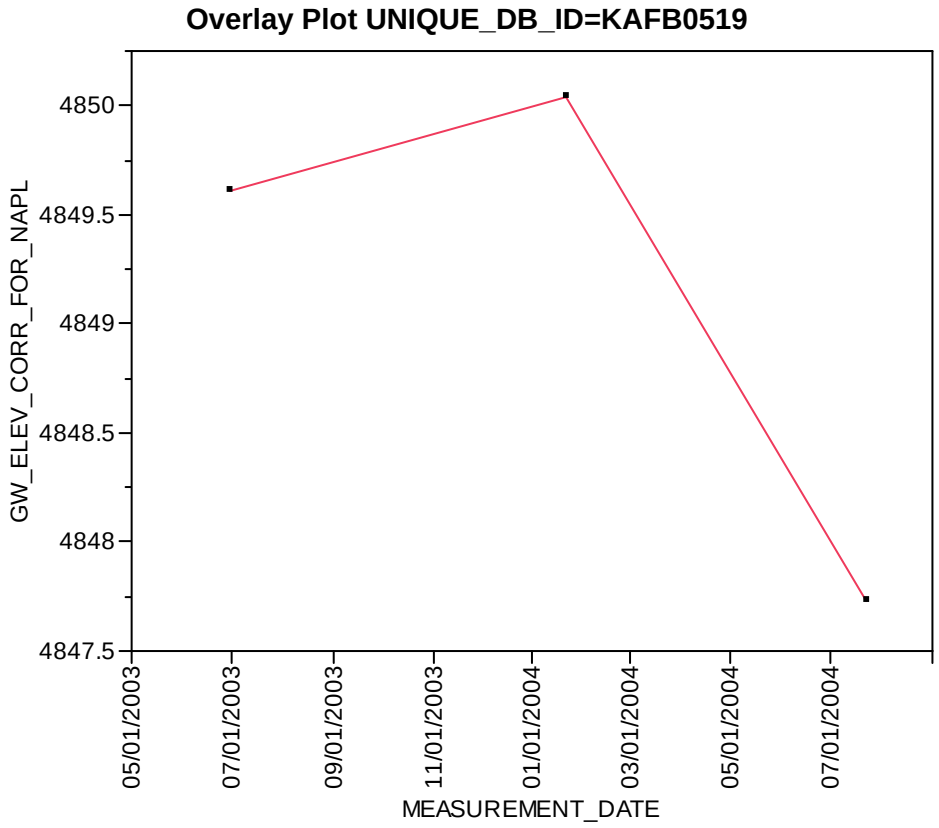
THIS PAGE INTENTIONALLY LEFT BLANK

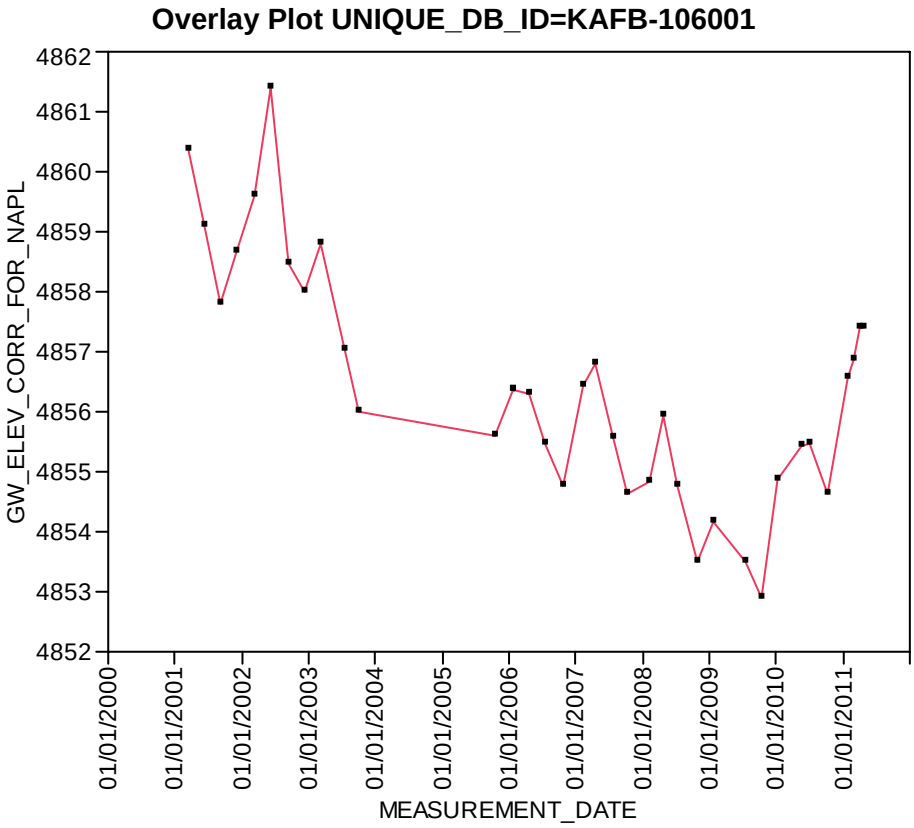
APPENDIX F-1

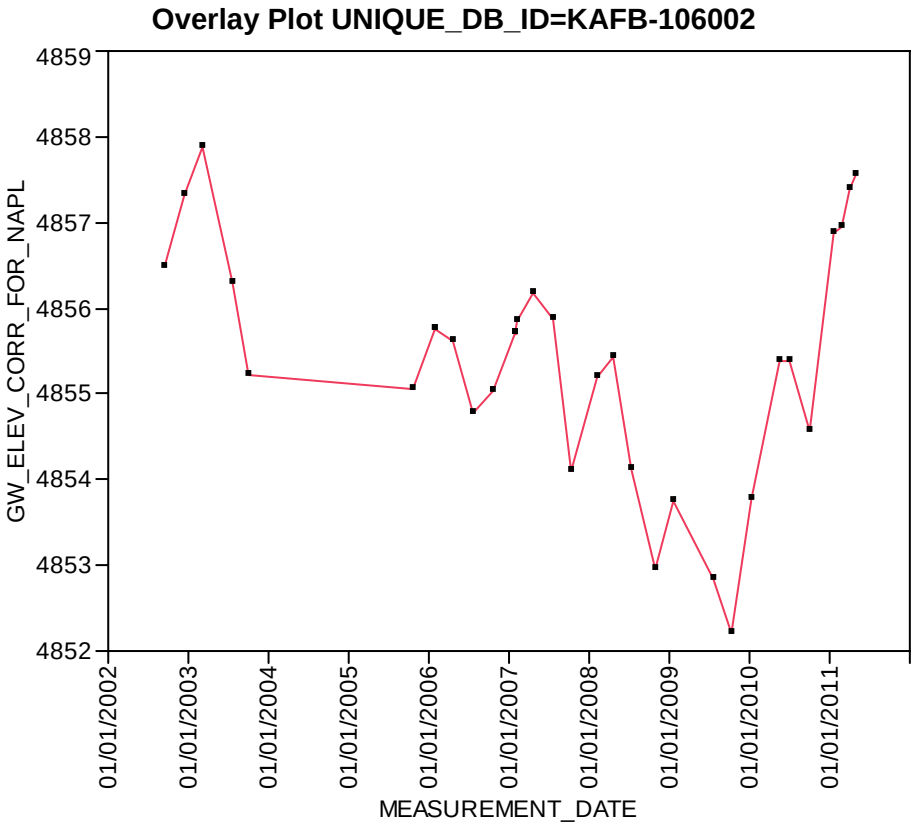
Water-Level Hydrographs
January – March 2011

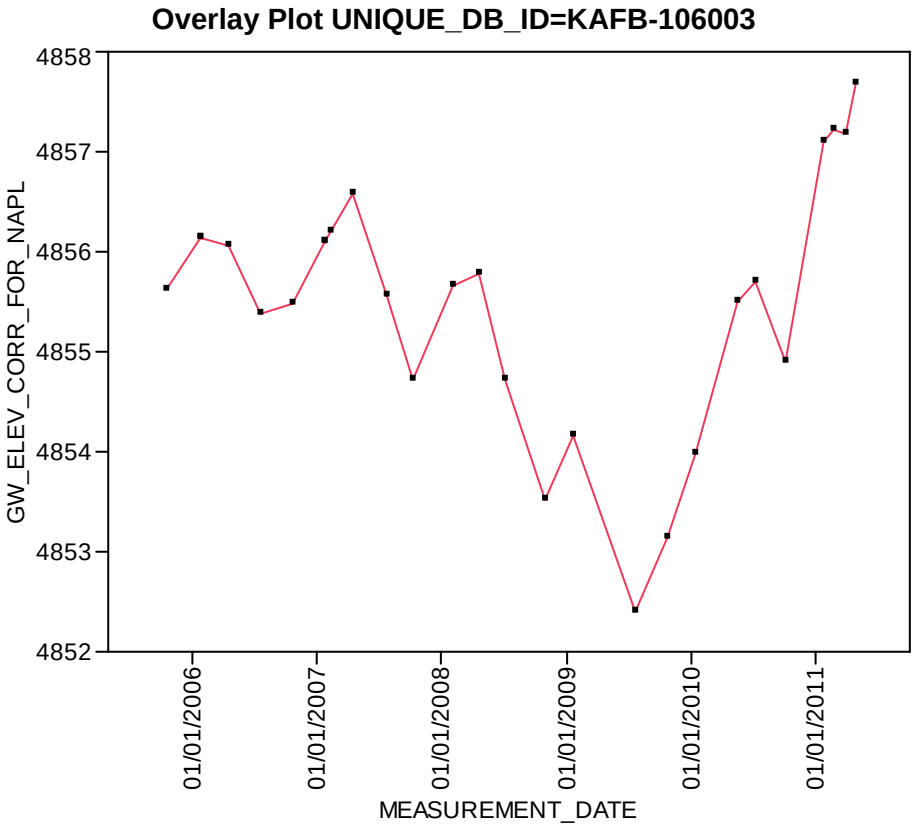
THIS PAGE INTENTIONALLY LEFT BLANK

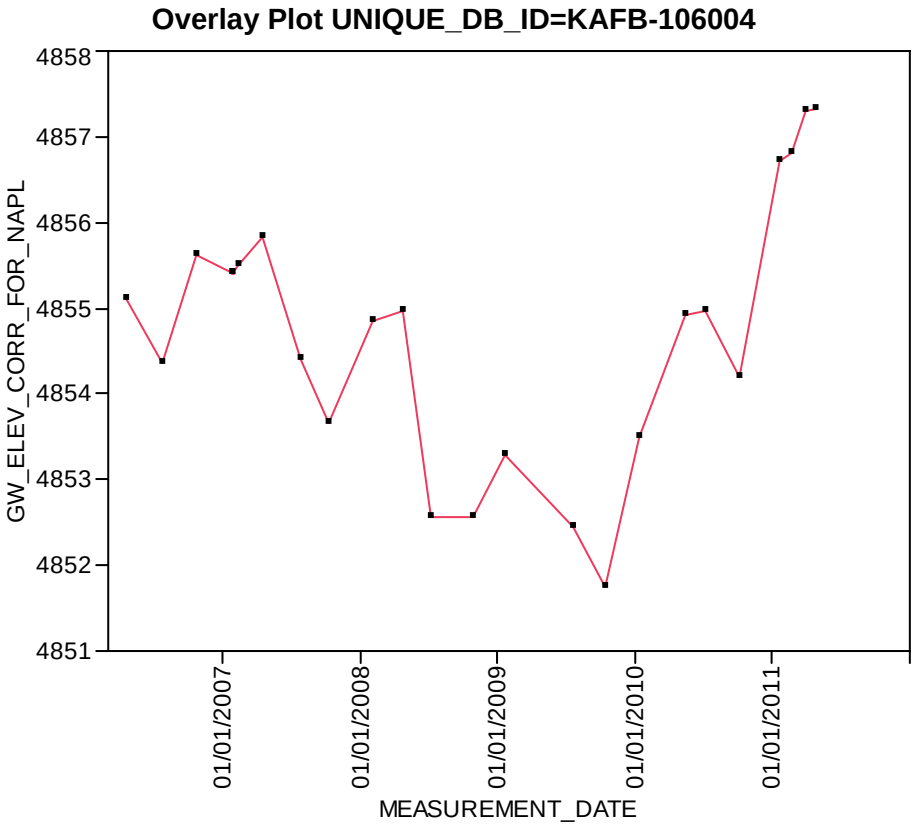

Overlay Plot UNIQUE_DB_ID=KAFB-0510-MW
GW_ELEV_CORR_FOR_NAPL
4750.5
4750
4749.5
4749
4748.5
4748
4747.5
4747
4746.5
01/01/2002
01/01/2003
01/01/2004
01/01/2005
01/01/2006
01/01/2007
MEASUREMENT_DATE

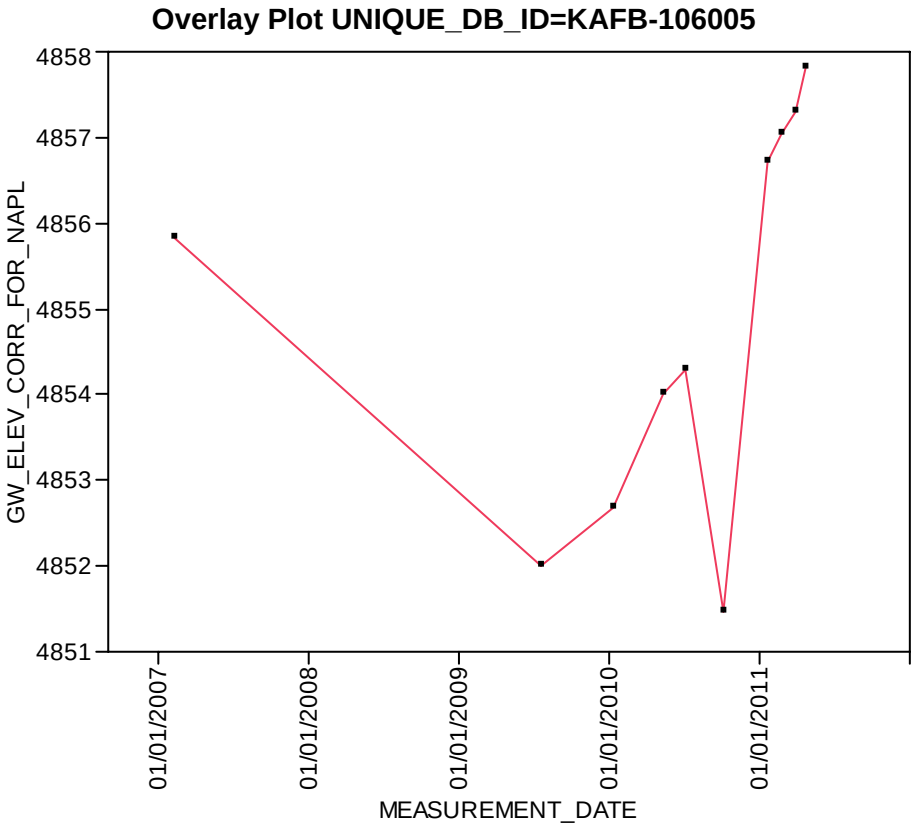

Overlay Plot UNIQUE_DB_ID=KAFB0519
GW_ELEV_CORR_FOR_NAPL
4850
4849.5
4849
4848.5
4848
4847.5
05/01/2003
07/01/2003
09/01/2003
11/01/2003
01/01/2004
03/01/2004
05/01/2004
07/01/2004
MEASUREMENT_DATE

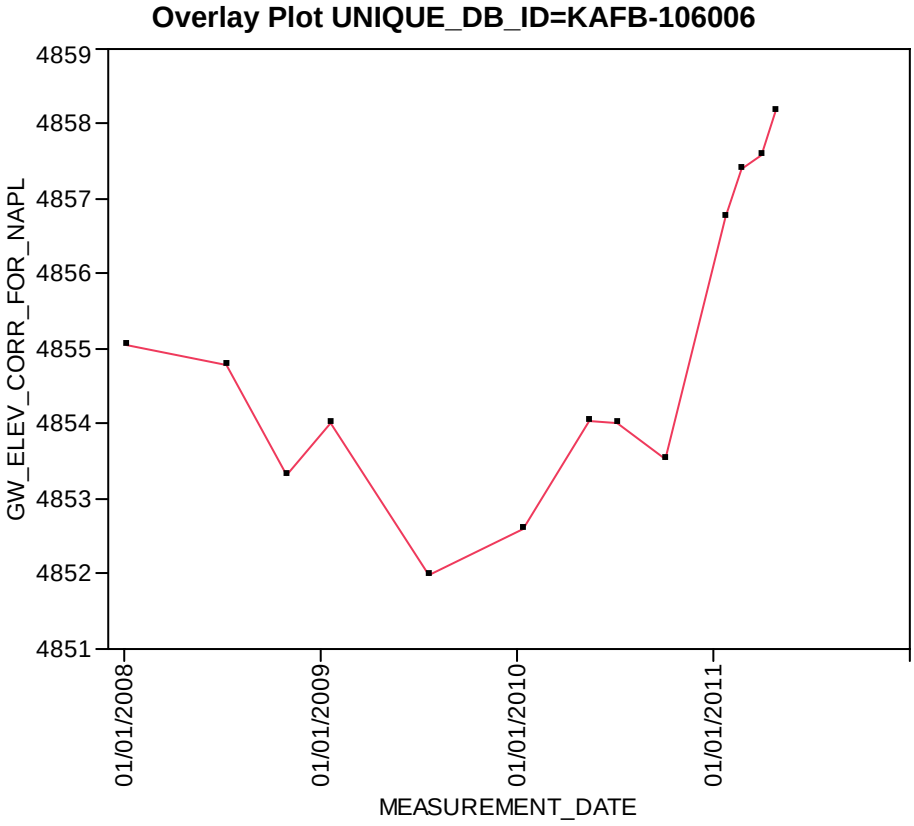

Overlay Plot UNIQUE_DB_ID=KAFB-106001
GW_ELEV_CORR_FOR_NAPL
4862
4861
4860
4859
4858
4857
4856
4855
4854
4853
4852
01/01/2000
01/01/2001
01/01/2002
01/01/2003
01/01/2004
01/01/2005
01/01/2006
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

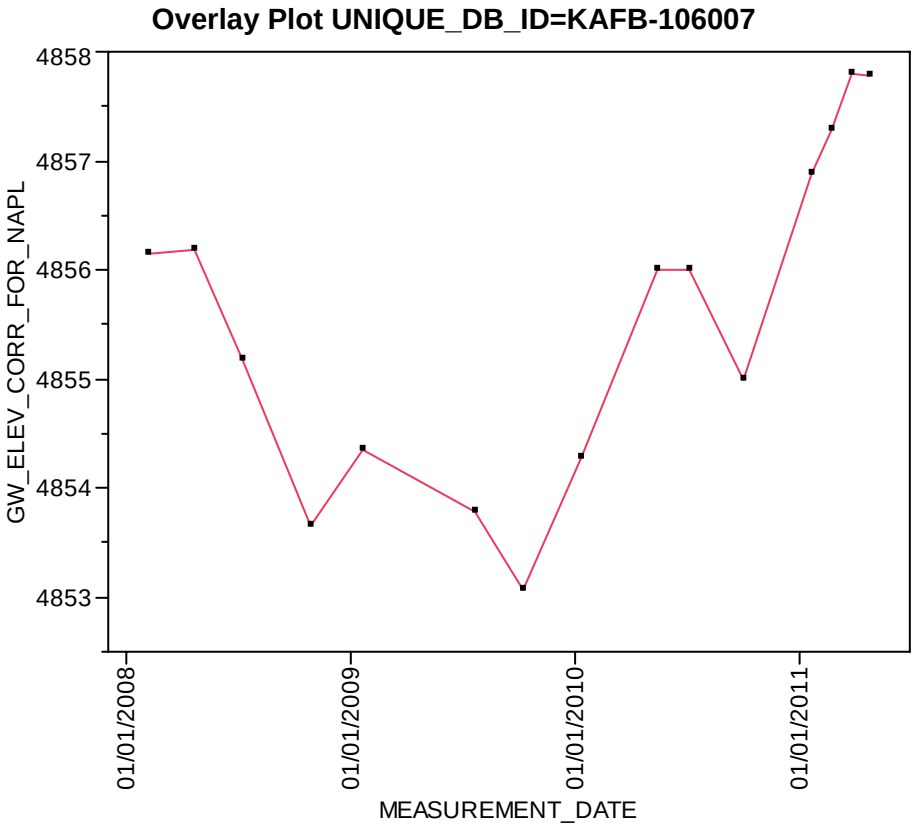

Overlay Plot UNIQUE_DB_ID=KAFB-106002
GW_ELEV_CORR_FOR_NAPL
4859
4858
4857
4856
4855
4854
4853
4852
01/01/2002
01/01/2003
01/01/2004
01/01/2005
01/01/2006
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

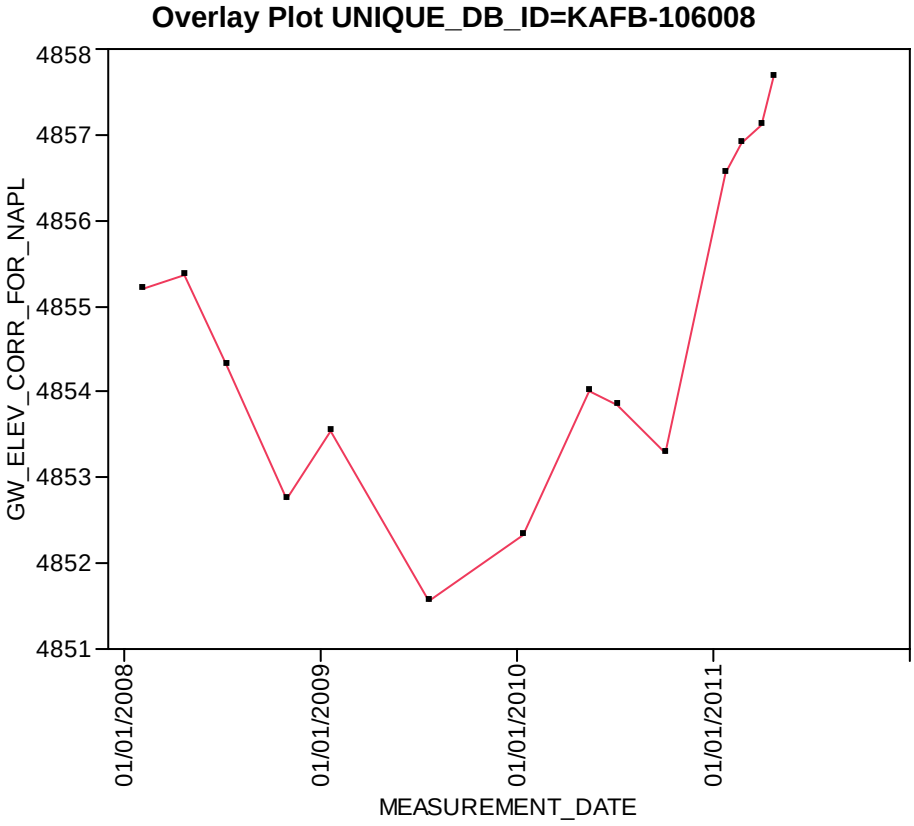

Overlay Plot UNIQUE_DB_ID=KAFB-106003
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
01/01/2006
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

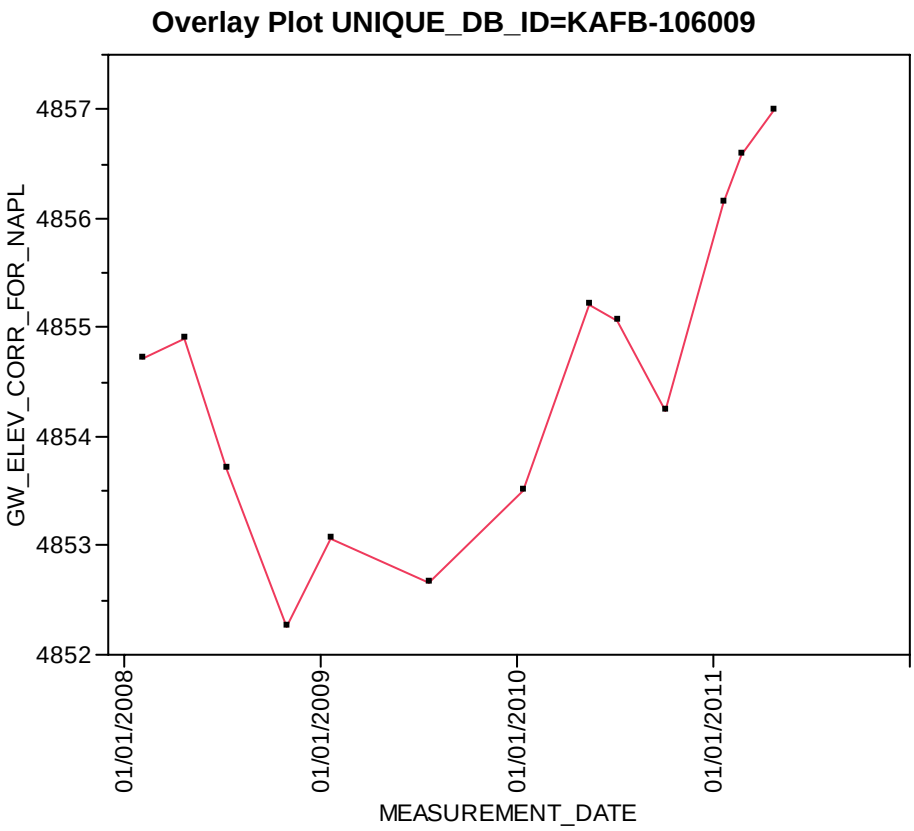

Overlay Plot UNIQUE_DB_ID=KAFB-106004
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

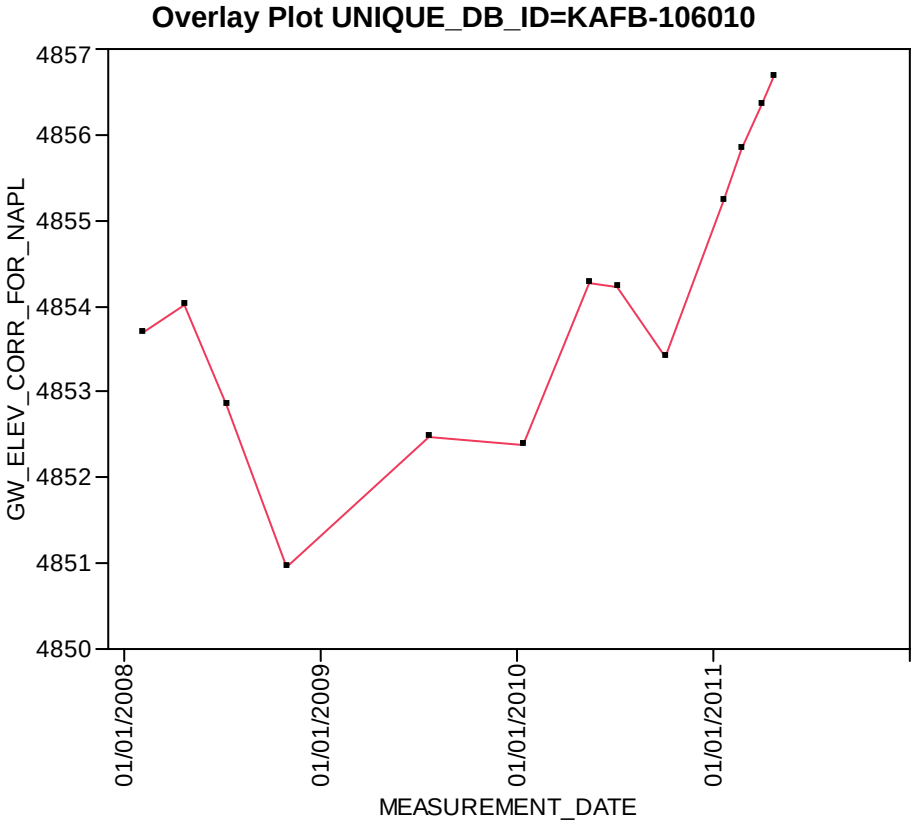

Overlay Plot UNIQUE_DB_ID=KAFB-106005
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

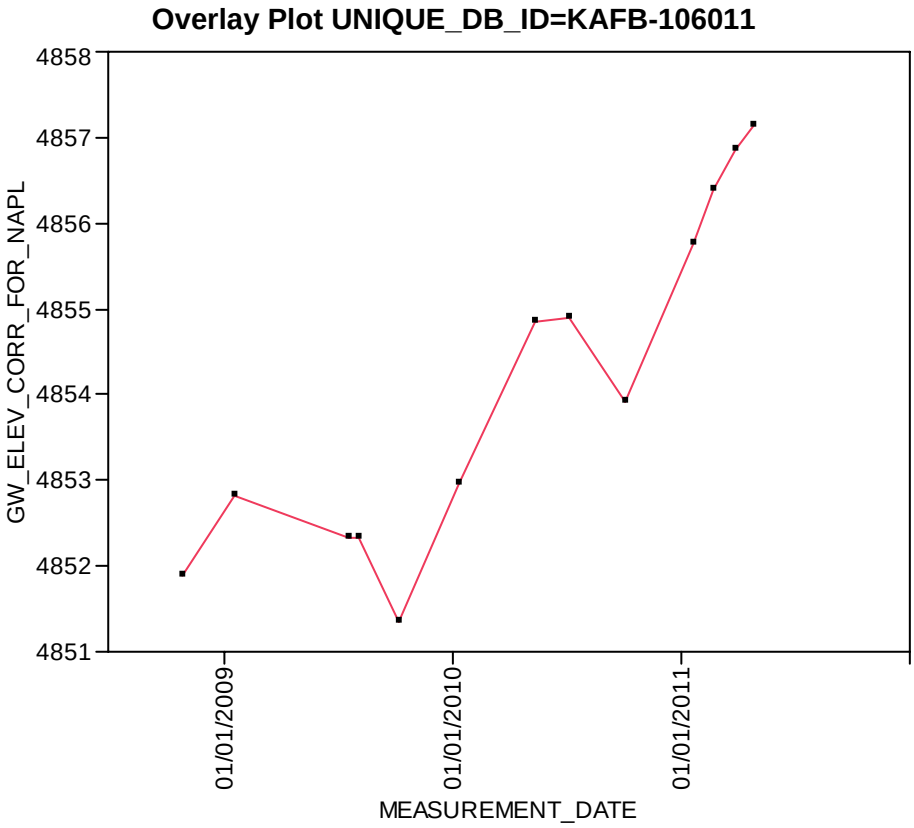

Overlay Plot UNIQUE_DB_ID=KAFB-106006
GW_ELEV_CORR_FOR_NAPL
4859
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

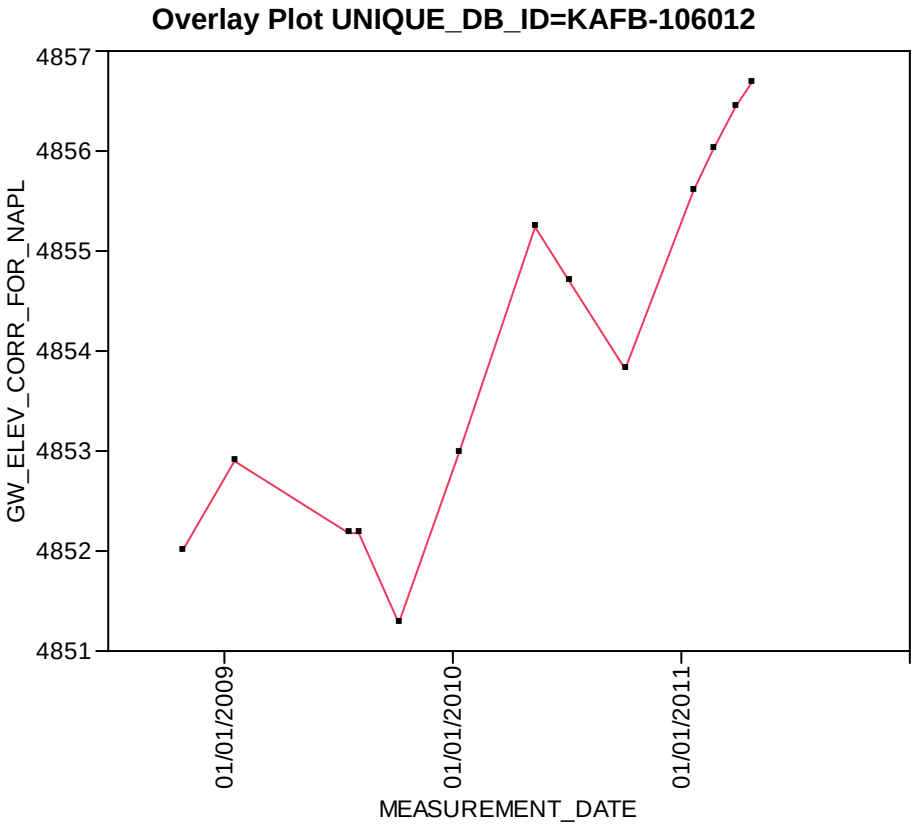

Overlay Plot UNIQUE_DB_ID=KAFB-106007
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

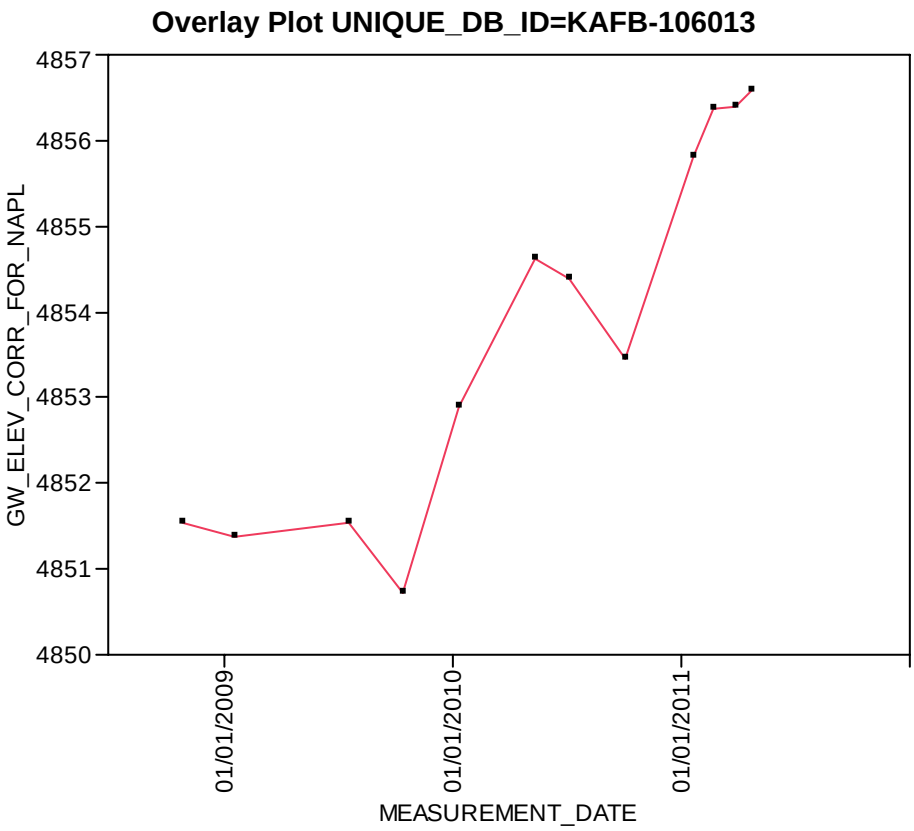

Overlay Plot UNIQUE_DB_ID=KAFB-106008
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

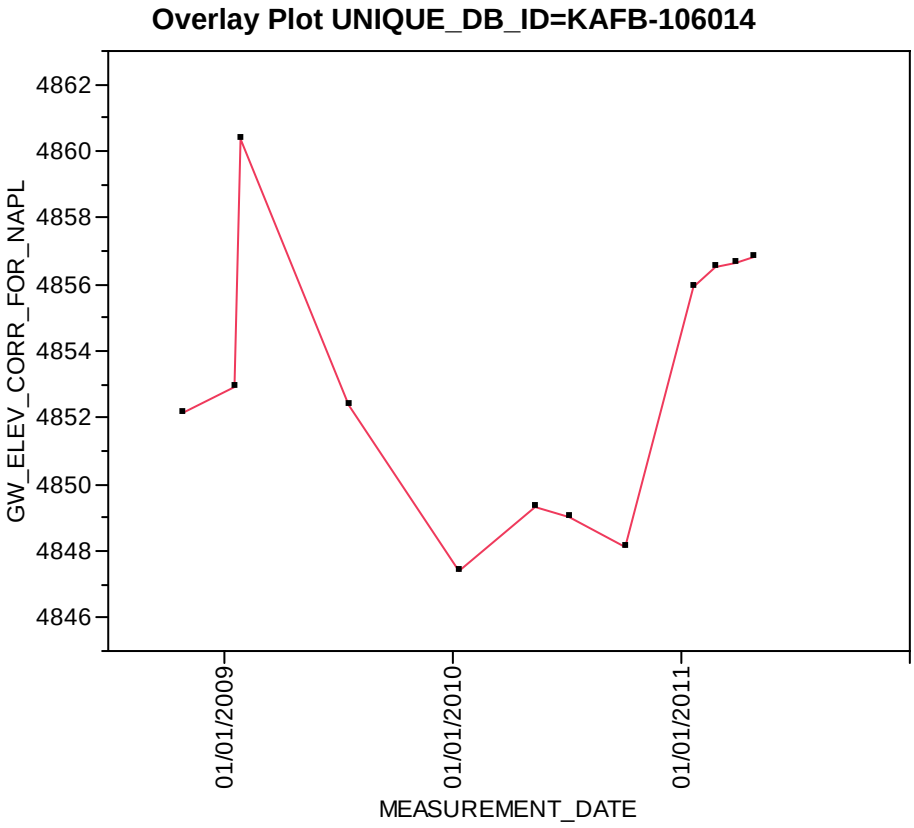

Overlay Plot UNIQUE_DB_ID=KAFB-106009
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

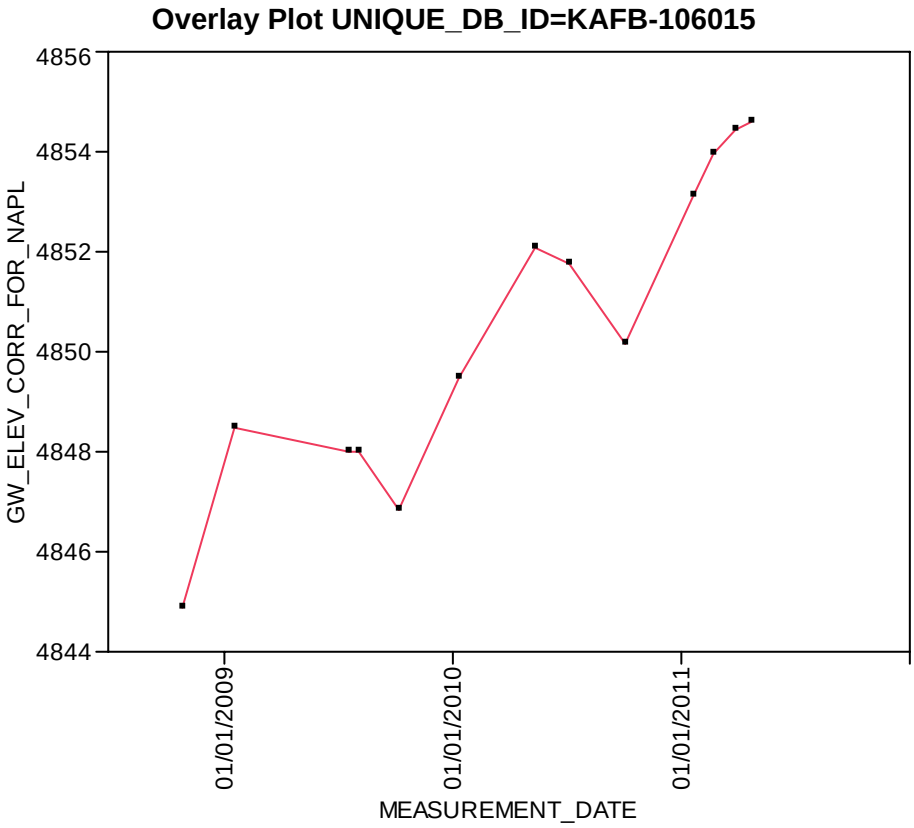

Overlay Plot UNIQUE_DB_ID=KAFB-106010
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
4850
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

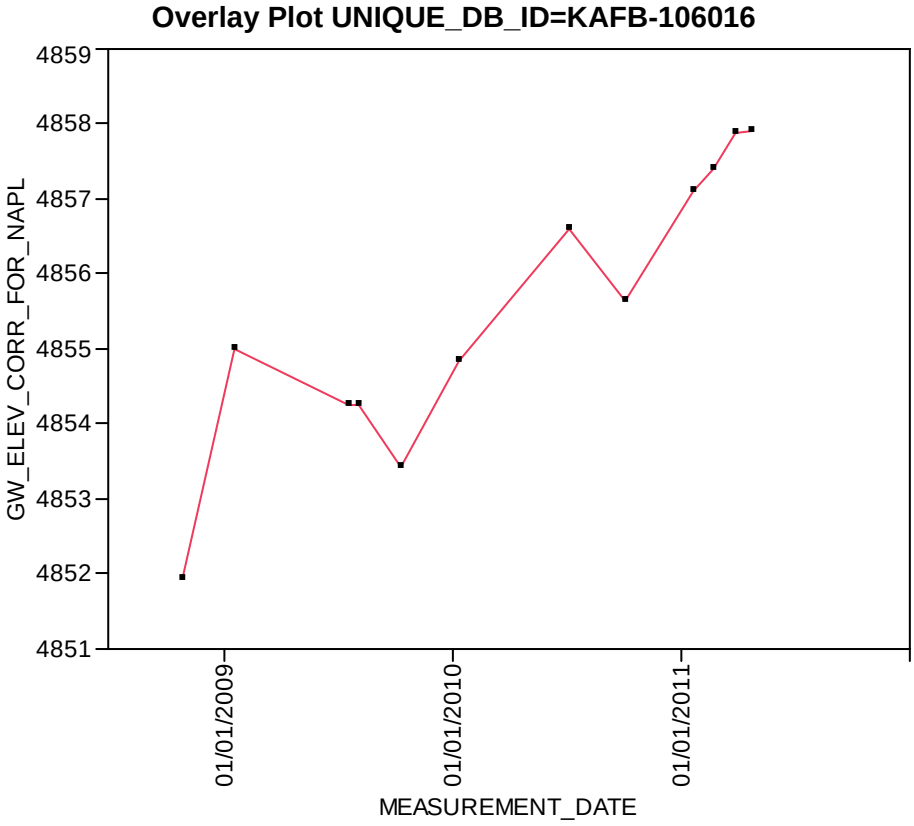

Overlay Plot UNIQUE_DB_ID=KAFB-106011
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

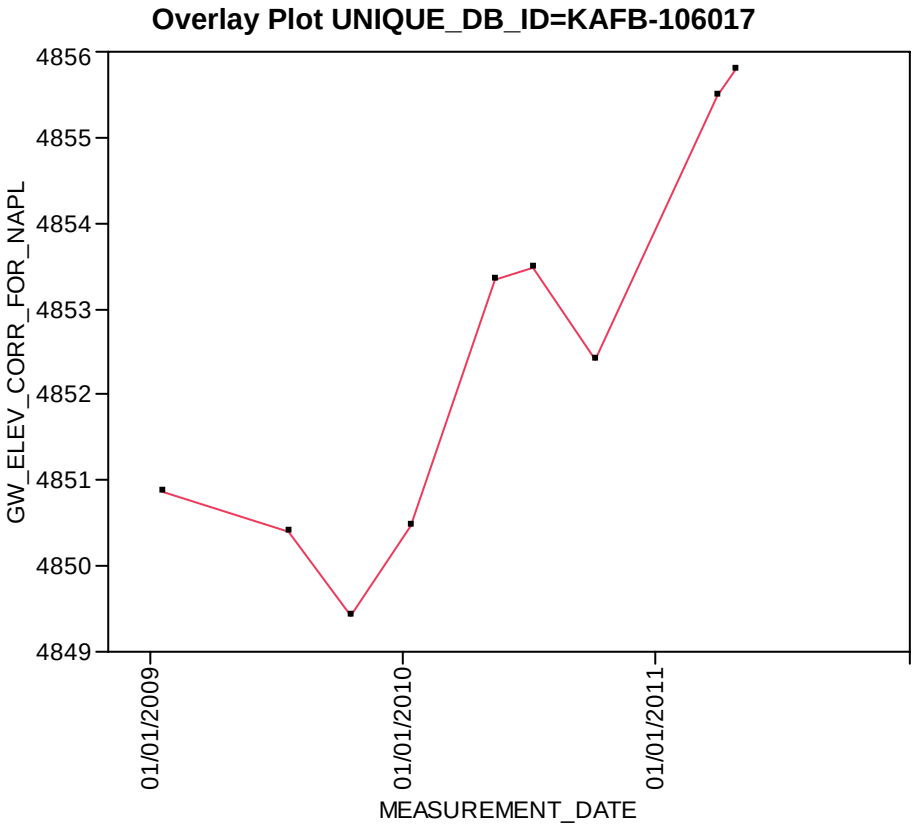

Overlay Plot UNIQUE_DB_ID=KAFB-106012
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

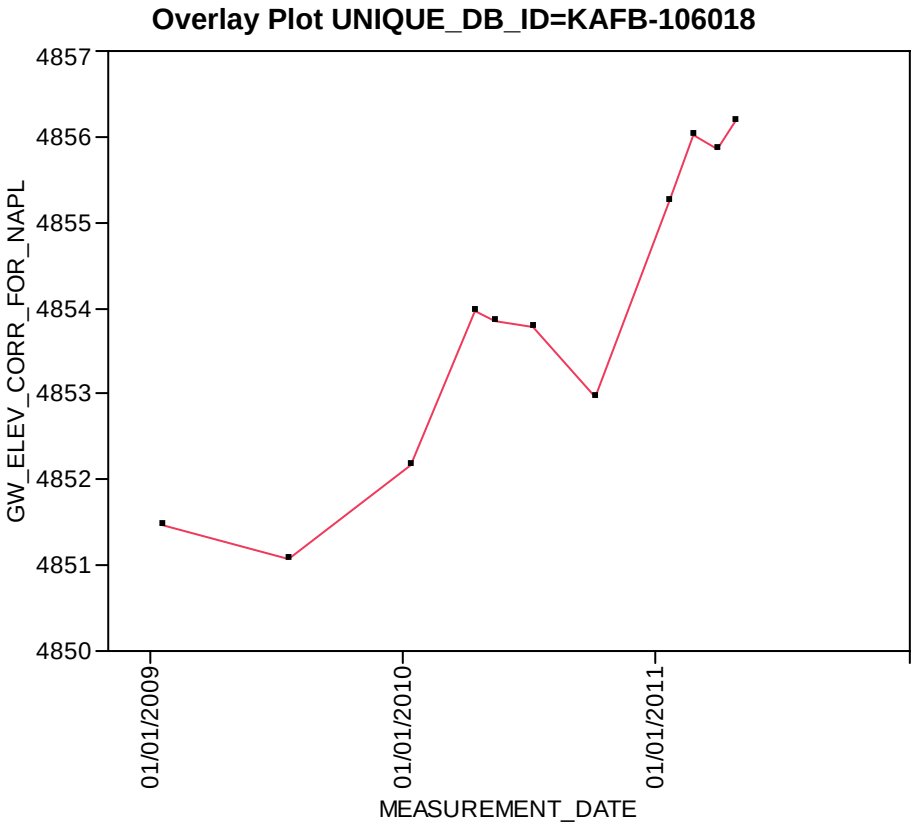

Overlay Plot UNIQUE_DB_ID=KAFB-106013
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
4850
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

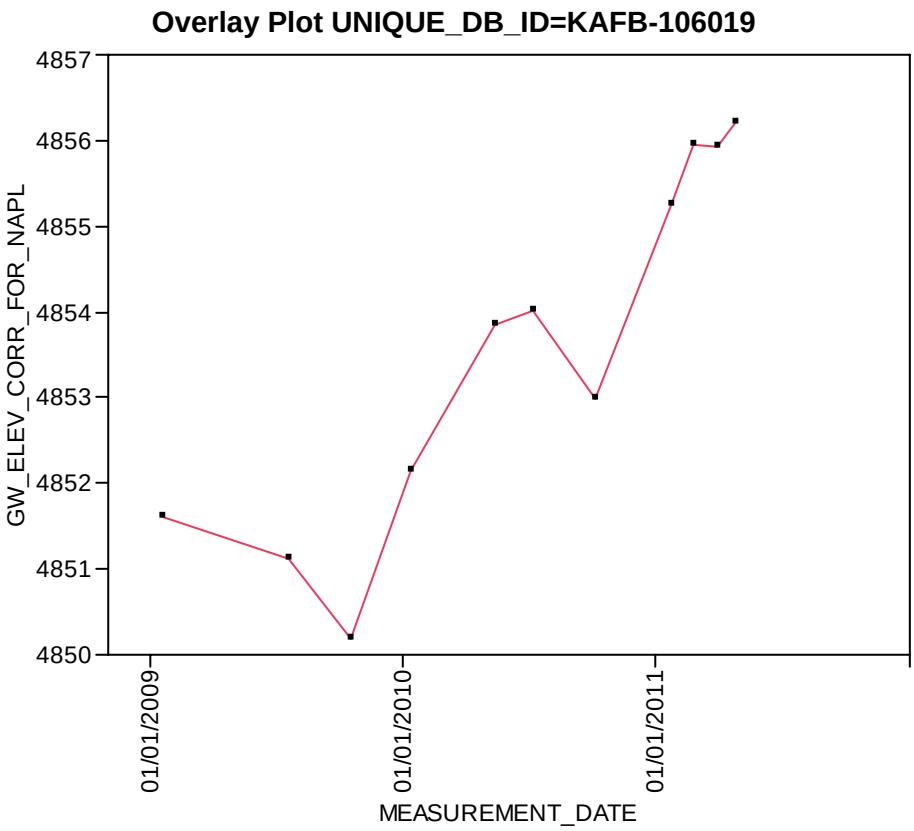

Overlay Plot UNIQUE_DB_ID=KAFB-106014
GW_ELEV_CORR_FOR_NAPL
4862
4860
4858
4856
4854
4852
4850
4848
4846
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

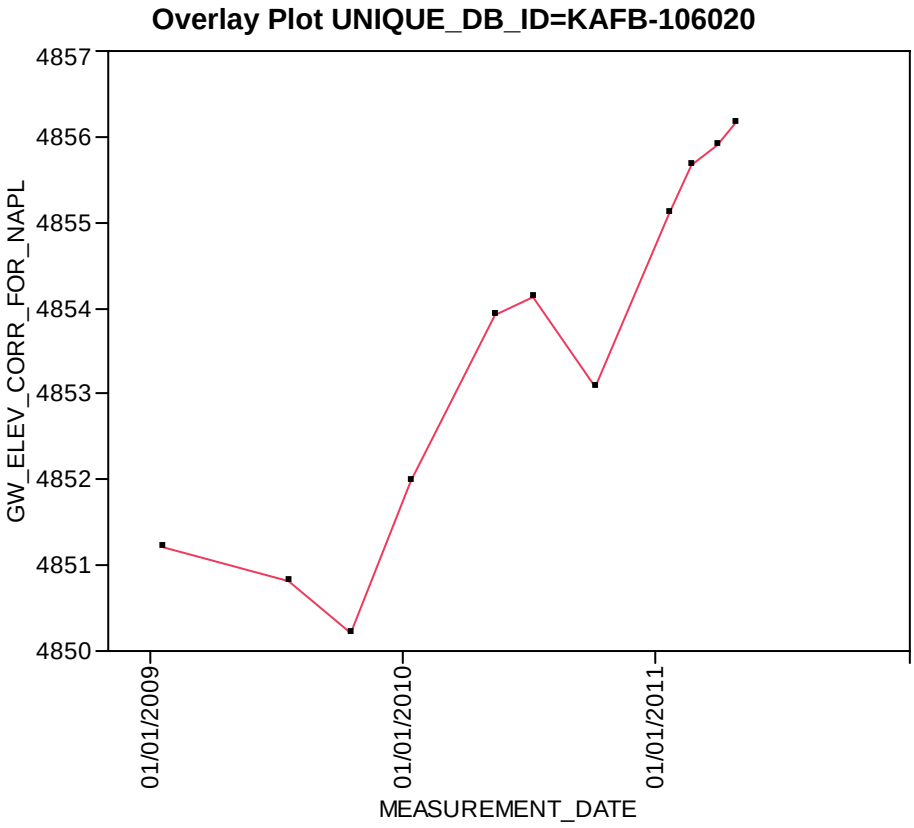

Overlay Plot UNIQUE_DB_ID=KAFB-106015
GW_ELEV_CORR_FOR_NAPL
4856
4854
4852
4850
4848
4846
4844
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

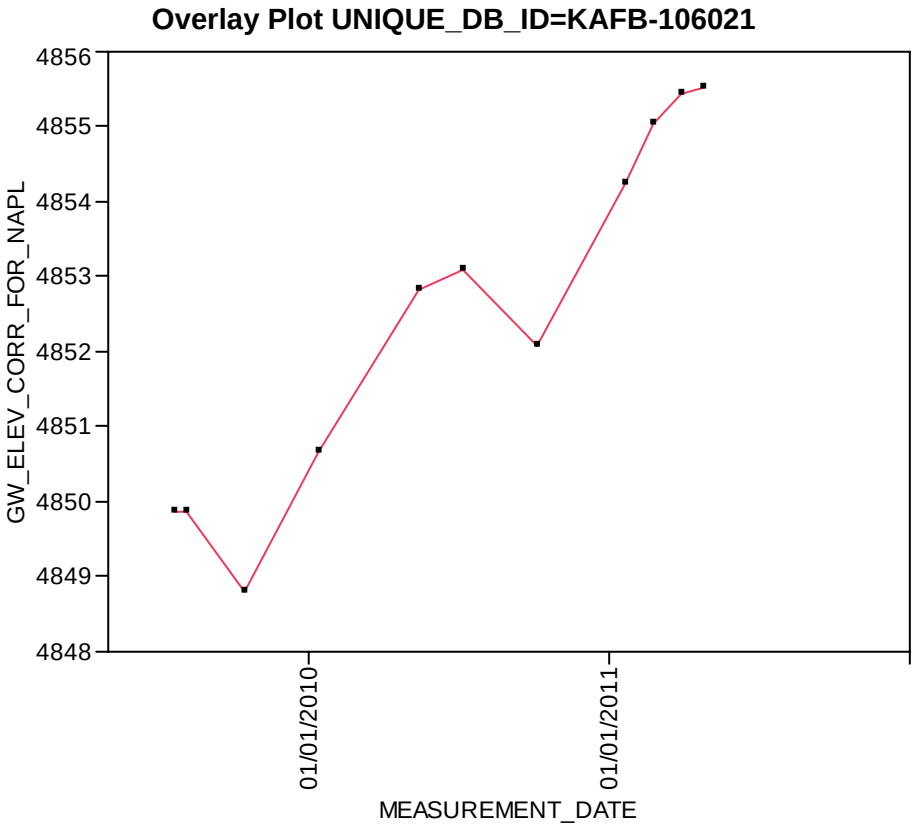

Overlay Plot UNIQUE_DB_ID=KAFB-106016
GW_ELEV_CORR_FOR_NAPL
4859
4858
4857
4856
4855
4854
4853
4852
4851
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

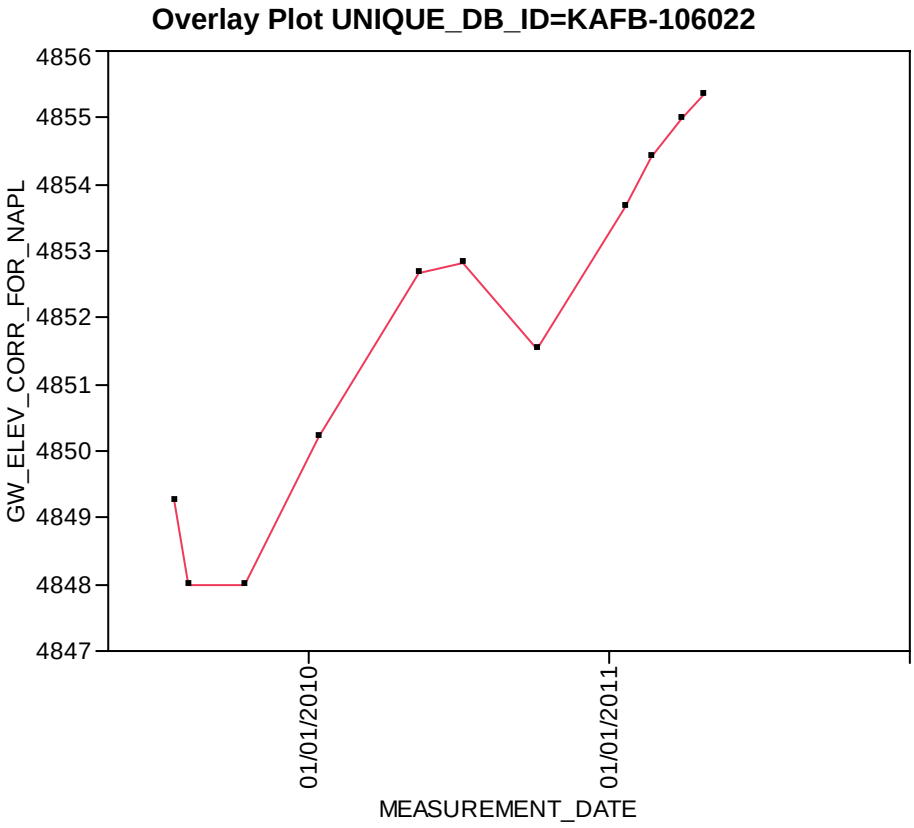

Overlay Plot UNIQUE_DB_ID=KAFB-106017
GW_ELEV_CORR_FOR_NAPL
4856
4855
4854
4853
4852
4851
4850
4849
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

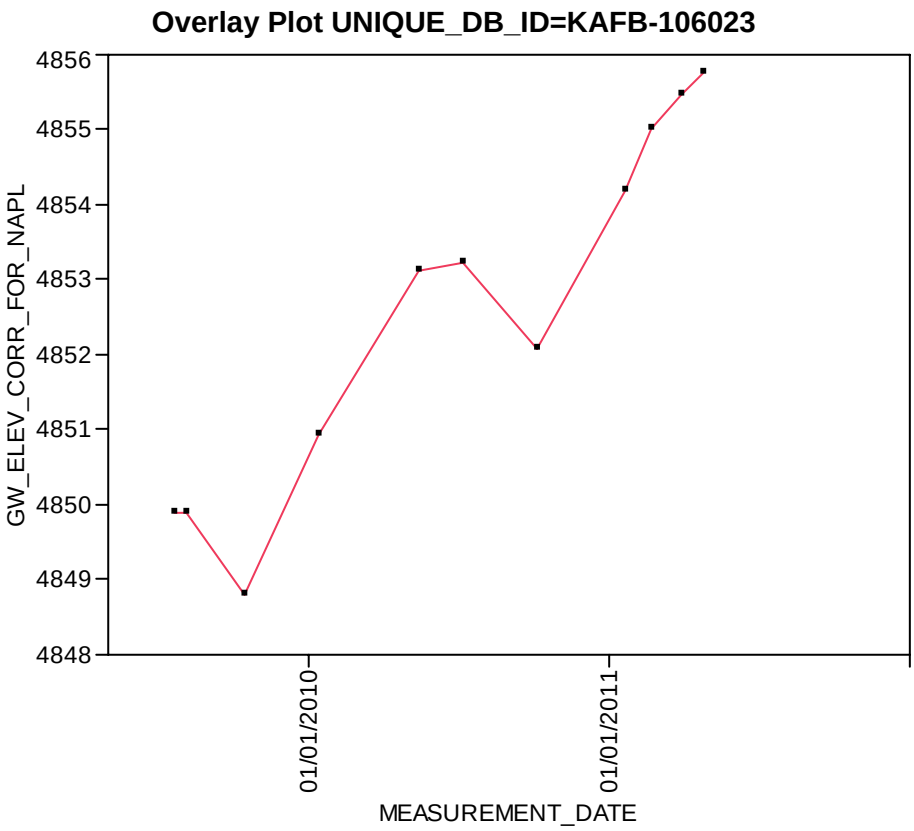

Overlay Plot UNIQUE_DB_ID=KAFB-106018
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
4850
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

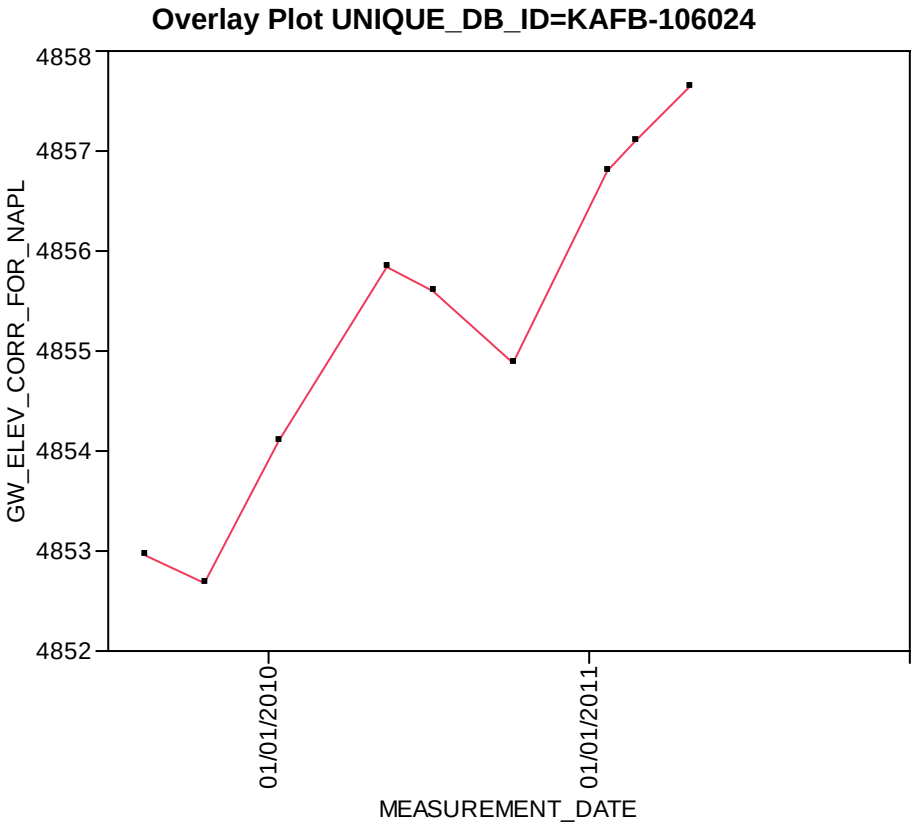

Overlay Plot UNIQUE_DB_ID=KAFB-106019
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
4850
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

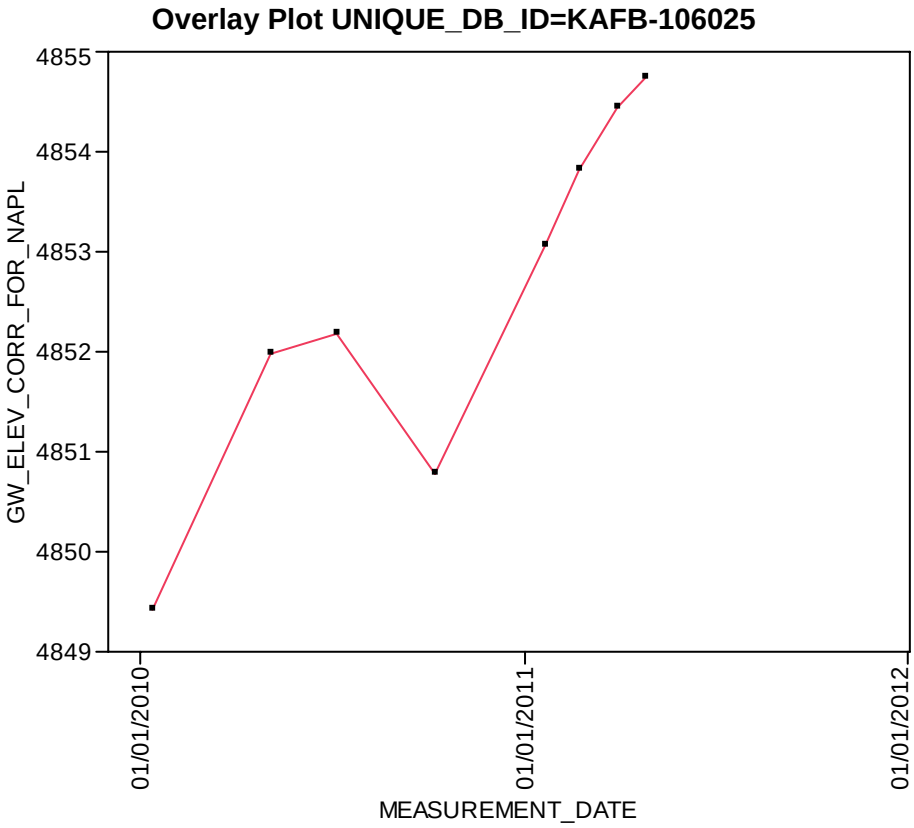

Overlay Plot UNIQUE_DB_ID=KAFB-106020
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
4851
4850
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

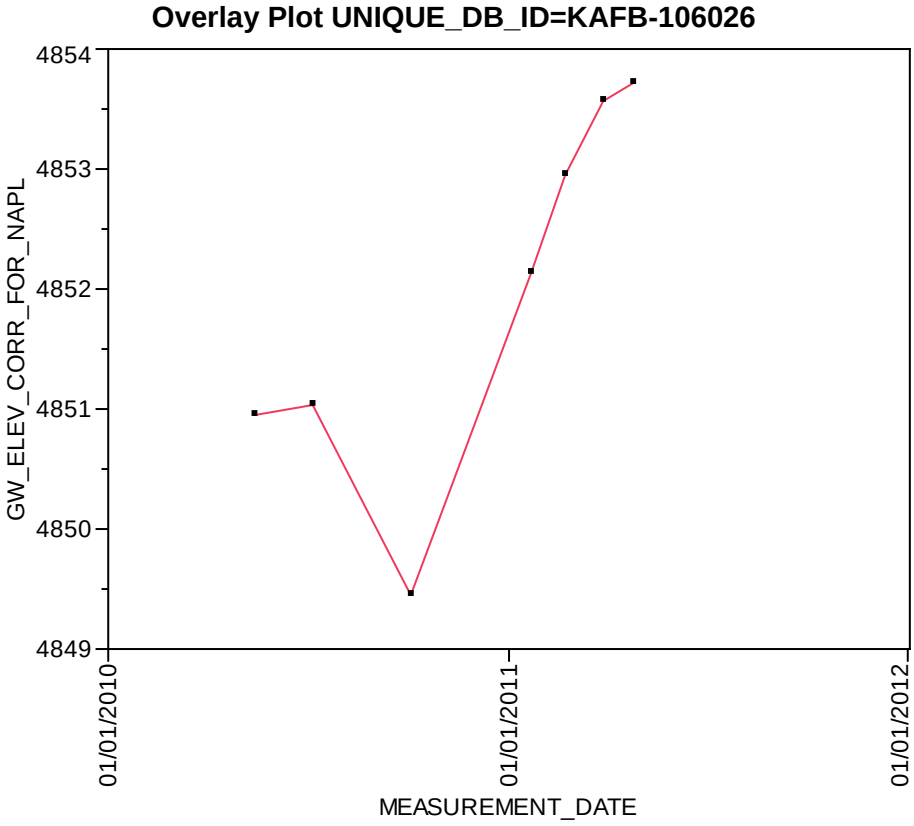

Overlay Plot UNIQUE_DB_ID=KAFB-106021
4856
4855
4854
4853
4852
4851
4850
4849
4848
GW_ELEV_CORR_FOR_NAPL
01/01/2010
01/01/2011
MEASUREMENT_DATE

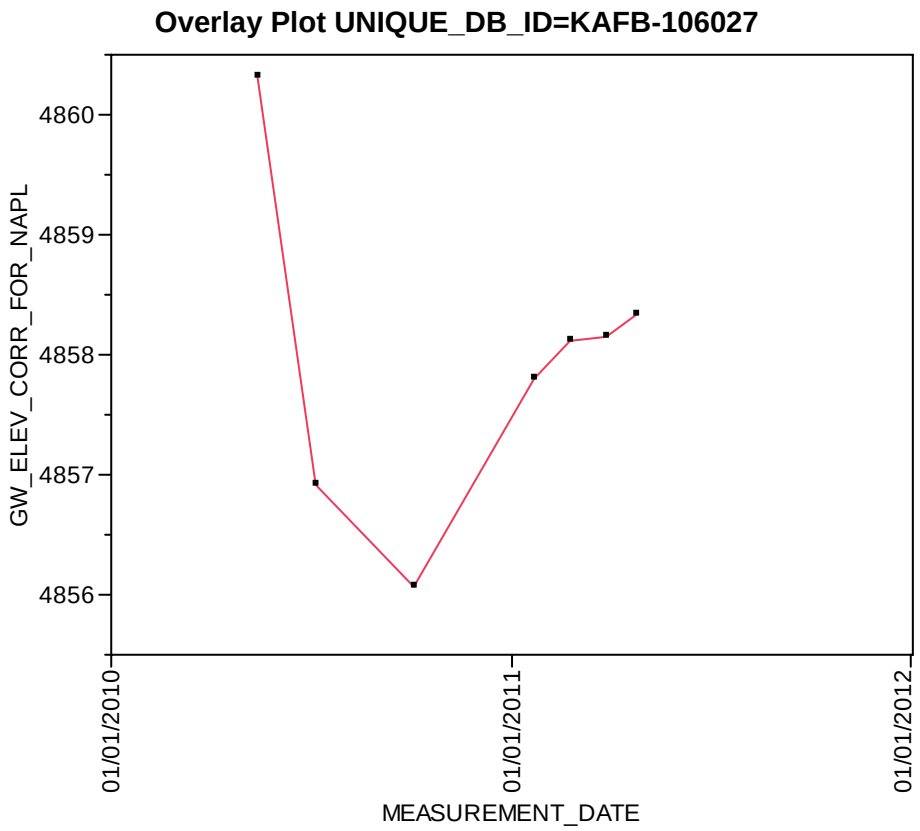

Overlay Plot UNIQUE_DB_ID=KAFB-106022
4856
4855
4854
4853
4852
4851
4850
4849
4848
4847
GW_ELEV_CORR_FOR_NAPL
01/01/2010
01/01/2011
MEASUREMENT_DATE

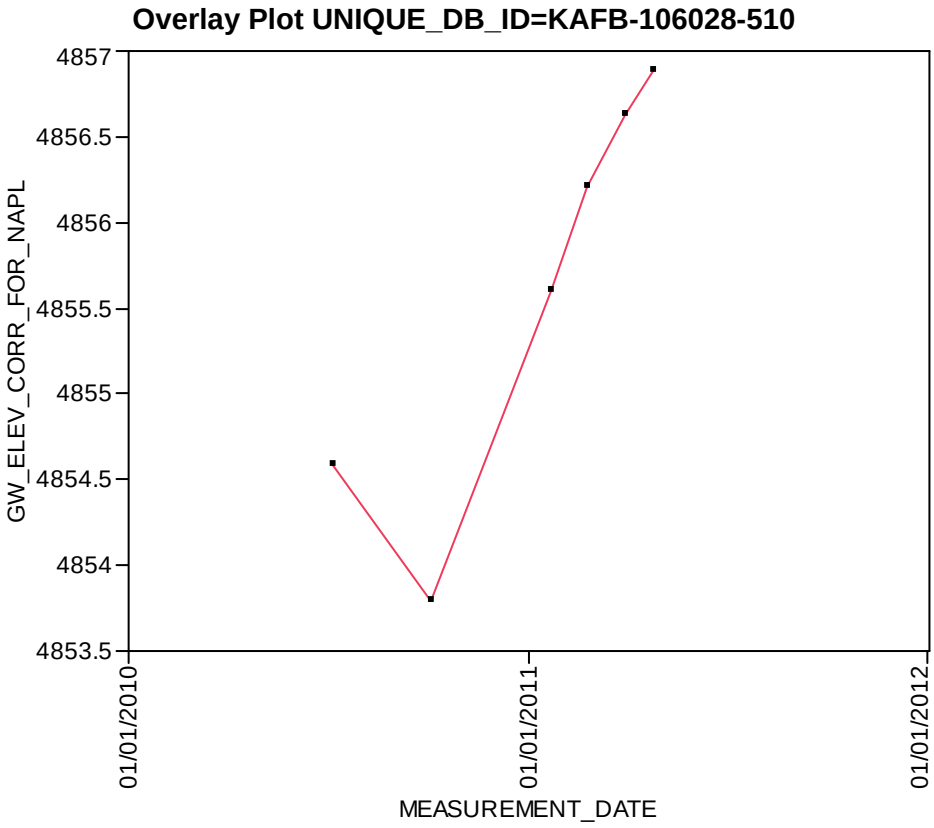

Overlay Plot UNIQUE_DB_ID=KAFB-106023
GW_ELEV_CORR_FOR_NAPL
4856
4855
4854
4853
4852
4851
4850
4849
4848
01/01/2010
01/01/2011
MEASUREMENT_DATE

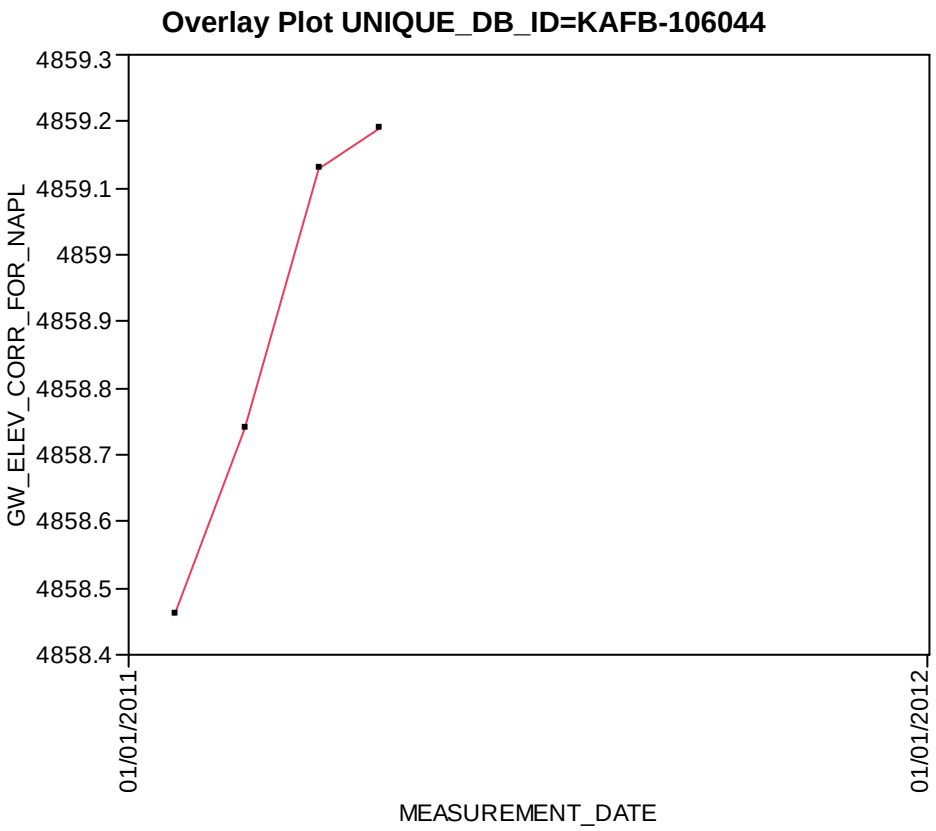

Overlay Plot UNIQUE_DB_ID=KAFB-106024
GW_ELEV_CORR_FOR_NAPL
4858
4857
4856
4855
4854
4853
4852
01/01/2010
01/01/2011
MEASUREMENT_DATE

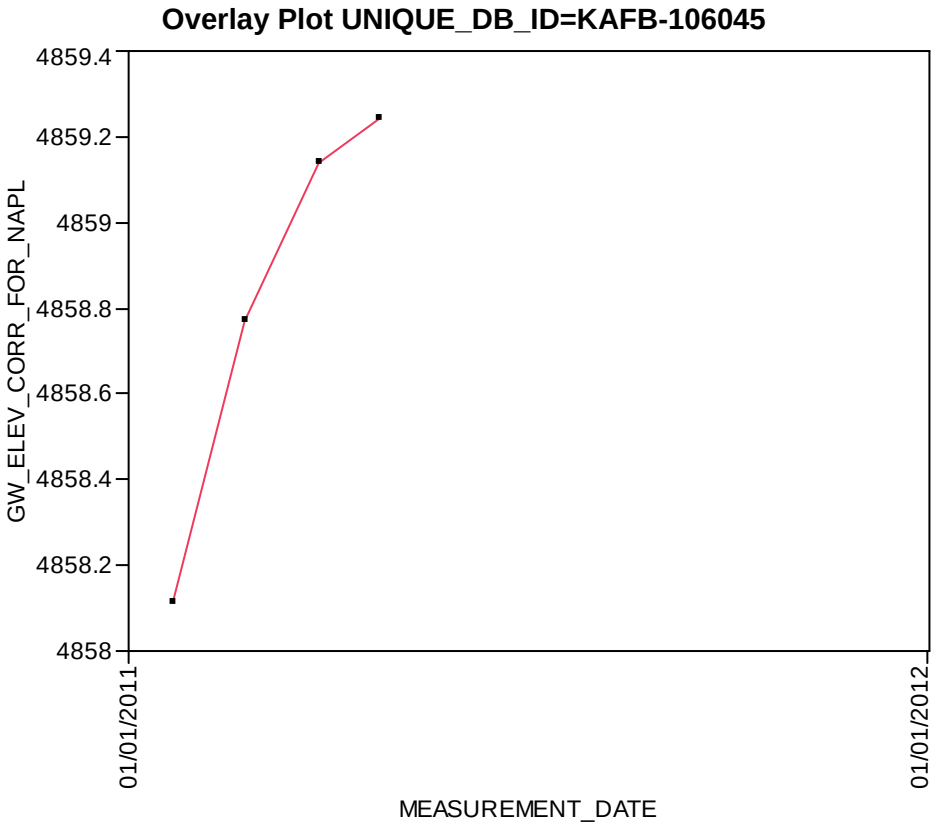

Overlay Plot UNIQUE_DB_ID=KAFB-106025
GW_ELEV_CORR_FOR_NAPL
4855
4854
4853
4852
4851
4850
4849
01/01/2010
01/01/2011
01/01/2012
MEASUREMENT_DATE

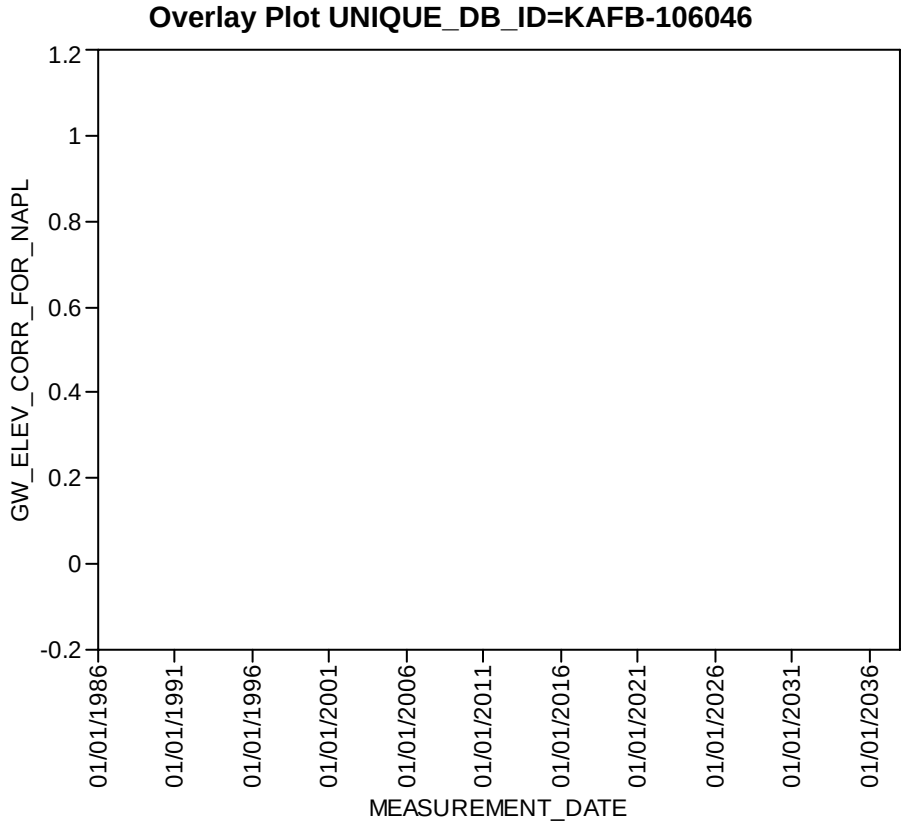

Overlay Plot UNIQUE_DB_ID=KAFB-106026
GW_ELEV_CORR_FOR_NAPL
4854
4853
4852
4851
4850
4849
01/01/2010
01/01/2011
01/01/2012
MEASUREMENT_DATE

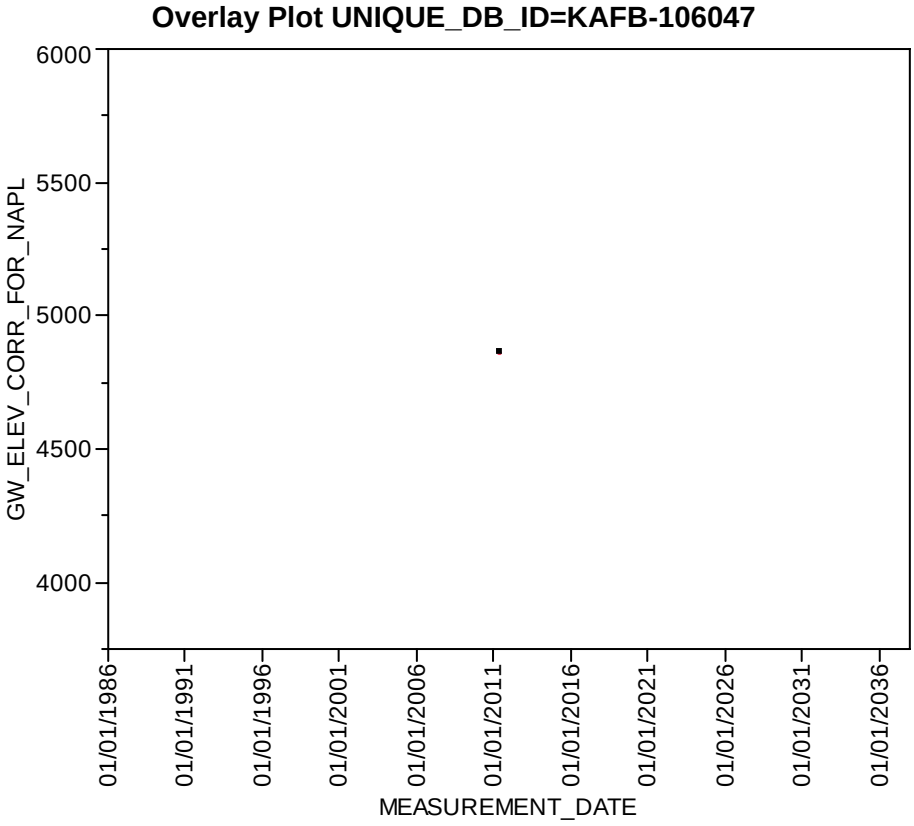

Overlay Plot UNIQUE_DB_ID=KAFB-106027
GW_ELEV_CORR_FOR_NAPL
4860
4859
4858
4857
4856
01/01/2010
01/01/2011
01/01/2012
MEASUREMENT_DATE

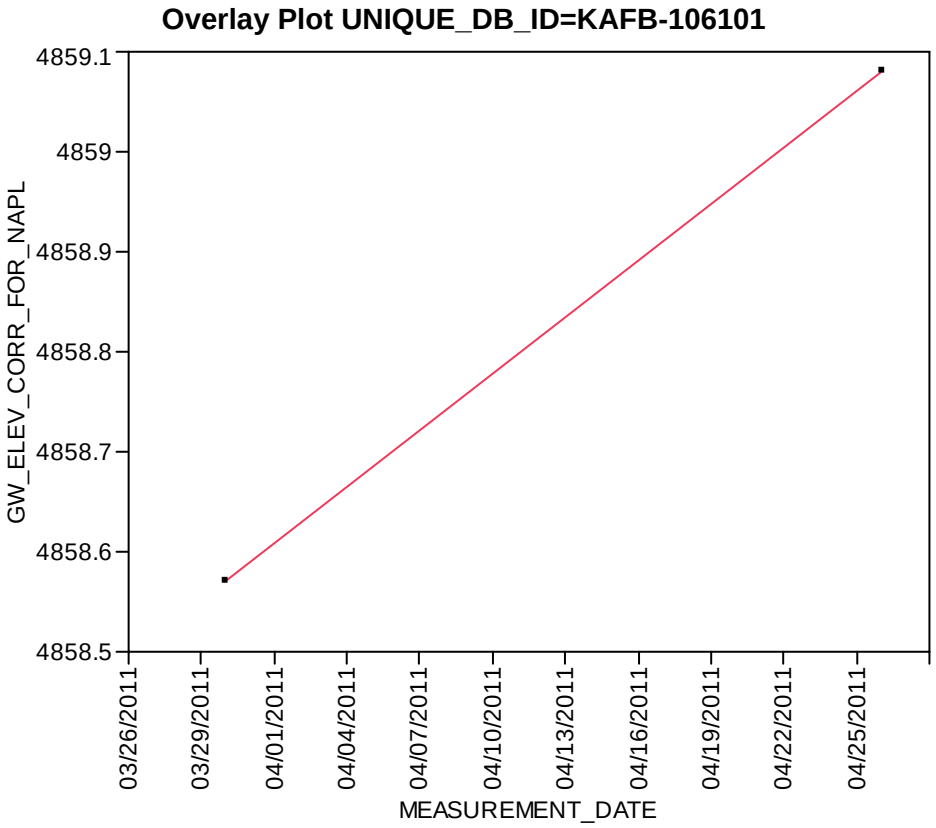

Overlay Plot UNIQUE_DB_ID=KAFB-106028-510
GW_ELEV_CORR_FOR_NAPL
4857
4856.5
4856
4855.5
4855
4854.5
4854
4853.5
01/01/2010
01/01/2011
01/01/2012
MEASUREMENT_DATE

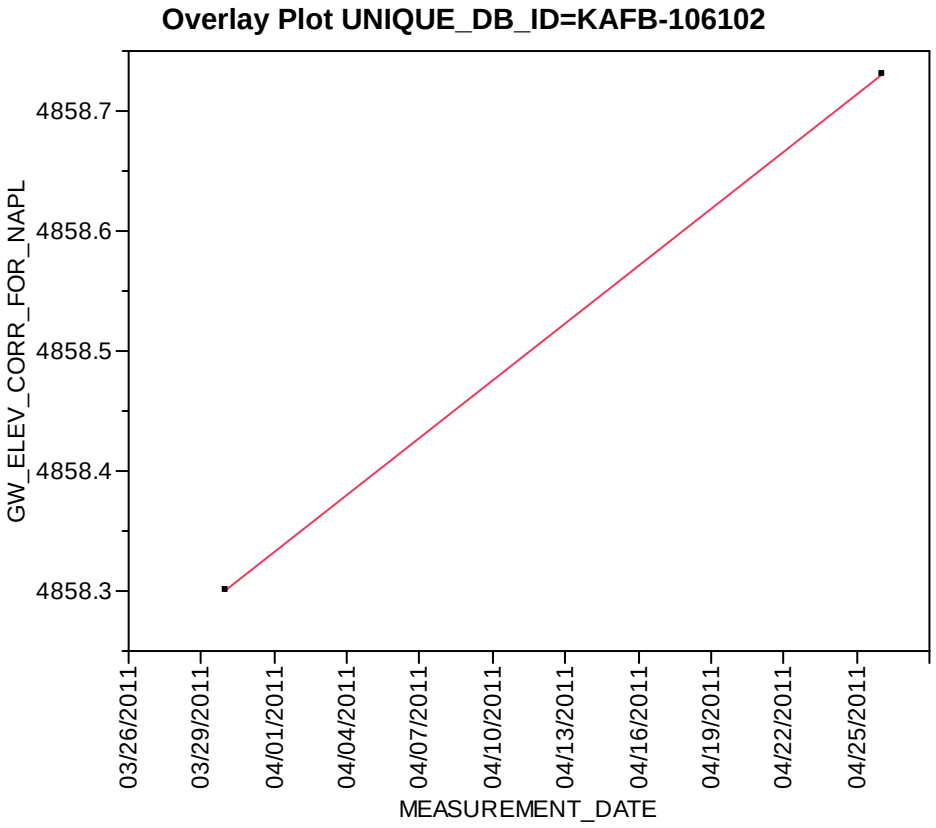

Overlay Plot UNIQUE_DB_ID=KAFB-106044
4859.3
4859.2
4859.1
4859
4858.9
4858.8
4858.7
4858.6
4858.5
4858.4
GW_ELEV_CORR_FOR_NAPL
01/01/2011
01/01/2012
MEASUREMENT_DATE

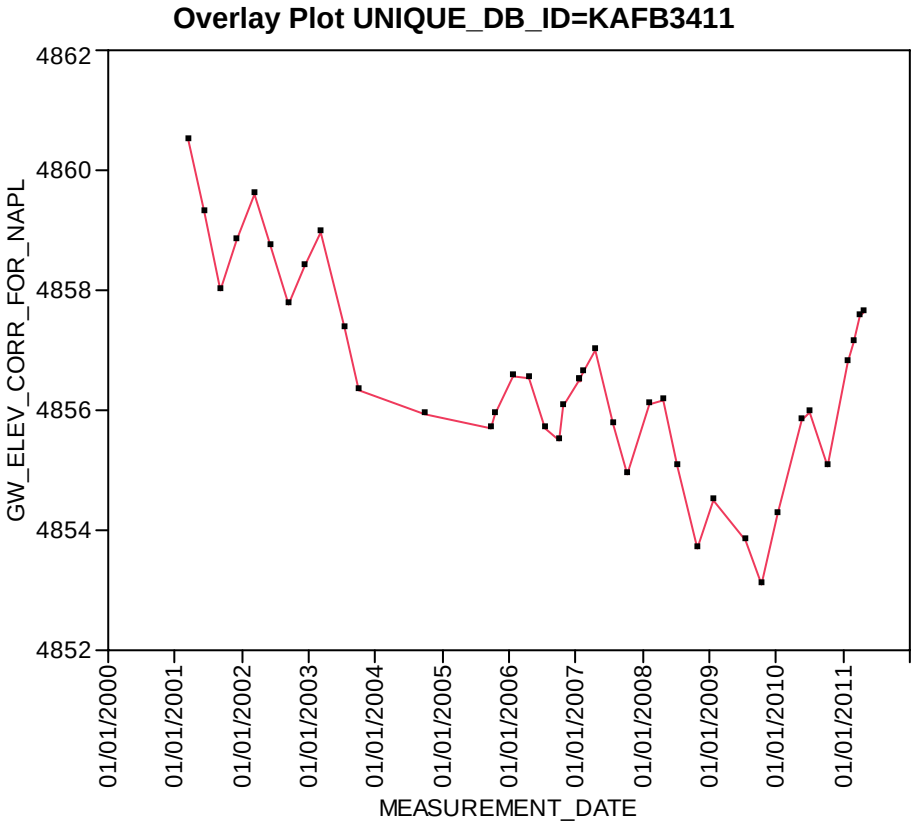

Overlay Plot UNIQUE_DB_ID=KAFB-106045
4859.4
4859.2
4859
4858.8
4858.6
4858.4
4858.2
4858
GW_ELEV_CORR_FOR_NAPL
01/01/2011
01/01/2012
MEASUREMENT_DATE


Overlay Plot UNIQUE_DB_ID=KAFB-106046
GW_ELEV_CORR_FOR_NAPL
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
01/01/1986
01/01/1991
01/01/1996
01/01/2001
01/01/2006
01/01/2011
01/01/2016
01/01/2021
01/01/2026
01/01/2031
01/01/2036
MEASUREMENT_DATE


Overlay Plot UNIQUE_DB_ID=KAFB-106047
GW_ELEV_CORR_FOR_NAPL
6000
5500
5000
4500
4000
01/01/1986
01/01/1991
01/01/1996
01/01/2001
01/01/2006
01/01/2011
01/01/2016
01/01/2021
01/01/2026
01/01/2031
01/01/2036
MEASUREMENT_DATE


Overlay Plot UNIQUE_DB_ID=KAFB-106101
GW_ELEV_CORR_FOR_NAPL
4859.1
4859
4858.9
4858.8
4858.7
4858.6
4858.5
03/26/2011
03/29/2011
04/01/2011
04/04/2011
04/07/2011
04/10/2011
04/13/2011
04/16/2011
04/19/2011
04/22/2011
04/25/2011
MEASUREMENT_DATE


Overlay Plot UNIQUE_DB_ID=KAFB-106102
GW_ELEV_CORR_FOR_NAPL
4858.7
4858.6
4858.5
4858.4
4858.3
03/26/2011
03/29/2011
04/01/2011
04/04/2011
04/07/2011
04/10/2011
04/13/2011
04/16/2011
04/19/2011
04/22/2011
04/25/2011
MEASUREMENT_DATE

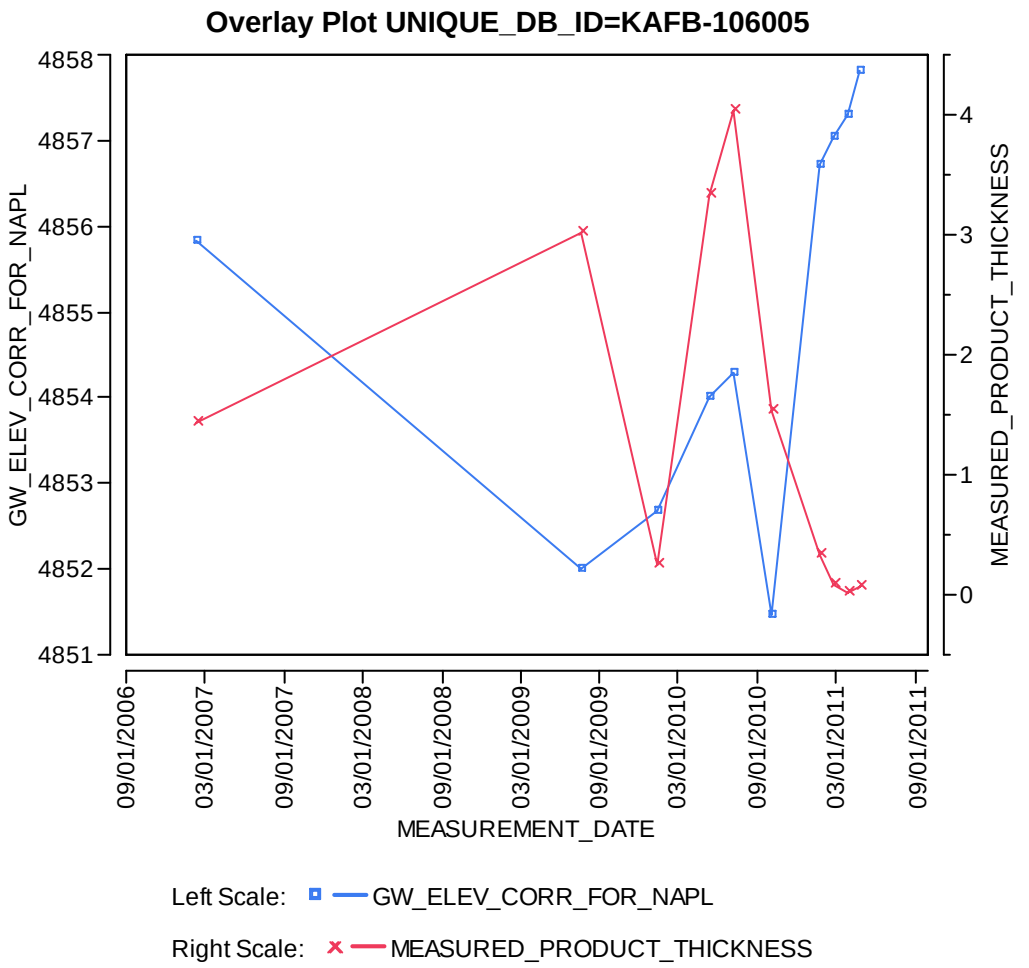

Overlay Plot UNIQUE_DB_ID=KAFB3411
GW_ELEV_CORR_FOR_NAPL
4862
4860
4858
4856
4854
4852
01/01/2000
01/01/2001
01/01/2002
01/01/2003
01/01/2004
01/01/2005
01/01/2006
01/01/2007
01/01/2008
01/01/2009
01/01/2010
01/01/2011
MEASUREMENT_DATE

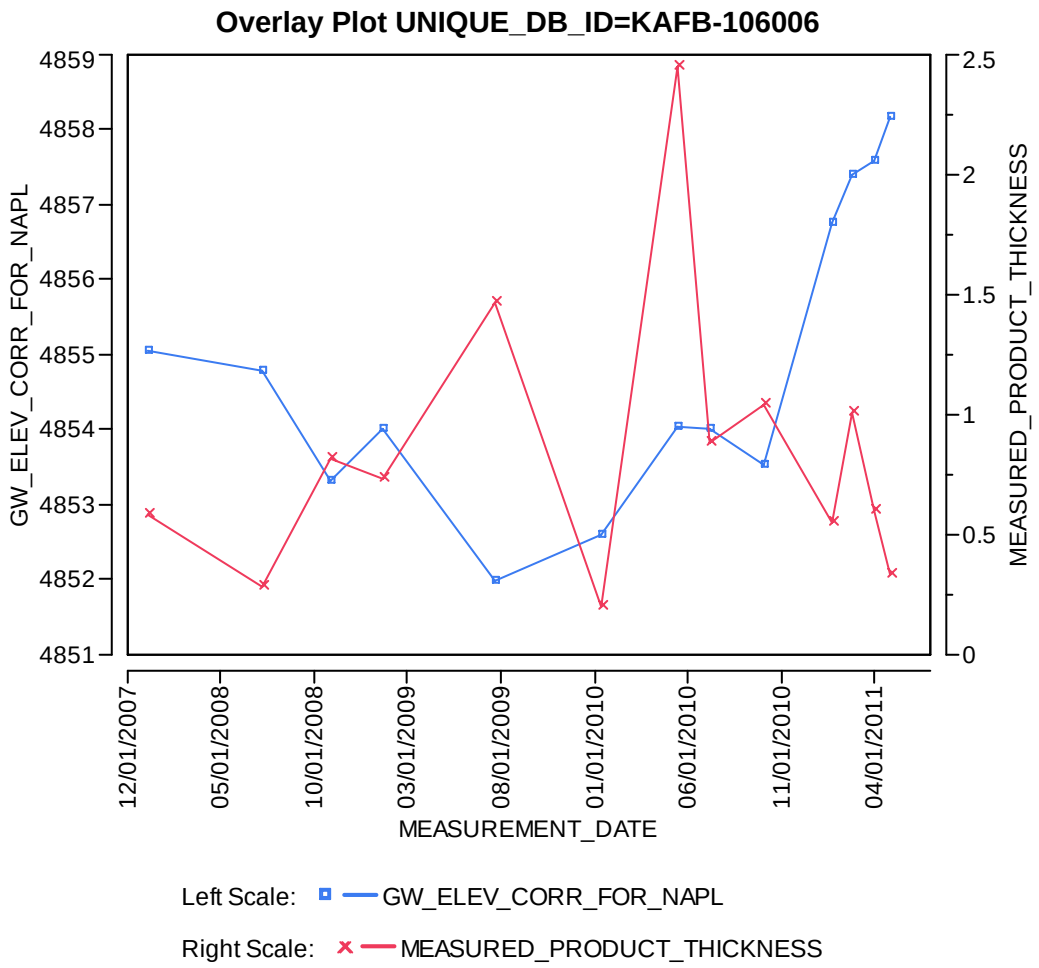
THIS PAGE INTENTIONALLY LEFT BLANK

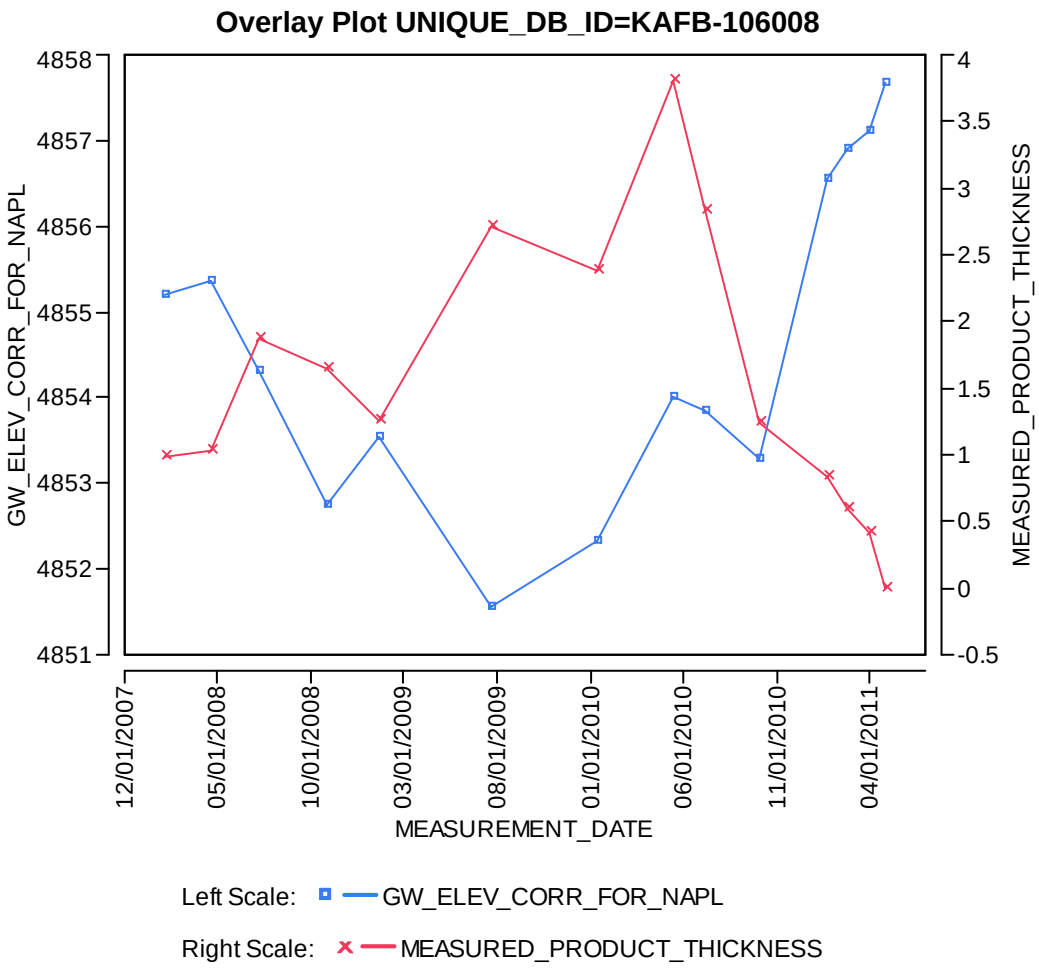
APPENDIX F-2

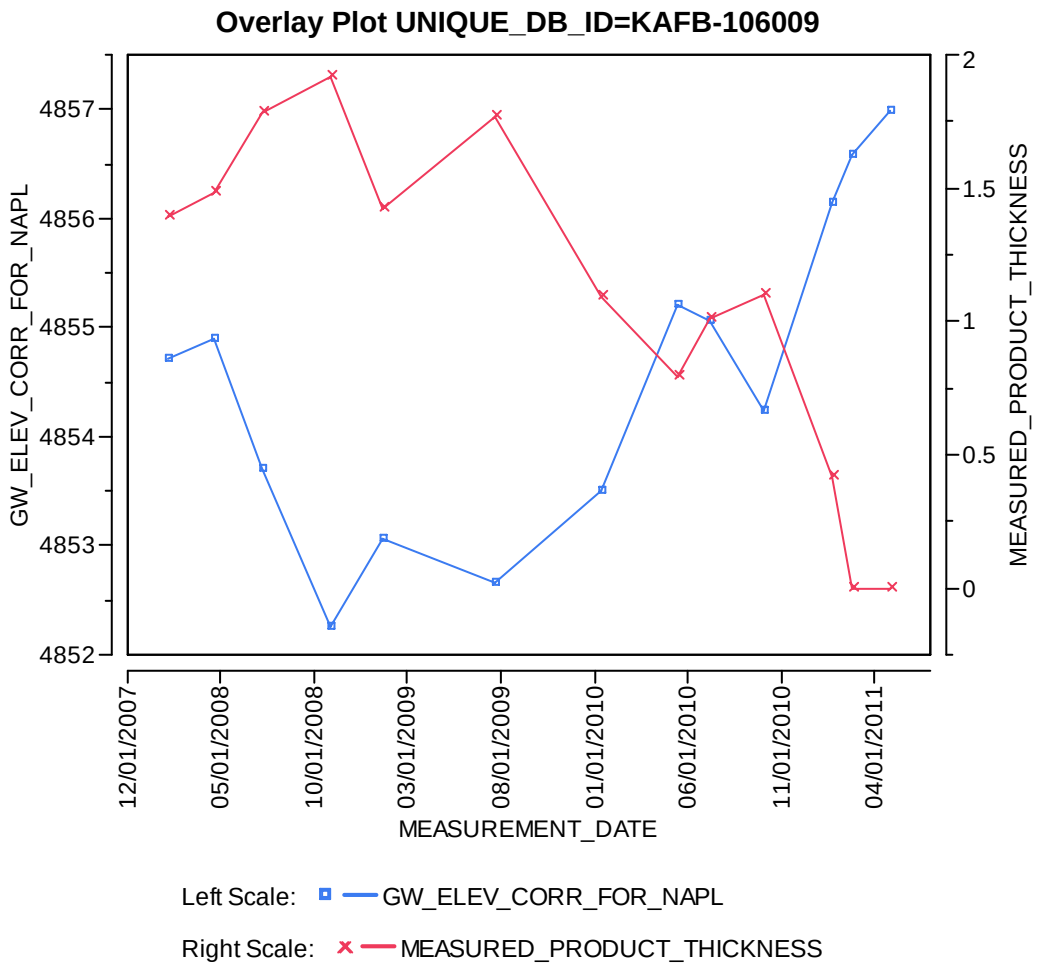
NAPL Measurements
January – March 2011

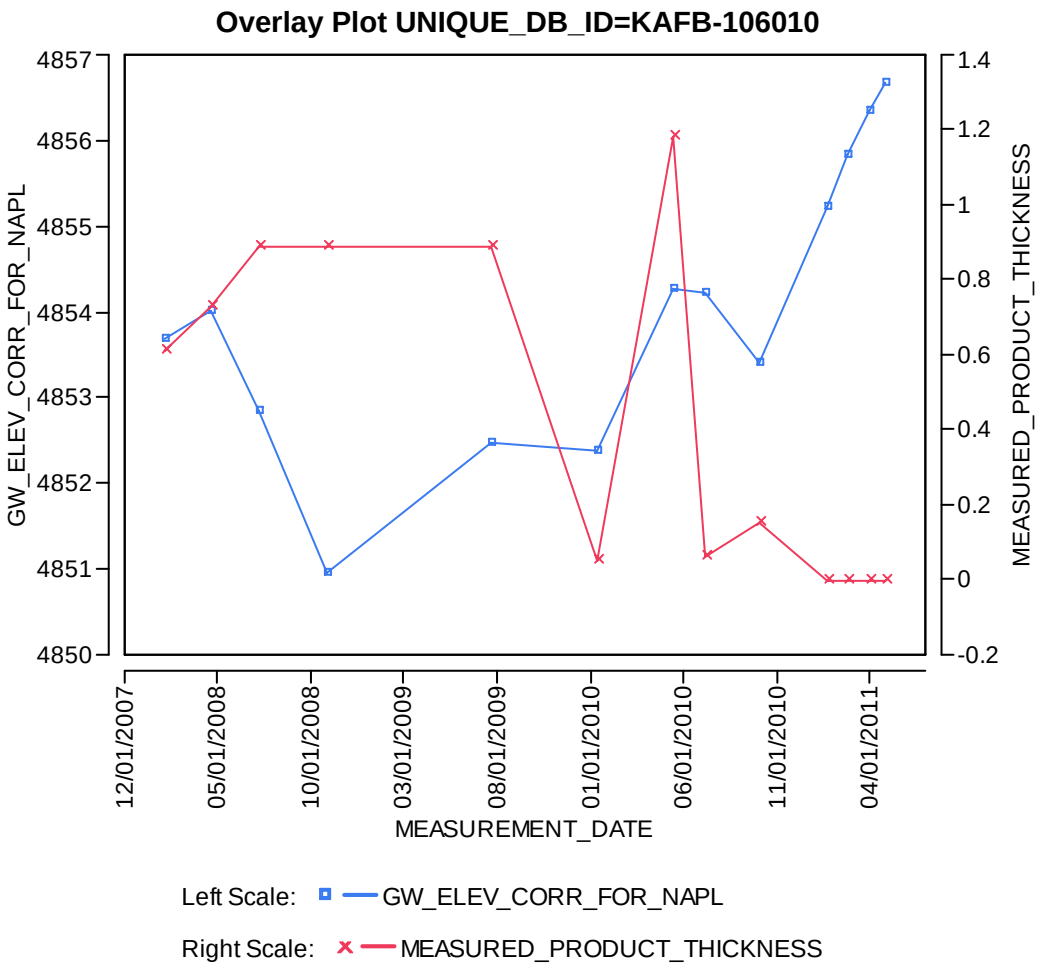
THIS PAGE INTENTIONALLY LEFT BLANK

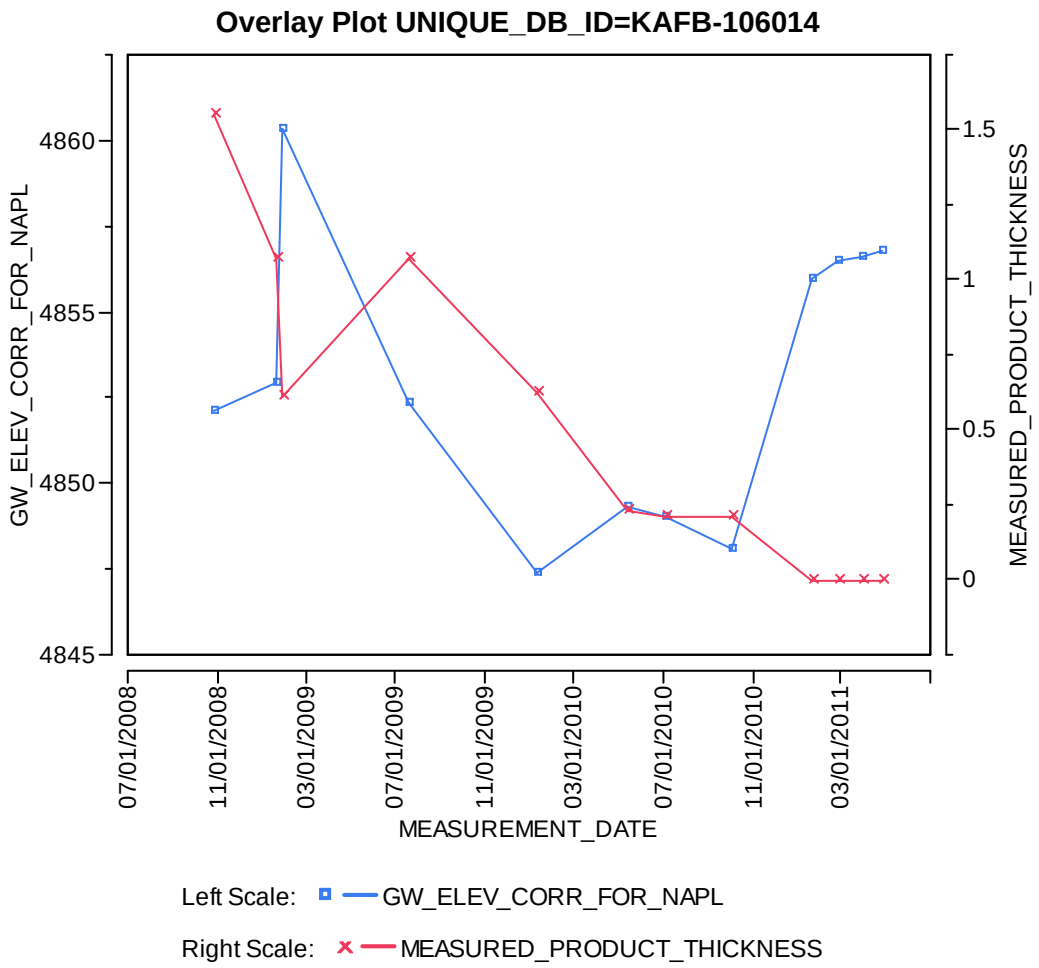

Overlay Plot UNIQUE_DB_ID=KAFB-106005
GW_ELEV_CORR_FOR_NAPL
MEASURED_PRODUCT_THICKNESS
4858
4857
4856
4855
4854
4853
4852
4851
4
3
2
1
0
09/01/2006
03/01/2007
09/01/2007
03/01/2008
09/01/2008
03/01/2009
09/01/2009
03/01/2010
09/01/2010
03/01/2011
09/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS

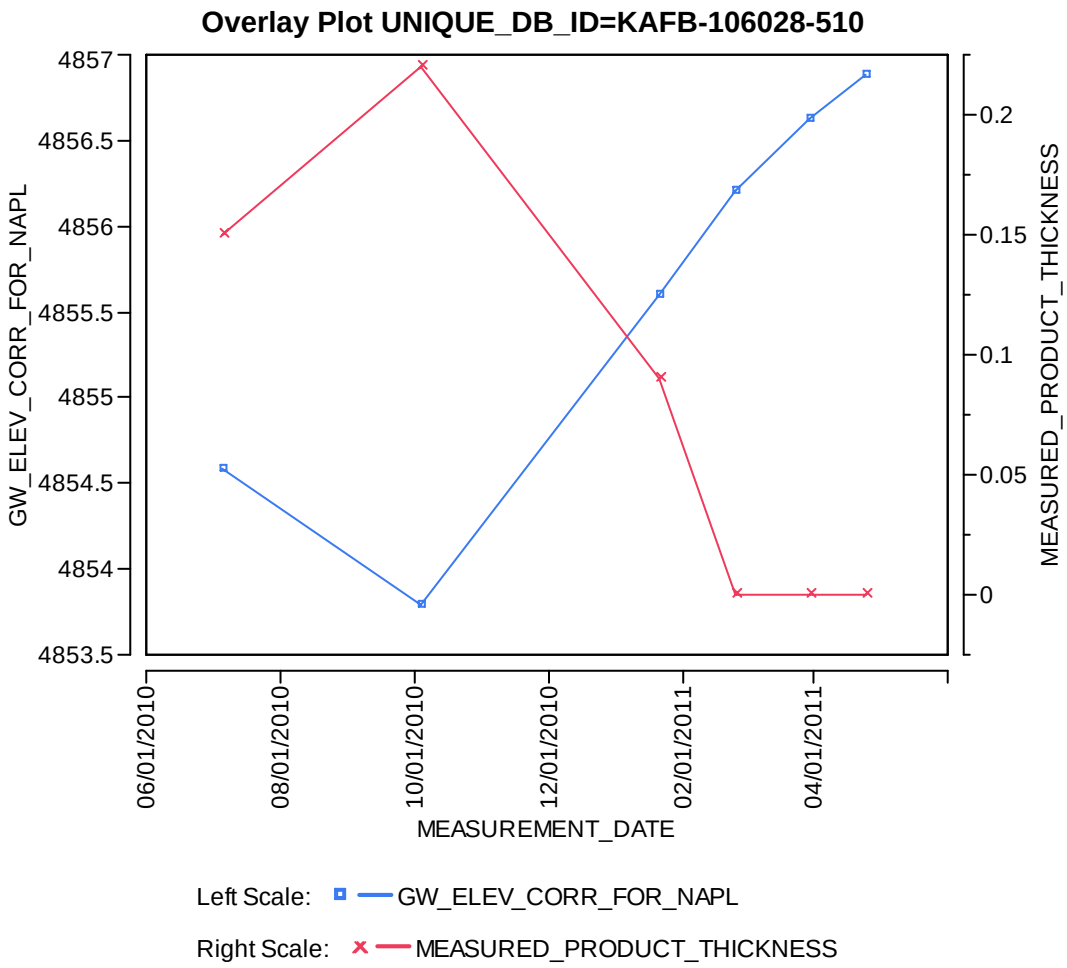

Overlay Plot UNIQUE_DB_ID=KAFB-106006
GW_ELEV_CORR_FOR_NAPL
MEASURED_PRODUCT_THICKNESS
4859
4858
4857
4856
4855
4854
4853
4852
4851
2.5
2
1.5
1
0.5
0
12/01/2007
05/01/2008
10/01/2008
03/01/2009
08/01/2009
01/01/2010
06/01/2010
11/01/2010
04/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS


Overlay Plot UNIQUE_DB_ID=KAFB-106008
GW_ELEV_CORR_FOR_NAPL
MEASURED_PRODUCT_THICKNESS
4858
4857
4856
4855
4854
4853
4852
4851
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
12/01/2007
05/01/2008
10/01/2008
03/01/2009
08/01/2009
01/01/2010
06/01/2010
11/01/2010
04/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS


Overlay Plot UNIQUE_DB_ID=KAFB-106009
GW_ELEV_CORR_FOR_NAPL
4857
4856
4855
4854
4853
4852
MEASURED_PRODUCT_THICKNESS
2
1.5
1
0.5
0
12/01/2007
05/01/2008
10/01/2008
03/01/2009
08/01/2009
01/01/2010
06/01/2010
11/01/2010
04/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS


Overlay Plot UNIQUE_DB_ID=KAFB-106010
GW_ELEV_CORR_FOR_NAPL
MEASURED_PRODUCT_THICKNESS
4857
4856
4855
4854
4853
4852
4851
4850
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
12/01/2007
05/01/2008
10/01/2008
03/01/2009
08/01/2009
01/01/2010
06/01/2010
11/01/2010
04/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS


Overlay Plot UNIQUE_DB_ID=KAFB-106014
GW_ELEV_CORR_FOR_NAPL
4860
4855
4850
4845
MEASURED_PRODUCT_THICKNESS
1.5
1
0.5
0
07/01/2008
11/01/2008
03/01/2009
07/01/2009
11/01/2009
03/01/2010
07/01/2010
11/01/2010
03/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS


Overlay Plot UNIQUE_DB_ID=KAFB-106028-510
GW_ELEV_CORR_FOR_NAPL
4857
4856.5
4856
4855.5
4855
4854.5
4854
4853.5
MEASURED_PRODUCT_THICKNESS
0.2
0.15
0.1
0.05
0
06/01/2010
08/01/2010
10/01/2010
12/01/2010
02/01/2011
04/01/2011
MEASUREMENT_DATE
Left Scale: GW_ELEV_CORR_FOR_NAPL
Right Scale: MEASURED_PRODUCT_THICKNESS

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-2

Shallow Soil Boring Logs

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106143

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/17/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5345.1
Y Coordinate: 1472820.46
X Coordinate: 1542550.46

Hole Diameter Upper (in.): 2
Hole Diameter Lower (in.): 2
Surface Completion Type:

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: JR Drilling
Drilling Method: Direct Push (Geoprobe)
Logged By: Dale Flores

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0		106143-00	0.0		Poorly graded SAND with Silt (SP-SM); pinkish white; (7.5YR 8/2); dry; very loose; 90% very fine sand to 0.1mm; rounded; 10% silt; no odor.	SP-SM		Description from hand auger cuttings.
5		106143-05	0.0		Silty SAND (SM); reddish yellow (7.5YR 6/6); dry; very loose; 80% very fine sand; subrounded; 5% fine gravel to 5mm; subrounded; 15% silt; no odor.	SM		
10		106143-10	0.0		Same as above (5 ft).			
15		106143-15	0.0		SILT (ML); strong brown (7.5YR 4/6); dry; firm; non plastic; 90% silt; 10% very fine sand to 0.2mm; no odor.	ML		
20		106143-20	0.0		Same as above (12 ft).			Total depth = 20 ft.
25								
30								

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106144

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/16/2011
Date TD Reached: 2/16/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5344.1
Y Coordinate: 1472807.25
X Coordinate: 1542326.20

Hole Diameter Upper (in.): 2
Hole Diameter Lower (in.): 2
Surface Completion Type:

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: JR Drilling
Drilling Method: Direct Push (Geoprobe)
Logged By: Dale Flores

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0								
5		106144-00	0.0		Poorly graded SAND with Silt (SP-SM); pinkish white (7.5YR 8/2); dry; very loose; 90% very fine sand to 0.2mm; subrounded; 10% silt; no odor.	SP-SM		Description from hand auger cuttings.
10		106144-05	0.0		Silty SAND (SM); reddish yellow (7.5YR 6/6); dry; very loose; 80% very fine sand; subrounded; 5% fine gravel to 5mm; subrounded; 15% silt; no odor.	SM		
		106144-10	0.0		Same as above (5 ft).			
15		106144-15	0.0		SILT (ML); light brown (7.5YR 6/4); dry; soft; non plastic; 90% silt; 10% very fine sand to 0.08mm; no odor.	ML		
20		106144-20	0.0					Total depth = 20 ft.
25								
30								

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106145

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/16/2011
Date TD Reached: 2/16/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5343.8
Y Coordinate: 1472777.70
X Coordinate: 1542138.38

Hole Diameter Upper (in.): 2
Hole Diameter Lower (in.): 2
Surface Completion Type:

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: JR Drilling
Drilling Method: Direct Push (Geoprobe)
Logged By: Dale Flores

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0								
5		106145-00	0.0		Poorly graded SAND with Silt (SP-SM); pinkish white (7.5YR 8/2); dry; very loose; 90% very fine sand to 0.2mm; subrounded; 10% silt; slight odor.	SP-SM		Description from hand auger cuttings.
10		106145-05	3.2		Silty SAND (SM); reddish yellow (5YR 6/6); moist; loose; 60% very fine sand to 0.2mm; subrounded; 40% silt; slight odor.			
15		106145-10	0.7		Same as above (5 ft).	SM		
20		106145-15	NR		Same as above (5 ft).			
25		106145-20	1.7		SILT (ML); strong brown (7.5YR 4/6); dry; firm; low plasticity; 90% silt; 10% very fine sand to 0.2mm; no odor.	ML		Total depth = 20 ft.
30								

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106146

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/16/2011
Date TD Reached: 2/16/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1472951.78
X Coordinate: 1542082.71

Hole Diameter Upper (in.): 2
Hole Diameter Lower (in.): 2
Surface Completion Type:

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: JR Drilling
Drilling Method: Direct Push (Geoprobe)
Logged By: Dale Flores

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0								
5		106146-00	0.6		Poorly graded SAND with Silt (SP-SM); pinkish white (7.5YR 8/2); dry; very loose; 90% very fine sand to 0.2mm; subrounded; 10% silt; no odor.	SP-SM		Description from hand auger cuttings.
10		106146-05	0.0		Silty SAND (SM); reddish yellow (7.5YR 6/6); dry; very loose; 80% very fine sand; subrounded; 5% fine gravel to 5mm; subrounded; 15% silt; no odor.	SM		
15		106146-10	0.0		Same as above (5 ft).			
20		106146-15	0.0		SILT (ML); strong brown (7.5YR 4/6); dry; firm; non plastic; 90% silt; 10% very fine sand to 0.2mm; no odor.	ML		
25		106146-20	0.0					Total depth = 20 ft.
30								

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106147

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/16/2011
Date TD Reached: 2/17/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5342.8
Y Coordinate: 1472850.62
X Coordinate: 1541959.30

Hole Diameter Upper (in.): 2
Hole Diameter Lower (in.): 2
Surface Completion Type:

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: JR Drilling
Drilling Method: Direct Push (Geoprobe)
Logged By: Dale Flores

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0								
5		106147-00	0.1		Poorly graded SAND with Silt (SP-SM); pinkish white (7.5YR 8/2); dry; very loose; 90% very fine sand to 0.2mm; subrounded; 10% silt; slight odor.	SP-SM		Description from hand auger cuttings.
10		106147-05	450.0		Silty SAND (SM); reddish yellow (5YR 6/6); dry; very loose; 60% very fine sand to 0.5mm; subrounded; 40% silt; strong odor.	SM		
		106147-10	80.0		Same as above (5 ft).			
15		106147-15	4.6		SILT (ML); reddish yellow (5YR 7/6); dry; hard; low plasticity; 90% silt; 5% very fine sand to 0.08mm; 5% white caliche; slight odor.	ML		Very hard drilling from 14 to 17 ft due to caliche cementation.
20		106147-20	1.1					Total depth = 20 ft.
25								
30								

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D

Well Installation Forms
January – March 2011

D-1. Well Borehole Logs, Completion Diagrams, and Development Records

D-2. Shallow Soil Boring Logs

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

Well Borehole Logs, Completion Diagrams, and Development Records

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106044 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: 497.00
▼ At End of Drilling: 489.24
▼ After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Silty SAND (SM); pink (7.5YR 7/4); dry; very loose; 85% very fine sand to 0.07mm; rounded; 15% silt.			Hand augered.
5					Same as above (0 ft).	SM	Concrete Seal	***Note: No headspace requirement at this location***
10					Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 75% fine sand; 10% fine gravel to 1cm; rounded; 15% silt.			Began drilling @ 0915 on 1/5/11.
15					Same as above (10 ft).			
20					Poorly graded GRAVEL (GP); pink (7.5YR 8/3); dry; very loose; 90% gravel to 2cm; 10% fine sand; angular.	GP	High Solids Bentonite Grout	
25					Silty SAND with Gravel (SM); brown (7.5YR 5/4); dry; very loose; 70% fine sand; 15% fine gravel to 8mm; subrounded; 15% silt.			
30					Same as above (20 ft).	SM		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); dry; very loose; 90% very fine sand to 0.01mm; rounded; 10% silt.	SP-SM		
35					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 95% fine sand; 5% coarse sand to 0.2mm; subrounded.	SP		
40					Same as above (35 ft).			
45					Same as above (35 ft).		High Solids Bentonite Grout	
50					Same as above (35 ft).			
55					Poorly graded GRAVEL (GP); light reddish brown (5YR 6/3); dry; very loose; 90% fine gravel to 5mm; 10% coarse sand; subangular.	GP		
60					Poorly graded SAND (SP); dry; very loose; 75% very fine sand; 25% coarse sand to 0.5mm; subangular.	SP		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 75% fine sand, 10% coarse sand to 4mm; subrounded; 15% silt.			
65					Same as above (60 ft).	SM		
70					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); dry; very loose; 70% fine sand; 30% fine gravel to 5mm; rounded; trace fines.	SP		
75					Silty SAND (SM); brown (7.5YR 4/4); dry; very loose; 80% fine sand; 5% coarse sand to 4mm; rounded; 15% silt.		High Solids Bentonite Grout	
80					Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 85% very fine sand; trace gravel to 2.5cm; rounded; 15% silt.	SM		
85					Silty SAND (SM); brown (7.5YR 4/3); dry; very loose; 75% very fine sand to 0.1mm; rounded; 15% silt; 10% clay nodules.			
90								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/4); dry; very loose; 85% fine sand; 5% fine gravel to 1cm; rounded; 10% silt.	SP-SM		
95					Poorly graded SAND (SP); brown (7.5YR 4/4); dry; very loose; 95% medium sand; 5% coarse sand to 1mm; subangular.	SP		
100					Same as above (95 ft); trace gravel to 3cm.			
105					Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; very loose; 90% very fine sand; 10% coarse sand; trace gravel to 2 cm; rounded.		High Solids Bentonite Grout	
110					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 85% very fine sand; 10% fine gravel to 1.5cm; rounded; 5% clay nodules.			
115					Same as above (110 ft); brown (10YR 5/3).			
120								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/4); dry; very loose; 90% very fine sand to 0.1mm; rounded; 10% silt; trace clay nodules.	SP-SM		
125					Sandy fat CLAY (CH); brown (7.5YR 4/4); moist; soft; 65% clay, 35% very fine sand to 0.001mm.	CH		
130					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 85% fine sand to 0.1mm; subangular; 15% silt.	SM		
135					Clayey SAND (SC); light brown (7.5YR 6/4), moist, loose, 85% fine sand to 0.1mm; subrounded; 15% clay.	SC	High Solids Bentonite Grout	
140					Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium sand; trace coarse to 1mm; subangular.	SP		
145					Same as above (140 ft); slightly coarser.			
150								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); brown (7.5YR 5/2); dry; very loose; 90% medium to coarse sand; 10% fine gravel to 1cm; rounded.	SW		
155					Poorly graded SAND (SP); brown (7.5YR 4/3); dry; loose; 90% fine sand; 5% medium gravel to 2cm; well rounded; 5% silt.			
160					Poorly graded SAND (SP); brown (7.5YR 4/2); dry; loose; 100% fine to medium sand to 0.3mm; subangular.			
165					Same as above (160 ft); medium to coarse sand to 3mm.	SP	High Solids Bentonite Grout	
170					Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium to coarse sand to 3mm; rounded.			
175					Same as above (170 ft); 5% fine gravel.			
180								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium to coarse sand to 3mm; rounded.			
185					Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium to coarse sand to 3mm; rounded.			
190					Same as above (185 ft); slightly finer sand.	SP		
195					Poorly graded SAND (SP); reddish brown (5YR 4/4); dry; very loose; 90% medium to coarse sand, 10% fine gravel to 1cm; rounded.		High Solids Bentonite Grout	
200					Well graded SAND (SW); brown (7.5YR 4/4); moist; very loose, 80% fine to medium sand; 20% coarse sand to 3mm; rounded.			
205					Same as above (200 ft); dry; 80% fine to medium sand; 15% coarse sand; 5% fine gravel.	SW		
210								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); brown (7.5YR 4/4); moist; very loose, 80% fine to medium sand; 20% coarse sand to 3mm; rounded.	SW		
215					Poorly graded SAND (SP); brown (7.5YR 4/4); moist; very loose; 100% fine to medium sand to 2mm; subrounded; trace clay.	SP		
220					Poorly graded SAND with Gravel (SP); dark brown (7.5YR 3/3); dry; very loose; 80% fine sand; 20% fine to medium gravel to 3cm; rounded.			
225					Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 100% medium sand to 0.5mm; subrounded		High Solids Bentonite Grout	
230								
235					Well graded SAND (SW); very pale brown (10YR 7/3); dry; loose; 35% fine sand; 30% medium sand; 30% coarse sand; 5% fine gravel to 1.5cm; well rounded.	SW		
240					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 98% medium sand; 2% coarse sand to 2mm; subangular.	SP		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); pinkish white (7.5YR 6/2); moist; very loose; 85% medium to very coarse sand; 15% fine gravel to 2cm; rounded.	SW		
245					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; very loose; 99% medium sand; 1% coarse sand to 0.4mm; subangular.			
250					Same as above (245 ft).	SP		
255					Well graded SAND (SW); brown (10YR 5/3); damp; loose; 60% medium sand; 35% coarse sand; 5% fine gravel to 2cm; subrounded	SW	High Solids Bentonite Grout	
260					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand to 0.4mm; angular; 5% silt.			
265					Same as above (260 ft); yellowish brown (10YR 5/4); damp; trace gravel to 2cm.	SP		
270								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand to 0.4mm; angular; 5% silt.			
275					Same as above (270 ft); damp.			
280					Same as above (270 ft); 1% fine gravel to 1cm.			
285					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 90% medium sand; 5% coarse sand; 5% fine gravel to 1.5cm; rounded.	SP	High Solids Bentonite Grout	
290					Same as above (285 ft); 10% coarse sand; trace fine gravel.			
295					Poorly graded SAND(SP); dark yellowish brown (10YR 3/4); damp; loose; 80% medium sand; 15% coarse sand; 5% fine gravel to 2.5cm; rounded.			
300								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); dark yellowish brown (10YR 3/4); damp; loose; 98% medium sand; 2% coarse sand; trace gravel to 3cm; rounded.	SP		Hammer hose blew. Needs repair before continuing.
305					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very loose; 40% fine sand; 30% medium sand; 20% coarse sand; 10% fine gravel to 1cm; well rounded.	SW		
310					Poorly graded GRAVEL (GP); grey (5YR 6/1); dry; very loose; 90% medium gravel to 4cm; 10% coarse sand; well rounded.	GP		
315					Well graded SAND with Gravel (SW); brown (7.5YR 5/3); dry; very loose; 30% fine sand; 30% medium sand; 25% coarse sand; 15% fine gravel to 2cm.	SW	High Solids Bentonite Grout	
320					Well graded GRAVEL with Sand (GW); brown (7.5 YR 4/3); dry; very loose; 60% fine to medium gravel to 3.8cm; 40% coarse sand; rounded.	GW		End of 1/6/11.
325					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very loose; 90% fine to coarse sand; 10% fine gravel to 2.7cm; subangular.	SW		Resumed drilling @ 0755 on 1/7/11.
330								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: 497.00
▼ At End of Drilling: 489.24
▼ After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very loose; 98% fine to coarse sand; 2% fine gravel to 2.7cm; subangular.	SW		
335					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 90% medium sand; 8% fine sand; 2% fine gravel to 1cm; subangular.	SP		
340					Well graded SAND (SW); light yellowish brown (10YR 6/4); dry; very loose; 95% fine to coarse sand; 5% fine gravel to 1.5cm; subangular.	SW		Approximately 15 minutes for 20 ft of casing.
345					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 98% medium sand; 2% fine gravel to 1cm; subrounded.		High Solids Bentonite Grout	6 minutes to load new casing.
350					Same as above (345 ft); 95% medium sand; 5% fine gravel.	SP		No sample in chip tray 345-355 ft.
355					Same as above (345 ft).			
360					Poorly graded GRAVEL (GP); light gray (7.5YR 7/1); dry; very loose; 98% fine to medium gravel to 3cm; 2% medium sand; rounded.	GP / SP		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); brown (10YR 5/3); dry to moist; loose; 90% medium sand; 5% coarse sand; 5% fine gravel to 2cm; rounded.			
365					Same as above (360 ft); 98% medium sand; 2% fine gravel to 1.5cm.	SP		
370					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% fine to coarse sand to 4mm; subangular; trace fines.	SW		
375					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 90% medium sand; 10% fine gravel to 2cm; subangular.	SP	High Solids Bentonite Grout	
380					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% fine to coarse sand to 4mm; subangular; trace fines.	SW		
385					Same as above (380 ft); 95% fine to coarse sand; 5% fine gravel.			
390								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 95% medium sand; 5% fine gravel to 1.5cm; rounded.			
395					Same as above (390 ft); more damp; no gravel.			
400					Same as above (390 ft); dry.			
405					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand; 5% coarse sand to 0.5cm; rounded.	SP	High Solids Bentonite Grout	
410					Same as above (405 ft); damp.			
415					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); damp; loose; 100% medium sand to 0.4mm; rounded.			
420					Fat CLAY with Sand (CH); reddish	CH		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					brown (5YR 5/3); dry to moist; firm; medium plasticity; 60% clay, 25% silt; 15% fine sand to 0.02mm.	CH		
425					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 85% medium sand; 10% coarse sand; 5% fine gravel to 1.3mm, subrounded.	SP		
430					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand; 5% coarse sand to 2mm; subrounded.			
435					Same as above (430 ft); 90% medium sand; 10% coarse sand.		High Solids Bentonite Grout	
440					Sandy SILT (ML); brown (7.5YR 5/3); moist; soft; low plasticity; 60% silt; 40% fine sand to 0.05mm.	ML		
445					Poorly graded SAND (SP); brown (7.5YR 4/3); damp; loose; 95% fine sand to 0.2mm; rounded; 5% silt.	SP		
450								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (7.5YR 4/3); damp; loose; 95% fine sand to 0.2mm; rounded; 5% silt.	SP		
455					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; loose; 100% fine to coarse sand to 7mm; subrounded.	SW	High Solids Bentonite Grout	
460					Well graded SAND with Silt and Gravel (SW-SM); dark yellowish brown (10YR 4/4); damp; loose; 60% medium sand; 15% coarse sand; 15% fine gravel to 1.2cm; well rounded; 10% silt.	SW-SM		
465					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 99% medium sand; 1% fine gravel to 2cm; well rounded.	SP	Top of Bentonite Seal	
470					Well graded SAND (SW); reddish brown (5YR 5/3); dry; very loose; 90% medium to very coarse sand; 10% fine gravel to 1cm; rounded.	SW		
475					Well graded GRAVEL with Sand (GW); brown (7.5YR 4/4); dry; very loose; 70% fine to medium gravel to 2.6cm; 30% medium to coarse sand; well rounded.	GW		
480					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 98% medium sand; 2% coarse sand; trace gravel to 1cm; subangular.	SP / SW		

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; very loose; 70% fine to coarse sand; 30% fine gravel to 1.5 cm; well rounded.			Casing coupler stuck. Cut with torch to remove coupler. Added new casing and resumed drilling.
485					Same as above (480 ft); increasing moisture content.	SW	Betonite Seal	
490					Poorly graded SAND (SP); brown (10YR 5/3); damp; loose; 80% medium sand; 20% fine sand; trace fine gravel to 1.3cm; subrounded.		5" Schedule 80 PVC Riser	
495					Same as above (490 ft).			
					Same as above (490 ft); wet.		Top of 20/40 Sand	
500					Same as above (490 ft); 5% fine gravel; 15% fine sand.	SP	Top of 10/20 Sand	
505					Poorly graded SAND (SP); brown (7.5YR 5/4); wet; loose; 90% coarse sand; 10% fine to medium gravel to 5.3cm; well rounded.		Top of Schedule 80 PVC 0.010 Slot Screen	
510								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/3); wet; loose; 80% coarse sand; 10% fine gravel to 1.4cm; subrounded; 10% silt.	SP-SM		
515					Poorly graded SAND (SP); brown (7.5YR 5/4); wet; loose; 100% coarse to very coarse sand; trace fine gravel to 8mm; subrounded.			
520					Same as above (515 ft); 90% coarse sand; 10% fine gravel to 1.4cm.		Bottom of Screen Sump	
525					Same as above (515 ft).		Bottom of Sump	
530					Same as above (515 ft); 90% medium sand; 10% coarse sand.	SP		
535					Poorly graded SAND (SP); brown (7.5YR 5/3); wet; loose; 90% coarse to very coarse sand; 10% fine gravel to 1.2cm; subrounded.		Bottom of Filter Pack Native Backfill	
540								

Borehole ID: KAFB-106044

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/7/2011
Date Completed: 1/17/2011

Ground Elevation AMSL (ft): 5345.6
Y Coordinate: 1472371.83
X Coordinate: 1541447.86

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

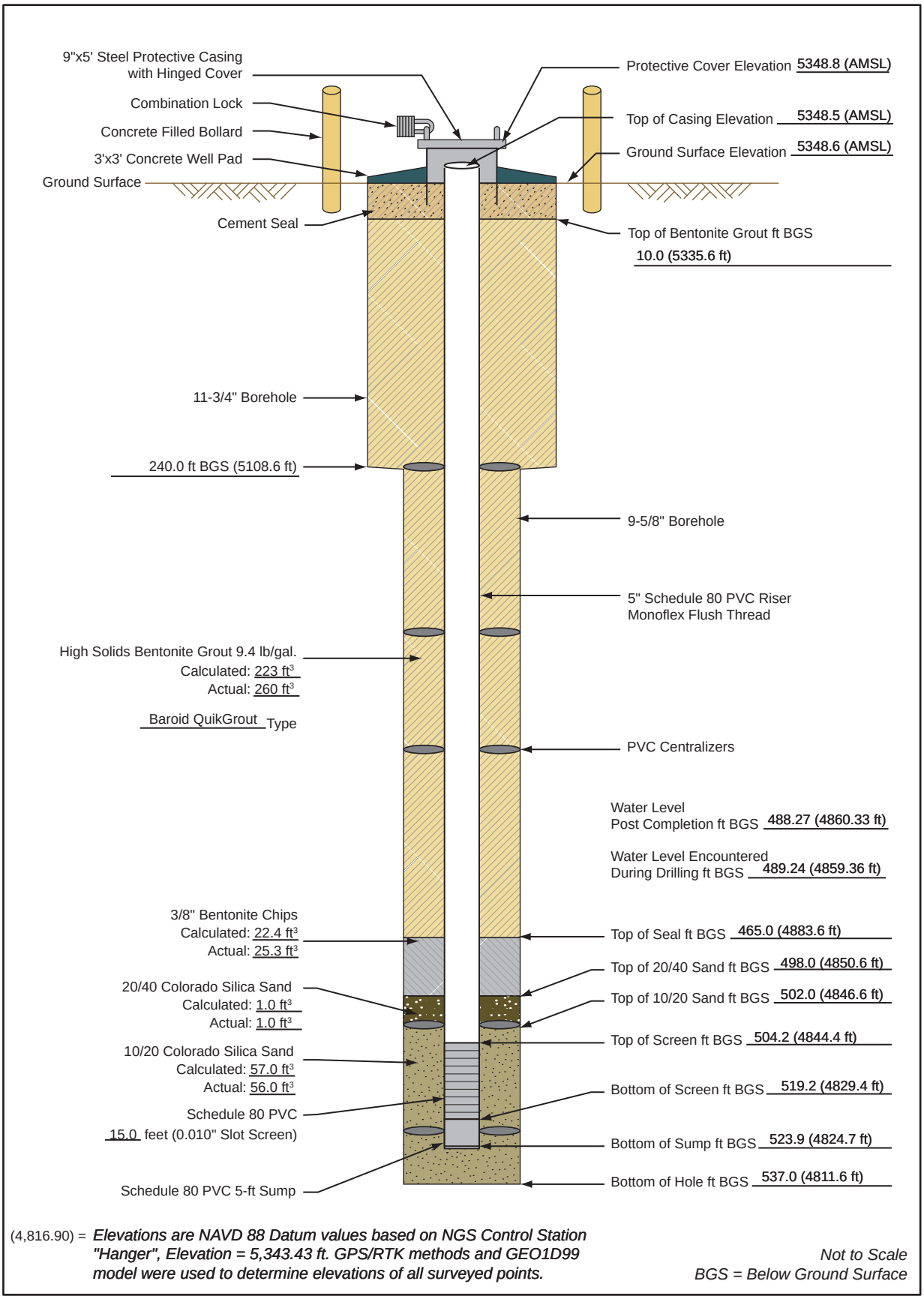
Groundwater Levels BGS (ft):
At Time of Drilling: 497.00
At End of Drilling: 489.24
After Drilling: 488.26

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND (SP); brown (7.5YR 4/3); wet; loose; 80% coarse sand; 15% very coarse sand; 5% fine gravel to 8mm; subrounded.	SP		Total depth = 540 ft. Reached @ 1345 on 1/7/11. Water added during drilling (gallons) = 0 Water added after drilling (gallons) = 1,048 Water added during construction (gallons) = Not Recorded
545								
550								
555								
560								
565								
570								

Monitoring Well Completion Diagram KAFB-106044

Installation Start Date/Time: 1/7/2011 @ 15:40
Installation End Date/Time: 1/17/2011 @ 14:00



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106044

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106044

Personnel: G. Peacock

Date Installed: 1/17/11

Date: 1/23/11

Csg. Diameter (I.D.): .42'

Samplers: G. Peacock

Total Depth (ft. BGL): 523.9

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 1/23/11-1/24/11

Depth to Water Before Developing Well (ft. BGL): 490.3

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 33.6 feet	= 44.7 gal.	*	1	=	44.7

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 44.7 gallons

Depth Purging From: 502 feet

Time Purging Begins: 0820, 1/24/11

Weather: Partly Cloudy, 40's

Screened Interval (ft BGL): 504.23-519.23

Equipment Nos.: **pH Meter:** YSI 6820 1234AZ **EC Meter**: YSI 6820 1234AZ **Turbidity Meter**: HACH 2100

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: N/A

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
1/23/2011	1120	490.30	0.1	18.30	8.03	0.368	1000+	Begin Initial Bail
1/23/2011	1200	--	36	18.93	7.63	0.320	1000+	Continue Bailing
1/23/2011	1220	--	64	18.37	7.77	0.299	1000+	Continue Bailing
1/23/2011	1225	--	--	--	--	--	--	Begin Swabbing
1/23/2011	1315	--	--	--	--	--	--	Resume Swabbing
1/23/2011	1335	--	--	--	--	--	--	Resume Bailing
1/23/2011	1400	--	108	17.72	7.94	0.308	1000+	Continue Bailing
1/23/2011	1420	--	--	--	--	--	--	Switch to Swabbing
1/23/2011	1435	--	--	--	--	--	--	Resume Bailing
1/24/2011	0820	491.71	262	16.51	6.81	0.292	55.6	Begin Pumping

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106044

Project Number: 140705

Samplers: G. Peacock

Date: 1/23/11

Checked By:

Time Start: 1120, 1/23/11

Time Finish: 1215, 1/24/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
1/24/2011	0840	491.75	362	9.11	7.92	0.307	9.95	Continue Pumping
1/24/2011	1035	491.80	462	18.63	7.92	0.307	3.6	Continue Pumping
1/24/2011	1055	491.80	562	19.14	7.95	0.308	3.9	Continue Pumping
1/24/2011	1110	491.82	662	19.40	7.95	0.308	9.5	Continue Pumping
1/24/2011	1130	491.85	762	19.51	7.96	0.306	5.87	Continue Pumping
1/24/2011	1150	491.87	862	20.04	7.94	0.306	5.04	Continue Pumping
1/24/2011	1205	491.87	962	19.93	7.97	0.305	11	Continue Pumping
1/24/2011	1215	491.87	1000	19.27	8.00	0.308	11.2	Stop Pumping
1/24/2011	1215	491.87	1000	19.27	8.00	0.308	11.2	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

APPENDIX D-1

KAFB-106045 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); pink (5YR 7/3); dry; soft; low plasticity; 90% silt; 10% very fine sand to 0.1mm.			Hand augered. ***Note: No headspace requirement at this location, groundwater level at time of drilling not recorded due to added water***
5					Same as above (0 ft); reddish brown (5YR 5/4).		Concrete Seal	
10					SILT (ML); reddish brown (2.5 YR 4/4); moist; soft; low plasticity; 90% silt; 10% fine gravel.	ML		
15					Same as above (10 ft); light reddish brown (5YR 6/4).		High Solids Bentonite Grout	
20								
25					Poorly Graded GRAVEL with Sand (GP); grey (5YR 5/1); dry; very loose; 90% fine gravel to 1mm; subangular; 10% fine to very fine sand.			
30					Same as above (21 ft); gravel to 2mm; angular.	GP		

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); reddish brown (5YR 4/4); very soft; moist; non to low plasticity; 95% silt with clay; 5% very fine sand.			
35					Same as above (30 ft).			
40					Same as above (30 ft).			
45					Same as above (30 ft); 10% fine to very fine sand.	ML	- High Solids Bentonite Grout	
50					Same as above (30 ft).			
55					Same as above (30 ft).			
60								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty GRAVEL with Sand (GM); pinkish grey (5YR 6/2); dry; loose; 50% gravel to 20mm; angular; 20% fine to very fine sand; 30% silt with clay.	GM		
					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 80% fine to very fine sand; rounded; 20% silt with clay.			
65								
70					Same as above (62 ft).			
75					Same as above (62 ft).	SM	High Solids Bentonite Grout	
80					Same as above (62 ft).			
85					Same as above (62 ft).			
90								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 80% fine to very fine sand; rounded; 20% silt with clay.	SM		
95					Poorly Graded SAND (SP); brown (7.5YR 5/4); moist; 95% fine to very fine sand; well sorted; 5% fines.	SP		
100					Same as above (95 ft); light brown (7.5YR 6/3).			
105					Same as above (95 ft).		High Solids Bentonite Grout	
110					Same as above (95 ft).			
115					Same as above (95 ft).			
120								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120								
125					Lean CLAY with Sand (CL); brown (7.5YR 5/4); moist; firm; low to medium plasticity; 80% clay; 20% fine to very fine sand; thinly bedded.	CL		
130					Silty SAND (SM); brown (7.5YR 5/4); moist; loose to medium density; 80% fine to very fine sand; rounded; 20% silt with clay. Same as above (125 ft).	SM		
135					Same as above (125 ft).		- High Solids Bentonite Grout	
140					Poorly Graded SAND (SP); pinkish grey (7.5YR 6/2); dry to moist; very loose; 95% well sorted sand to 0.2mm; subrounded; 5% fines.	SP		
145					Same as above (145 ft).			
150								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
155					Poorly Graded GRAVEL with Silt and Sand (GP-GM); pinkish grey (7.5YR 6/2); dry; very loose; 70% fine gravel to 10mm; subrounded; 20% fine to medium sand; trace granite clasts; 10% silt.	GP-GM		
					Reddish brown sand lense.	SM		
160					Poorly Graded GRAVEL with Silt and Sand (GP-GM); pinkish grey (7.5YR 6/2); dry; very loose; 70% fine gravel to 10mm; subrounded; 20% fine to medium sand; trace granite clasts; 10% silt.	GP-GM		
165					Poorly Graded SAND with Gravel (SP); pinkish grey (7.5YR 6/2); dry to slightly moist; very loose; 85% medium sand; 20% fine to coarse gravel to 3cm; subangular; 5% silt.	SP	High Solids Bentonite Grout	
170					Same as above (165 ft).			
175					Same as above (165 ft); gravel content decreasing.			
180								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly Graded SAND with Gravel (SP); pinkish grey (7.5YR 6/2); dry to slightly moist; very loose; 75% medium sand; 20% fine to coarse gravel to 3cm; subangular; 5% silt.			
185					Poorly Graded SAND (SP); pinkish grey (7.5YR 6/2); dry to slightly moist; very loose; 95% medium sand to 0.2mm; little to no fines.			Drilling very fast.
190					Same as above (185 ft).			
195					Same as above (185 ft).	SP	High Solids Bentonite Grout	
200					Same as above (185 ft).			
205					Same as above (185 ft).			
210								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly Graded SAND (SP); light reddish brown (5YR 6/3); dry to slightly moist; very loose; 95% medium sand; sand size 0.2mm; little to no fines.			
215					Same as above (210 ft).	SP		
220					No cuttings returned.			Drill string plugged, no cuttings returned. Added 5 gallons of water.
225					Same as above (210 ft).		High Solids Bentonite Grout	
230					Same as above (210 ft).	SP		
235					Same as above (210 ft).			
240								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly Graded SAND (SP); light reddish brown (5YR 6/3); dry to slightly moist; very loose; 95% medium sand; sand size 0.2mm; little to no fines.			11-3/4" drive casing advanced to 240 ft bgs. Began advancing 9-5/8" drive casing.
245					Same as above (240 ft); moist; percent gravel alternates between 0% and 5% between 245 and 270 ft bgs.			
250					Same as above (245 ft).			
255					Same as above (245 ft).	SP	High Solids Bentonite Grout	
260					Same as above (245 ft).			Drilling very fast.
265					Same as above (245 ft).			
270								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly Graded SAND (SP); pinkish grey (7.5YR 7/2); moist; very loose; 95% medium sand to 0.5mm; subangular; well sorted; 5% fines.			Drilling fast.
275					Same as above (270 ft).			
280					Same as above (270 ft); gravel content alternating between 0% and 10% through interval 270 - 299 ft.			
285					Same as above (280 ft).	SP	High Solids Bentonite Grout	
290					Same as above (280 ft).			
295					Same as above (280 ft).			
300						GP		

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly Graded GRAVEL with Sand (GP); reddish yellow (7.5YR 6/6); moist; very loose; 50% fine to medium gravel to 3cm; subangular; 45% medium sand; 5% fines; occurs as a lense.	GP		
305					Poorly Graded SAND (SP); reddish yellow (7.5YR 6/6); very loose; subangular; 95% medium sand; 5% fine gravel to 1cm; little to no fines.			
310					Same as above (303 ft).	SP		
315					Same as above (303 ft).		High Solids Bentonite Grout	
320					Poorly Graded GRAVEL (GP); light grey (7.5YR 7/1); dry; 95% gravel to 4cm; subangular to rounded; 5% fines.	GP		
325					Poorly Graded SAND (SP); reddish yellow (7.5YR 6/6); very loose; 95% medium sand; 5% fine gravel to 1cm; subangular; little to no fines.			
330					Same as above (320 ft).	SP		

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly Graded SAND (SP); reddish yellow (7.5YR 6/6); very loose; 95% medium sands; 5% fine gravel to 1cm; subangular; little to no fines.			
335					Same as above (330 ft).			
340					Same as above (330 ft).			Drilling rate: 1 ft/min from 340 ft to 360 ft.
345					Same as above (330 ft).	SP	High Solids Bentonite Grout	
350					Same as above (330 ft); thinly bedded clay lense.			
355					Same as above (330 ft).			
360								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360								
365					Poorly Graded SAND (SP); reddish yellow (7.5YR 6/6); very loose; 95% medium sands; 5% fine gravel to 1cm; subangular; little to no fines.	SP		
					Well Graded SAND with Gravel (SW); brown (7.5YR 5/2); moist; very loose; 60% medium to coarse sand; 40% gravel to 2cm; rounded; trace fines.	SW		
370					Poorly Graded SAND with Gravel (SP); brown (7.5YR 5/2); moist; very loose; 85% coarse sand; 15% gravel to 1cm; subrounded; trace fines.			
375					Same as above (369 ft).	SP	High Solids Bentonite Grout	
380					Same as above (369 ft).			
385					6 inch gravel lense up to 2cm in diameter.	GP		
					Poorly Graded SAND with Gravel (SP); brown (7.5YR 5/2); moist; very loose; 85% coarse sand; 15% gravel to 1cm; subrounded; trace fines.	SP		
390								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly Graded SAND with Gravel (SP); brown (7.5YR 5/2); moist; very loose; 85% coarse sand; 15% gravel to 1cm; subrounded; trace fines.			
395					Same as above (390 ft).			
400					Same as above (390 ft).			
405					Same as above (390 ft); moisture content increasing.	SP	- High Solids Bentonite Grout	
410					Same as above (390 ft).			
415					Same as above (390 ft).			
420								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly Graded SAND with Gravel (SP); brown (7.5YR 5/2); moist; very loose; 90% coarse sand; 10% gravel to 1.5cm; subrounded; trace fines.			
425					Same as above (420 ft); no gravel.			
430					Same as above (420 ft); moist; 5% gravel.	SP		
435					Same as above (420 ft); dry; no gravel.		High Solids Bentonite Grout	
440					Silty SAND (SM); red brown (5YR 5/4); moist; loose; 85% fine sand to 0.04mm; subrounded; 15% silt; clay nodules.	SM		
445					Poorly Graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% medium sand to 0.3mm; subrounded; trace fines.	SP		
450								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly Graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% medium sand to 0.3mm; subrounded; trace fines.			
455					Same as above (450 ft); trace gravel.	SP		Started adding water, ~10 gallons.
460					Well Graded SAND with Gravel (SW); dark brown (7.5YR 3/3); moist; very loose; 60% very coarse sand; 40% gravel to 1.5cm; subrounded; trace fines.			Added ~30 gallons of water.
465					Same as above (460 ft).	SW	- High Solids Bentonite Grout	
470					Poorly Graded SAND (SP); dark brown (7.5 YR 3/3); moist; very loose; 100% medium to coarse sand to 0.5 mm; subrounded; trace fines.	SP		Added ~50 gallons of water.
475					Well Graded SAND with Gravel (SW); dark brown (7.5YR 3/3); moist; very loose; 60% very coarse sand; 40% gravel to 1.5cm; subrounded; trace fines.	SW	- Top of Bentonite Seal	
480								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: Not Recorded
▼ At End of Drilling: 512.70
▼ After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well Graded SAND with Gravel (SW); dark brown (7.5YR 3/3); moist; very loose; 60% very coarse sand; 40% gravel to 1.5cm; subrounded; trace fines.	SW		Added ~10 gallons of water.
485					Silty SAND (SM); reddish brown (5YR 4/3); damp; loose; 75% medium to coarse sand to 3mm; rounded; 25% silt. ▼	SM		
490					Well Graded SAND with Gravel (SW); dark brown (7.5YR 3/3); moist; very loose; 60% very coarse sand; 40% gravel to 1.5cm; subrounded; trace fines.	SW		Added ~50 gallons of water, not sure when water table was encountered due to saturation.
495					Silty SAND (SM); reddish brown (5YR 4/3); saturated; loose; 75% medium to coarse sand to 3mm; rounded; 25% silt.	SM	Native Backfill	Difficult to determine fines content due to saturation.
500					Same as above (495 ft).			
505					Same as above (495 ft).			
510								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly Graded SAND (SP); reddish brown (5YR 5/3); wet; very loose; 100% coarse sand to 0.1mm; subrounded; trace fines.	SP	5" PVC Schedule 80 Riser	Driller added ten gallons of water. Producing water from aquifer.
515					No cuttings returned.		Bentonite Seal	
520					No cuttings returned.		Top of 20/40 Sand Top of 10/20 Sand	
525					Poorly Graded SAND with Silt (SP-SM); brown (7.5YR 4/3); wet; very loose; 90% medium to coarse sand to 0.5mm; 10% silt; trace gravel; subangular; gravel to 3cm.			
530					Same as above (525 ft).	SP-SM	Top of Schedule 80 PVC 0.010 Slot Screen	
535					Same as above (525 ft); <5% silt; sand becoming coarser.			
540								

Borehole ID: KAFB-106045

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 12/16/2010
Date TD Reached: 12/17/2010
Date Completed: 1/7/2011

Ground Elevation AMSL (ft): 5345.2
Y Coordinate: 1472400.50
X Coordinate: 1541418.00

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

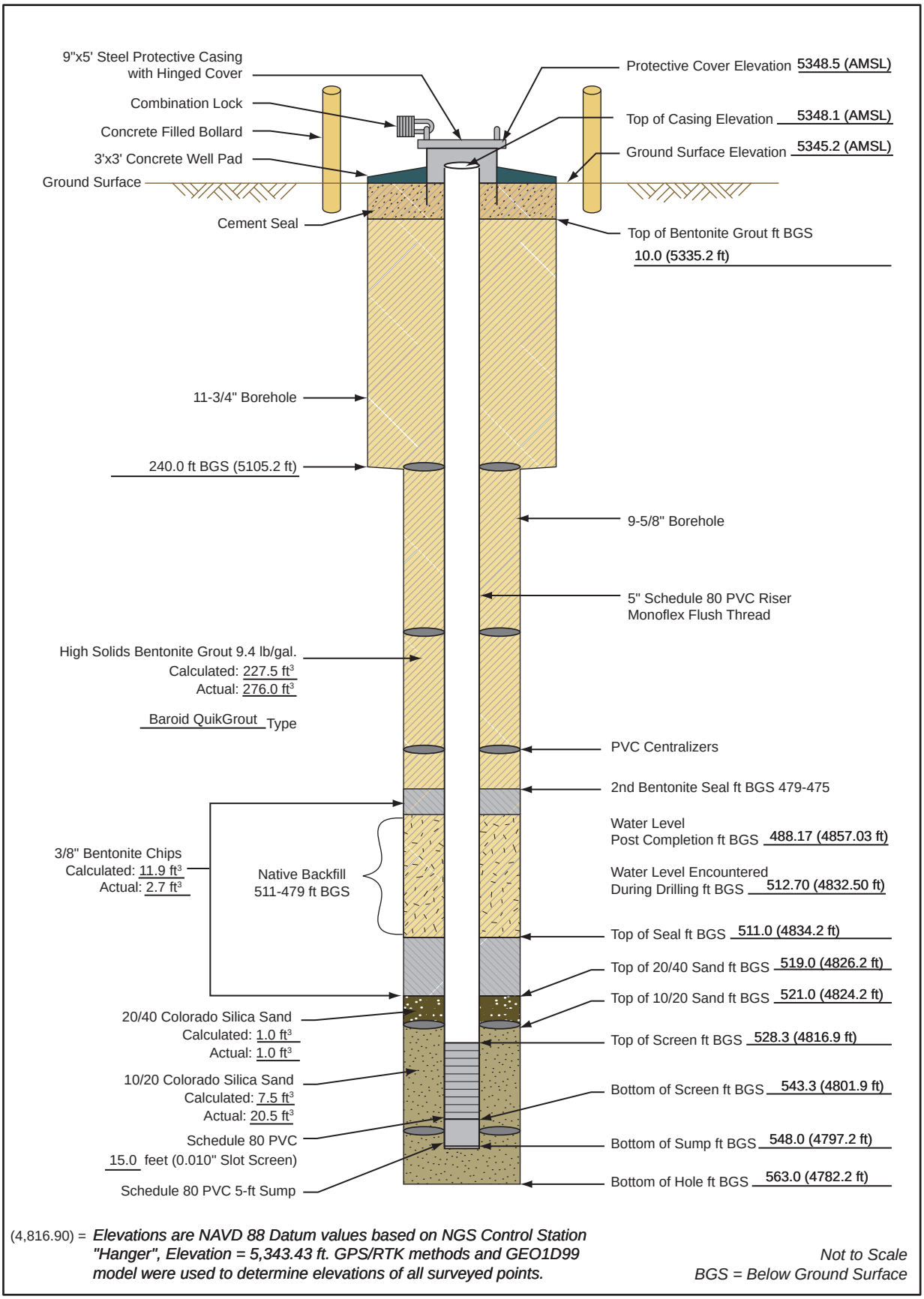
Groundwater Levels BGS (ft):
At Time of Drilling: Not Recorded
At End of Drilling: 512.70
After Drilling: 488.17

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly Graded SAND with Silt (SP-SM); brown (7.5YR 4/3); wet; very loose; 90% medium to coarse sand to 0.5mm; 10% silt; trace gravel to 3cm; subangular.		Bottom of Screen	
545					Same as above (540 ft).		Sump	
							Bottom of Sump	
550					Same as above (540 ft).	SP-SM		
555					Same as above (540 ft).			
560					Silty SAND (SM); reddish brown (5YR 5/3); wet; very loose; 85% medium sand to 1mm; subrounded; 15% silt.	SM		Total depth = 563 ft. Reached @ 1530 on 12/17/11.
565								Water added during drilling (gallons) = 160.
570								Water added during construction (gallons) = 1700.

Monitoring Well Completion Diagram KAFB-106045

Installation Start Date/Time: 12/20/2010 @ 10:48
Installation End Date/Time: 1/8/2011 @ 17:38



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106045

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106044

Personnel: G. Peacock

Date Installed: 1/17/11

Date: 1/23/11

Csg. Diameter (I.D.): .42'

Samplers: G. Peacock

Total Depth (ft. BGL): 523.9

Method of Development:

X Surging X Bailing X Pumping

X Original Development ☐Redevelopment ☐Other

Development Date: 1/23/11-1/24/11

Depth to Water Before Developing Well (ft. BGL): 490.3

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 33.6 feet	= 44.7 gal.	*	1	=	44.7

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 44.7 gallons

Depth Purging From: 502 feet

Time Purging Begins: 0820, 1/24/11

Weather: Partly Cloudy, 40's

Screened Interval (ft BGL): 504.23-519.23

Equipment Nos.: **pH Meter:** YSI 6820 1234AZ **EC Meter**: YSI 6820 1234AZ **Turbidity Meter**: HACH 2100

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: N/A

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
1/23/2011	1120	490.30	0.1	18.30	8.03	0.368	1000+	Begin Initial Bail
1/23/2011	1200	--	36	18.93	7.63	0.320	1000+	Continue Bailing
1/23/2011	1220	--	64	18.37	7.77	0.299	1000+	Continue Bailing
1/23/2011	1225	--	--	--	--	--	--	Begin Swabbing
1/23/2011	1315	--	--	--	--	--	--	Resume Swabbing
1/23/2011	1335	--	--	--	--	--	--	Resume Bailing
1/23/2011	1400	--	108	17.72	7.94	0.308	1000+	Continue Bailing
1/23/2011	1420	--	--	--	--	--	--	Switch to Swabbing
1/23/2011	1435	--	--	--	--	--	--	Resume Bailing
1/24/2011	0820	491.71	262	16.51	6.81	0.292	55.6	Begin Pumping

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106044

Project Number: 140705

Samplers: G. Peacock

Date: 1/23/11

Checked By:

Time Start: 1120, 1/23/11

Time Finish: 1215, 1/24/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
1/24/2011	0840	491.75	362	9.11	7.92	0.307	9.95	Continue Pumping
1/24/2011	1035	491.80	462	18.63	7.92	0.307	3.6	Continue Pumping
1/24/2011	1055	491.80	562	19.14	7.95	0.308	3.9	Continue Pumping
1/24/2011	1110	491.82	662	19.40	7.95	0.308	9.5	Continue Pumping
1/24/2011	1130	491.85	762	19.51	7.96	0.306	5.87	Continue Pumping
1/24/2011	1150	491.87	862	20.04	7.94	0.306	5.04	Continue Pumping
1/24/2011	1205	491.87	962	19.93	7.97	0.305	11	Continue Pumping
1/24/2011	1215	491.87	1000	19.27	8.00	0.308	11.2	Stop Pumping
1/24/2011	1215	491.87	1000	19.27	8.00	0.308	11.2	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

APPENDIX D-1

KAFB-106101 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); red (2.5YR 5/6); dry to moist; very stiff to hard; 65% silt; 30% clay; 5% very fine to fine sand; no odor.			Hand augered. ***Note: No headspace requirement at this location.***
5					Same as above (0 ft); no odor.	ML		Began drilling @ 1443 on 02/15/2011. Injected water into cyclone for dust suppression.
10					Same as above (0 ft); trace coarse sand; subangular; no odor.		Cement Seal	
15					Lean CLAY with Sand (CL); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 70% clay; 15% silt; 15% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.			
20					Same as above (15 ft); light reddish brown (2.5YR 7/4); no odor.	CL		Kelly down @ 1530. New connection @ 1539. Resumed drilling @ 1540.
25					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; very stiff; 85% silt with minor clay; 15% fine sand; no odor.	ML		
30								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 65% silt; 30% clay; 5% fine sand; trace medium to coarse sand; subrounded; no odor.			No cuttings returned past 32', still have circulation. Regained cuttings at 34'.
35					SILT with Sand (ML); reddish brown (2.5YR 5/4); dry to moist; very stiff; 85% silt with trace clay; 15% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	ML	Cement Seal	
40					Silty SAND (SM); pale red (2.5YR 6/2); dry; dense to very dense; 85% very fine to coarse sand; angular to subangular; 15% silt; no odor.	SM		Kelly down @ 1559. New connection @ 1611. Resumed drilling @ 1613.
45					Silty SAND with Gravel (SM); reddish brown (2.5YR 5/4, based on fines); moist; dense to very dense; 70% coarse sand; trace fine to medium sand; angular; 15% fine gravel to 5mm; angular to subangular; 15% silt with minor clay; coarse sand and gravel dominantly granitic composition; no odor.		Top of High Solids Bentonite Grout	Rig chatter @ 45'.
50					SILT (ML); red (2.5YR 5/8); dry to moist; very stiff; 90% silt with minor clay; 10% very fine to fine sand; no odor.	ML		
55					SILT with Sand (ML); red (2.5YR 5/8); dry to moist; very stiff; 85% silt with minor clay; 15% very fine to fine sand; trace medium to coarse sand; subangular; no odor.			
60								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: 485.00
▼ At End of Drilling: 480.45
▼ After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Lean CLAY (CL); red (2.5YR 5/8); dry; very stiff; medium plasticity; 95% clay with minor silt; 5% very fine to fine sand; no odor.			Kelly down @ 1629. New connection @ 1639. Resumed drilling @ 1641.
65					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry; very stiff; low plasticity; 70% clay; 30% silt; trace very fine to fine sand; no odor.	CL		
70					Same as above (65 ft); clay mainly as nodules; no odor.			
75					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; very stiff; 75% silt with trace clay; 25% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.	ML	High Solids Bentonite Grout	
80					Poorly graded SAND (SP); light gray (5YR 7/1); moist; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.			Kelly down @ 1706. End of 02/15/11. New connection @ 0759 on 02/16/11. Resumed drilling @ 0800 on 02/16/11. Driller injected water for dust suppression.
85					Same as above (79 ft); no odor.	SP		
90								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry to moist; dense to very dense; 95% fine to medium sand; subrounded; 5% silt; pumice present; no odor.	SP		Rig chatter below 90', breif discharge of fine to coarse gravel; angular to subangular.
95					SILT with Sand (ML); yellowish red (5YR 5/6); moist; very stiff; 80% silt; 5% clay; 15% fine sand; no odor.	ML		
					Lean CLAY (CL); reddish brown (2.5YR 5/4); moist; very stiff; low to medium plasticity; 95% clay; 5% very fine to fine sand; no odor.	CL		
100					SILT (ML); yellowish red (5YR 5/6); moist; stiff to very stiff; 90% silt; 5% clay; 5% very fine to fine sand; no odor.	ML		Kelly down @ 0817. New connection @ 0832. Resumed drilling @ 0835. Stopped advancing @ 0845 due to minor mechanical problems. Resumed drilling @ 0915.
105					Sandy lean CLAY (CL); yellowish red (5YR 5/6); moist; very stiff; low plasticity; 55% clay; 15% silt; 30% very fine to fine sand; trace medium sand; subangular to subrounded.	CL	High Solids Bentonite Grout	
110					Same as above (105 ft); no odor.			
115					Same as above (105 ft); no odor.			
120					Poorly graded SAND with Clay (SP-SC); pale red (2.5YR 6/2); dry to moist; dense to very dense; 90% very fine to fine sand; trace medium sand; subangular;	SP-SC		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					10% clay as nodules; no odor. Note: likely top of Santa Fe Group. Sand was proceeded by a thin lense of light brown (7.5YR 6/3) lean clay; appeared as nodules.	SP-SC		Kelly down @ 0944. New connection @ 1006. Resumed drilling @ 1009.
125					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry; dense; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.			
130					Same as above (125 ft); 95% very fine to fine sand; 5% silt; no odor.	SP		
135					Same as above (125 ft); 95% fine to medium sand; subrounded to subangular; 5% silt; no odor.		High Solids Bentonite Grout	
140					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 6/3); moist; dense; 75% very fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 3cm; angular to subangular; 10% clay; no odor.	SW-SC		Kelly down @ 1029. New connection @ 1045. Resumed drilling @ 1049.
145					Well graded SAND (SW); pale red (2.5YR 6/2); dry to moist; dense; 85% very fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel; angular to subangular; 5% silt with minor clay; no odor.	SW		
150					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry to moist; dense; 95% very fine to fine sand; 5% silt; no odor.	SP		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: 485.00
▼ At End of Drilling: 480.45
▼ After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry to moist; dense; 100% fine to medium sand; subangular to subrounded; no odor; sand dominantly intermediate to mafic composition with some quartz and feldspar; minor pumice fragments.	SP		
155					Same as above (150 ft); no odor.			
160					Silty SAND (SM); brown (7.5YR 5/4); moist; dense; 80% very fine to medium sand; trace coarse sand; subrounded to subangular; 20% silt with trace clay; no odor.	SM		Kelly down @ 1122. New connection @ 1432. Resumed drilling @ 1434.
165					Silty SAND (SM); light reddish brown (5YR 6/3); moist; dense to very dense; 80% very fine to fine sand; trace medium sand; subrounded; 20% silt; no odor.		- High Solids Bentonite Grout	
170					Well graded SAND (SW); light reddish brown (5YR 6/3); moist; dense to very dense; 100% fine to coarse sand; subrounded to subangular; trace fine gravel to 12mm; no odor.	SW		
175					Same as above (170 ft); no gravel; no odor.			
180					Clayey SAND with Gravel (SC); reddish	SC		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					brown (5YR 4/3); moist; dense to very dense; 65% fine to coarse sand; subrounded to subangular; 15% fine gravel to 12mm; subrounded to subangular; 20% clay as nodules and as coating on gravel; low plasticity; no odor.	SC		Kelly down @ 1502. New connection @ 1520. Resumed drilling @ 1522.
185					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); moist; very dense; 100% fine sand; no odor.	SP		
190					Well graded SAND (SW); light reddish gray (2.5YR 7/1); moist; very dense; 100% fine to coarse sand; subangular to subrounded; no odor.			Lost cutting returns at 188'; driller stopped advancing to clean hole and discharge hose. Discharge was clayey sand to clayey gravel, but could not determine if cuttings are representative due to collection in discharge hose.
195					Same as above (190 ft); slightly finer; no odor.	SW	High Solids Bentonite Grout	
200					Same as above (190 ft); slightly coarser; no odor.			Kelly down @ 1435. Total depth of 11-3/4" casing. End of 02/16/11. New connection @ 1238 on 02/17/11. Resumed drilling @ 1239 on 02/17/11.
205					Poorly graded SAND (SP); weak red (2.5YR 5/2); moist; medium dense; 95% very fine to fine sand; 5% silt; no odor.	SP		
210								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); weak red (2.5YR 5/2); moist; medium dense; 100% very fine to medium sand; subrounded to subangular; no odor.	SP		Kelly down @ 1246. New connection @ 1254. Resumed drilling @ 1255. Did not have to hammer casing 200-225'. Began driving casing below 225'.
215					Same as above (210 ft); 95% very fine to fine sand; trace medium sand; subrounded to subangular; 5% silt; no odor.			
220					Silty SAND (SM); reddish brown (5YR 5/4); moist; medium dense; 75% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 15mm; subrounded; 20% silt with trace clay; silty/clayey coating on gravel; no odor.	SM		
225					Same as above (218 ft); no odor.		High Solids Bentonite Grout	
230					Well graded SAND with Silt (SW-SM); pale red (2.5YR 7/2); dry to moist; dense; 90% very fine to coarse sand; subrounded to subangular; 10% silt with trace clay; no odor.	SW-SM		
235					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; dense; 85% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% silt with trace clay; no odor.	SM		
240								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; dense; 85% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% silt with trace clay; no odor.	SM		Kelly down @ 1305. New connection @ 1316. Resumed drilling @ 1320.
245					Lean CLAY (CL); reddish brown (5YR 5/3); moist; very stiff to hard; medium plasticity; 95% clay; 5% silt; no odor.	CL		
250					Silty SAND (SM); reddish brown (5YR 5/3); moist; dense to very dense; 85% very fine to medium sand; subrounded; 15% silt with minor clay; no odor.	SM		
255					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/3); moist; dense to very dense; 90% very fine to fine sand; subrounded; 10% silt; no odor.	SP-SM	High Solids Bentonite Grout	
260					Same as above (250 ft); no odor.			
265					Well graded SAND with Silt (SW-SM); reddish brown (5YR 5/3); moist; dense to very dense; 90% very fine to coarse sand; subrounded; 10% silt; no odor.	SW-SM		Kelly down @ 1334. New connection @ 1343. Resumed drilling @ 1344.
270					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; dense; 80% fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 2.5cm; subrounded; 5% silt with minor clay; no odor.	SW		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270								
275					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to fine sand; trace medium sand; subrounded; 5% silt; no odor. Note: cobbles to 10cm noted from discharge at 274'.	SP		
280					Silty SAND (SM); reddish brown (5YR 5/3); moist; dense to very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		
					GRAVEL (GW); lense.	GW		Kelly down @ 1356. New connection @ 1407. Resumed drilling @ 1407.
285					Well graded SAND (SW); pale red (2.5YR 7/2); moist; dense; 90% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 12mm; subrounded; 5% silt; no odor.	SW	High Solids Bentonite Grout	
290					Lean CLAY (CL); brown (7.5YR 5/3); moist; stiff; medium plasticity; 95% clay; 5% fine to medium sand; subrounded to subangular; no odor.	CL		
295					Clayey SAND with Gravel (SC); brown (7.5YR 5/3); moist; dense to very dense; 70% very fine to coarse sand; subangular to subrounded; 15% fine gravel to 15mm; subangular to subrounded; 15% clay with minor silt; no odor.	SC		
300					Sandy lean CLAY (CL); reddish brown (7.5YR 4/3); moist; stiff; low plasticity; 70% clay with trace silt; 30% very fine to	CL		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					fine sand; no odor.			Kelly down @ 1417. New connection @ 1426. Resumed drilling @ 1426.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; dense; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.	SP		
305					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense; 100% fine to coarse sand; subangular to subrounded; no odor.			
310					Same as above (305 ft); 100% very fine to coarse sand; subangular to subrounded; no odor.	SW		
315					Same as above (305 ft); 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.		High Solids Bentonite Grout	
320					Well graded GRAVEL (GW); pale red (2.5YR 7/2); dry; dense; 95% fine to coarse gravel; angular to subrounded; 5% coarse sand; angular to subrounded; no odor.	GW		Kelly down @ 1438. New connection @ 1449. Resumed drilling @ 1452.
					Well graded SAND with Gravel (SW); pinkish gray (5YR 7/2); dry to moist; dense; 80% very fine to coarse sand; subrounded to subangular; 15% fine to coarse gravel to 5cm; subrounded; 5% clay with minor silt, mainly as coating on coarse sand and gravel; no odor.	SW		
325								
330								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
					Well graded SAND with Gravel (SW); pinkish gray (5YR 7/2); dry to moist; dense; 80% very fine to coarse sand; subrounded to subangular; 15% fine gravel to 18mm; subrounded; 5% fines; no odor.	SW		
335					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense; 95% very fine to coarse sand; subrounded to subangular; 5% fine gravel to 15mm; subrounded; no odor.			Sand/gravel discharge preceeded by heavy dust.
					Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense; 85% medium to coarse sand; subangular to subrounded; 15% fine gravel to 12mm; subrounded to subangular; no odor.	SP		
340					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; dense to very dense; 65% very fine to medium sand; trace coarse sand; subrounded to subangular; 15% coarse gravel to 7.5cm; subrounded; 20% silt with trace clay; no odor.	SM	High Solids Bentonite Grout	Kelly down @ 1506. New conection @ 1515. Resumed drilling @ 1516. Stopped drilling @ 1524 due to hammer not firing. Resumed drilling @ 1529.
345					Same as above (340 ft); fine gravel to 15mm; subrounded; no odor.			
350					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense; 95% very fine to coarse sand; subangular; 5% silt; no odor.	SW		
355					Well graded SAND with Silt (SW-SM); reddish brown (5YR 4/3); moist; dense; 90% very fine to coarse sand; subangular to subrounded; 10% silt with trace clay; no odor.	SW-SM		
360								Kelly down @ 1538. End of 2/17/11.

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360								
365					Well graded SAND with Silt (SW-SM); strong brown (7.5YR 5/8); moist; dense; 90% very fine to coarse sand; subangular to subrounded; 10% silt with trace clay; no disernable odor; appears hydrocarbon stained.	SW-SM		New connection @ 1117 on 2/18/11. Resumed drilling @ 1150 on 2/18/11. No PID readings at either discharge or well head. Sample leaves slight oily residue on hands.
370					Well graded SAND (SW); brown (7.5YR 4/3); moist; very dense; 100% very fine to coarse sand; subrounded to subangular; no odor; less hydrocarbon staining. Same as above (365 ft); less coarse fraction; no odor; apppears hydrocarbon stained.	SW		
375					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; very dense; 80% very fine to fine sand; trace medium to coarse sand; subrounded to subangular; 20% silt; no odor; appears hydrocarbon stained (minor).	SM	High Solids Bentonite Grout	
380					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very dense; 95% very fine to fine sand; 5% silt; no odor; no visible hydrocarbon staining.	SP		Kelly down @ 1211. New connection @ 1224. Resumed drilling @ 1224.
385					Well graded SAND (SW); light reddish brown (5YR 6/3); moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
390								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
▽ At Time of Drilling: 485.00
▼ At End of Drilling: 480.45
▼ After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390								
395					Well graded SAND (SW); light reddish brown (5YR 6/3); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
400					Silty GRAVEL (GM); reddish brown (5YR 4/3); dry to moist; dense; 80% fine to coarse gravel to 5cm; subrounded to subangular; 5% very fine to coarse sand; subrounded to subangular; 15% silt with minor clay as coating on gravel; no odor.	GM		Kelly down @ 1238. New connection @ 1247. Resumed drilling @ 1248. Driller injected water into cyclone for dust suppression.
405					Well graded SAND with Silt (SW-SM); weak red (2.5YR 5/2); moist; very dense; 90% very fine to coarse sand; subrounded; 10% silt; no odor.	SW-SM	High Solids Bentonite Grout	
410					Silty SAND (SM); weak red (2.5YR 5/2); moist; very dense; 70% very fine to fine sand; 30% silt with trace clay; no odor.	SM		
415					Well graded SAND (SW); pale red (2.5R 5/2); dry to moist; very dense; 95% very fine to coarse sand; subangular; 5% silt; no odor.	SW		
420								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.			Kelly down @ 1305. New connection @ 1312. Resumed drilling @ 1312.
425					Same as above (420 ft); no odor.	SP		
430					Well graded SAND (SW); reddish brown (5YR 5/3); moist; dense to very dense; 95% very fine to coarse sand; subrounded to subangular; 5% silt; no odor.	SW		
435					Poorly graded SAND (SP); reddish brown (5YR 5/3); dry to moist; dense to very dense; 95% very fine to fine sand; trace medium sand; subrounded to subangular; 5% silt; no odor.		High Solids Bentonite Grout	
440					Same as above (435 ft); trace medium to coarse sand; subangular to subrounded; trace fine to coarse gravel to 3cm; subrounded; no odor.	SP		Kelly down @ 1328. New connection @ 1338. Resumed drilling @ 1343.
445					Same as above (435 ft); no odor.			
450								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 90% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subrounded; 5% silt; no odor.		High Solids Bentonite Grout	
455					Same as above (450 ft); no odor.	SW	Top of Bentonite Seal	
460					Same as above (450 ft); slight decrease in medium to coarse sand; no odor.			Kelly down @ 1358. New connection @ 1404. Resumed drilling @ 1405.
465					Poorly graded SAND (SP); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.			Very dusty discharge, majority of fines being blown out.
470					Same as above (465 ft); no odor.	SP		
475					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to coarse sand; subangular; no odor.	SW		
480								

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); reddish brown (5YR 5/3); dry to moist; dense; 100% fine to coarse sand; subangular; no odor.	SW	Bentonite Seal	Kelly down @ 1423. New connection @ 1443. Resumed drilling @ 1443.
485					Sandy lean CLAY (CL); brown (7.5YR 5/3); dry to moist; stiff; low to medium plasticity; 70% clay as nodules, some desicated with waxy texture; 30% very fine to fine sand; no odor.	CL	5" Schedule 80 PVC Riser	Water encountered during drilling = 485.0'.
490					SILT (ML); reddish brown (5YR 4/4); dry to moist; stiff; 90% silt with trace clay; 10% very fine to fine sand; no odor.	ML		
495					Poorly graded SAND (SP); pale red (2.5YR 6/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor.	SP	Top of 20/40 Sand Top of 10/20 Sand	
500					Same as above (490 ft); light reddish brown (2.5YR 6/3); moist; no odor.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	Initial heavy discharge of water and wet cuttings when air was turned on at 495'. Once casing storage was evacuated, cuttings were very moist to nearly saturated. No free water is being discharged. Kelly down @ 1506 on 02/18/11. New connection @ 0908 on 02/19/11. Resumed drilling @ 0913 on 02/19/11.
505					Well graded SAND (SW); reddish brown (2.5YR 6/3); wet; dense; 95% very fine to coarse sand; angular to subangular; 5% fine gravel to 15mm; angular to subangular; no odor.	SW		
					Same as above (500 ft); moist to wet; no odor.			
510					Poorly graded SAND (SP); reddish brown (2.5YR 6/3); moist to wet; dense; 100% fine to medium sand; trace very fine and coarse sand; subangular; no	SP		

Borehole ID: KAFB-106101

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5337.2
Y Coordinate: 1474038.62
X Coordinate: 1540432.85

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

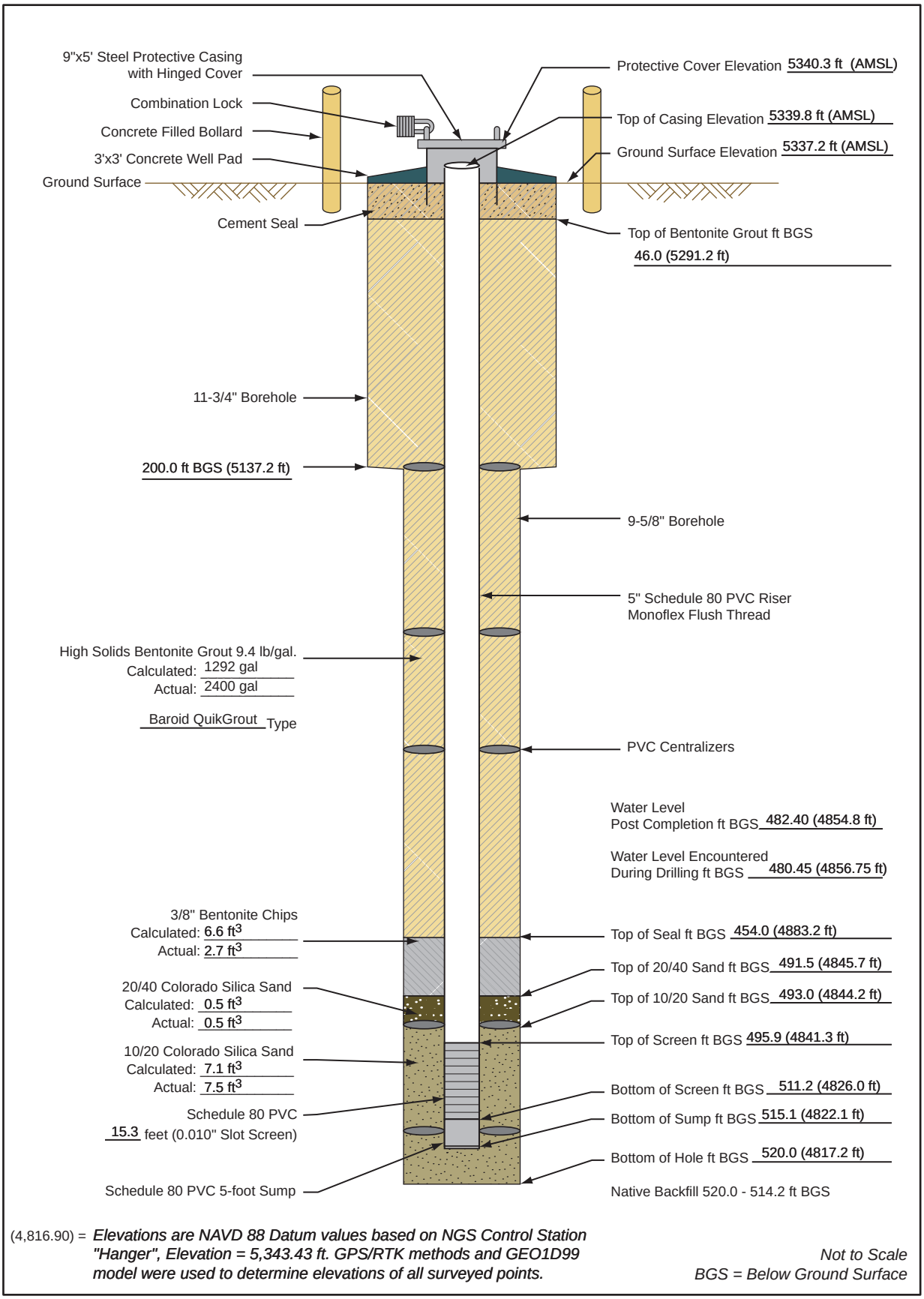
Groundwater Levels BGS (ft):
At Time of Drilling: 485.00
At End of Drilling: 480.45
After Drilling: 482.40

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					odor.	SP	Bottom of Screen Sump	
515					Well graded SAND (SW); reddish brown (2.5YR 6/3); moist to wet; dense; 100% fine to coarse sand; trace very fine sand; subangular to subrounded; trace fine gravel to 10mm; subangular to subrounded; no odor.	SW	Bottom of Sump	Inital discharge at 515' is wet with free water and heavy fines. Kelly down @ 0942. New 5' connection @ 0954. Resumed drilling @ 0956.
520					Well graded SAND with Gravel (SW); reddish brown (2.5YR 6/3); wet; dense; 85% very fine to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 3cm; subrounded; no odor. Same as above (516 ft); 15% fine gravel to 19mm; subrounded to subangular; no odor.	SW	Native Backfill	Total depth = 520 ft. Reached @ 1007 on 02/19/11. Water added during drilling (gallons) = 0 Water added during construction (gallons) = 900 Kelly down: TD the joint and ready to make new connection.
525								
530								
535								
540								

Monitoring Well Completion Diagram KAFB-106101

Installation Start Date/Time: 2/19/2011 @ 9:00
Installation End Date/Time: 2/21/2011 @ 14:34



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106101

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106101

Personnel: D. Flores, A. Trujillo

Date Installed: 2/21/11

Date: 3/16/11

Csg. Diameter (I.D.): 5"

Samplers: D. Flores, A. Trujillo

Total Depth (ft. BGL): 520.0

Method of Development:

X Surging | X Bailing | X Pumping

X Original Development | ☐Redevelopment | ☐Other

Development Date: 3/16/11-3/17/11

Depth to Water Before Developing Well (ft. BGL): 482.19

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 37.81 feet	= 941.6 gal.	*	1	=	941.6

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 941.6 gallons

Depth Purging From: 506 feet

Time Purging Begins: 1028, 3/17/11

Weather: Sunny

Screened Interval (ft BGL): 495.9-511.12

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: LVE 2818

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 900 gallons of water added during dirlling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/16/2011	1508	--	5	22.11	7.66	0.645	>2000	Begin Bailing/Initial Reading
3/16/2011	1524	--	25	19.89	7.65	0.785	>2000	Dark and Muddy
3/16/2011	1534	--	45	19.35	7.68	0.813	>2000	Dark and Muddy
3/16/2011	1539	--	55	19.12	7.71	0.823	>2000	Continue Bailing, Muddy
3/16/2011	1600	--	--	--	--	--	>2000	Begin Surging
3/16/2011	1620	--	60	19.98	7.97	0.441	>2000	Muddy
3/16/2011	1632	--	80	19.60	7.89	0.823	>2000	Light Brown
3/17/2011	1028	483.50	--	--	--	--	--	Begin Pumping, 5 GPM
3/17/2011	1037	484.15	95	20.20	7.59	0.737	9.99	Continue Pumping, Cloudy
3/17/2011	1047	481.27	145	20.68	7.59	0.693	6.70	Continue Pumping, Clear

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106101

Project Number: 140705

Samplers: D. Flores, A. Trujillo

Date: 3/17/11

Checked By:

Time Start: 1508, 3/16/11

Time Finish: 1327, 3/17/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/17/2011	1057	484.27	195	20.70	7.60	0.682	2.8	Continue Purging
3/17/2011	1107	484.25	245	20.68	7.61	0.685	2.2	Continue Purging, Clear
3/17/2011	1117	484.25	295	20.71	7.61	0.685	1.9	Continue Purging, Clear
3/17/2011	1127	484.25	345	20.78	7.60	0.683	2.0	Continue Purging, Clear
3/17/2011	1137	484.25	395	20.81	7.62	0.685	1.6	Continue Purging, Clear
3/17/2011	1147	484.25	445	20.80	7.62	0.686	1.1	Continue Purging, Clear
3/17/2011	1157	484.25	495	20.84	7.59	0.683	1.1	Continue Purging, Clear
3/17/2011	1207	484.25	545	20.81	7.63	0.684	1.0	Continue Purging, Clear
3/17/2011	1217	484.25	595	20.84	7.63	0.679	1.1	Continue Purging, Clear
3/17/2011	1227	484.25	645	20.90	7.62	0.681	1.3	Continue Purging, Clear
3/17/2011	1237	484.22	695	20.73	7.63	0.678	1.9	Continue Purging, Clear
3/17/2011	1247	484.22	745	20.84	7.63	0.676	0.8	Continue Purging, Clear
3/17/2011	1257	484.22	795	20.71	7.63	0.676	0.9	Continue Purging, Clear
3/17/2011	1307	484.23	845	20.71	7.65	0.674	1.0	Continue Purging, Clear
3/17/2011	1317	484.23	895	20.72	7.63	0.673	1.0	Continue Purging, Clear
3/17/2011	1327	484.23	945	20.70	7.65	0.676	0.9	Stop Purging
3/17/2011	1327	484.23	945	20.70	7.65	0.676	0.9	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106102 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Clayey SAND (SC); light reddish brown (2.5YR 7/3); dry; medium dense to dense; 60% very fine to fine sand; 25% clay; 15% silt; trace caliche nodules; no odor.			Hand augered. ***Note: no headspace requirement at this location***
5					Same as above (0 ft); light reddish brown (2.5YR 6/3); no odor.	SC		Spud @ 1307 on 2/22/11.
10					Sandy lean CLAY (CL); red (2.5YR 4/6); dry; medium stiff to stiff; medium plasticity; 70% clay with minor silt; 30% very fine to fine sand; trace medium to coarse sand; subangular; no odor.			
15					Lean CLAY (CL); red (2.5YR 4/6); moist; stiff; medium plasticity; 95% clay; 5% very fine to fine sand; no odor.	CL	Cement Seal	Driller began injecting potable water into cyclone for dust suppression.
20					Same as above (16 ft); no odor.			Kelly down @ 1323. New connection @ 1331. Resumed drilling @ 1332.
25					SILT (ML); red (2.5YR 5/6); dry to moist; stiff; 90% silt with trace clay; 10% very fine to fine sand; trace medium to coarse sand; subangular; no odor.	ML		
30					Lean CLAY (CL); red (2.5YR 5/6); dry to moist; stiff; medium plasticity; 90% clay; 10% very fine to fine sand; no odor.	CL		

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy lean CLAY (CL); red (2.5YR 5/6); dry to moist; stiff; low plasticity; 70% clay; 30% very fine to coarse sand; subangular; no odor.		Cement Seal	
35					Same as above (30 ft); no odor.	CL	Top of High Solids Bentonite Grout	Bit packing off.
40					Same as above (30 ft); no odor.			Kelly down @ 1356. New connection @ 1405. Resumed drilling @1405.
45					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry; stiff to very stiff; 85% silt; 15% very fine to fine sand; no odor.	ML		
50					No cuttings returned.			Discharge clogged, attempted to clear @ 1420. Discharge cleared, resumed advancing @ 1425. No cuttings returned without surging air. Regained returns at 52'.
55					Sandy SILT (ML); light red (2.5YR 6/6); dry; stiff to very stiff; 70% silt; 30% very fine to coarse sand; subangular; no odor. SILT (ML); red (2.5YR 4/6); moist; very stiff; 70% silt; 30% clay; no odor.	ML		
60					Lean CLAY (CL); red (2.5YR 4/6); moist; very stiff; low plasticity; 70% clay; 30% silt; no odor.	CL		

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); red (2.5YR 4/6); dry to moist; stiff to very stiff; 95% silt; 5% very fine to fine sand; no odor.			Kelly down @ 1439. New connection @ 1449. Resumed drilling @ 1450.
65					Same as above (60 ft); no odor.	ML		
70					SILT with Sand (ML); red (2.5YR 4/6); dry; stiff to very stiff; 80% silt; 20% very fine to fine sand; trace coarse sand; subangular; no odor.			
					No cuttings returned.			
75					Lean CLAY (CL); reddish brown (2.5YR 4/4); moist; very stiff; medium plasticity; 95% clay; 5% very fine to fine sand; no odor.		High Solids Bentonite Grout	
80					Same as above (73 ft); low to medium plasticity; 90% clay with minor silt; 10% very fine to fine sand; no odor.	CL		Kelly down @ 1517. New connection @ 1613. Resumed drilling @ 1616. Stopped advancing due to plugged discharge hose @ 1623. Resumed drilling @ 1643.
85					Same as above (73 ft); 90% clay with minor silt; 10% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; no odor.			
90					SILT with Sand (ML); light reddish brown (2.5YR 6/4); dry to moist; very stiff; 75% silt with trace clay; 25% very fine to	ML		End of 2/22/11 @ 1712.

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					medium sand; subangular to subrounded; no odor.	ML		Resumed driling @ 0825 on 2/23/11. Driller added water to cyclone for dust suppression.
95					No cuttings returned.			Discharge may be clogged.
100					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry to moist; very stiff; low plasticity; 65% clay; 30% silt; 5% very fine to fine sand; no odor. Note: may not be representative - high % of clay may be from inside discharge.	CL		Kelly down @ 0839. New connection @ 0947. Resumed drilling @ 0948. Stopped advancing @ 0952, clearing cyclone and discharge hose. Discharge hose cleared @ 1026. Resumed advancing.
105					SILT (ML); reddish brown (2.5YR 5/3); dry to moist; very stiff; 95% silt with trace clay; 5% very fine to fine sand.	ML	High Solids Bentonite Grout	
110					Lean CLAY (CL); reddish brown (2.5YR 5/3); dry to moist; very stiff; low plasticity; 65% clay nodules; 30% silt; 5% very fine to fine sand; no odor.	CL		
115					Same as above (109 ft); no odor.			
120					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to fine sand; trace medium to coarse sand; subangular to	SP		Likely top of Sante Fe Group.

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					subrounded; 5% silt; no odor.			Kelly down @ 1049. New connection @ 1058. Resumed drilling @ 1102.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.			
125					Same as above (120 ft); 95% very fine to fine sand; trace medium sand; subangular to subrounded; 5% silt; no odor.	SP		
130					Clayey SAND (SC); reddish brown (5YR 4/3); dry to moist; very dense; 75% very fine to coarse sand; subangular; 25% clay with minor silt; no odor.	SC		
					SILT (ML); light reddish brown (2.5YR 4/3); dry to moist; very stiff; 85% silt; 15% clay; no odor.	ML		
135					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; no odor.		High Solids Bentonite Grout	
140					Same as above (133 ft); 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.	SP		Kelly down @ 1122. New connection @ 1133. Resumed drilling @ 1133.
145					Same as above (133 ft); trace pumice clasts; rounded; no odor.			
150								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; trace pumice; no odor.			
155					Same as above (150 ft); 100% fine sand; trace medium to coarse sand; subangular to subrounded; trace pumice; no odor.	SP		
160					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 100% very fine to coarse sand; subangular to subrounded; no odor.			Kelly down @ 1152. New connection @ 1204. Resumed drilling @ 1239.
165					Same as above (160 ft); 95% sand; 5% fine gravel to 15mm; subangular to subrounded; higher abundance of pumice fragments than 155'; oxidized and abraded; no odor.	SW	High Solids Bentonite Grout	
170					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 100% fine to medium sand; subangular to subrounded; higher abundance of pumice fragments than 155'; oxidized and abraded; no odor.	SP		
175					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; dense; 75% very fine to medium sand; trace coarse; subangular to subrounded; 25% silt with minor clay; no odor.	SM		
180					Poorly graded SAND (SP); pale red	SP		

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					(2.5YR 7/2); dry; dense to very dense; 100% very fine to fine sand; trace medium sand; subangular to subrounded; no odor.			Kelly down @ 1253. New connection @ 1311. Resumed drilling @ 1311.
185					Same as above (179 ft); 95% very fine to fine sand; 5% silt; no odor.	SP		
190					Same as above (179 ft); no odor.			
195					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense to very dense; 90% very fine to coarse sand; subrounded; 5% fine gravel to 10mm; 5% silt; no odor.	SW	High Solids Bentonite Grout	
200					SILT (ML); brown (7.5YR 5/3); dry to moist; stiff to very stiff; 75% silt; 25% clay; no odor.	ML		Kelly down @ 1328. New 5' connection @ 1338. Resumed drilling @ 1342.
205					Lean CLAY (CL); brown (7.5YR 5/3); dry to moist; stiff; low plasticity; 70% clay; 30% silt; trace very fine to fine sand; no odor.	CL		Kelly down @ 1345, TD 11-3/4" casing. Switched to 9-5/8" casing, new connection @ 1718. Resumed drilling @ 0743 on 2/24/11.
210					Same as above (205 ft); medium plasticity; 95% clay; 5% silt; no odor.			

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Silty SAND (SM); pale red (2.5YR 7/2); dry; dense; 75% very fine to fine sand; trace medium sand; subrounded; 25% silt; no odor.	SM		Casing followed bit without using hammer.
215					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; dense; 70% very fine to coarse sand; subangular to subrounded; 15% fine gravel to 15mm; subrounded; 15% silt with minor clay as coating on gravel and coarse sand; no odor.			
220					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense; 90% very fine to fine sand; 5% fine to coarse gravel to 3cm; subrounded; 5% silt with trace clay as coating on gravel; no odor.	SP		Kelly down @ 0807. New connection @ 0816. Resumed drilling.
225					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; trace coarse gravel with clay coating; no odor.	SW	High Solids Bentonite Grout	
230					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor.	SP		Driller began injecting water into cyclone for dust suppression.
235					Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 7/2); dry; dense; 90% very fine sand; trace fine sand; 10% silt; no odor.	SP-SM		
240								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Material Description	U.S.C.S.	Well Diagram	Remarks
240	SILT (ML); reddish brown (2.5YR 5/4); dry to moist; stiff to very stiff; 70% silt; 30% clay; trace very fine to fine sand; no odor.	ML		Kelly down @ 0831. New connection @ 0837. Resumed drilling @ 0838.
245	Silty SAND (SM); light reddish brown (2.5YR 6/3); dry to moist; dense to very dense; 75% very fine to fine sand; 25% silt; no odor.	SM		Began driving casing below 245'.
250	Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
255	Same as above (250 ft); no odor.		High Solids Bentonite Grout	
260	Poorly graded SAND (SP); reddish brown (5YR 4/4); dry to moist; dense to very dense; 100% fine to medium sand; trace very fine sand; subrounded; no odor.	SP		Kelly down @ 0901. New connection @ 0913. Resumed drilling @ 0914.
265	Same as above (260 ft); 95% sand; 5% fine gravel to 10mm; subrounded; no odor.			
270				

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense to very dense; 80% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 3cm; subrounded; 5% silt with clay as coating on gravel; no odor.	SP		
275					Same as above (270 ft); no odor.			
280					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subrounded; trace fine gravel to 10mm; subrounded; 5% silt; no odor.	SW		Kelly down @ 0927. New connection @ 0933. Resumed drilling @ 0934.
285					Same as above (279 ft); no gravel; no odor.		High Solids Bentonite Grout	
290					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% medium to coarse sand; subangular to subrounded; trace very fine to fine sand; 5% fine gravel to 15mm; subrounded; no odor. Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense to very dense; 85% very fine to fine sand; 15% fine to coarse gravel to 2cm; subangular to subrounded; no odor.	SP		
295					Clayey SAND (SC); brown (7.5YR 5/3); moist; very dense; 80% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subrounded; 15% clay with minor silt; no odor.	SC		
300								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); reddish brown (5YR 4/4); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		Kelly down @ 0950. New connection @ 1000. Resumed drilling @ 1005.
305					Poorly graded SAND (SP); reddish brown (2.5YR 5/4); dry to moist; very dense; 95% very fine to fine sand; trace medium to coarse sand; subrounded; 5% silt; no odor.	SP		
310					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.			
315					Well graded SAND with Gravel (SW); pale red (2.5YR 7/2); dry to moist; very dense; 80% very fine to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 2cm; subangular to subrounded; 5% silt with clay as coating on gravel; no odor		- High Solids Bentonite Grout	
320					Same as above (315 ft); no odor.	SW		Kelly down @ 1021. New connection and resumed drilling.
325					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.			
330								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Well graded GRAVEL with Sand (GW); pale red (2.5YR 7/2); dry; dense to very dense; 80% fine to coarse gravel to 2.5cm; subangular to subrounded; 15% very fine to coarse sand; subangular to subrounded; 5% silt with clay as coating on gravel; no odor.	GW		
340					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor. Note: brief discharge of gravel at base of interval.	SW		
345					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to fine sand; 5% silt; no odor.	SP	- High Solids Bentonite Grout	Kelly down @ 1053. New connection @ 1102. Resumed drilling @ 1102.
350					Same as above (340 ft); 95% very fine to fine sand; trace medium to coarse sand; subrounded; 5% silt; no odor.			Stopped drilling to reconnect air hose to casing hammer @1118. Resumed drilling @ 1152.
355					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense to very dense; 90% very fine to coarse sand; subangular to subrounded; 5% fine gravel to 15mm; subrounded; 5% silt; no odor.	SW		
360					Same as above (350 ft); no odor.			

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Silty SAND (SM); light reddish brown (2.5YR 6/3); dry to moist; dense; 85% very fine to fine sand; 15% silt; no odor.	SM		Kelly down @ 1200. New connection @ 1211. Resumed drillling @ 1214.
365					Poorly graded SAND (SP); light reddish brown (2.5YR 6/3); dry to moist; dense to very dense; 100% fine to medium sand; trace very fine sand; subrounded; no odor.	SP		
370					Well graded SAND (SW); light reddish brown (2.5YR 6/3); moist; dense to very dense; 100% very fine to coarse sand; subangular to subrounded; no odor.			
375					Same as above (370 ft); pale red (2.5YR 7/2); dry to moist.	SW	High Solids Bentonite Grout	
380					Same as above (370 ft); no odor.			Kelly down @ 1232. New connection @ 1239. Resumed drilling @ 1242.
385					Same as above (370 ft); increasing abundance of medium to coarse sand; no odor.			
390					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 100% very fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	SP		

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390								
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 100% very fine to medium sand; trace coarse sand; subangular to subrounded; no odor.	SP		
395								
					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
400					Same as above (395 ft); no odor.			Kelly down @ 1312. New connection @ 1315. Resumed drilling @ 1316.
405					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 100% very fine to fine sand; no odor.	SP	High Solids Bentonite Grout	
410								
					Well graded SAND (SW); pale red (2.5YR 7/2); dry; very dense; 100% very fine to coarse sand; subangular to subrounded; trace fine gravel to 15mm; subangular; no odor.	SW		
415					Same as above (410 ft); no odor.			
					Silty SAND (SM); pale red (2.5YR 7/2); moist; very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		
420								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; very dense; 80% very fine to fine sand; 20% silt; no odor.	SM		Kelly down @ 1351. New connection @ 1358. Resumed drilling @ 1359.
425					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to fine sand; 5% silt; no odor. Brief discharge of fine to coarse gravel to 5cm; subrounded.	SP		
430					Same as above (425 ft); dry; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor.			
435					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% medium to coarse sand; subangular to subrounded; trace very fine to fine sand; 5% fine gravel to 15mm; no odor.		High Solids Bentonite Grout	
440					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 6/2); dry; very dense; 90% very fine to fine sand; 10% silt; trace limestone fragments; no odor.	SP-SM		Kelly down @ 1437. New connection @ 1445. Resumed drilling @ 1448.
445					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; no odor.	SP		
450								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Material Description	U.S.C.S.	Well Diagram	Remarks
450	Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; trace medium sand; subrounded; 5% silt; no odor.	SP		Kelly down @ 1516 on 2/24/11. New connection @ 0821 on 3/1/11. Resumed drilling @ 0833 on 3/1/11. Driller began injecting water into cyclone for dust suppression.
455	Same as above (450 ft); no odor.			
460	Same as above (450 ft); 100% fine to medium sand; trace coarse sand; subangular to subrounded; no odor.			
465	Same as above (450 ft); trace fine gravel to 5mm; subrounded; no odor.		High Solids Bentonite Grout	
470	Well graded GRAVEL with Sand (GW); pale red (2.5YR 7/2); moist; very dense; 70% fine to coarse gravel to 7.5cm; subrounded; 30% fine to coarse sand; subangular to subrounded; no odor.	GW		
475	Poorly graded SAND (SP); pale red (2.5YR 7/2); moist; dense to very dense; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% fine gravel to 10mm; subrounded; no odor.	SP		
480	Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 90% very fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 2cm; subangular to subrounded; no odor.	SW		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
480					Well graded SAND (SW); pale red (2.5YR 7/2); dry; dense to very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 3cm; subangular to subrounded; no odor.	SW	High Solids Bentonite Grout; Top of Bentonite Seal	Kelly down @ 0902. New connection @ 0911. Resumed drilling @ 0912.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); moist; very dense; 100% very fine to fine sand; no odor. Note: sandy clay; dark brown (7.5YR 3/4) with clay nodules at 484'.	SP		
485					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subrounded; no odor.	SW		Dusty dry discharge from 480-497'. Kelly down.
490					SILT with Sand (ML); light reddish brown (5YR 6/4); dry to moist; very dense; 80% silt; 20% very fine to fine sand; no odor.	ML		
					Silty SAND (SM); light reddish brown (5YR 6/4); dry to moist; very dense; 70% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 7.5cm; subrounded; 20% silt; no odor.	SM		
495					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 90% very fine to medium sand; trace coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subrounded; 5% silt; no odor. Same as above (495 ft); wet; no odor.	SP		
500								Kelly down @ 0941. New connection @ 1107. Resumed drilling @ 1146.
505					Well graded SAND (SW); weak red (2.5YR 5/2); moist; very dense; 95% very fine to coarse sand; subangular; 5% fine gravel to 18mm; subangular to subrounded; no odor.	SW		
510								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
510					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 95% very fine to medium sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subangular to subrounded; no odor.	SP	Bentonite Seal	
515					Well graded SAND (SW); weak red (2.5YR 5/2); moist; very dense; 95% fine to coarse sand; subangular to subrounded; trace very fine sand; 5% fine to coarse gravel to 7.5cm; subangular to subrounded; trace cobbles to 15cm; no odor.	SW	5" Schedule 80 PVC Riser Top of 20/40 Sand Top of 10/20 Sand	
520					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 95% fine to medium sand; trace very fine and coarse sand; subangular to subrounded; 5% fine to coarse gravel to 5cm; subangular to subrounded; no odor.	SP	Top of 5" Schedule 80 PVC 0.010" Slot Screen	Kelly down @ 1214. New connection @ 1246. Resumed drilling @ 1252.
525					Same as above (520 ft); moist; 100% very fine to fine sand; no odor.			
530					Same as above (520 ft); 100% very fine to medium sand; trace coarse sand; subangular to subrounded; trace fine gravel to 12mm; subangular to subrounded; no odor.			
535					Well graded SAND (SW); weak red (2.5YR 5/2); wet; very dense; 95% very fine to coarse sand; subangular to subrounded; 5% fine gravel to 12mm; subrounded; no odor.	SW	Bottom of Screen Sump	
540								

Borehole ID: KAFB-106102

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 3/1/2011
Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3
Y Coordinate: 1474039.85
X Coordinate: 1540401.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Stick-up

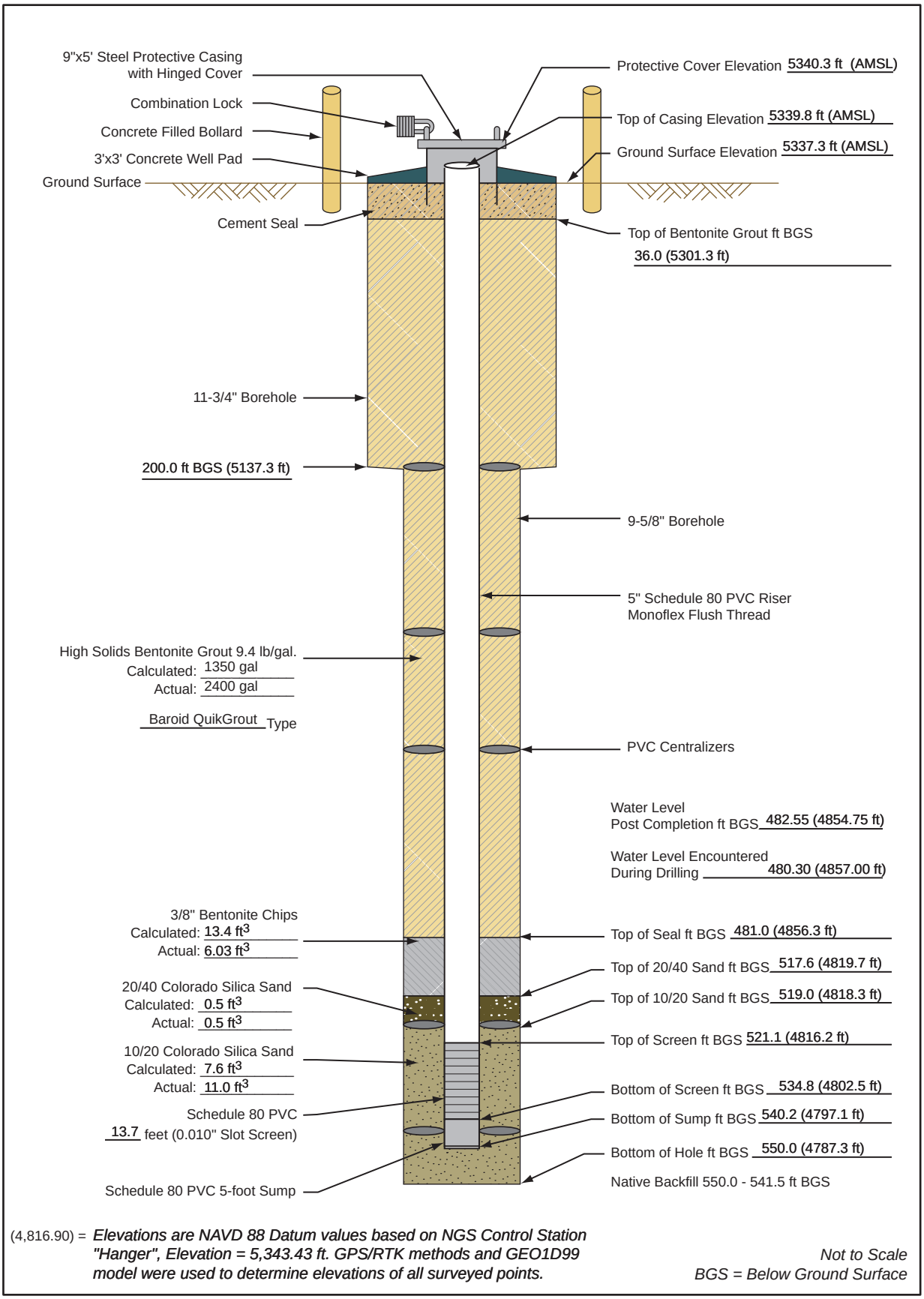
Groundwater Levels BGS (ft):
At Time of Drilling: 480.30
At End of Drilling: Not Recorded
After Drilling: 482.55

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
540					Poorly graded SAND with Gravel (SP); weak red (2.5YR 5/2); wet; very dense; 85% medium to coarse sand; angular to subangular; trace very fine to fine sand; 15% fine to coarse gravel to 5cm; subangular; no odor.		Bottom of Sump	Kelly down @ 1328. New connection @ 1340. Resumed drilling @ 1343. Heavy discharge of water when air was turned on after connection. Heavy discharge likely washed fine-grained material out of sample at 540'.
545					Poorly graded SAND (SP); weak red (2.5YR 5/2); wet; very dense; 100% very fine to medium sand; subangular to subrounded; no odor.	SP	Bottom of Filter Pack	
550							Native Backfill	Total Depth = 550 ft. Reached @ 1418 on 3/1/11.
555								Water added during drilling (gallons) = 0
560								Water added after drilling (gallons) = 1,000
565								Water added during construction (gallons) = Not Recorded
570								Spud: started drilling from surface.
								Kelly down: TD the joint and ready to make new connection.

Monitoring Well Completion Diagram KAFB-106102

Installation Start Date/Time: 3/22/2011 @ 7:59
Installation End Date/Time: 3/3/2011 @ 17:20



(4,816.90) = *Elevations are NAVD 88 Datum values based on NGS Control Station "Hanger", Elevation = 5,343.43 ft. GPS/RTK methods and GEO1D99 model were used to determine elevations of all surveyed points.*

Not to Scale
BGS = Below Ground Surface

140705.CB010040_MW_KAFB_106102

Shaw Environmental, Inc.

Well Development Record

Project Name: KAFB BFF

Location: BFF

Well/Piez. No.: 106102

Personnel: D. Flores, A. Trujillo

Date Installed: 3/3/11

Date: 3/16/11

Csg. Diameter (I.D.): 5"

Samplers: D. Flores, A. Trujillo

Total Depth (ft. BGL): 541.50

Method of Development:

X Surging | X Bailing | X Pumping

X Original Development | ☐Redevelopment | ☐Other

Development Date: 3/16/11-3/19/11

Depth to Water Before Developing Well (ft. BGL): 482.52

	Vol. (V)		Purge Factor		Volume to Purge
Height of Water Column: 58.98 feet	= 1064.95 gal.	*	1	=	1064.95

$V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O$ added during drilling/installation) = 1064.95 gallons

Depth Purging From: 530 feet

Time Purging Begins: 1027, 3/19/11

Weather: Sunny

Screened Interval (ft BGL): 521.08-534.84

Equipment Nos.: **pH Meter:** YSI 100258 **EC Meter**: YSI 100258 **Turbidity Meter**: LVE 2818

Equipment Decontaminated Prior to Development: Y X N

Describe: Steam Cleaned

Collected Sample of Water Added to Well: Y N X

Describe: N/A

Comment: 1000 gallons of water added during drilling/well installation activities

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/16/2011	1000	--	10	--	--	--	--	Begin Bailing
3/16/2011	1009	--	20	19.74	8.10	0.412	>2000	Initial Reading
3/16/2011	1042	--	30	19.87	7.98	0.365	>2000	Continue Bailing, Muddy
3/16/2011	1100	--	--	--	--	--	--	Bailer Came Up Sandy
3/19/2011	1423	--	40	--	--	--	--	Sandy, Muddy brown
3/19/2011	0903	482.96	50	--	--	--	--	Continue Bailing, Muddy
3/19/2011	1027	483.58	50	--	--	--	--	Begin Pumping, 10 GPM
3/19/2011	1035	484.20	70	19.57	7.81	0.392	1000+	Continue Pumping
3/19/2011	1100	484.13	170	24.45	7.91	0.382	119	Continue Pumping
3/19/2011	1120	484.11	270	24.09	7.97	0.384	53	Continue Pumping

Notes:

* Water Levels - Reported to the nearest 0.01 foot
* pH - Reading rounded to 0.1 pH units
* Water temperature - Reported to nearest 0.1C
* Turbidity report in NTV nearest whole #

Where:

B=3.14

$Ø_s$= porosity of the sand pack

r_c= radius of the well casing and screen in feet

L_c= length of water column inside the casing and screen in feet

r_w= radius of the well bore in feet

L_s= length of saturated portion of the sand pack in feet

7.48 gallons/cubic foot= conversion from cubic feet to gallons

Shaw Environmental, Inc.

Well Development Record

Project: KAFB BFF

Well No: 106102

Project Number: 140705

Samplers: D. Flores, A. Trujillo

Date: 3/19/11

Checked By:

Time Start: 1000, 3/16/11

Time Finish: 1415, 3/19/11

Field Chemistry (cont'd)

Date	Time	Water Level (ft. Below TOC)	Volume Removed (gal.)	Temp.°C	pH	EC (ms/cm)	Turbidity N.T.U.	Comments
3/19/2011	1140	484.10	370	24.01	8.01	0.394	35	Continue Pumping
3/19/2011	1200	484.07	470	24.21	7.99	0.379	29	Continue Pumping
3/19/2011	1220	484.06	570	23.07	7.98	0.361	31	Continue Pumping
3/19/2011	1240	484.08	670	22.73	8.00	0.353	14	Continue Pumping
3/19/2011	1300	484.07	770	21.54	8.04	0.347	13	Continue Pumping
3/19/2011	1325	484.05	870	22.72	8.01	0.349	11	Continue Pumping
3/19/2011	1350	484.04	970	23.12	8.01	0.344	7	Continue Pumping
3/19/2011	1415	484.01	1070	22.91	8.00	0.347	6	Stop Pumping
3/19/2011	1415	484.01	1070	22.91	8.00	0.347	6	Total Removed

Was well sampled after development? YES NO X

Sample Method: N/A

Sample Name: N/A

Analyses: N/A

APPENDIX D-1

KAFB-106108 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed; dirt road.		Concrete Seal	Hand augered.
5					Sandy SILT (ML); light reddish brown (5YR 5/4); dry; very soft; 50% silt; 40% fine to medium sand; 10% gravel to 4mm; angular to subangular.			Began drilling @ 0915 on 2/15/11.
10		SB0001	0.0		Sandy SILT (ML); reddish brown (2.5YR 5/4); dry; firm; 50% silt; 45% fine to medium sand; 5% gravel to 4mm; subangular.	ML	Bentonite Seal	Blow counts (8-9.5'): Not Recorded (cable at an angle).
15					Sandy SILT (ML); red (2.5YR 5/6); dry; soft; low plasticity; 30% silt; 20% clay; 45% very fine to medium sand; 5% gravel to 8mm; subangular.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0002	0.0		Silty SAND (SM); red (2.5YR 5/6); dry; dense; 60% very fine to fine sand; 40% silt.	SM		Blow counts (18-19.5'): 26/50. Blow counts (19.5-21'): 50/Not Recorded. Blow counts (21-22.5'): Not Recorded.
		SB0002-MS	0.0					
		SB0002-MSD	0.0					Added 10' of casing @ 1045.
25					Same as above (18 ft).		Bottom of Screen	
		SB0003	0.0		Silty SAND (SM); yellowish red (5YR 5/6); moist; dense; 60% very fine to fine sand; 20% silt; 20% clay; low plasticity.		Bentonite Seal	Blow counts (28-29.5'): 16/45/50.
30								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); yellowish red (5YR 5/6); moist; dense; 60% very fine to fine sand; 20% silt; 20% clay; low plasticity.		Bentonite Seal	Added 10' of casing @ 1110. Resumed drilling @ 1115.
35					Silty SAND (SM); red (2.5YR 4/6); moist; loose; 80% fine to medum sand; 5% gravel to 4mm; 15% silt.	SM		
40		SB0004	0.0		Silty SAND (SM); red (2.5YR 4/6); moist; dense; 80% fine to medium sand; 5% gravel to 4mm; 15% silt; mottled through out; calcite to 3mm; mica flakes.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38-39.5'): 50/Not Recorded. Blow counts (39.5-41'): 50/Not Recorded. Blow counts (41-42.5'): Not Recorded. Added 10' of casing @ 1140.
		SB0004						
		SB0004						
45					Poorly graded SAND with Gravel (SP); yellowish red (5YR 4/6); dry; very loose; 70% fine and coarse to very coarse sand; 30% gravel to 15mm; angular to subrounded; gravel is composed of granite.			
50		SB0005 SB0006	0.0		Poorly graded SAND (SP); yellowish red (5YR 4/6); 95% very fine to fine sand; 5% silt.		Bottom of Screen	Blow counts (48-49.5'): 38/40/43. Added 10' of casing @ 1230.
55					Same as above (48 ft).	SP	Bentonite Seal	
60					Poorly graded SAND with Gravel (SP); yellowish red (5YR 4/6); dry; very loose; 70% very fine to fine sand; 30% gravel to 8mm; angular to subangular; gravel is			

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					composed of granite.			Added 20' of casing @ 1245. Resumed drilling @ 1250.
65					Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; loose; 95% very fine to fine sand; 5% silt.			
70					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; loose; 95% very fine sand; 5% silt.			
75					Same as above (70 ft).	SP	Bentonite Seal	
80					Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; loose; 95% medium to coarse sand; 5% silt; coarse grains are composed of granite.			Added 20' of casing @ 1255. Resumed drilling @ 1305.
85					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 85% medium to coarse sand; 15% gravel to 21mm; angular to subrounded; some sand is cemented.			
90								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); light gray (5YR 7/1); dry; very loose; 100% medium to very coarse sand; some coarse sand is volcanic tuff.			
95					Same as above (90 ft).	SP		
100		SB0007	0.0		Poorly graded SAND (SP); light gray (5YR 7/1); dry; medium dense; 100% very fine to medium sand.			Blow counts (98-99.5'): 23/28/38. Blow counts (99.5-101'): 20/26/38.
		SB0007						
105					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% silt.		Bentonite Seal	
110					Same as above (103 ft).	SM		
115					Same as above (103 ft).			
120								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 15:11 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% silt.	SM		Added 5' of casing @ 1350 and drove flush with surface. Tripped out drill pipe @ 1405. Resumed drilling @ 0755 on 02/16/2011.
					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 85% medium to coarse sand; 15% gravel to 8mm; angular to subrounded.			
125					Same as above (122 ft).			
130					Same as above (122 ft).		Bentonite Seal	
135					Same as above (122 ft).	SP		
140							Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 80% medium to coarse sand; 20% gravel to 30mm; angular to subrounded.			Added 10' of casing @ 0805. Resumed drilling @ 0830.
145					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; very loose; 95% fine to medium sand; 5% gravel to 7mm; subangular to subrounded.			
		SB0008	0.0		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); dry; very dense; 70% medium to very coarse sand; 30%			Blow counts (148-149.5'): 6/50. Blow counts (149.5-151'): 50/Not
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 15:11 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150		SB0008			gravel to 15mm; angular to subrounded.		Bottom of Screen	Recorded. Added 10' of casing @ 0850. Resumed drilling @ 0855.
155					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% fine to medium sand; 5% gravel to 10mm; angular to subrounded.			
160					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); dry; loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded; gravel is dominantly pumice/tuff.			
165					Same as above (158 ft).	SP	Bentonite Seal	
170					Poorly graded SAND with Gravel (SP); 55% meduim to very coarse sand; 45% gravel to 12mm; subangular to subrounded.			
175					Same as above (170 ft).			
180								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND with Gravel (SP); 55% meduim to very coarse sand; 45% gravel to 12mm; subangular to subrounded.			
185					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to coarse sand. Same as above (182 ft).			
190					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand.			
195					Same as above (189 ft).	SP	Bentonite Seal	
200		SB0009	0.5		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); 55% medium to very coarse sand; 45% gravel to 40mm; subrounded to rounded; coarse gravel is dominantly rounded.			Blow counts (198-199.5'): 38/50. Blow counts (199.5-201'): 40/50. Blow counts (201-202.5'): 38/50.
		SB0009						
		SB0009						
205					Same as above (198 ft).			
210								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); moist; very loose; 80% medium to very coarse sand; 20% gravel to 22mm; subrounded to rounded.	SP		
215					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% fine to medium sand; 30% silt; 10% clay.	SM		
220					Same as above (213 ft); 35% silt; 5% clay.			
225					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand.	SP	Bentonite Seal	
230					Same as above (223 ft).			
235					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% medium to coarse sand.			
240							Top of Filter Pack	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 15:11 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pinkish gray (5YR 6/2); 95% medium to coarse sand; 5% clay.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Added 10' of casing @ 1005. Resumed drilling @ 1010.
245					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 95% medium to very coarse sand; 5% gravel to 5mm; subrounded to rounded.	SP		
		SB0010	4.0		Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% medium to coarse sand.			Blow counts (248-249.5'): 38/50. Blow counts (249.5-251'): Not Recorded.
250		SB0010					Bottom of Screen	Added 10' of casing @ 1130. Resumed drilling @ 1135.
					Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/4); moist; loose; 90% fine to medium sand; 10% silt.			
255					Same as above (252 ft).			
						SP-SM		
260					Same as above (252 ft); finer.		Bentonite Seal	Added 20' of casing @ 1140. Resumed drilling @ 1145.
265					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); dry; loose; 70% sand; 30% gravel to 15mm; angular to rounded.	SW		
270					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 60% fine sand; 20% silt; 20% clay.	SM		

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 60% fine sand; 20% silt; 20% clay.	SM		
275					Silty SAND (SM); moist; medium dense; 60% very fine to fine sand; 30% silt; 10% clay.			
					Poorly graded SAND with Silt (SP-SM); reddish brown (2.5YR 5/3); moist; loose; 90% fine to medium sand; 10% silt.	SP-SM		
280					Same as above (275 ft).			Added 20' of casing @ 1155.
285					Same as above (275 ft).		Bentonite Seal	
290					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 90% medium to coarse sand; 10% gravel to 7mm; subangular to rounded.	SP		
295					Same as above (290 ft).			
300		SB0011	0.3		Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); dry; dense; 70% medium to coarse sand; 30% gravel to			Blow counts (298-299.5'): 38/50.

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					25mm; subangular to subrounded.	SP		Added 20' of casing @ 1230. Resumed drilling @ 1235.
305					Poorly graded GRAVEL with Clay and Sand (GP-GC); dry; loose; 60% gravel to 30mm; subangular to subrounded; 30% medium to coarse sand; 5% silt; 5% clay. Same as above (301 ft).	GP-GC		
310					Poorly graded SAND with Gravel (SP); dry; loose; 80% fine to coarse sand; 20% gravel to 8mm; angular to rounded. Same as above (307 ft).	SP		
315					Well graded SAND (SW); dry; very loose; 100% sand.	SW	Bentonite Seal	
320					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; very loose; 95% very fine to medium sand; 5% silt.	SP		
325					Poorly graded GRAVEL with Sand (GP); dry; loose; 70% gravel to 12mm; subrounded to rounded; 30% fine to coarse sand; well graded.	GP		
330								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Well graded SAND with Silt and Gravel (SW-SM); brown (7.5YR 4/3); dry; loose; 75% sand; 15% gravel to 15mm; subrounded to rounded; 10% silt.	SW-SM	Bentonite Seal	
340					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; loose; 95% medium to coarse sand; 5% gravel to 12mm; rounded.	SP	Top of Filter Pack	
345					Same as above (335 ft).	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Poorly graded GRAVEL (GP); dry; loose; 95% gravel to 8mm; subangular to subrounded; 5% coarse to very coarse sand.	GP		
350		SB0012	0.2		Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); 85% sand; 15% gravel to 10mm; angular to rounded.	SW	Bottom of Screen	Blow counts (348-349.5'): 50/Not Recorded. Added 10' of casing @ 1345. Resumed drilling @ 1350.
355							Bentonite Seal	
					Poorly graded SAND with Gravel (SP); reddish gray (5YR 5/2); dry; loose; 85% medium to very coarse sand; 15% gravel to 18mm; subrounded to rounded.	SP		
360								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; loose; 90% medium to very coarse sand; 10% gravel to 20mm; angular to subrounded.	SP		Added 20' of casing @ 1355. Resumed drilling @ 1400.
365					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); dry; very loose; 85% sand; 15% gravel to 10mm; subangular to rounded.	SW		
370					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 60% sand; 40% gravel to 10mm; subangular to rounded.			
375					Poorly graded SAND with Gravel (SP); brown (7.5YR 4/4); moist; very loose; 70% medium to coarse sand; 30% gravel to 7mm; subrounded to rounded.	SP	Bentonite Seal	
380					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% fine sand.			
385					Well graded SAND (SW); light brown (7.5YR 6/3); dry; loose; 95% sand; 5% gravel to 4mm; subrounded to rounded.	SW		
390								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; loose; 95% fine to medium sand; 5% gravel to 3mm; subrounded.			
395					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% fine to coarse sand.			
		SB0013	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; dense; 100% medium to coarse sand.			Blow counts (398-399.5'): 6/27/50. Blow counts (399.5-401'): 11/14/50. Added 20' of casing @ 1440.
400		SB0013						
						SP		
405					Same as above (398 ft).		Bentonite Seal	
410					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 97% medium to coarse sand; 3% gravel to 15mm; subrounded to rounded.			
415					Well graded SAND (SW); light reddish brown (5YR 6/4); moist; loose; 95% sand; 5% gravel to 3mm; subangular.	SW		
420								

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 100% fine to coarse sand.	SP		Resumed drilling @ 1500.
425					Silty SAND with Gravel (SM); light reddish brown (5YR 4/4); moist; loose; 50% fine to medium sand; 30% gravel to 30mm; rounded; 20% silt.	SM	- Bentonite Seal	
430					Silty SAND (SM); light reddish brown (5YR 4/4); moist; loose; 79% very fine to medium sand; 1% gravel to 40mm; rounded; 20% silt; some obsidian (30-40mm).			
435					Poorly graded SAND (SP); reddish brown (5YR 4/3); moist; loose; 100% very fine to medium sand.	SP	- Top of Filter Pack	
440					Same as above (435 ft).		- Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Silty SAND (SM); light reddish brown (5YR 4/4); moist; medium dense; 70% fine to medium sand; 30% silt.	SM		
450		SB0014	0.0		Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/3); moist; dense; 75% fine to coarse sand; 20% gravel to	SP		Blow counts (448-449.5'): 16/50. Blow counts (449.5-451'): Not

Borehole ID: KAFB-106108

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/15/2011
Date TD Reached: 2/16/2011
Date Completed: 2/18/2011

Ground Elevation AMSL (ft): 5341.9
Y Coordinate: 1473731.62
X Coordinate: 1541083.91

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

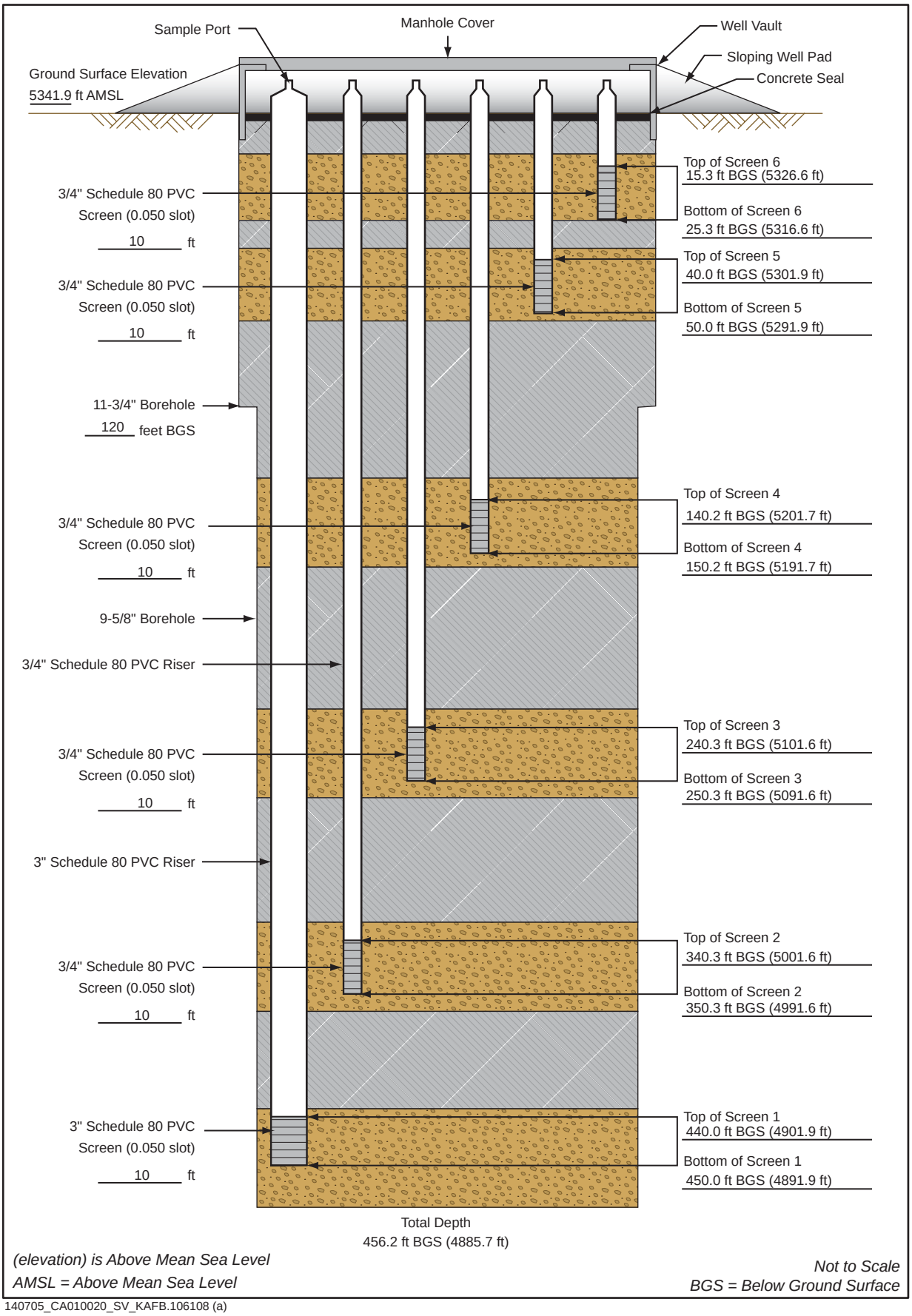
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450		SB0014			15mm; subrounded to rounded; 5% silt.	SP	Bottom of Screen	Recorded.
455					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; medium dense; 85% sand; 15% gravel to 4mm; subangular to rounded. Same as above (452 ft).	SW	Native Backfill	
460								Total depth = 458 ft. Reached @ 1600 on 02/16/11. Water added during drilling (gallons) = 0 Water added during construction (gallons) = Not Recorded
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106108

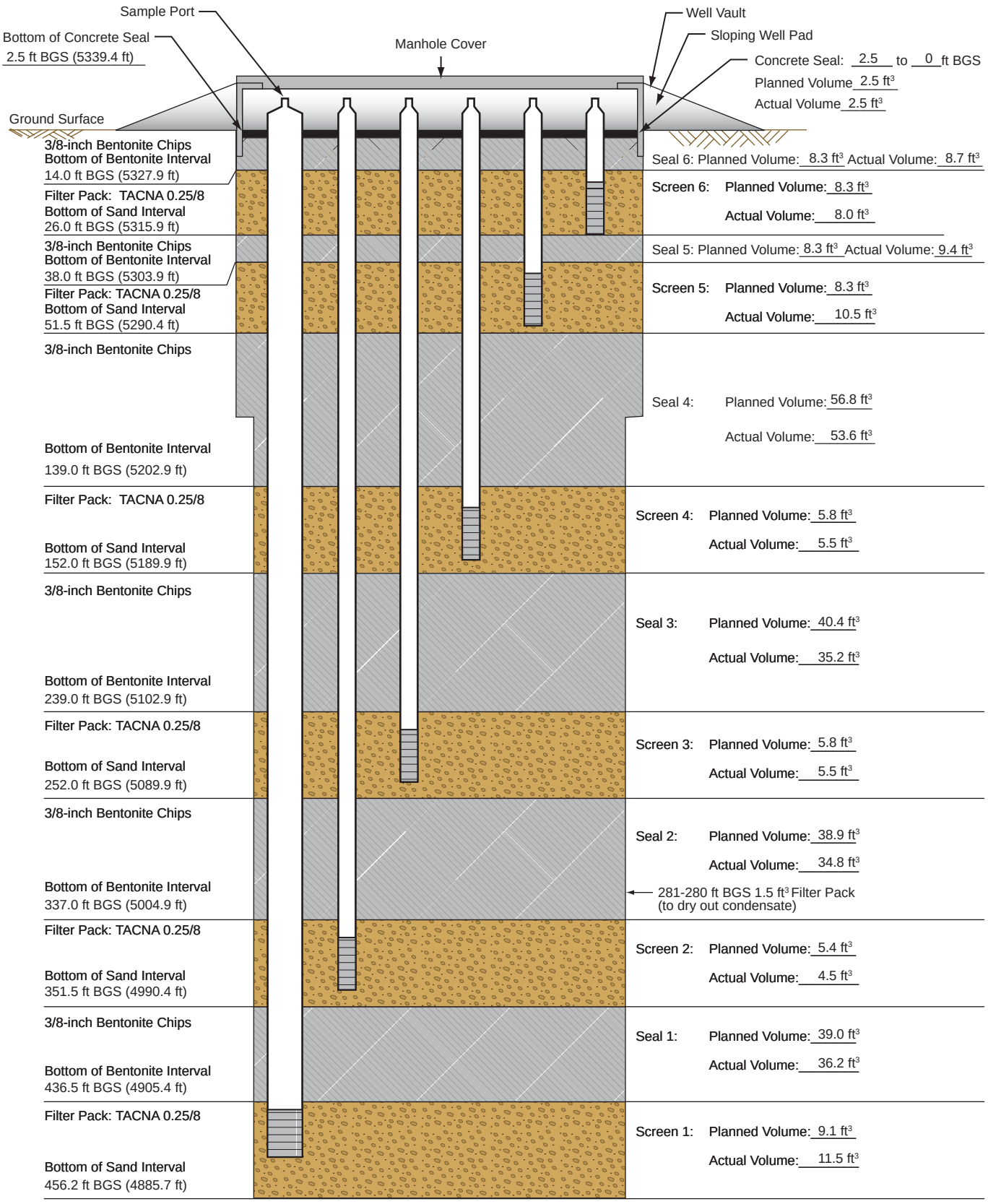
Installation Start Date/Time: 2/17/2011 @ 10:40
Installation End Date/Time: 2/18/2011 @ 17:15



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106108



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

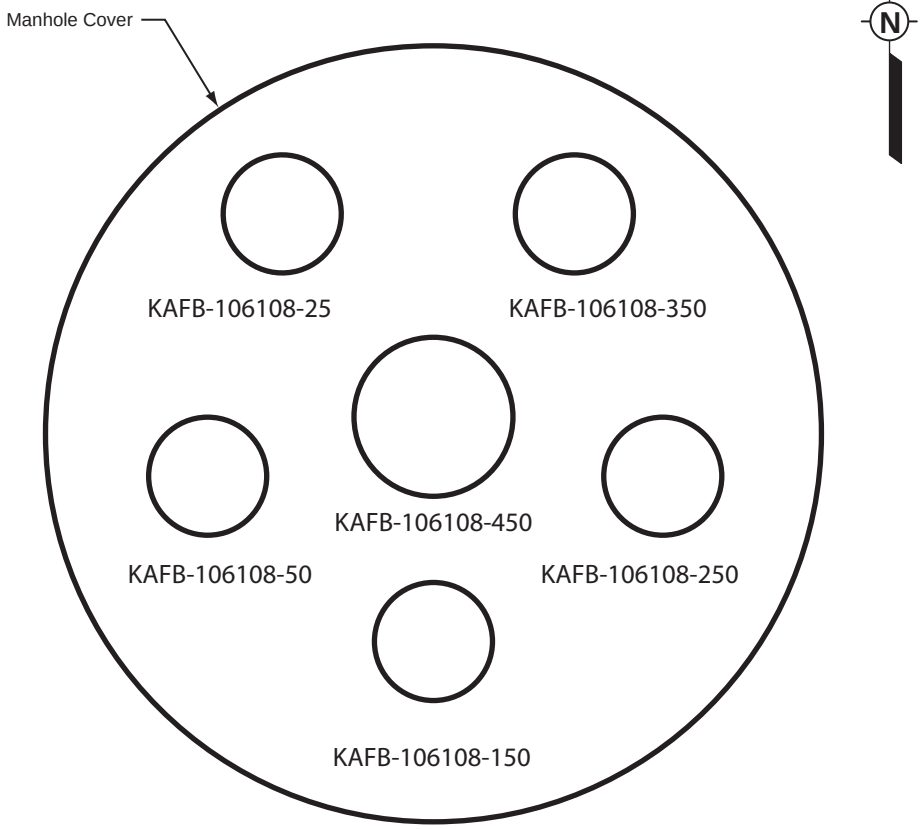
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106108

Top of Well Vault Elevation: 5341.9 (ft)

Northing: 1,473,730.11

Easting: 1,541,083.99



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106108-25	3/4	25.3	15.3 - 25.3	1,473,729.71	1,541,083.87	5341.5
KAFB-106108-50	3/4	50.0	40.0 - 50.0	1,473,729.47	1,541,083.74	5341.5
KAFB-106108-150	3/4	150.2	140.2 - 150.2	1,473,729.28	1,541,083.96	5341.5
KAFB-106108-250	3/4	250.3	240.3 - 250.3	1,473,729.42	1,541,084.21	5341.5
KAFB-106108-350	3/4	350.3	340.3 - 350.3	1,473,729.72	1,541,084.14	5341.5
KAFB-106108-450	3	450.0	440.0 - 450.0	1,473,729.60	1,541,083.99	5341.5

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106109 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed		Concrete Seal	Hand augered.
5								Began drilling @ 1255 on 1/21/11.
10		SB0015	9.4				Bentonite Seal	Blow counts (7-8.5'): 7/38.
15					Silty SAND with Gravel (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to medium sand; 15% gravel to 7mm; subrounded; 15% silt; low plasticity.		Top of Filter Pack	
20		SB0016	5.3		Silty SAND with Gravel (SM); red (5YR 5/6); dry; loose; 55% fine to coarse sand; 15% gravel to 10mm; subrounded; 15% silt; low plasticity.	SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (18.5-20'): 7/12/38.
25					Silty SAND with Gravel (SM); red (5YR 5/6); dry; loose; 70% very fine to medium sand; 15% gravel to 7mm; 15% silt; low plasticity.			
30		SB0017	6.8		Clayey SAND (SC); reddish brown (5YR 5/4); moist; loose; 80% fine to medium sand; 20% clay; low to medium plasticity.	SC	Bottom of Screen Bentonite Seal	Blow counts (27-28.5'): Not Recorded.

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND with Gravel (SM); reddish brown (5YR 4/3); moist; loose; 70% fine to medium sand; 15% gravel to 20mm; subangular to subrounded; 15% silt; low plasticity.		Bentonite Seal	
35					Silty SAND with Gravel (SM); yellowish red (5YR 5/6); moist; very loose; 80% fine to medium sand; 15% fine gravel to 4mm; angular to subangular; 15% silt; low plasticity.			Sand line stuck. Stopped @ 37'. Cut and repaired line. Resumed drilling @ 0915 on 01/22/11.
		SB0018	12.9				Top of Filter Pack	Blow counts (37-38.5'): 12/15/30.
40					Same as above (35 ft).	SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					Silty SAND with Gravel (SM); yellowish red (5YR 5/6); moist; very loose; 60% fine to medium sand; 15% gravel to 6mm; angular to rounded; 15% silt; low plasticity. Note: coarse gravel @ 47-48'.			
		SB0019	2.0					Blow counts (47-48.5'): 12/15/36.
50					Well graded SAND with Silt and Gravel (SW-SM); reddish brown (5YR 4/4); dry; very loose; 75% sand; 15% fine gravel to 8mm; angular to subrounded; 10% silt; nonplastic.	SW-SM	Bottom of Screen	
55					Silty SAND (SM); strong brown (7.5YR 5/6); moist; loose; 75% fine to medium sand; 10% gravel to 7mm; angular to subrounded; 15% silt; nonplastic.	SM	Bentonite Seal	
60								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); light brown (7.5YR 6/4); moist; very loose; 75% fine to medium sand; 10% gravel; angular to subangular; 15% silt; low plasticity.	SM		
65					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 80% fine to medium sand; 5% gravel to 40mm; subrounded; 15% silt; low plasticity.			
					Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 40% clay; low to medium plasticity.	SC		
70					Silty SAND (SM); light reddish brown (5YR 6/4); moist; loose; 60% very fine to fine sand; 5% gravel; 35% silt; low plasticity.			
75					Same as above (70 ft).	SM	- Bentonite Seal	
80					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 70% fine to medium sand; 30% silt; low plasticity.			
					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.			
85					Same as above (82 ft).	SP		
90								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.	SP		
95					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 60% fine to medium sand; 10% gravel; 30% silt; low plasticity. Same as above (92 ft); 70% fine to medium sand; 30% silt.	SM		
	X	SB0020	1.0					Blow counts (97-98.5'): 12/12/31.
100					Silty SAND (SM); brown (7.5YR 5/4); moist; very loose; 60% very fine to fine sand; 40% silt; low plasticity. No cuttings returned.			Sand line eyelet came off. Stopped drilling. Resumed drilling @ 1130. Cyclone plugged with silt @ 1145. Stopped drilling. Resumed drilling @ 1310. No soil classification due to large chunks of silt coming out of cyclone.
105					No cuttings returned.		Bentonite Seal	
110					No cuttings returned.			
115								Visually clean soil from cyclone.
					Lean CLAY with Sand (CL); brown (7.5YR 5/4); moist; loose; medium plasticity; 85% clay; 15% very fine sand.	CL		
120					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines.	SP		

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines.			Resumed drilling @ 0845 on 1/23/11.
					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% medium to coarse sand; 15% gravel to 11mm; subangular to subrounded; 5% fines.			
125								
							- Bentonite Seal	
130					Same as above (122 ft).			
					Same as above (122 ft); 15% gravel to 10mm; subangular to subrounded.	SP		
135								
							- Top of Filter Pack	
					Poorly graded SAND wth Gravel (SP); moist; very loose; 80% medium to coarse sand; 20% gravel to 9mm; subangular to subrounded; 5% fines.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
140								
145					Same as above (138 ft); 70% sand; 30% gravel.			
		SB0021	0.0		Clayey SAND with Gravel (SC); brown (7.5YR 5/4); moist; medium dense; 60% medium to coarse sand; 15% gravel; subangular to subrounded; 15% clay;	SC		Blow counts (147-148.5'): 12/12/31.
150						SP		

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 16:24 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					low to medium plasticity. Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% medium to coarse sand; 15% gravel; subrounded to rounded; 5% fines.		Bottom of Screen	
155					Same as above (151 ft).			
160					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; very loose; 95% fine to medium sand; 5% fines.	SP		
165					Same as above (160 ft).		Bentonite Seal	
170					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; very loose; 75% sand; 20% gravel to 20mm; subangular to rounded; 5% fines.			
175					Well graded SAND (SW); reddish gray (5YR 5/2); moist; very loose; 90% sand; 10% fine gravel; angular to subrounded.	SW		
180								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); moist; very loose; 70% sand; 30% gravel to 12mm; subangular to subrounded; 5% fines.	SW		
					Poorly graded SAND (SP); reddish brown (5YR 5/3); 95% medium to coarse sand; 5% gravel to 5mm; 5% fines.	SP		
185					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; very loose; 85% sand; 15% gravel; subrounded to rounded; 5% fines; clasts of volcanic tuff.	SW		
190					Poorly graded SAND with Gravel (SP); brown (10YR 5/3); moist; very loose; 70% medium to coarse sand; 30% gravel to 20mm; subangular to rounded; 5% fines.	SP	Bentonite Seal	
195		SB0022	6.1		Poorly graded SAND (SP); light brown (2.5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines.			Blow counts (197-198.5'): 5/30/refusal.
		SB0023	6.1		Silty SAND (SM); brown (7.5YR 5/4); moist; very loose; 85% very fine to medium sand; 15% silt; low to medium plasticity.	SM		Blow counts (198.5-200'): Not Recorded. Blow counts (200-201.5'): Not Recorded.
200		SB0023						
					Clayey SAND (SC); reddish brown (5YR 5/4); moist; loose; 75% very fine to fine sand; 25% clay; low plasticity.	SC		
205					Silty SAND (SM); reddish brown (5YR 5/3); 80% sand; 20% silt.	SM		
210								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Silty SAND (SM); reddish brown (5YR 5/3); 80% sand; 20% silt.	SM		
215					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; very loose; 85% sand; 15% gravel to 6mm; rounded; 5% fines.	SW		
220					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 6/2); moist; very loose; 70% gravel to 15mm; subangular to well rounded; 30% medium to coarse sand; 5% fines.	GW		
225					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; very loose; 90% medium to coarse sand; 10% gravel to 11mm.	SP	Bentonite Seal	
230					Well graded SAND (SW); pinkish gray (5YR 6/2); moist; very loose; 95% sand; 5% gravel.	SW		
235					Same as above (230 ft).			
240					Clayey SAND (SC); light reddish brown (5YR 6/3); moist; loose; 50% very fine to fine sand; 50% clay; medium plasticity.	SC	Top of Filter Pack	

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; very loose; 85% fine sand; 15% fines.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Same as above (240 ft); medium to coarse sand.			
					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; very loose; 75% sand; 20% fine gravel to 13mm; subrounded to rounded; 10% fines.	SW		
		SB0024	2.4			SM		Blow counts (247-248.5'): 7/23/42. Description from split spoon sample.
250					Silty SAND (SM); reddish brown (5YR 5/3); moist; firm; 75% very fine to fine sand; 25% silt; low plasticity.		Bottom of Screen	
					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% fines.			
255					Same as above (250 ft).			
							Bentonite Seal	
260					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to coarse sand; 15% fine gravel; angular to rounded.	SP		
265					Same as above (258 ft).			
							Native Backfill	
270								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 16:25 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to coarse sand; 15% fine gravel; angular to rounded.	SP		
275					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/3); moist; very loose; 60% gravel to 10mm; subrounded to rounded; 40% medium to coarse sand.	GP	Native Backfill	
280					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 13mm.	SW	Filter Pack	
285					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to coarse sand; 5% gravel.	SP		
290					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 25mm.	SW	Bentonite Seal	
295					Poorly graded SAND (SP); light brown (5YR 6/3); moist; very loose; 90% fine to coarse sand; 10% gravel to 25mm.	SP		
		SB0025	18.0		Poorly graded SAND (SP); brown (5YR 4/4); moist; very loose; 95% medium to coarse sand.			Blow counts (297-298.5'): 17/48/refusal. Blow counts (298.5-300'): Not Recorded.
300		SB0025						

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND with Gravel (SP); light brown (5YR 5/3); dry; very loose; 70% medium to coarse sand; 30% gravel to 7mm; subangular to rounded.			
305					Same as above (300 ft).			
310					Poorly graded SAND with Gravel (SP); light brown (5YR 5/3); dry; very loose; 85% medium to coarse sand; 15% gravel to 30mm; subrounded to rounded.			
315					Same as above (308 ft).	SP	Bentonite Seal	
320					Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; very loose; 95% fine to medium sand; 5% gravel.			
325					Same as above (317 ft).			
330					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded.			

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to coarse sand; 40% gravel to 10mm; subrounded to rounded.			
335					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); dry; very loose; 60% medium to very coarse sand; 40% gravel to 30mm; subangular to subrounded.	SP	Bentonite Seal	
340					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/3); 80% medium to very coarse sand; 20% gravel to 8mm; subrounded to rounded. No cuttings returned.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	No recovery. Blockage in drill system.
345								
350		SB0026 SB0026	0.0		Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); dry; very loose; 80% sand; 20% gravel to 9mm.	SW	Bottom of Screen	Blow counts (347-348.5'): 7/12/23. Blow counts (348.5-350'): Not Recorded.
355					Well graded GRAVEL with Sand (GW); dry; very loose; 70% gravel to 15mm; angular to subrounded; 30% medium to very coarse sand.	GW	Bentonite Seal	
360					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; very loose; 95% fine to medium sand; 5% fines.	SP		

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; very loose; 95% fine to medium sand; 5% fines.			Resumed drilling @ 0820 on 1/24/11.
365					Poorly graded SAND (SP); moist; loose; no gravel.			"Stop Work" called by Shaw and WDC @ 0945.
370					Same as above (365 ft).	SP		
375					Same as above (365 ft).		Bentonite Seal	Samples placed in chip tray but not described. Samples placed in IDW sample bag. "Stop Work" called by Shaw/WDC.
380					Well graded SAND with Gravel (SW); light reddish brown (5YR 6/3); dry; very loose; 85% sand; 15% gravel to 11mm; subangular to subrounded.	SW		Resumed drilling @ 0945 on 02/04/11.
385					Poorly graded GRAVEL with Sand (GP); light reddish brown (5YR 6/3); dry; very loose; 70% gravel to 26mm; angular to subrounded; 30% medium to very coarse sand.	GP		
390								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND with Gravel; brown (7.5YR 5/4); dry; very loose; 85% medium to coarse sand; 15% gravel to 7mm; subangular to subrounded.			
395					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% medium sand.			
		SB0027	NR					Could not obtain accurate blow counts from 397-400'. Insufficient volume for headspace measurement.
400		SB0027			Same as above (395 ft).	SP		
405					Same as above (395 ft).		Bentonite Seal	
410					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded.	SW		
415					Same as above (410 ft).			
					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 5/4); moist; very loose; 90% very fine to fine sand; 10% silt; nonplastic.	SP-SM		
420								

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); reddish brown (5YR 5/4); dry; very loose; 95% sand; 5% fines.	SW		
425					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to medium sand.		- Bentonite Seal	
430					Same as above (425 ft); very fine to fine sand.			
435					Same as above (425 ft); fine to medium sand; 5% gravel to 11mm; subrounded.	SP	- Top of Filter Pack	
440					Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 90% fine to medium sand; 10% gravel to 22mm; angular to subrounded.		- Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); dry; very loose; 60% very fine to coarse sand; 40% gravel to 20mm; angular to subrounded.	SW		
		SB0028	NR					Blow counts (447-448.5'): could not obtain accurate count. Blow counts (448.5-450'): Not
450		SB0028						

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 16:25 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106109

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/21/2011
Date TD Reached: 2/4/2011
Date Completed: 2/9/2011

Ground Elevation AMSL (ft): 5338.7
Y Coordinate: 1473479.95
X Coordinate: 1540803.52

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

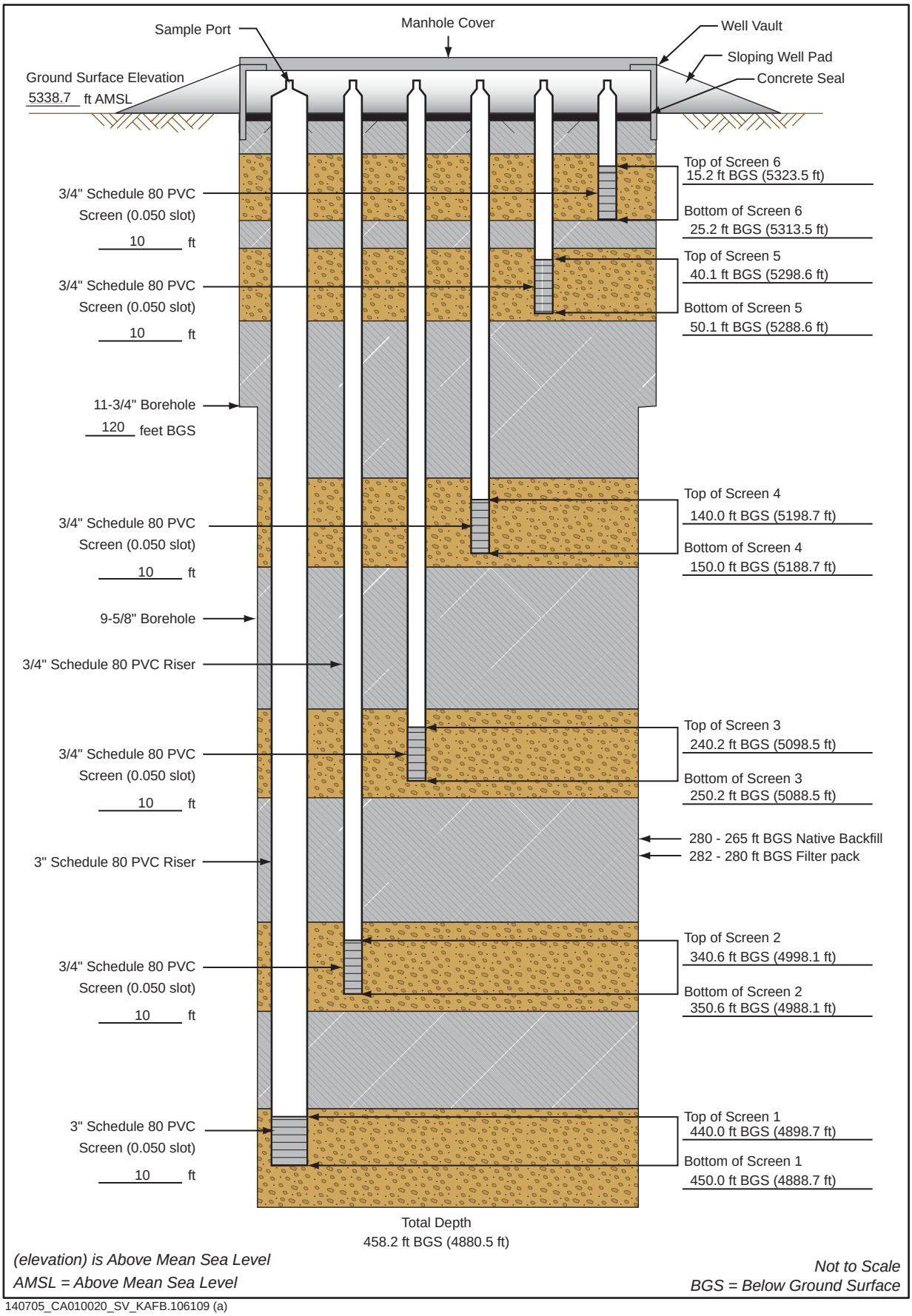
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; very loose; 85% sand; 15% gravel to 16mm; subangular to subrounded.	SW	Bottom of Screen	Recorded. Insufficient volume for headspace measurement.
455					Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 70% very fine to fine sand; 30% silt; nonplastic.	SM		
					Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; very loose; 95% very fine to medium sand; 5% fines.	SP		
460								Total depth = 458.2 ft. Reached @ 1630 on 2/4/11.
								Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106109

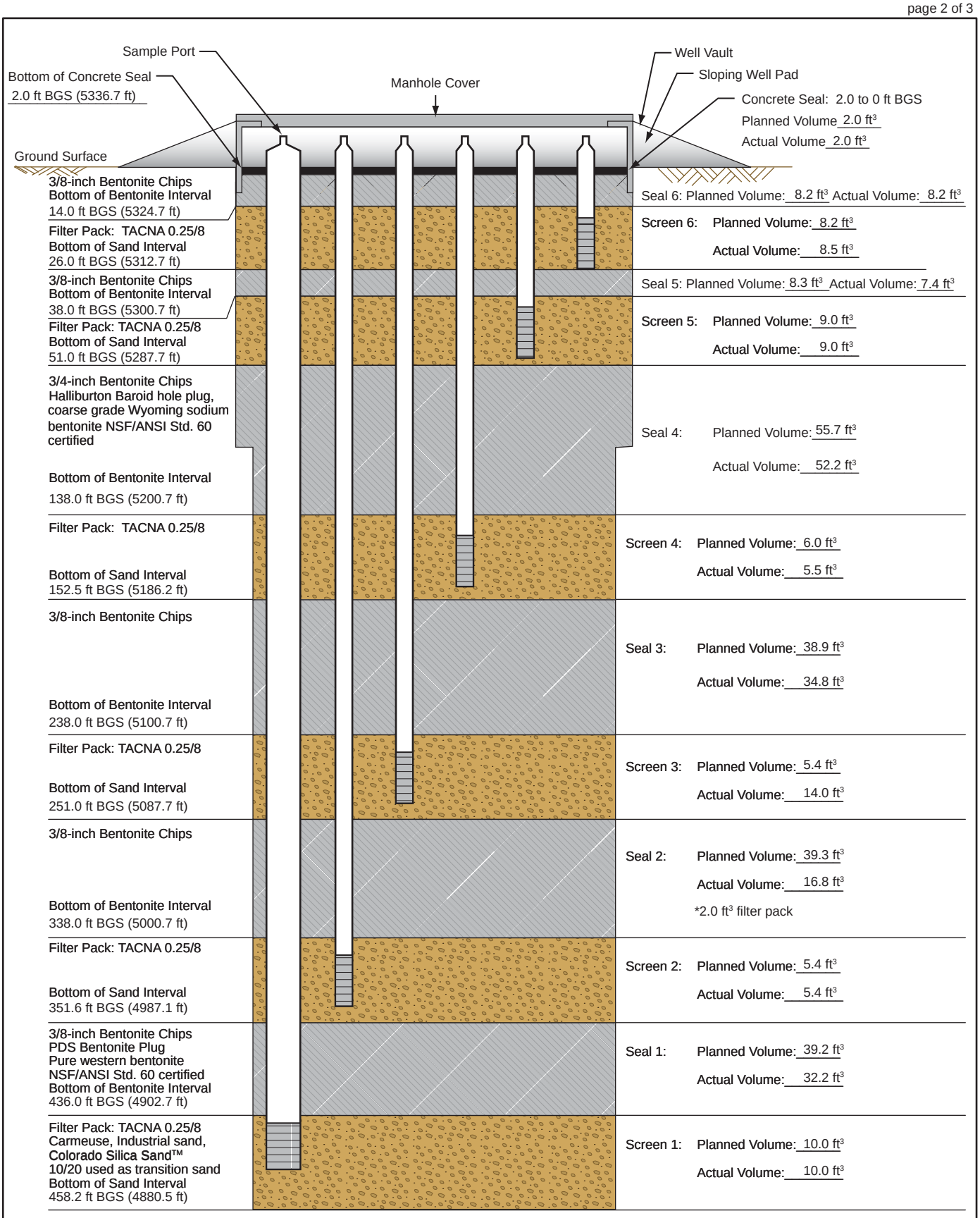
Installation Start Date/Time: 2/7/2011 @ 08:05
Installation End Date/Time: 2/9/2011 @ 15:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106109



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

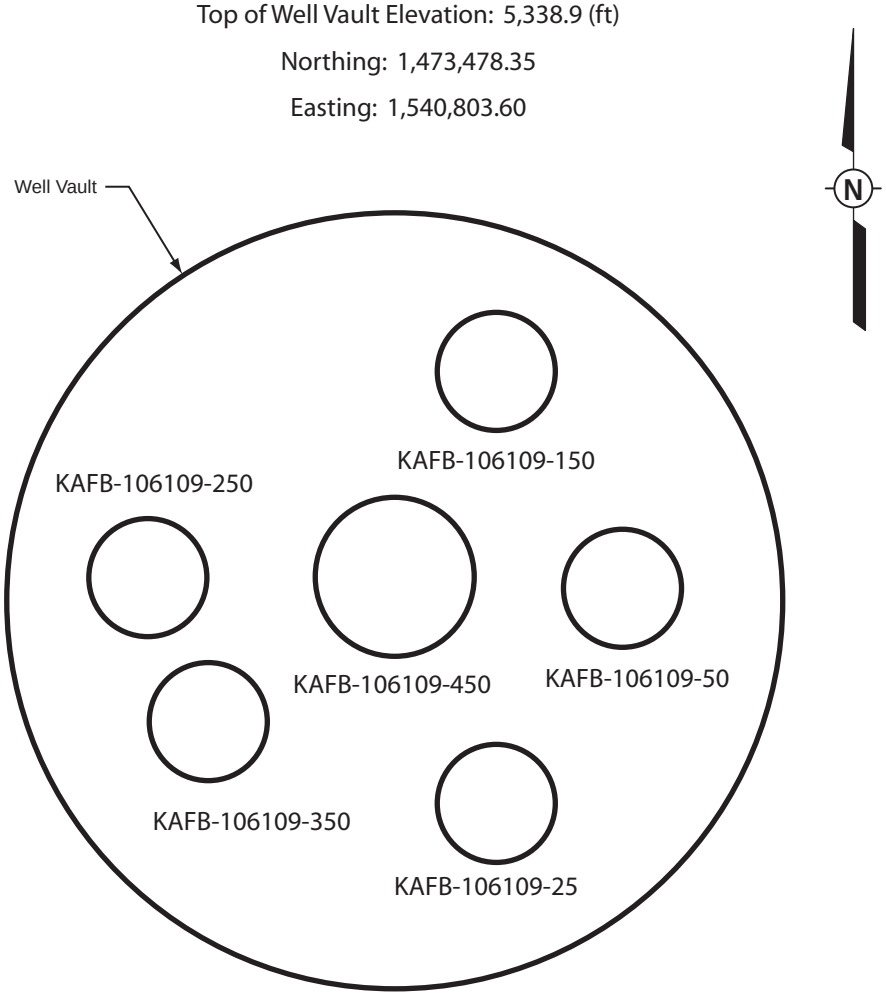
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106109

Top of Well Vault Elevation: 5,338.9 (ft)

Northing: 1,473,478.35

Easting: 1,540,803.60



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106109-25	3/4	25.2	15.2-25.2	1,473,477.62	1,540,803.71	5338.4
KAFB-106109-50	3/4	50.1	40.1-50.1	1,473,477.83	1,540,803.89	5338.3
KAFB-106109-150	3/4	150.0	140.0-150.0	1,473,478.11	1,540,803.71	5338.3
KAFB-106109-250	3/4	250.2	240.2-250.2	1,473,478.02	1,540,803.43	5338.4
KAFB-106109-350	3/4	350.6	340.6-350.6	1,473,477.70	1,540,803.42	5338.4
KAFB-106109-450	3	450.0	440.0-450.0	1,473,477.95	1,540,803.65	5338.4

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106110 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed.		Concrete Seal	Hand augered.
5					Silty SAND (SM): light reddish brown (5YR 6/4); 60% very fine to fine sand; 40% silt.			Began drilling @ 1435 on 2/19/11.
10		SB0029	0.0		Silty SAND (SM): light reddish brown (5YR 6/4); dry; very dense; 60% very fine to fine sand; 40% silt.		Bentonite Seal	Blow counts (8.0-9.5'): 50/Not Recorded.
15					Silty SAND (SM); reddish brown (2.5YR 5/4); dry; loose; 65% very fine and coarse sand; 5% gravel to 12mm; subrounded to rouded; 30% silt.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0030	0.0		Silty SAND (SM); red (2.5YR 5/6); dry; very dense; 70% very fine to medium sand; 30% silt; mottling throughout.			Blow counts (18-19.5'): 50/Not Recorded.
25					Silty SAND (SM); reddish brown (2.5YR 5/3); dry; loose; 55% very fine to fine sand; 45% silt.		Bottom of Screen	
30		SB0031	0.0		Silty SAND (SM); reddish brown (2.5YR 5/3); dry; very dense; 55% very fine to fine sand; 45% silt.		Bentonite Seal	Blow counts (28-29.5'): 50/Not Recorded. Blow counts (29.5-31'): 50/Not

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30		SB0031			Silty SAND (SM); reddish brown (2.5YR 5/3); dry; very dense; 55% very fine to fine sand; 45% silt.	SM	Bentonite Seal	Recorded. Blow counts (31-32.5'): 50/Not Recorded. End of 2/19/11. Resumed drilling @ 0810 on 2/20/11.
		SB0032	0.0					
35					Silty SAND (SM); red (2.5YR 5/6); dry; loose; 50% very fine to fine sand; 5% gravel to 8mm; subangular to subrounded; 45% silt.			
		SB0033	0.0		Silty GRAVEL with Sand (GM): red (2.5YR 5/6); dry; very dense; 40% gravel to 15mm; angular to subrounded; 40% very fine to fine and coarse sand; 20% silt; gravel is coated with caliche.	GM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38-39.5'): 50/Not Recorded. Blow counts (39.5-41'): 50/Not Recorded. Blow counts (41-42.5'): Not Recorded.
40		SB0033						
		SB0033						
45					Silty SAND (SM); red (2.5YR 5/6); dry; loose; 40% very fine to fine sand; 10% very coarse sand; 5% gravel to 8mm; rounded; 45% silt. Same as above (42 ft).	SM		
		SB0034	0.0		Silty SAND (SM); reddish brown (5YR 5/4); dry; very dense; 55% very fine to fine sand; 45% silt.		Bottom of Screen	Blow counts (48-49.5'): 50/Not Recorded. Blow counts (49.5-51'): 50/Not Recorded. New 10' connection @ 0920. Resumed drilling @ 0925.
50		SB0034						
55					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt.		Bentonite Seal	
60								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (5YR 4/4); dry; loose; 55% very fine to fine sand; 45% silt.			New 10' connection @ 0930. Resumed drilling @ 0950.
65					Silty SAND (SM); reddish brown (5YR 4/4); dry; loose; 52% very fine to fine sand; 3% gravel to 10mm; subrounded to rounded; 45% silt.			New 20' connection @ 0955.
70					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt.			
75					Same as above (70 ft).	SM	Bentonite Seal	
80					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 70% fine to coarse sand; 30% silt.			Resumed drilling @ 1010.
85					Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to fine sand; 40% silt.			
90								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Silty SAND (SM); light reddish brown (5YR 6/3); dry; loose; 60% very fine to fine sand; 10% coarse sand; 30% silt.	SM		
95					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); dry; loose; 85% medium to very coarse sand; 5% gravel to 12mm; angular to subrounded; 10% silt.	SP-SM		
100		SB0035, SB0035-MS	0.9		Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); dry; dense; 85% medium to very coarse sand; 5% gravel to 10mm; angular to subrounded; 10% silt; some mottling.			Blow counts (98-99.5'): 38/49/50. Blow counts (99.5-101'): 40/50. New 20' connection @ 1110. Resumed drilling @ 1120.
		SB0035-MSD	0.9					
105					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 55% very fine sand; 45% silt.		Bentonite Seal	
					Same as above (102 ft).			
110					Same as above (102 ft).	SM		
115					Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 70% fine to medium sand; 30% silt.			
120								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Clayey SAND (SC); yellowish red (5YR 4/6); moist; loose; 50% very fine to medium sand; 40% clay; 10% silt.	SC		New 20' connection @ 1135. Prepared for 9 5/8" casing. Resumed drilling @ 1545.
125					No cuttings returned.			9 5/8" casing fell through strata too fast.
130					Poory graded SAND with Gravel (SP); light reddish brown (2.5YR 6/3); dry; very loose; 80% very fine to coarse sand; 20% gravel to 30mm; angular to rounded.	SP	Bentonite Seal	
135					No cuttings returned.			9 5/8" casing fell through strata too fast.
140					Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 70% fine to medium sand; 30% silt.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Poorly graded SAND with Silt (SP-SM); pinkish gray (5YR 7/2); moist; very loose; 85% fine to coarse sand; 5% gravel to 20mm; subangular to subrounded; 10% silt.	SP-SM		
150		SB0036	0.0		Silty SAND with Gravel (SM); yellowish red (5YR 4/6); dry; very dense; 65% fine to coarse sand; 15% gravel to 10mm;	SM		Blow counts (148-149.5'): 100/75.

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					subangular to subrounded; 20% silt.	SM	Bottom of Screen	New 10' connection @ 1625. Resumed drilling @ 1635.
155					Poorly graded SAND (SP); dry; loose; 100% medium to very coarse sand.	SP		
160					Poorly graded SAND with Silt (SP-SM); dry; loose; 90% fine to medium sand; 10% silt.	SP-SM		
					Same as above (156 ft).			New 20' connection @ 1635. Resumed drilling @ 1655.
165					Same as above (156 ft).		Bentonite Seal	
170					Well graded SAND with Silt and Gravel (SW-SM); pinkish gray (5YR 6/2); dry; loose; 70% sand; 20% gravel to 7mm; subangular to subrounded; 10% silt.	SW-SM		
175					Poorly graded SAND (SP); yellowish red (5YR 5/6); 95% fine to medium sand; 5% silt.	SP		
180								End of 2/20/11.

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Silt and Gravel (SW-SM); pinkish gray (7.5YR 6/2); dry; loose; 75% sand; 15% gravel to 15mm; subangular to rounded; 10% silt.	SW-SM		Resumed drilling @ 0800 on 2/21/11.
185					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very loose; 95% medium to coarse sand; 5% gravel to 10mm; subangular to rounded.	SP		
190					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; very loose; 90% very fine to medium sand; 10% silt; trace 1mm pumice.	SP-SM	Bentonite Seal	
195					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; very loose; 90% very fine to fine sand; 10% silt; trace 2-3mm pumice.			
200		SB0037	0.3		Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; dense; 90% very fine to fine sand; 10% silt; trace 2-3mm pumice.			Blow counts (198-199.5'): 35/50. New 20' connection @ 0820. Resumed drilling @ 0840.
205					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 90% fine to coarse sand; 10% gravel to 13mm; subangular to rounded.	SP		
210								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); pinkish gray (5YR 7/2); moist; very loose; 70% medium to coarse sand; 30% gravel to 5mm; subrounded to rounded.			
215					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to fine sand.			
220					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to very coarse sand.			
225					Same as above (220 ft).	SP	Bentonite Seal	
230					Same as above (220 ft); fine to coarse sand.			
235					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/3); moist; very loose; 85% very fine to medium sand; 15% gravel to 33mm; subrounded to rounded.		Top of Filter Pack	
240								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 0905. Resumed drilling @ 0915.
245					Same as above (240 ft).			
250		SB0038	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; dense; 100% very fine to medium sand; coarse fraction is quatrz and pumice.	SP	Bottom of Screen	Blow counts (248-249.5'): 15/35/50. Stopped drilling @ 1045. Top hammer seal stuck to drill pipe. End of 2/21/11. Resumed drilling @ 0840 on 2/22/11.
255					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% very fine to medium sand; 5% coarse sand.			
260					Same as above (255 ft).		Bentonite Seal	New 20' connection @ 0850. Resumed drilling @ 0900.
265					Clayey SAND (SC); brown (7.5YR 5/4); moist; loose; 50% fine to medium sand; 30% clay; 20% silt; nonplastic.	SC		
270								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 80% fine to medium sand; 20% silt.	SM		
275					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 70% fine to coarse sand; 30% gravel to 8mm; subangular to subrounded.	SP		
280					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 85% fine to medium sand; 15% gravel to 4mm; subrounded to rounded.			
285					Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subangular to subrounded; 30% fine to coarse sand.	GP	Bentonite Seal	
290					Poorly graded SAND with Gravel (SP); pinkish gray (7.5YR 6/2); moist; very loose; 60% medium to coarse sand; 40% gravel to 15mm.	SP		
295					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; very loose; 85% sand; 15% gravel to 7mm; subangular to rounded.	SW		
300		SB0039	0.0		Poorly graded SAND with Gravel (SP); dry; dense; 70% fine to coarse sand; 30% gravel to 40mm; subangular to	SP		Blow counts (298-299.5'): 50/25. Blow counts (299.5-301'): 50/31.

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300		SB0039			rounded.	SP		New 20' connection @ 0945.
305					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/4); moist; medium dense; 55% gravel to 35mm; subangular to rounded; 40% medium to coarse sand; 5% silt.	GP		
310					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; medium dense; 60% medium to very coarse sand; 40% gravel to 15mm; subangular to rounded.	SP		
315					Poorly graded GRAVEL with Sand (GP); reddish brown (5YR 5/4); moist; medium dense; 70% gravel to 35mm; subrounded to rounded; 30% medium to coarse sand.	GP	Bentonite Seal	
320					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 95% medium to coarse sand; 5% gravel to 15mm; subrounded to rounded.	SP		Resumed drilling @ 1015.
325					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; loose; 80% sand; 20% gravel to 10mm; subangular to rounded.	SW		
330								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 60% medium to coarse sand; 30% silt; 10% clay; nonplastic.	SM	Bentonite Seal	
335					Poorly graded SAND with Silt (SP-SM); reddish yellow (7.5YR 6/6); moist; loose; 90% very fine to medium sand; 10% silt.	SP-SM	Top of Filter Pack	
340					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; loose; 85% fine to coarse sand; 15% gravel to 5mm; angular to subrounded.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); dry; loose; 60% medium to very coarse sand; 40% gravel to 20mm; subrounded to rounded.			
350		SB0040	0.0		Poorly graded GRAVEL with Sand (GP); dry; medium dense; 85% gravel to 40mm; subrounded to rounded; 15% coarse to very coarse sand.	GP	Bottom of Screen	Blow counts (348-349.5'): 15/30/50. Blow counts (349.5-351'): Not Recorded. New 10' connection @ 1115.
		SB0040						
355					Poorly graded GRAVEL with Sand (GP); dry; loose; 60% gravel to 20mm; angular to rounded; 40% medium to very coarse sand.		Bentonite Seal	
360								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/4); moist; loose; 85% fine to coarse sand; 15% gravel to 12mm; subangular to subrounded.			New 20' connection @ 1140. Resumed drilling @ 1145.
365					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; loose; 95% medium to coarse sand; 5% gravel to 5mm; subangular to rounded.			
370					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/4); moist; loose; 70% fine to very coarse sand; 30% gravel to 20mm; subangular to rounded.			
375					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/3); moist; loose; 55% fine to very coarse sand; 45% gravel to 15mm; subangular to subrounded.	SP	Bentonite Seal	
380					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 90% medium to coarse sand; 10% gravel to 5mm; subrounded to rounded.			New 20' connection @ 1200. Resumed drilling @ 1205.
385					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% fine to coarse sand; 5% gravel to 12mm; subrounded to rounded.			
390								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); reddish brown (5YR 3/3); moist; loose; 100% sand.			
395					Same as above (390 ft); increase in coarse fraction.	SW		
400		SB0041	0.0		Well graded SAND (SW); reddish brown (5YR 5/3); moist; dense; 100% sand.			Blow counts (398-399.5'): 50/20. Blow counts (399.5-401'): 50/30
		SB0041			Same as above (398 ft).			New 20' connection @ 1235. Resumed drilling @ 1245.
405					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; very loose; 100% very fine to fine sand.	SP	Bentonite Seal	
410					Well graded SAND (SW); reddish brown (5YR 5/3); dry; loose; 100% sand.			
					Same as above (406 ft).			
415					Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); moist; medium dense; 80% sand; 20% gravel to 20mm; subangular to rounded.	SW		
420								

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% fine to medium sand.	SP		New 20' connection @ 1250. Resumed drilling @ 1305.
425					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 85% very fine to fine sand; 15% silt.	SM	Bentonite Seal	
430					Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 55% very fine to fine sand; 30% silt; 15% clay; nonplastic.			
435					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% medium sand; trace fine sand. Same as above (432 ft).		Top of Filter Pack	
440					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; medium dense; 100% fine to coarse sand.	SP	Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; medium dense; 100% fine to very coarse sand.			
450		SB0042	0.0		Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; dense; 90% medium to very coarse sand; 10% gravel			Blow counts (448-449.5'): 50/20.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 09:23 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106110

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/19/2011
Date TD Reached: 2/22/2011
Date Completed: 2/24/2011

Ground Elevation AMSL (ft): 5340.4
Y Coordinate: 1473285.26
X Coordinate: 1541121.79

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

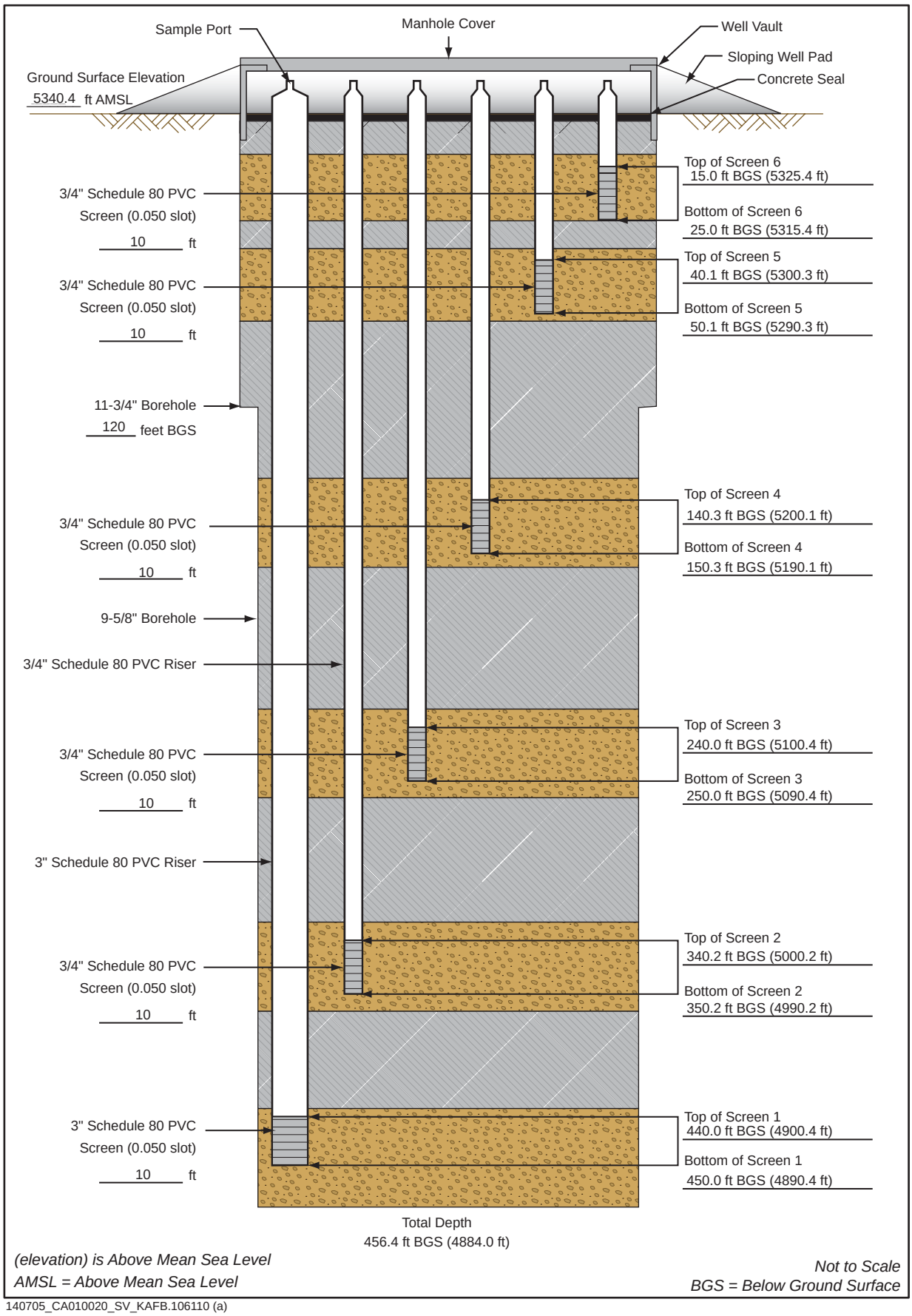
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					to 10mm; rounded.		Bottom of Screen	
455					Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; medium dense; 100% fine to coarse sand.	SP		
460								Total Depth = 456.4 ft. Reached @ 1355 on 2/22/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = Not Recorded
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106110

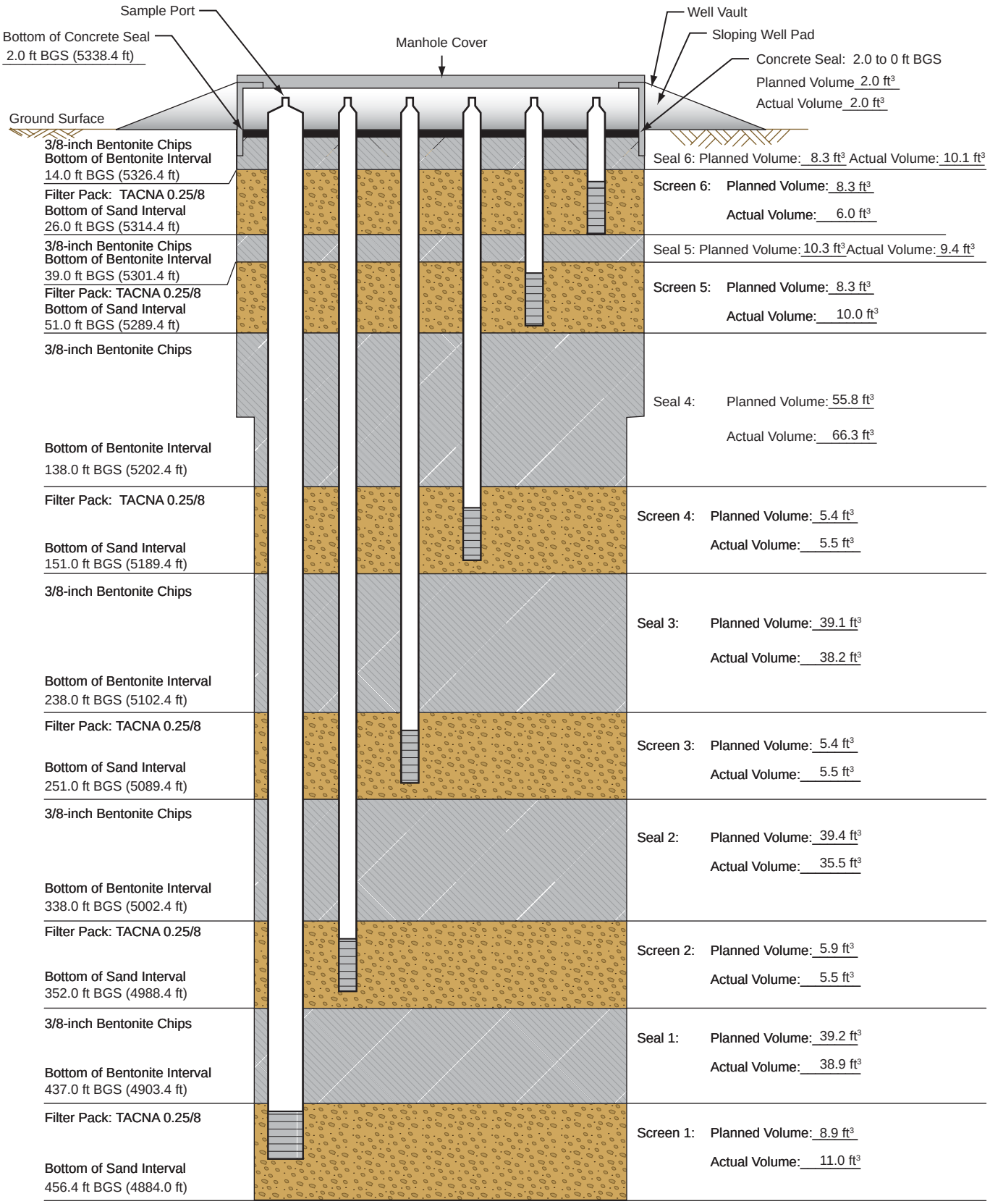
Installation Start Date/Time: 2/23/2011 @ 08:25
Installation End Date/Time: 2/24/2011 @ 14:50



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106110



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

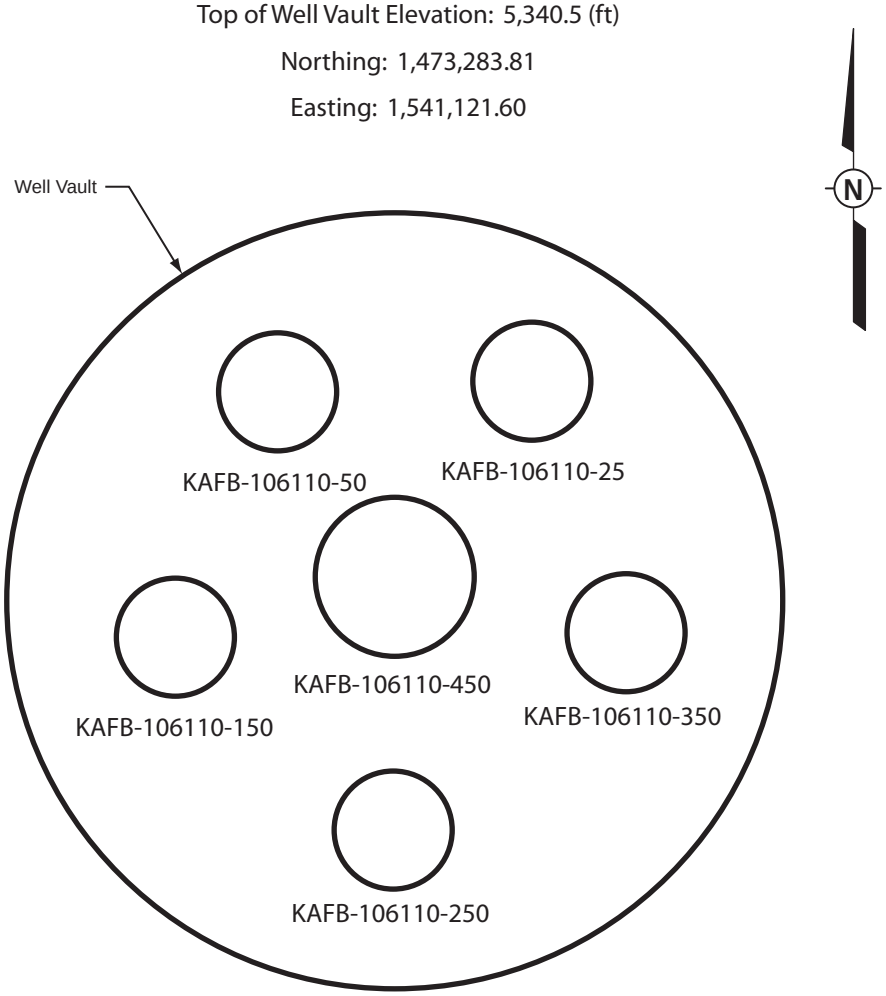
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106110

Top of Well Vault Elevation: 5,340.5 (ft)

Northing: 1,473,283.81

Easting: 1,541,121.60



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106110-25	3/4	25.0	15.0 - 25.0	1,473,283.48	1,541,121.58	5340.1
KAFB-106110-50	3/4	50.1	40.1 - 50.1	1,473,283.26	1,541,121.34	5340.1
KAFB-106110-150	3/4	150.3	140.3 - 150.3	1,473,283.02	1,541,121.49	5340.1
KAFB-106110-250	3/4	250.0	240.0 - 250.0	1,473,283.07	1,541,121.75	5340.1
KAFB-106110-350	3/4	350.2	340.2 - 350.2	1,473,283.35	1,541,121.80	5340.1
KAFB-106110-450	3	450.0	440.0 - 450.0	1,473,283.34	1,541,121.58	5340.1

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106111 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed.		Concrete Seal	Hand augered.
5					Silty SAND (SM); light reddish brown (2.5YR 6/4); dry; loose; 55% very fine to fine sand; 5% very coarse sand; 10% gravel to 4mm; subrounded; 30% silt.			Began drilling @ 1220 on 3/1/11.
		SB0043	0.0				Bentonite Seal	Blow counts (7-8.5'): 75/Not Recorded. Blow counts (8.5-10'): 100/Not Recorded. Blow counts (10-11.5'): Not Recorded.
10		SB0044	0.0		Silty SAND (SM); reddish brown (2.5YR 4/4); dry; very dense; 55% very fine to fine sand; 5% gravel to 4mm; subrounded to rounded; 40% silt; mottling throughout. Note: small piece of wood (10mm) in split spoon sample.			
		SB0044					Top of Filter Pack	
15					Silty SAND (SM); reddish brown (2.5YR 4/4); dry; medium dense; 50% very fine to fine sand; 5% coarse sand; 45% silt.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
		SB0045	0.0			SM		Blow counts (17-18.5'): 100/Not Recorded. Blow counts (18.5-20'): 100/Not Recorded. Petroleum odor @ 18'.
20		SB0045			Silty SAND (SM); light reddish brown (2.5YR 7/3); dry; very dense; 55% very fine to fine sand; 5% very coarse sand; 40% silt; very mottled throughout.			
25					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt.		Bottom of Screen	
		SB0046 SB0046-MS	0.0				Bentonite Seal	Blow counts (27-28.5'): 50/35/20. Blow counts (28.5-30'): 50/25/15.
30		SB0046-MSD	0.0					

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt.			New 10' connection @ 1440. Resumed drilling @ 1448.
35					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; medium dense; 55% very fine to fine sand; trace gravel; 35% silt; 10% clay; nonplastic; some mottling.		- Bentonite Seal	
		SB0047	0.0					Blow counts (37-38.5'): 20/30/50.
40					Silty SAND (SM); reddish brown (2.5YR 5/4); dry; medium dense; 60% very fine to fine sand; trace gravel to 4mm; rounded; 40% silt; mottling throughout.		- Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1505. Resumed drilling @ 1515.
45					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; medium dense; 65% very fine to fine and coarse sand; 5% gravel to 3mm; rounded; 30% silt; mica flakes throughout.	SM		
		SB0048	0.0					Blow counts (47-48.5'): 20/30/50.
50					Silty SAND (SM); reddish brown (2.5YR 4/4); moist; medium dense; 70% very fine to fine sand; trace gravel; 30% silt.		- Bottom of Screen	New 10' connection @ 1530. Resumed drilling @ 1540.
55					Silty SAND with Gravel (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 15% gravel to 15mm; subangular to subrounded; 25% silt.		- Bentonite Seal	
60								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 40% silt.			New 20' connection @ 1545. Resumed drilling @ 1550.
65					Same as above (60 ft).			
70					Same as above (60 ft).			
75					Silty SAND (SM); reddish brown (2.5YR 5/4); moist; loose; 85% fine sand; 15% silt.	SM	Bentonite Seal	
80					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 85% very fine to fine sand; 15% silt.			New 20' connection @ 1605.
85					Silty SAND (SM); yellowish red (5YR 5/6); moist; loose; 80% fine sand; 3% gravel to 20mm; subrounded to rounded; 17% silt.			
90								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 97% fine to medium sand; 3% gravel to 15mm; subrounded to rounded.			
95					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; loose; 100% very fine to medium sand.			
		SB0049	0.9					Blow counts (97-98.5'): 30/50.
100					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; dense; 100% very fine to medium sand. Note: split spoon contained 2" section of cemented sand.			Resumed drilling @ 1645.
105					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; loose; 100% very fine to medium sand. Note: fragments of cemented very fine sand and silt.	SP	Bentonite Seal	
110					Poorly graded SAND with Gravel (SP); moist; loose; 60% fine and coarse to very coarse sand; 40% gravel to 20mm; angular to subrounded.			
115					Poorly graded SAND (SP); moist; loose; 100% very fine to fine sand.			
120								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Silty SAND (SM); reddish brown (2.5YR 4/3); moist; loose; 60% very fine to fine sand; 40% silt.	SM		End of 3/1/11 @ 1645. Resumed drilling @ 1010 on 3/2/11, advancing with 9-5/8" casing.
125					Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 55% very fine to fine sand; 35% silt; 10% clay; nonplastic.			
130					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 100% medium to coarse sand.	SP	- Bentonite Seal	
135					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to very coarse sand.		- Top of Filter Pack	
140					Poorly graded SAND with Gravel (SP); light reddish brown (5YR 6/4); moist; very loose; 85% fine to coarse sand; 15% gravel to 4mm; subrounded.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1020.
145					Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand.			
		SB0050	0.0					Blow counts (147-148.5'): 50/30/20. Blow counts (148.5-150'): Not Recorded.
150		SB0050			Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); moist; dense; 85% medium to very coarse sand; 15%			

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					gravel to 10mm; angular to rounded. Note: split spoon contained cemented fragments to 45mm.	SP	Bottom of Screen	
					Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subrounded to rounded; 30% medium to very coarse sand.	GP		
155					Poorly graded SAND (SP); pinkish gray (5YR 7/2); moist; very loose; 90% medium to very coarse sand; 10% gravel to 10mm; subrounded to rounded.			
160					Same as above (156 ft).			New 20' connection @ 1105.
165					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% gravel to 4mm; subangular to subrounded.	SP	Bentonite Seal	
170					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 90% fine to coarse sand; 10% gravel to 4mm; subrounded.			
175					Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 90% fine to medium sand; 10% gravel to 4mm; subrounded.			
180								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 85% fine to medium sand; 15% gravel to 10mm; subangular to subrounded.			New 20' connection @ 1120. Resumed drilling @ 1125.
185					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 80% medium to very coarse sand; 20% gravel to 10mm; subangular to rounded.	SP		
190					No cuttings returned; casing fell too fast to collect sample.			
195					Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very loose; 60% medium to very coarse sand; 40% gravel to 7mm; subangular to rounded.	SP	Bentonite Seal	
		SB0051	0.0					Blow counts (197-198.5'): 50/50.
200					Poorly graded GRAVEL with Sand (GP); moist; very dense; 60% gravel to 30mm; subrounded to rounded; 40% medium to coarse sand.	GP		New 20' connection @ 1140. Resumed drilling @ 1220.
205					Clayey SAND (SC); light yellowish brown (2.5YR 6/3); moist; medium dense; 80% fine to medium sand; 15% clay; 5% silt.	SC		
210								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); yellowish brown (10YR 5/4); moist; very loose; 85% fine to coarse sand; 15% gravel to 20mm; subrounded to rounded.			
215					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 70% sand; 30% gravel to 15mm; subangular.			
220					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 4mm; subangular to rounded; gravel is pumice.	SP	- Bentonite Seal	New 20' connection @ 1225. Resumed drilling @ 1235.
225					Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 15mm; angular to subrounded; gravel is pumice.			
230					Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded.			
235					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to rounded.	SW	- Top of Filter Pack	
240								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); dry; very loose; 75% sand; 25% gravel to 15mm; subangular to rounded.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1240. Resumed drilling @ 1250.
245					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; very loose; 80% sand; 20% gravel to 7mm; subangular to rounded; pumice present.			
		SB0052	0.7					Blow counts (247-248.5'): 50/Not Recorded. Blow counts (248.5-250'): 60/Not Recorded.
250		SB0052			Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% very fine to medium sand; trace gravel.	SP	Bottom of Screen	New 10' connection @ 1315.
255					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; very loose; 100% fine to medium sand; coarse pumice fragments.			
260					Silty SAND (SM); reddish brown (5YR 5/4); moist; medium dense; 60% very fine to medium sand; 40% silt.	SM	Bentonite Seal	New 20' connection @ 1335. Resumed drilling @ 1340.
265					Same as above (258 ft).			
270								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Clayey SAND (SC); brown (7.5YR 4/4); moist; medium dense; 60% fine to medium sand; 20% clay; 20% silt; nonplastic.	SC		
275					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; loose; 100% medium to very coarse sand.	SP		
280					Well graded SAND (SW); dry; loose; 95% sand; 5% gravel to 5mm; subangular to rounded.	SW		New 20' connection @ 1350. Resumed drilling @ 1400.
285					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 60% gravel to 15mm; subangular to subrounded; 40% medium to very coarse sand.	GP	Bentonite Seal	
290					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 50% gravel to 15mm; subangular to subrounded; 45% fine to very coarse sand; 5% silt.			
295					Well graded SAND with Gravel (SW); moist; medium dense; 60% sand; 40% gravel to 35mm; subrounded to rounded.	SW		
		SB0053	0.0					Blow counts (297-298.5'): 60/Not Recorded. Blow counts (298.5-300'): 67/Not Recorded.
300		SB0053			Poorly graded GRAVEL (GP); dry; very dense; 90% gravel to 25mm; angular to rounded; 10% medium to very coarse	GP		

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					sand.			New 20' connection @ 1430. Resumed drilling @ 1435.
305					Poorly graded GRAVEL with Sand (GP); dry; medium dense; 55% gravel to 25mm; subangular to rounded; 45% coarse to very coarse sand.	GP		
310					Well graded SAND with Gravel (SW); light reddish brown (5YR 6/4); moist; medium dense; 60% sand; 40% gravel to 12mm; subrounded to rounded.	SW		
315					Poorly graded GRAVEL with Sand (GP); pale brown (10YR 6/3); moist; medium dense; 70% gravel to 30mm; subrounded to rounded; 30% medium to coarse sand.	GP	Bentonite Seal	
320					Well graded SAND with Gravel (SW); pale brown (10YR 6/3); moist; medium dense; 80% sand; 20% gravel to 10mm; subangular to subrounded.	SW		New 20' connection @ 1445. Resumed drilling @ 1450.
325					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; loose; 95% medium to coarse sand; 5% gravel to 4mm; subangular to subrounded.	SP		
330								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; loose; 80% sand; 20% gravel to 4mm; angular to subrounded.	SW	Bentonite Seal	
335					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 5/3); moist; loose; 70% sand; 20% gravel to 35mm; angular to rounded; 10% clay.	SW-SC	Top of Filter Pack	
340					Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 95% fine to medium sand; 5% gravel to 10mm; subangular to rounded.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1455. Resumed drilling @ 1505.
345					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; medium dense; 60% sand; 40% gravel to 20mm; angular to rounded.	SW		
		SB0054	0.0					Blow counts (347-348.5'): 50/Not Recorded.
350					Poorly graded SAND with Gravel (SP); dry; dense; 85% medium to coarse sand; 15% gravel to 20mm; angular to rounded.	SP	Bottom of Screen	New 10' connection @ 1525.
355					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; loose; 85% sand; 15% gravel to 30mm; angular to rounded.	SW	Bentonite Seal	
360								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/3); moist; loose; 85% fine to very coarse sand; 15% gravel to 25mm; angular to rounded.	SP		New 20' connection @ 1525. Resumed drilling @ 1545.
365					Well graded SAND (SW); pinkish gray (5YR 6/2); dry; loose; 95% sand; 5% gravel to 15mm; subangular to rounded.			
370					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); moist; loose; 85% sand; 15% gravel to 50mm; subangular to rounded.			
375					Well graded SAND (SW); pinkish gray (5YR 6/2); moist; loose; 95% sand; 5% gravel to 15mm; subangular to rounded.	SW	Bentonite Seal	
380					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; loose; 70% sand; 30% gravel to 20mm; subangular to rounded.			New 20' connection @ 1550. Resumed drilling @ 1600.
385					Well graded SAND with Gravel (SW); dry; dense; 85% sand; 15% gravel to 10mm; angular to rounded.			
390								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 100% medium sand.	SP		
					Silty SAND (SM); light brown (7.5YR 6/4); dry; dense; 50% very fine to medium sand; 5% gravel to 5mm; subrounded to rounded; 35% silt; 10% clay; nonplastic.	SM		
395					Clayey SAND (SC); light gray (10YR 7/1); moist; dense; 55% very fine to fine sand; 35% clay; 10% silt; low plasticity.	SC		
		SB0055	0.0					Blow counts (397-398.5'): 50/40. Blow counts (398.5-400'): 50/40.
400		SB0056	0.0		Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; dense; 100% fine to coarse sand.			Resumed drilling @ 1650.
405					Same as above (398 ft).		Bentonite Seal	
410					Same as above (398 ft).	SP		
415					Same as above (398 ft).			
420								

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 60% very fine to medium sand; 40% silt.			New 20' connection @ 1655.
425					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine to medium sand; 40% silt.	SM	- Bentonite Seal	
430					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine to medium sand; trace gravel to 40mm; 25% silt; 15% clay; nonplastic.			
435					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% very fine to medium sand; trace gravel to 30mm; 5% silt.		- Top of Filter Pack	
440					Same as above (435 ft).	SP	- Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% very fine to medium sand.			End of 3/2/11. Resumed drilling @ 0755 on 3/3/11.
		SB0057	0.0					Blow count (447-448.5'): 50/45.
450					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand.			

Borehole ID: KAFB-106111

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/4/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1473288.69
X Coordinate: 1541336.23

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

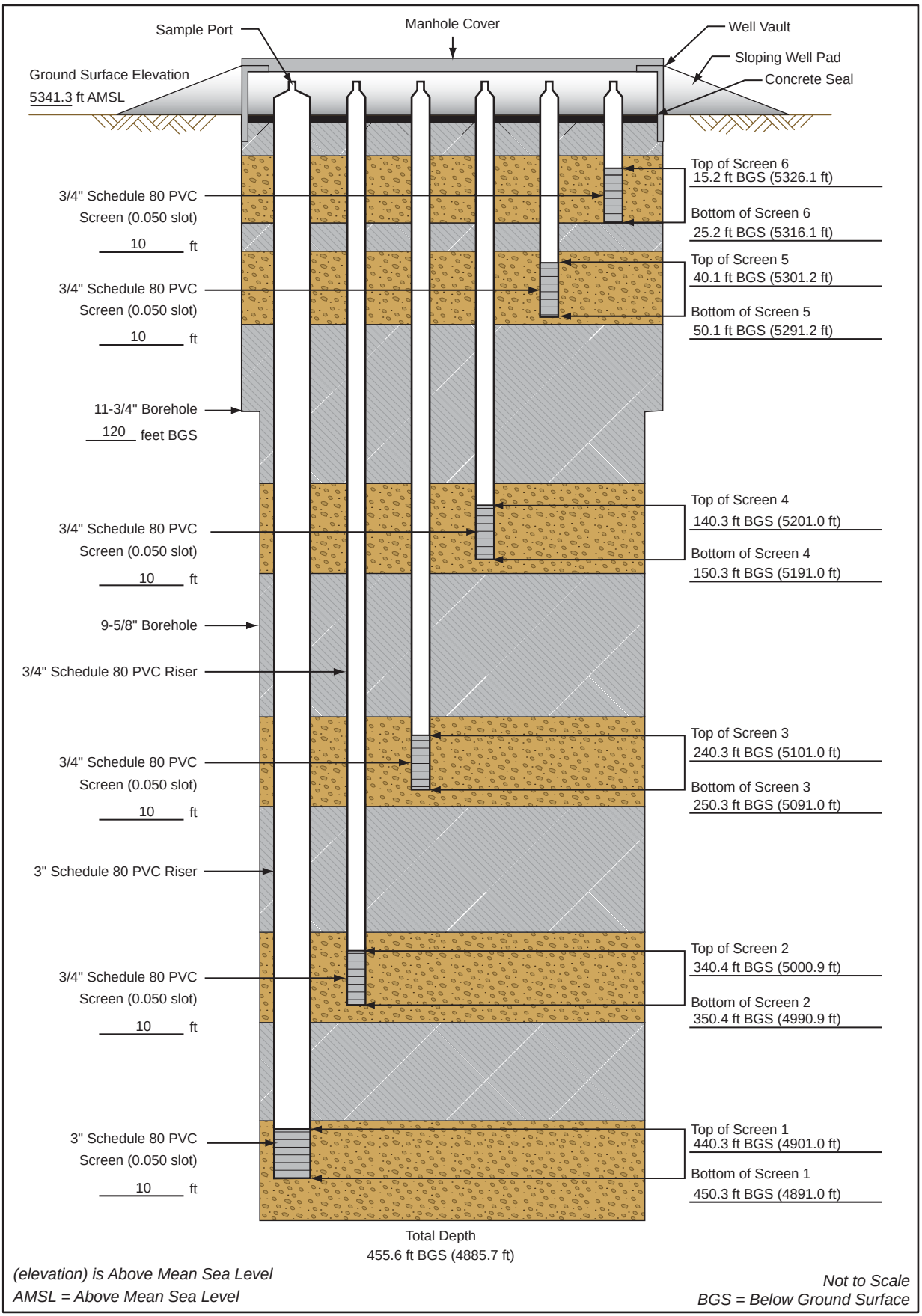
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Patrick Ostrye

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand.	SP	Bottom of Screen	New 10' connection @ 0810. Resumed drilling @ 0815.
455					Same as above (450 ft).		Bottom of Filter Pack	
460					Well graded SAND (SW); brown (7.5YR 4/3); moist; medium dense; 100% sand.	SW	Native Backfill	Total depth = 460 ft. Reached @ 0820 on 3/3/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = 320
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106111

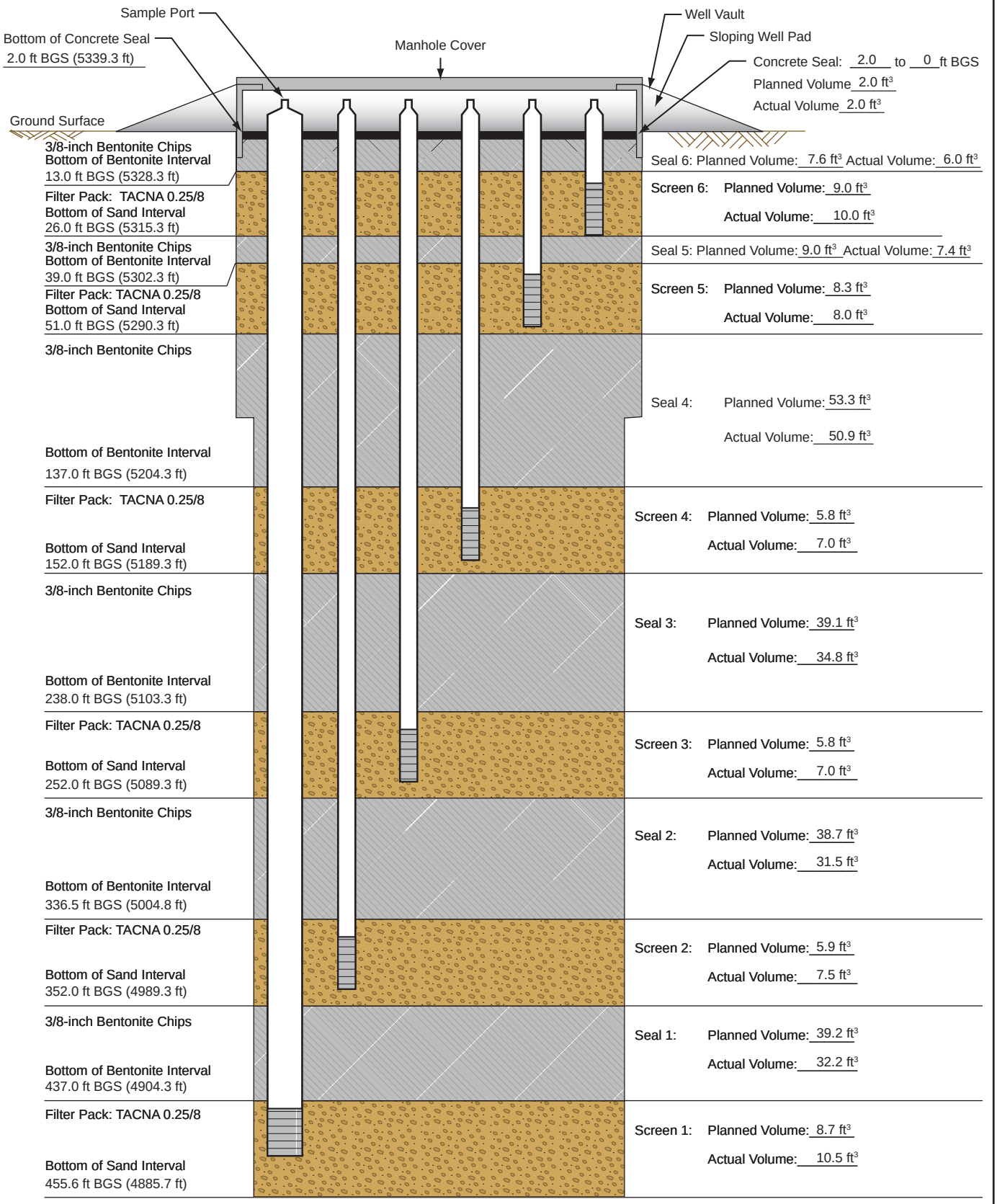
Installation Start Date/Time: 3/3/2011 @ 10:35
Installation End Date/Time: 3/4/2011 @ 16:25



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106111



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

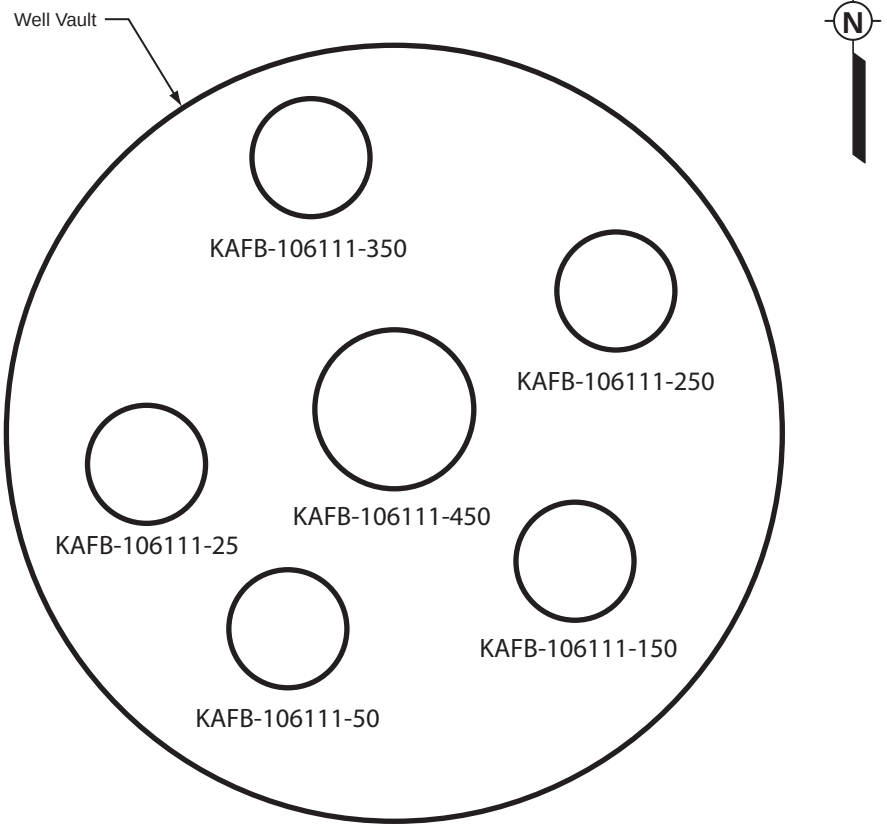
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106111

Top of Well Vault Elevation: 5,341.6 (ft)

Northing: 1,473,286.63

Easting: 1,541,336.13



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106111-25	3/4	25.2	15.2 - 25.2	1,473,286.17	1,541,335.96	5341.0
KAFB-106111-50	3/4	50.1	40.1 - 50.1	1,473,285.95	1,541,336.14	5341.1
KAFB-106111-150	3/4	150.3	140.3 - 150.3	1,473,286.06	1,541,336.40	5341.1
KAFB-106111-250	3/4	250.3	240.3 - 250.3	1,473,286.32	1,541,336.38	5341.1
KAFB-106111-350	3/4	350.4	340.4 - 350.4	1,473,286.40	1,541,336.08	5341.1
KAFB-106111-450	3	450.3	440.3 - 450.3	1,473,286.30	1,541,336.22	5341.0

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106112 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 5/4); dry; very loose; low plasticity; 70% silt; 30% very fine to medium sand; trace fine gravel to 8mm.		Concrete Seal	Hand augered.
5					Same as above (0 ft); 60% silt; 40% very fine to coarse sand; trace fine gravel to 4mm.		Bentonite Seal	Began drilling @ 1517 on 2/22/11.
10		SB0058	0.0		Same as above (0 ft); reddish brown (5YR 5/4); stiff; trace gravel to 8mm; angular.	ML	Top of Filter Pack	Blow counts (8.5-10'): 5/6. Kelly down @ 1522. Resumed drilling @ 1535.
15					SILT with Sand (ML); reddish brown (2.5YR 4/4); dry; stiff; nonplastic; 85% silt; 15% very fine to medium sand to 1mm.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0059	0.0		Lean CLAY (CL); brown (7.5YR 5/4); dry; hard; low plasticity; 70% clay; 30% silt.	CL		Blow counts (18.5-20'): 16/30. Kelly down @ 1543. Resumed drilling @ 1553.
25					Sandy SILT (ML); strong brown (7.5YR 5/6); dry; stiff; nonplastic; 60% silt; 35% very fine to very coarse sand; 5% fine gravel to 1cm.	ML	Bottom of Screen Bentonite Seal	
30		SB0060	0.0					Blow counts (28.5-30'): 9/12.

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; very stiff; low plasticity; 70% silt; 15% clay; 15% very fine sand to 0.1mm.		Bentonite Seal	Resumed drilling @ 1615.
35					Same as above (30 ft); 85% silt; 15% very fine to coarse sand; trace fine gravel to 6mm.			
40	X	SB0061	0.0		Sandy SILT (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 60% silt; 40% very fine to very coarse sand; trace fine gravel to 7mm.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38.5-40'): 8/15. Kelly down @ 1622. Resumed drilling @ 1633.
45					Same as above (40 ft); trace clay nodules.	ML		
50	X	SB0062	0.0					Blow counts (48.5-50'): 12/22. Blow counts (50-51.5'): 12/23.
	X	SB0063	0.0		Same as above (40 ft); very stiff.		Bottom of Screen	Kelly down @ 1638. Resumed drilling @ 1655.
55					Same as above (40 ft).		Bentonite Seal	
60								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 80% silt; 20% very fine to medium sand; trace gravel to 1.5cm.			Driller forgot to remove 10' drill rod, drilled to 70' open hole and then hammered in casing.
65					Same as above (60 ft).			
70					Same as above (60 ft); trace gravel to 2.3cm.			Kelly down @ 1702. New connection, pushed to 70' @ 1713. End of 2/22/11. Resumed drilling @ 0745 on 2/23/11.
75					Same as above (60 ft); 80% silt; 20% very fine to medium sand; trace clay nodules.	ML	Bentonite Seal	
80					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; hard; nonplastic; 85% silt; 15% very fine to coarse sand to 3mm.			Kelly down @ 0752. Resumed drilling @ 0758.
85					Same as above (80 ft); trace fine gravel to 5mm.			
90								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); strong brown (7.5YR 5/6); dry; hard; nonplastic; 85% silt; 15% very fine to coarse sand to 3mm.	ML		
95					Same as above (90 ft).			
100		SB0064	0.0		Silty SAND (SM); yellowish brown (10YR 5/4); dry; very dense; 70% fine sand to 0.2mm; rounded; 30% silt.	SM	Bentonite Seal	Blow counts (98.5-100'): 30/50. Kelly down @ 0810. Resumed drilling @ 0826.
105					Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 90% medium sand; 5% coarse sand; trace gravel to 6mm; rounded; 5% silt.	SP		
110					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; loose; 85% very fine to very coarse sand; 5% fine gravel to 1cm; subrounded; 10% silt.	SW-SM		
115					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 75% silt; 25% very fine to coarse sand to 4mm.	ML	Native Backfill	
120							Bentonite Seal	

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 85% silt; 15% very fine to fine sand to 0.5mm.			Kelly down @ 0835. Total depth with 11-3/4" casing reached. Resumed drilling @ 1230.
125					Same as above (120 ft).	ML	Bentonite Seal	
130					SILT with Sand (ML); brown (7.5YR 5/4); moist; very stiff; low plasticity; 60% silt; 25% clay; 15% fine to medium sand to 1mm.			
135					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 85% silt; 15% very fine to medium sand to 1mm.			
					Lean CLAY (CL).	CL	Top of Filter Pack	
140					Well graded SAND with Silt (SW-SM); brown (10YR 4/3); dry; very loose; 90% very fine to medium sand to 2mm; subrounded; 10% silt with clay nodules.	SW-SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1242. Resumed drilling @ 1247.
145					Well graded SAND (SW); brown (10YR 4/3); dry; loose; 95% very fine to very coarse sand; trace gravel to 6mm; subangular; 5% silt.	SW		
150		SB0065	0.0					Blow counts (147-148.5'): 11/15.

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
155					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 95% very fine to very coarse sand; trace gravel to 6mm; subangular; 5% silt; medium to coarse sand is predominantly pumice.	SW	Bottom of Screen	Kelly down @ 1250. Resumed drilling @ 1302.
160					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 80% silt; 20% very fine to medium sand to 2mm.	ML		
165					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; medium dense; 90% very fine to coarse sand to 3mm; subrounded; 10% silt.	SW-SM		Kelly down @ 1306. Resumed drilling @ 1311.
170					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 85% silt; 15% very fine sand to 0.1mm.	ML	Bentonite Seal	
175					Well graded SAND with Silt (SW-SM); light brown (7.5YR 6/4); dry; loose; 80% very fine to very coarse sand; 10% fine gravel to 1.3cm; well rounded; 10% silt; predominantly pumice.	SW-SM		
180					Same as above (170 ft); 90% very fine to very coarse sand; trace fine gravel; 10% silt.			

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% medium sand to 1mm; subrounded; 5% silt.	SP		Kelly down @ 1317. Resumed drilling @ 1324.
185					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 95% very fine to very coarse sand; trace fine gravel to 1.1cm; rounded; 5% silt.			
190					Same as above (185 ft); finer.			
195					Same as above (185 ft); finer.	SW	Bentonite Seal	
		SB0066	0.0					Blow counts (197-198.5'): 17/12.
200					Same as above (185 ft); medium dense.			Resumed drilling @ 1342.
205					Silty SAND (SM); brown (10YR 4/3); dry; medium dense; 70% fine sand to 0.5mm; rounded; 30% silt.	SM		
210					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 90% very fine to very coarse sand; 5% fine gravel to 1.8cm;	SW		

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					rounded; 5% silt.	SW		
215					SILT with Sand (ML); dark yellowish brown (10YR 4/4); moist; very stiff; low plasticity; 60% silt; 25% clay; 15% very fine to fine sand; trace gravel to 3cm; well rounded.	ML		
220					Silty SAND (SM); brown (10YR 5/3); moist; loose; 75% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 20% silt.	SM	- Bentonite Seal	Kelly down @ 1349. Resumed drilling @ 1357.
225					Same as above (220 ft); coarser gravel to 3cm.			
230					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose; 90% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 5% silt; predominantly lithics.	SW		
235					Same as above (230 ft); grayish brown (10YR 5/2); predominantly pumice.		- Top of Filter Pack	
240								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; very loose; 90% very fine to very coarse sand; 5% fine gravel to 1.5cm; rounded; 5% silt; mix of pumice and lithics.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1401.
245					Same as above (240 ft); loose; predominantly lithics.			
	X	SB0067	3.4					Blow counts (247-248.5'): 12/43.
250					Lean CLAY (CL); brown (7.5YR 5/3); dry; hard; low plasticity; 100% clay.	CL	Bottom of Screen	Kelly down @ 1410.
					SILT (ML); brown (7.5YR 5/3); moist; hard; low plasticity; 60% silt; 40% clay.	ML		
255					Same as above (252 ft).			
260					Same as above (252 ft); 90% silt; 10% very fine to medium sand.		Bentonite Seal	Kelly down @ 1429. Resumed drilling @ 1435.
265					Silty SAND (SM); yellowish brown (10YR 5/4); moist; loose; 60% very fine to medium sand to 1mm; rounded; 40% silt.	SM		
270								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 90% fine to medium sand; 10% coarse sand to 2mm; subrounded; trace fines.			
275					Same as above (270 ft); 90% fine sand; 10% medium sand.	SP		
280					Same as above (270 ft).			Kelly down @ 1440.
285					Silty SAND (SM); brown (7.5YR 4/3); moist; loose; 70% very fine to medium sand to 1mm; rounded; 30% silt.	SM	Bentonite Seal	
290					Well graded SAND (SW); brown (7.5YR 5/2); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 8mm; subrounded.	SW		
295					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 85% medium sand to 2mm; 15% very fine to fine sand; rounded.	SP		
		SB0068	0.5					Blow counts (297-298.5'): 3/Not recorded (for 18").
300								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 11:08 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); grayish brown (10YR 5/2); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 9mm; subrounded to rounded.			Resumed drilling @ 1511.
305					Same as above (300 ft).			
310					Same as above (300 ft); gravel to 2.6cm.			
315					Same as above (300 ft); 90% very fine to very coarse sand; 10% fine gravel.	SW	Bentonite Seal	
320					Well graded SAND with Gravel (SW); 70% very fine to very coarse sand; 30% fine gravel.			Kelly down @ 1521. Resumed drilling @ 1528.
325					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to very coarse sand; trace fine gravel to 7mm; subrounded; trace fines.			
330								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to very coarse sand; trace fine gravel to 7mm; subrounded; trace fines; coarser than 325'.		Bentonite Seal	
335					Same as above (330 ft); finer.	SW	Top of Filter Pack	
340					Same as above (330 ft); finer.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1542. Resumed drilling @ 1551.
					Lean CLAY (CL); lense.	CL		
345					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very fine to coarse sand to 4mm; rounded.	SW		
		SB0069	0.5					Blow counts (347-348.5'): 26/50.
350							Bottom of Screen	
					Well graded SAND with Silt (SW-SM); yellowish brown (10YR 5/4); dry; very dense; 85% very fine to very coarse sand; 5% fine gravel to 1cm; rounded; 10% silt.	SW-SM		Kelly down @ 1605. Crew had trouble making connection. Used a different 10' section. Resumed drilling @ 1637.
355					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subrounded; 5% silt.	SW	Bentonite Seal	Rate of penetration very slow.
360								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subrounded; 5% silt; coarser than 355'.	SW		Kelly down @ 1650.
365					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 90% medium sand; 5% coarse sand to 2.5mm; rounded; 5% fines.	SP		Bit packed off @ 1708. Resumed drilling @ 1709.
370					Same as above (365 ft); trace fine gravel to 6mm.			End of day @ 1714 on 2/23/11. Resumed drilling @ 0738 on 2/24/11.
375					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to coarse sand to 3mm; subangular to rounded; trace fines.		Bentonite Seal	
380					Same as above (375 ft); coarser.	SW		Kelly down @ 0746. Resumed drilling @ 0752.
385					Same as above (375 ft).			
390								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to coarse sand to 3mm; subangular to rounded; trace gravel to 2.5cm; trace fines.			
395					Same as above (390 ft); trace gravel to 1.1cm.			
		SB0070	3.3					Blow counts (397-398.5'): 6/Not Recorded. Blow counts (398.5-400'): 2/35.
400		SB1742	3.3		Same as above (390 ft); no gravel.			Kelly down @ 0813. Replaced flange from cyclone hose to hammer @ 0830. Resumed drilling @ 1004.
405					Same as above (390 ft); no gravel; grading finer.	SW	Bentonite Seal	
410					Same as above (390 ft); no gravel; grading coarser.			
415					Same as above (390 ft); no gravel; grading coarser than 410'.			
420								

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very dense; 100% very fine to very coarse sand; trace fine gravel to 8mm; subangular to rounded; trace fines.			Kelly down @ 1021. Resumed drilling @ 1027.
425					Same as above (420 ft); grading coarser.			
430					Same as above (420 ft); 95% very fine to very coarse sand; 5% fine gravel to 2cm.	SW	Bentonite Seal	
435					Same as above (420 ft); grading finer; very fine to coarse sand to 3mm; no gravel.			
440					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; very dense; 80% very fine to very coarse sand; 20% fine gravel to 1.5cm; subrounded.		Top of Filter Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1103. Resumed drilling @ 1108.
445					Poorly graded SAND (SP); brown (10YR 4/3); moist; very dense; 95% fine sand; 5% medium sand; trace fine gravel to 1.6cm; rounded.	SP		
		SB0071	25.3					Blow counts (447-478.5'): 33/50.
450							Bottom of Screen	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 11:08 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106112

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/22/2011
Date TD Reached: 2/24/2011
Date Completed: 3/2/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473505.07
X Coordinate: 1541936.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

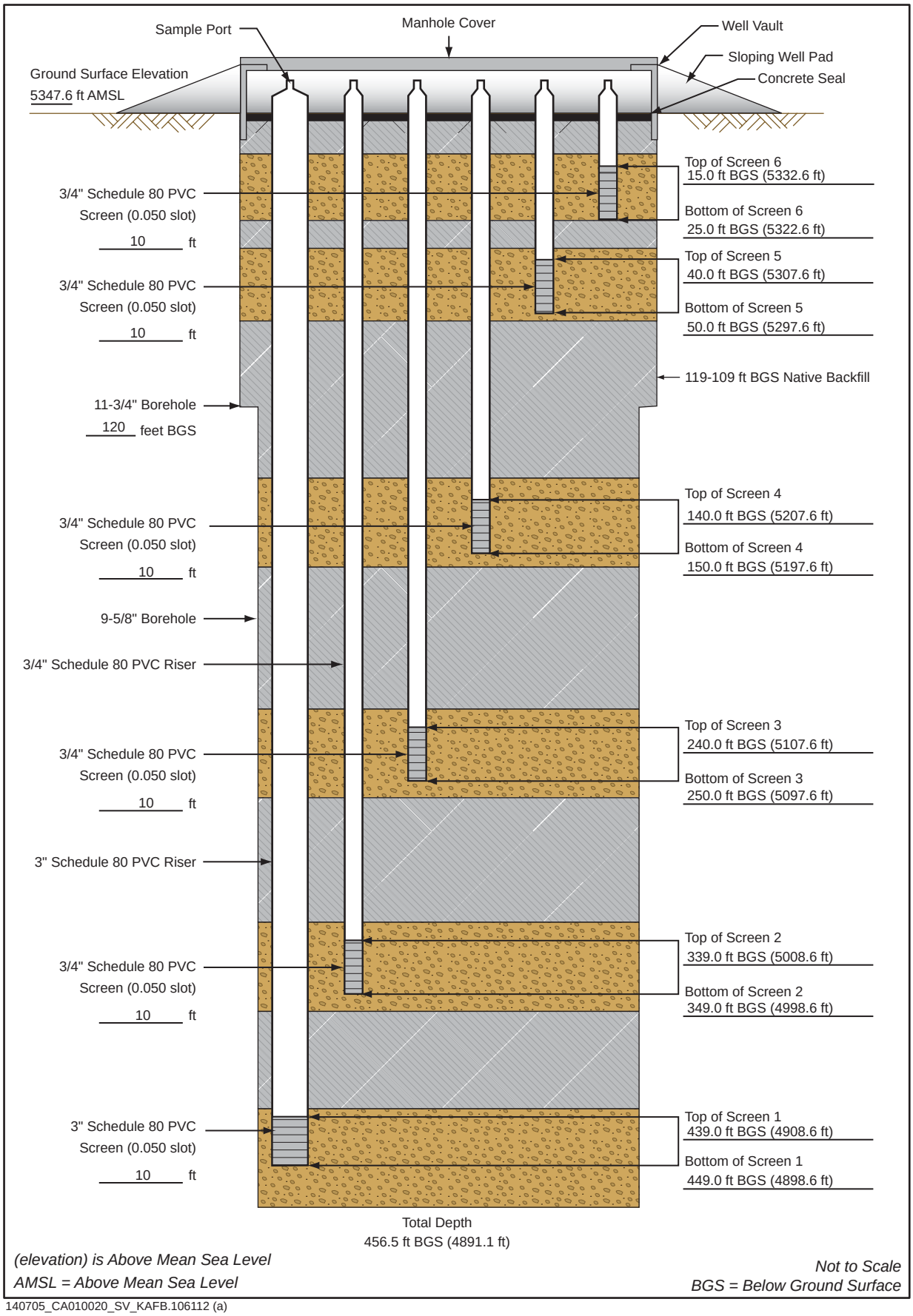
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
455					Silty SAND (SM); brown (7.5YR 4/4); moist; very dense; 80% medium sand to 1mm; rounded; 20% silt.	SM		Kelly down @ 1123. Resumed drilling @ 1139. Drillers noted a strong odor from hole and cuttings.
					Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 100% very fine to medium sand to 1mm; subrounded.	SP	Bottom of Filter Pack	
460					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 100% very fine to very coarse sand to 4mm; rounded.	SW	Native Backfill	Total depth @ 460 ft. Reached @ 1200 on 2/24/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = 230
475								Kelly down: TD the joint and ready to make new connection.
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106112

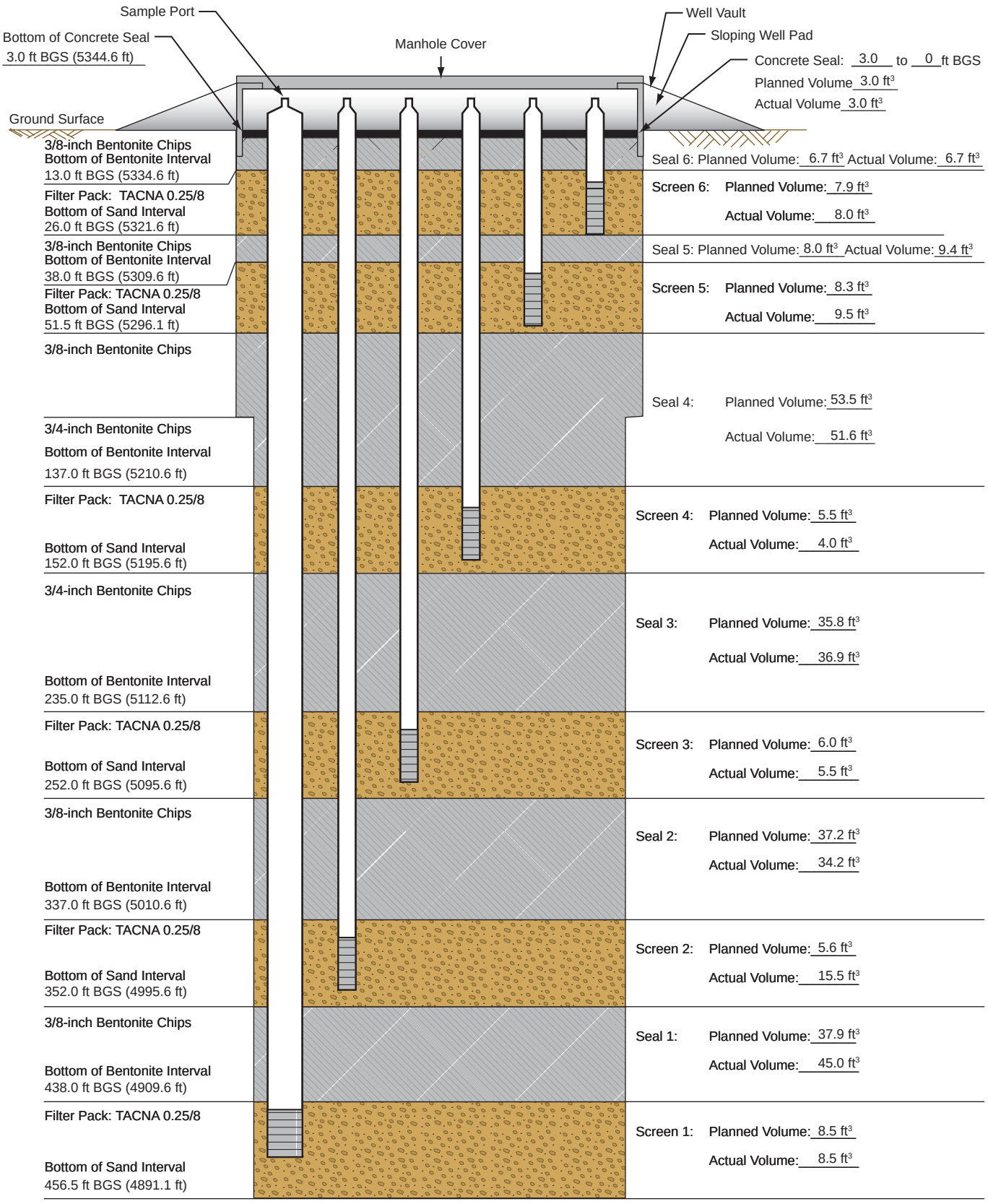
Installation Start Date/Time: 3/1/2011 @ 8:00
Installation End Date/Time: 3/2/2011 @ 16:45



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106112



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

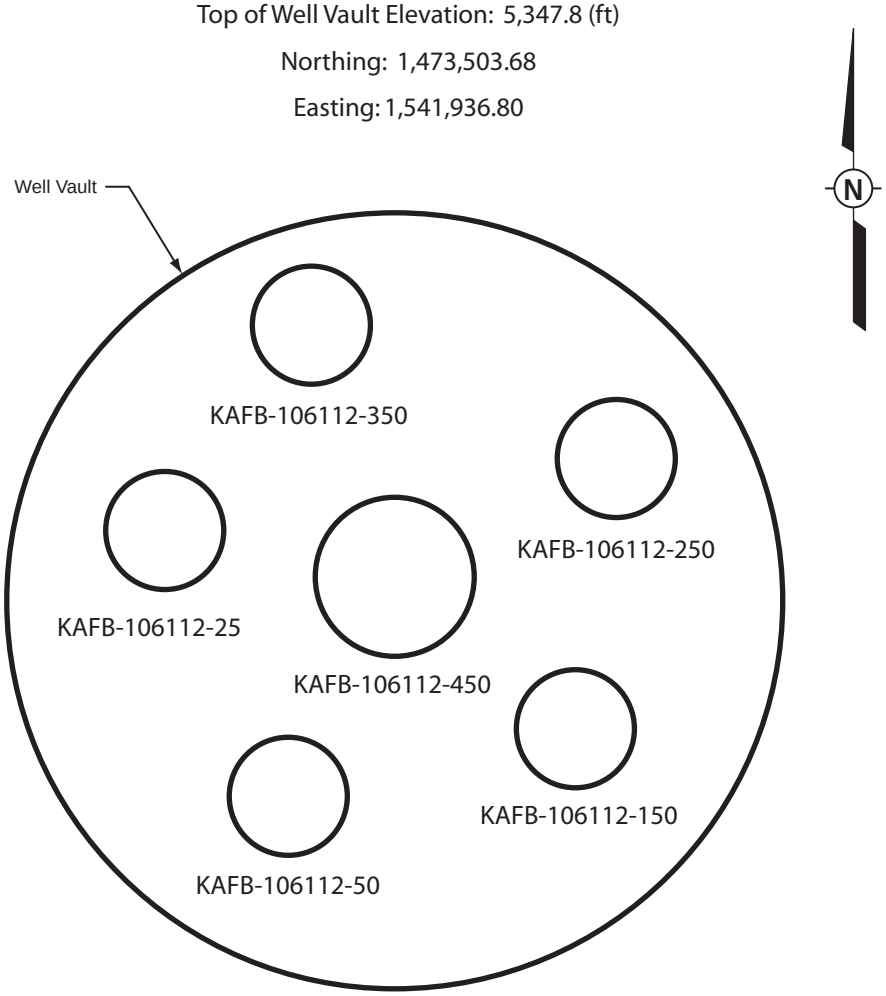
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106112

Top of Well Vault Elevation: 5,347.8 (ft)

Northing: 1,473,503.68

Easting: 1,541,936.80



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106112-25	3/4	25.0	15.0 - 25.0	1,473,503.09	1,541,936.54	5347.2
KAFB-106112-50	3/4	50.0	40.0 - 50.0	1,473,502.85	1,541,936.70	5347.2
KAFB-106112-150	3/4	150.0	140.0 - 150.0	1,473,502.95	1,541,936.98	5347.3
KAFB-106112-250	3/4	250.0	240.0 - 250.0	1,473,503.22	1,541,937.01	5347.3
KAFB-106112-350	3/4	349.0	339.0 - 349.0	1,473,503.34	1,541,936.72	5347.3
KAFB-106112-450	3	449.0	439.0 - 449.0	1,473,503.19	1,541,936.80	5347.3

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106113 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Clayey SAND (SC); reddish brown (5YR 4/4); moist; medium dense; 60% fine to coarse sand; subrounded to subangular; trace gravel to 1cm; 40% clay with minor silt; no odor.		Concrete Seal	Hand augered.
5					Same as above (0 ft); no odor.	SC	Bentonite Seal	Spud @ 1454 on 01/18/11.
10							Top of Filter Pack	
		SB0072	1.7		Poorly graded SAND with Silt (SP-SM); red (2.5YR 5/6); moist; very dense; 90% fine sand; 10% silt with minor clay; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1540. Resumed drilling @ 1544. Blow counts (10-11.5'): 48/50. Blow counts (11.5-13'): Not Recorded.
		SB0080	1.7					Hard to drive casing ~14-15 ft.
15					Same as above (10 ft); no odor.	SP-SM		
20								Kelly down @ 1551.
		SB0073	0.0		Clayey SAND (SC); reddish brown (5YR 4/4); moist; very dense; 60% fine sand; 40% clay with minor silt; no odor.		Bottom of Screen	New connection @ 1628. Resumed drilling @1634. Blow counts (20-21.5'): 50/Not Recorded. Blow counts (21.5-23'): 50 Not Recorded.
		SB0073						
25					Same as above (20 ft); no odor.	SC	Bentonite Seal	Kelly down @ 1640. New connection @ 1716. End of 01/18/11.
30								

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30								
		SB0074	0.0		Clayey SAND (SC); reddish brown (5YR 4/4); moist; very dense (based on blow counts); 60% fine sand; 40% clay with minor silt; no odor.	SC	Bentonite Seal	Resumed drilling @ 0747 on 01/19/11. Blow counts (30-31.5'): 48/50.
35								
					Clayey SAND with Silt (SC-SM); reddish brown (5YR 4/4); moist; very dense; 75% fine sand; 25% clay and silt; no odor.	SC-SM	Top of Filter Pack	Casing followed bit without using hammer.
40								Kelly down @ 0755.
		SB0075	0.0		Clayey SAND (SC); reddish brown (5YR 4/4); moist; very dense (based on blow counts); 70% fine sand; 30% clay with minor silt; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 0826. Resumed drilling @ 0826. Blow counts (40-41.5'): 48/50.
45					Same as above (40 ft); no odor.	SC		Hard to drive casing ~45'-47'.
50								Kelly down @ 0840.
		SB0076	0.0		Sandy lean CLAY (CL); reddish brown (5YR 4/4); moist; hard; low to medium plasticity; 70% clay with silt; 30% fine sand; no odor.		Bottom of Screen	New connection @ 0914. Resumed drilling @ 0915. Blow counts (50-51.5'): 17/50. Blow counts (51.5-53'): 19/50.
		SB0076				CL		
55							Bentonite Seal	
					Clayey SAND (SC); reddish brown (5YR 4/4); moist; dense; 70% fine to medium sand; 30% clay with minor silt; no odor.	SC		
60								Kelly down @ 0922.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60								
65					Silty SAND (SM); reddish brown (5YR 4/4); moist; very dense; 80% fine to medium sand; subangular; trace gravel to 1.5cm; 20% silt with minor clay; no odor.	SM		New connection @ 0959. Resumed drilling @ 1000.
70					SILT with Sand (ML); reddish brown (2.5YR 5/4); moist; very dense; 75% silt with minor clay; 25% fine sand; no odor.	ML		
75					Same as above (65 ft); 25% fine to coarse sand; subrounded; no odor.		Bentonite Seal	
80					Same as above (65 ft); with trace gravel to 1cm; no odor.			Kelly down @ 1006.
85					Sandy lean CLAY (CL); red (2.5YR 4/6); moist; medium stiff; medium plasticity; 70% clay with minor silt; 30% fine sand; no odor.	CL		New connection @ 1021. Resumed drilling @ 1023.
90					SILT with Sand (ML); red (2.5YR 4/6); moist; stiff; 75% silt with minor clay; 25% fine sand; no odor.	ML		

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); red (2.5YR 4/6); moist; stiff; 80% silt with minor clay; 20% fine sand; no odor.			
95					Same as above (90 ft); slight increase in clay; no odor.	ML		
100		SB0077	5.4					Blow counts (98.5-100'): 14/50. Blow counts (100-101.5'): 17/50. Kelly down @ 1031 on 01/19/11. New connection @ 1108 on 01/20/11. Resumed drilling @ 1111.
		SB0077			Silty SAND (SM); yellowish red (5YR 4/6); moist; stiff; 70% fine sand; 30% silt with trace clay; no odor. Note: large gravel up to 3cm in split spoon @ 102'.	SM		
105					Well graded SAND (SW); light reddish brown (2.5YR 6/3); moist; medium dense to dense; 100% fine to coarse sand; subrounded to subangular; no odor.		Bentonite Seal	
110					Same as above (103 ft); no odor.	SW		
115					Poorly graded SAND (SP); light reddish brown (2.5YR 6/3); moist; medium dense; 95% fine sand; 5% silt and clay (clay as nodules); no odor.	SP		Did not have to hammer entire joint.
120								Kelly down @ 1120.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); red (2.5YR 4/6); moist; 75% silt with minor clay (clay as nodules); 25% fine sand; no odor.			
125					Same as above (120 ft); no odor.	ML	- Bentonite Seal	
130					Same as above (120 ft); no odor.			
135					Lean CLAY (CL); red (2.5YR 4/6); moist; stiff; medium plasticity; 95% clay with minor silt; 5% fine sand; no odor.	CL	- Top of Filter Pack	
140					Same as above (133 ft); no odor.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1211. New connection @ 1218.
					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; 95% fine sand; 5% silt; no odor.			Resumed drilling @ 1220. Likely top of Santa Fe Group.
145					Same as above (141 ft); no odor.	SP		
150		SB0078	0.0		Well graded SAND (SW); light reddish	SW		Blow counts (148.5-150'): 9/24. Kelly down @1232. End

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 15:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
		SB0078-MS	0.0		gray (2.5YR 7/1); dry; loose; 95% fine to coarse sand; subrounded; trace fine gravel to 1cm; subrounded; 5% silt; no odor.	CL	Bottom of Screen	of 01/20/11. New connection @ 0819 on 01/21/11. Resumed drilling @ 0820. Blow counts (150-151.5'): 13/50.
		SB0078-MSD	0.0					
					Sandy lean CLAY (CL); reddish brown (5YR 5/4); moist; stiff; low plasticity; 60% clay with minor silt; 40% fine sand; no odor.			
155								Blow counts (151.5-153'): 18/50.
					SILT with Sand (ML); red (2.5YR 4/6); dry to moist; stiff; 85% silt; 15% fine sand; no odor.	ML		
160								Kelly down @ 0827.
					Poorly graded SAND with Silt (SP-SM); light reddish gray (2.5YR 7/1); dry to moist; loose; 90% fine sand; 10% silt; no odor.			New connection @ 0841. Resumed drilling @ 0842.
165							Bentonite Seal	
					Same as above (160 ft); minor gravel from discharge at 167 ft; no odor.			
170						SP-SM		
					Same as above (160 ft); no odor.			
175								
					Same as above (160 ft); reddish brown (2.5YR 5/4); no odor.			
180								Kelly down @ 0853.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry to moist; loose; 100% fine to medium sand; trace coarse sand; subrounded; no odor.			New connection @ 0907. Resumed drilling @ 0908.
185					Same as above (180 ft); no odor.	SP		
190					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry to moist; 95% fine to coarse sand; subrounded to subangular; 5% fine gravel to 1cm; subrounded; no odor.			
195					Same as above (190 ft); no odor.		Bentonite Seal	
200		SB0079	0.0		Same as above (190 ft); no odor. Note: very dense based on blow counts, high blow counts to this depth may have been due to hydraulic problem with the rig.	SW		Blow counts (198.5-200'): 48/50. Had to drive entire 20 ft joint of casing. Kelly down @ 0821. New connection @ 1110. Resumed drilling @ 1112.
205					Same as above (190 ft); no odor.			
210								

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); light reddish brown (2.5YR 6/3); dry to moist; loose; 90% fine to coarse sand; subrounded to subangular; 10% fine gravel to 1cm; subrounded; no odor. Pumice clasts/fragments at ~211 ft.	SW		Color change may be HC staining.
215					Well graded GRAVEL with Sand (GW); light reddish brown (2.5YR 6/3); dry to moist; loose; 85% fine to coarse gravel to 4cm; subrounded; 15% fine to coarse sand; subrounded; no odor.	GW		
220					Same as above (213 ft); no odor.			Kelly down @ 1127. New connection @ 1219. Resumed drilling @ 1220.
225							Bentonite Seal	
230					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry to moist; loose; 100% fine to coarse sand; subrounded to subangular; trace fine gravel to 1cm; no odor. Pumice noted.	SW		
235					Same as above (225 ft); no odor.			
240					Same as above (225 ft); no odor.		Top of Filter Pack	Kelly down @ 1241.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; loose; 95% fine to coarse sand; subrounded to subangular; 5% fine to coarse gravel to 3cm; subrounded to subangular; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @1250. Resumed drilling @ 1251.
245					Well graded SAND with Gravel (SW); light reddish gray (2.5YR 7/1); dry; loose; 80% fine to coarse sand; subrounded to subangular; 20% fine to coarse gravel to 4cm; subrounded; no odor.	SW		
250		SB0081	214.0		Same as above (245 ft); no odor.		Bottom of Screen	Blow counts (248.5-250'): 27/50. Kelly down @1304 on 01/21/11.
					SILT (ML); reddish brown (5YR 4/3); dry to moist; stiff; 100% silt; no odor.			New connection @1143 on 01/22/11. Resumed drilling @1144.
255					Same as above (251 ft); no odor.			
					SILT (ML) reddish brown (5YR 4/3); dry to moist; stiff; 80% silt; 20% clay; no odor.	ML		Kelly down @ 1155.
260					Same as above (257 ft); no odor.		Bentonite Seal	New connection @ 1205. Resumed drilling @ 1208. Casing driving very slowly below 260 ft.
265					Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 6/2); dry to moist; loose; 90% fine sand; 10% silt; no odor.	SP-SM		
270								

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270								
275					Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 6/2); dry to moist; loose; 90% fine sand; 10% silt; no odor.	SP-SM		
280					Silty SAND (SM); pale red (2.5YR 6/2); dry to moist; loose; 80% very fine to fine sand; 20% silt; no odor.	SM		Casing driving very slowly to 280 ft. Kelly down @ 1239. New connection @ 1247. Resumed drilling @ 1251.
285					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% fine sand; trace medium to coarse sand; angular to subangular; 5% silt; no odor. Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; loose; 95% fine to coarse sand; angular to subrounded; 5% silt; no odor. Silty GRAVEL with Sand (GM); reddish brown (5YR 5/4); dry to moist; loose; 70% fine to medium gravel to 3cm; subrounded to subangular; 15% fine to coarse sand; subrounded to subangular; 15% silt; no odor.	SP SW GM	Bentonite Seal	Casing won't drive below 285 ft. Below 285 ft, clay discharged as large, abraded nodules.
290					Lean CLAY (CL); light reddish brown (5YR 6/3); dry; very stiff; 90% clay (as nodules); 10% silt; no odor.	CL		
295					No cuttings returned; only heavy dust (fines).			
300		SB0082	0.0					Blow count (298.5-300'): 19/50. Kelly down @ 1347. End of 01/22/11.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300								
		SB0082			Poorly graded SAND with Gravel (SP); light reddish gray (2.5YR 7/1); dry; loose; 85% coarse sand; trace fine to medium sand; subangular to subrounded; 15% fine gravel; trace medium gravel to 3cm; no odor. Note: sample in split spoon is well graded sand with gravel (SW); blowing fines out during slow drilling.	SP		Began 01/23/11. Fmn. is weakly consolidated to unconsolidated - could not collect sample with out sand catcher. Blow counts (300-301.5'): 12/50. Blow counts (301.5-303'): 27/50.
		SB0082						
305					Well graded SAND with Gravel (SW); light reddish gray (2.5YR 7/1); dry; loose; 80% fine to coarse sand; subrounded; 20% fine to medium gravel to 2cm; subrounded to subangular; no odor. Heavy coarse gravel at 308 ft.			New connection @ 1049. Resumed drilling @1058.
310					Same as above (305 ft); no odor.	SW		
315							Bentonite Seal	
					Well graded GRAVEL with Sand (GW); light reddish gray (2.5YR 7/1); dry; loose; 85% fine to coarse gravel to 5cm; subrounded to subangular; 15% coarse sand; subrounded to subangular; no odor; gravel consists of lithics and mineral clasts (granite, dacite, feldspar, quartzite). Same as above (315 ft); sand is fine to coarse; no odor.	GW		
320								Kelly down @ 1116. New connection @ 1126. Resumed drilling @1127.
325					Well graded SAND (SW); reddish brown (5YR 5/4); dry to moist; loose; 95% fine to coarse sand; subangular; 5% silt; no odor. Same as above (322 ft); trace gravel to 3cm; no odor.	SW		
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 15:48 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; loose; 90% fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 5cm; subrounded; no odor.		- Bentonite Seal	
335					Same as above (330 ft); no odor.	SW	- Top of Filter Pack	
340					Same as above (330 ft); 95% sand; 5% gravel; no odor; higher percentage of fine to medium sand.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1147. New connection @ 1157. Resumed drilling @ 1158.
345					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% fine sand; some medium sand; subrounded to subangular; 5% silt; no odor.	SP		
350		SB0083	0.1				- Bottom of Screen	Blow counts (348.5-350'): 21/50. Blow counts: (350-351.5'): 27/50. Kelly down @ 1216. New connection @ 1242. Resumed drilling @1243.
		SB0083			Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/4); dry to moist; loose; 90% very fine to fine sand; trace medium sand; 10% silt; no odor.			
355					Same as above (350 ft); minor medium to coarse sand; subrounded to subangular; trace fine gravel to 1.5cm; subrounded; no odor.	SP-SM	- Bentonite Seal	Hammer stopped firing @ 1301, stopped advancing. Resumed advancing @ 1325. Stopped at ~357 ft @ 1335. Resumed attempting to advance @
360								

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% very fine to fine sand; 5% silt; no odor.			1412. Kelly down @ 1425. End of 01/23/11. Began 02/05/11 - Tripped out all 9-5/8" casing between 01/23/11 and 02/03/11. Had slough to 139 ft bgs with casing out of hole (likely base of younger alluvium). New connection @ 0911. Resumed drilling @ 0912.
365					Same as above (360 ft); trace medium to coarse sand; subangular; no odor.	SP		
370					Well graded SAND (SW); light reddish gray (2.5 YR 7/1); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% silt; no odor.			
375					Same as above (370 ft); no odor; gravel from discharge below 375 ft; chert gravel noted.	SW	Bentonite Seal	
380					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry to moist; loose; 90% fine to coarse sand; subangular to subrounded; 5% fine to coarse gravel; subangular to subrounded; 5% silt; no odor.			Kelly down @ 0930. New connection @ 0943. Resumed drilling @ 0944.
385					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.	SP		
390								

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.	SP		
395					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; loose; 100% fine to coarse sand; subangular to subrounded; trace fine gravel to 0.5cm; subrounded.	SW		
400		SB0084	9.9		Same as above (395 ft); no odor.			Blow counts (398.5-400'): 6/NR. Blow counts: (400-401.5'): 9/50. Kelly down @ 1002. New connection @ 1327. Resumed drilling @ 1335.
		SB0084						
405					Same as above (395 ft); no odor.		Bentonite Seal	
410					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry to moist; loose; 95% fine sand; trace medium to coarse sand; angular to subrounded; 5% silt; no odor.	SP		
415					Same as above (410 ft); 95% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 5% silt; no odor.			
420								Kelly down @ 1356.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND with Silt (SP-SM); light reddish brown (2.5YR 7/1); dry to moist; loose; 90% very fine to fine sand; trace medium sand; 10% silt; no odor.	SP-SM		New connection @ 1403. Resumed drilling @ 1403.
425					Poorly graded SAND (SP); light reddish brown (2.5YR 7/1); dry to moist; loose; 95% fine sand; trace medium sand; 5% silt; no odor.	SP		The interval from 425 ft to 435 ft consists of interbedded fine to coarse sands and fine to coarse gravels.
430							Bentonite Seal	
435					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry to moist; loose; 100% fine to coarse sand; subangular to subrounded; trace fine gravel to 12cm; subrounded; no odor.			
					Same as above (430 ft); no odor.		Top of Filter Pack	
440					Same as above (430 ft); no gravel; no odor.	SW	Top of 3" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1423. New connection @ 1430. Resumed drilling @ 1431.
445					Same as above (430 ft); no odor; gravel lense at 447 ft.			
450		SB0085	3.2					Blow counts (448.5-450'): 37/50.

Borehole ID: KAFB-106113

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 2/5/2011
Date Completed: 2/8/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473064.22
X Coordinate: 1542004.39

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

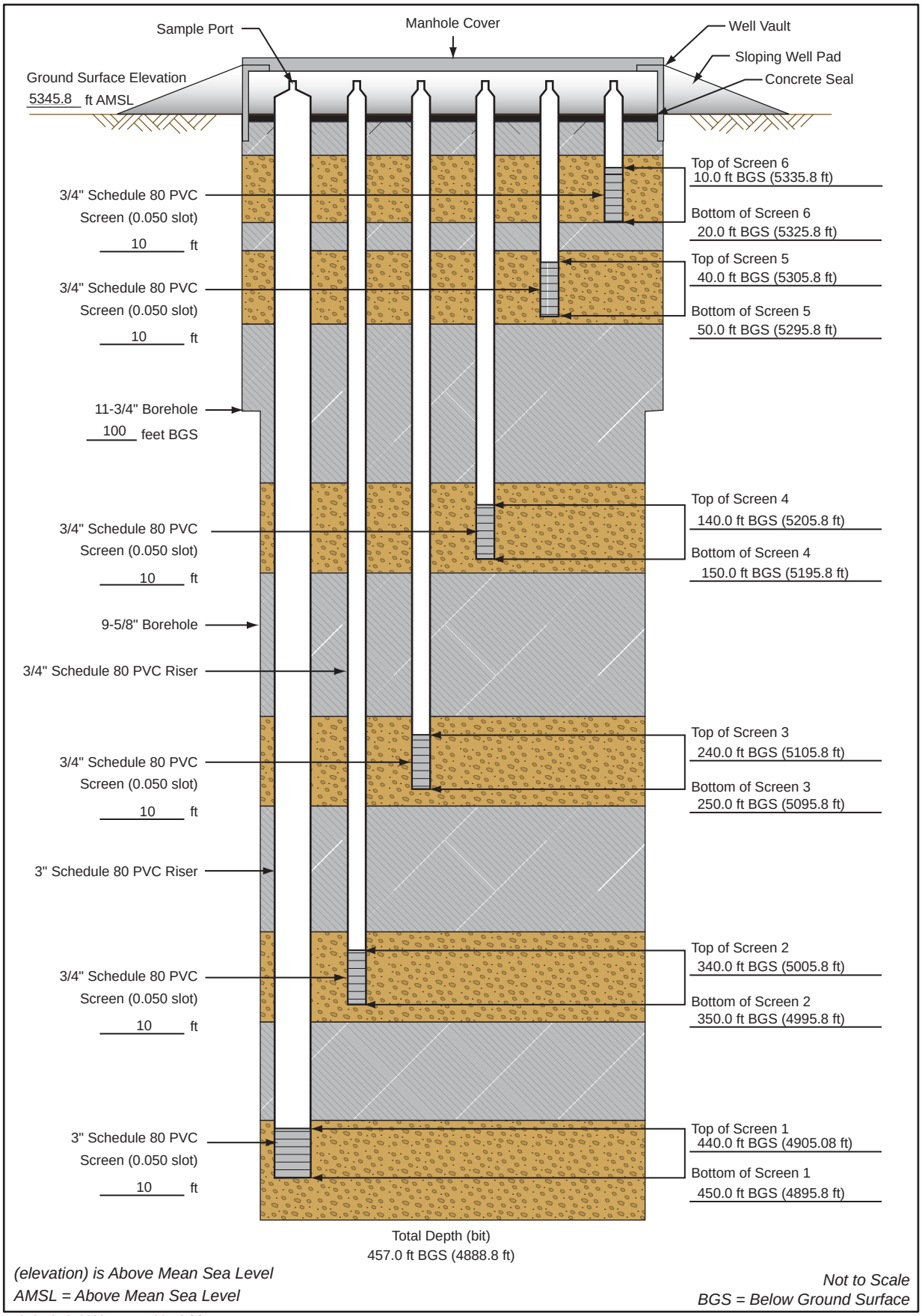
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
		SB0085			Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry to moist; loose; 100%fine to coarse sand subangular to subrounded; large gravel and cobbles noted in sample; no odor; slight odor from headspace sample.	SW	Bottom of Screen	Blow counts (450-451.5): 48/50.
455								
								Total depth = 457 ft. Reached @ 1540 on 2/8/11.
460								Water added during drilling = 0
								Water added during construction = Not Recorded
465								Spud: started drilling from surface.
								Kelly down: TD the joint and ready to make new connection.
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106113

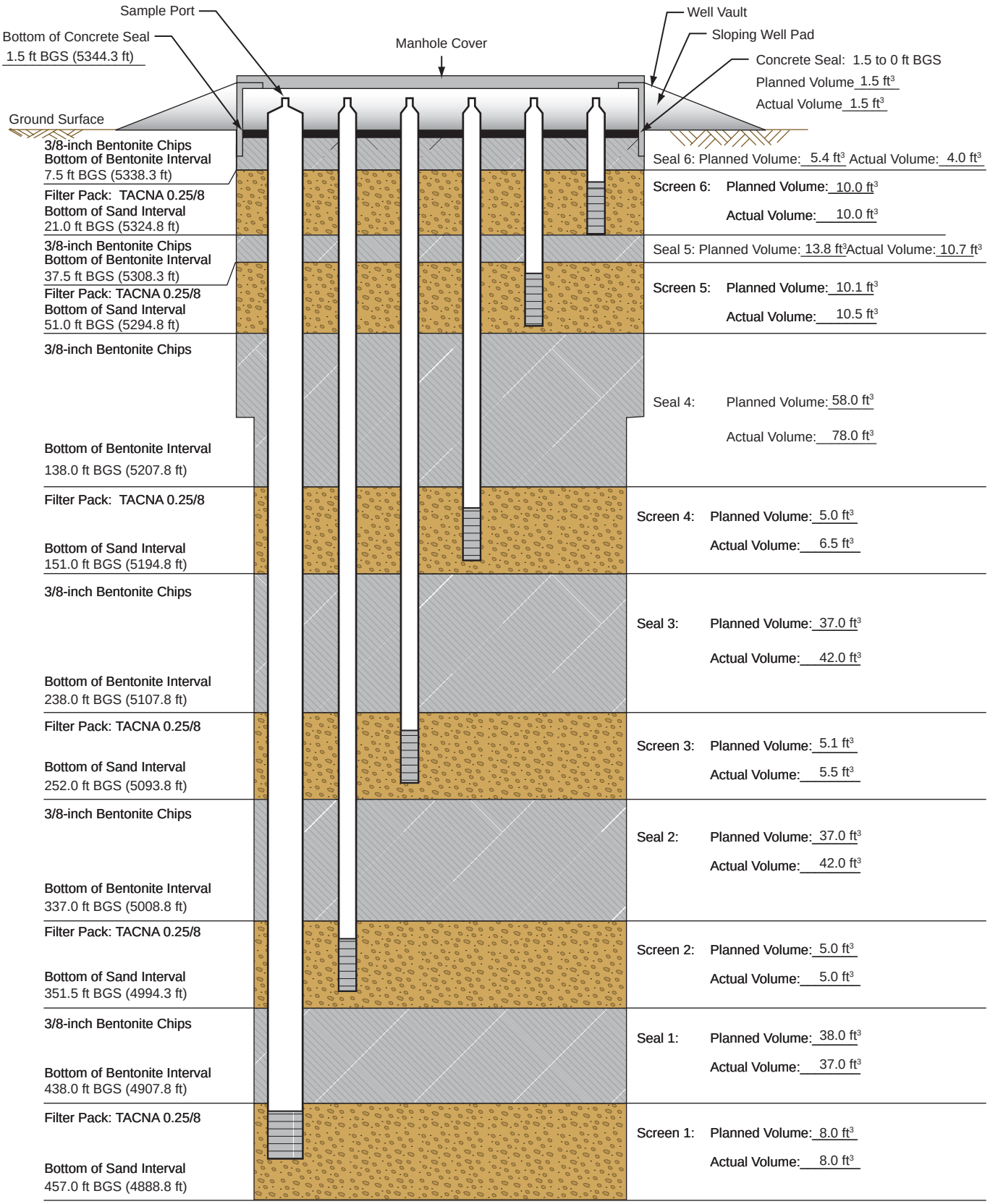
Installation Start Date/Time: 2/5/2011 @ 08:08
Installation End Date/Time: 2/8/2011 @ 10:51



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106113



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

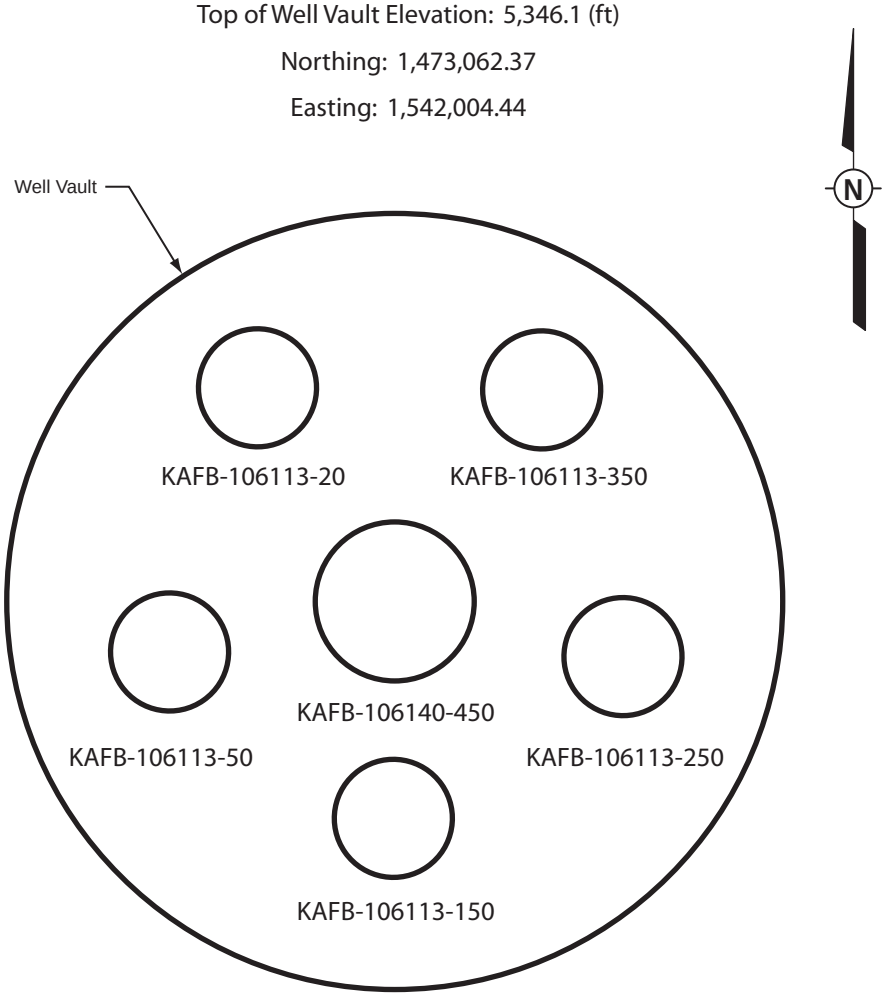
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106113

Top of Well Vault Elevation: 5,346.1 (ft)

Northing: 1,473,062.37

Easting: 1,542,004.44



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106113-20	3/4	20.0	10.0-20.0	1,473,062.15	1,542,004.37	5,345.5
KAFB-106113-50	3/4	50.0	40.0-50.0	1,473,061.84	1,542,004.23	5,345.5
KAFB-106113-150	3/4	150.0	140.0-150.0	1,473,061.65	1,542,004.48	5,345.5
KAFB-106113-250	3/4	250.0	240.0-250.0	1,473,061.80	1,542,004.79	5,345.5
KAFB-106113-350	3/4	350.0	340.0-350.0	1,473,062.07	1,542,004.70	5,345.6
KAFB-106113-450	3	450.0	440.0-450.0	1,473,062.01	1,542,004.50	5,345.6

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106114 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT with Sand (ML); red (2.5YR 5/6); moist; 80% silt with clay; 20% very fine to fine sand; subrounded to subangular.		Concrete Seal	Hand augered.
5					Same as above (0 ft); no odor.			Began drilling @ 1415 on 2/20/11.
10	X	SB0086	0.1		Same as above (0 ft); hard; gravel lense 12-13'.	ML	Bentonite Seal	Blow counts (9-10.5'): 12/19/23. New 10' connection @ 1440.
15					Same as above (0 ft); red (2.5YR 4/8); no odor.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20	X	SB0087	0.1		Lean CLAY (CL); red (2.5YR 5/6); dry; firm; low plasticity; 60% clay; 30% silt; 10% sand; no odor.			Blow counts (19-20.5'): 13/27/34. New connection @ 1505.
25					Same as above (20 ft); less clay; more silt; no odor.	CL	Bottom of Screen Bentonite Seal	
30	X	SB0088	0.2					Blow counts (29-30.5'):

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30								
		SB0089	0.2		SILT with Sand (ML); reddish brown (5YR 5/4); moist; soft; 55% silt; 20% clay; 25% sand; no odor.	ML	Bentonite Seal	12/18/32. Blow counts (30.5-32'): Not Recorded. New 10' connection @ 1525.
35					Lean CLAY with Sand (CL); red (2.5YR 5/6); dry; firm; 80% clay; 15% sand; 5% gravel; no odor.		Top of Filter Pack	
40		SB0090	0.3		Sandy Lean CLAY (CL); red (2.5YR 4/6); dry; stiff; 65% clay; 30% sand; 5% gravel.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (39-40.5'): 7/14/26. New 10' connection @ 1545.
45					Same as above (40 ft); reddish brown (2.5YR 4/4).	CL		
50		SB0091	0.3		Same as above (40 ft).		Bottom of Screen	Blow counts (49-50.5'): 11/14/21. New 10' connection @ 1605.
55					Poorly graded SAND with Silt and Gravel (SP-SM); reddish brown (5YR 5/4); dry; loose to medium dense; 60% coarse sand; 30% gravel; angular to subrounded; 10% silt; no odor.	SP-SM	Bentonite Seal	
60								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); red (2.5YR 4/8); moist; soft; 70% silt; 30% clay.			New 10' connection @ 1625.
65					Same as above (60 ft).	ML		
70					Same as above (60 ft); gravel fragments at 72'.			New 20' connection @ 1645.
75					Lean CLAY (CL); yellowish red (5YR 5/6); dry; stiff; non to low plasticity; 55% clay; 40% silt; 5% sand; no odor.		Bentonite Seal	
80					Same as above (75 ft).	CL		
85					Same as above (75 ft); reddish brown (5YR 4/3); hard.			
90								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Sandy lean CLAY (CL); yellowish brown (10YR 5/4); dry; stiff; medium plasticity; no odor.	CL		New 10' connection.
95					Silty SAND (SM); pale brown (10YR 6/3); moist; medium dense to dense; 80% fine sand; 20% silt.	SM		
100		SB0092	0.0		Same as above (95 ft); some gravel fragments.			Blow counts (99-100.5'): 15/26/35. New 20' connection @ 0805 on 2/21/11.
105					Same as above (95 ft).		Bentonite Seal	
110					Well graded GRAVEL (GW); reddish yellow (10YR 6/6); dry; 90% gravel; 10% coarse sand; subrounded; no odor.	GW		
115					SILT (ML); yellowish red; moist; non to low plasticity; 90% silt; 10% clay; no odor.	ML		
120								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; low plasticity; 75% clay; 25% silt; some angular gravel fragments; no odor.			New 20' connection @ 1320.
125					Same as above (120 ft).	CL		
130					Same as above (120 ft); yellowish red (5YR 5/6); no gravel.		Bentonite Seal	
135					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); moist; medium dense; 85% fine sand; 5% gravel; 10% silt; no odor.		Top of Filter Pack	
140					Same as above (135); no gravel.	SP-SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1700.
145					Same as above (135 ft); reddish yellow (7.5YR 6/6).			
150		SB0093	0.1					Blow counts (149-150.5'):

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); moist; medium dense; 85% fine sand; 5% gravel; 10% silt; no odor.	SP-SM	Bottom of Screen	19/17/26. New 10' connection @ 0815 on 2/22/11.
155					Well graded SAND (SW); light brown (7.5YR 6/3); dry to moist; dense; 90% fine to coarse sand; 10% gravel; angular to subrounded; no odor.			
160					Same as above (153 ft); no gravel; more fine grained; moderately sorted.			New 10' connection @ 0900.
165					Same as above (153 ft); becomes poorly graded.	SW	Bentonite Seal	
170					Same as above (153 ft).			New 10' connection @ 0915.
175					Same as above (153 ft); small gravel.			
180								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 11:24 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); light brown (7.5YR 6/3); dry to moist; dense; 90% fine to coarse sand; 10% gravel; angular to subrounded; no odor.			New 20' connection @ 0925.
185					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; 80% sand; 20% coarse gravel; subangular to subrounded.			
190					Same as above (185 ft).	SW		
195					Same as above (185 ft).		Bentonite Seal	
200		SB0094	0.4		Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; 95% fine sand; 5% gravel; no odor.			Blow counts (199-200.5'): 12/19/37. Blow counts (200.5-202'): 6/12/28. New 20' connection @ 1015.
		SB0094-MS						
		SB0094-MSD	0.4					
205					Same as above (200 ft).	SP		
210								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/3); moist; 60% sand; 40% gravel to 1.5cm.	SP		
215					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; gravel to 2cm; subangular to subrounded; no odor.	SW	Bentonite Seal	New 20' connection @ 1025.
220					Well graded SAND (SW); light brown (7.5YR 6/4); moist; medium dense; 90% sand; 10% coarse gravel; subangular to subrounded; no odor.			
225					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 95% fine sand; 5% fines; no odor.	SP	Top of Filter Pack	
230					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense to medium dense; 95% sand; 5% gravel and fines.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
235					Same as above (230 ft).			
240								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240								
245					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 4/2); dry; loose; 60% gravel; 40% coarse sand; subangular to angular; no odor.	GW		New 10' connection @ 1100.
250		SB0095	0.7		Lean CLAY (CL); reddish brown (5YR 5/3); dry to moist; soft to firm; non to low plasticity; no odor.	CL	Bottom of Screen	Blow counts (249-250.5'): 27/36/50.
255					Same as above (245 ft); stiff.			New 10' connection @ 1155.
260					Same as above (245 ft).		Bentonite Seal	
265					Well graded SAND with Clay and Gravel (SW-SC); brown (7.5YR 4/4); moist; medium dense to dense; 60% sand; 30% coarse gravel; 10% clay and silt; no odor.	SW-SC		New 20' connection @ 1205.
270					Poorly graded SAND with Clay (SP-SC); light brown (7.5YR 6/4); moist; dense; 90% coarse sand; 10% clay and silt; no odor.	SP-SC		

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND with Clay (SP-SC); light brown (7.5YR 6/4); moist; dense; 90% coarse sand; 10% clay and silt; no odor.			
275					Same as above (270); slight odor.	SP-SC		
280					Same as above (270 ft); slight odor.			New 20' connection @ 1315.
					Lean CLAY (CL); light brown (7.5YR 6/3); dry; hard; nonplastic; 90% clay with silt; 10% sand; no odor.			
285					Same as above (281 ft).	CL	Bentonite Seal	
290					Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/3); moist; medium dense; 70% sand; 30% gravel to 1cm; angular to subrounded; no odor.			
295					Same as above (290 ft); more gravel.	SP		
300		SB0096	1.1					Blow counts (299-300.5'):

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded GRAVEL (GW); brown (7.5YR 5/3); dry; loose; 90% gravel to 5cm; 10% coarse sand; subangular to rounded; no odor.			8/16/27. Blow counts (300.5-302'): 7/14/26. New 20' connection @ 1645.
		SB1743	1.1					
305					Same as above (300 ft); gravel to 0.5cm; more sand; finer.	GW		
310					Well graded SAND with Gravel (SW); light brown (7.5YR 6/4); dry; loose; 85% sand; 15% fine gravel to 0.5cm; no odor.			
315					Same as above (310 ft); some gravel; finer.		Bentonite Seal	
320					Same as above (310 ft).	SW		New connection @ 0800 on 2/23/11.
325					Same as above (310 ft); finer.			
330								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); light brown (7.5YR 6/4); dry; loose; 85% sand; 15% fine gravel to 0.5cm; no odor.	SW	Bentonite Seal	
335					Same as above (330 ft).			New 10' connection @ 0910.
							Top of Filter Pack	
340					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 7/2); dry; loose; 70% gravel to 1cm; 30% coarse sand; subrounded to subangular; no odor.	GW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Well graded SAND (SW); light brown (7.5YR 6/3); dry; loose; 100% sand; no odor.			
350		SB0097	0.3		Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; 70% sand; 30% gravel to 3cm; subangular to rounded; no odor.	SW	Bottom of Screen	Blow counts (349-350.5'): 11/49/50. New 10' connection @1025.
355					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; medium dense; 60% sand; 40% gravel to 2cm; angular to subrounded; no odor.		Bentonite Seal	
360								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (7.5YR 5/4); moist; medium dense; 100% sand; angular to subrounded; no odor.	SW		New 20' connection @ 1040.
365					Same as above (360 ft).			
					Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); dry; loose; 100% sand; no odor.	SP		
370					Same as above (367 ft).			
375					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; loose to medium dense; 55% sand; 45% gravel to 0.8cm; no odor.	SW	Bentonite Seal	
380					Same as above (375 ft).			New 20' connection.
					Poorly graded SAND (SP); dry; sand lense.	SP		
385					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; loose to medium dense; 55% sand; 45% gravel; no odor.	SW		
390								

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; loose to medium dense; 80% sand; 20% gravel; no odor.	SW		
395					Same as above (390 ft); brown (7.5YR 5/4); moist; finer.			
400		SB0098	1.2		Well graded GRAVEL with Sand (GW); light reddish brown (7.5YR 6/3); dry to moist; loose to medium dense; 55% gravel to 3cm; 45% sand; no odor.	GW		Blow counts (399-400.5'): 10/11/26. New 20' connection @ 1400.
405					Well graded SAND (SW); light brown (7.5YR 6/4); dry; loose; 100% sand; no odor.		Bentonite Seal	
410					Well graded SAND with Gravel (SW); light brown (7.5YR 6/4); dry; loose; 55% sand; 45% gravel to 0.6cm; angular to subangular; no odor.	SW		
415					Same as above (410 ft); 70% sand; 30% gravel; finer.			
420					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; 90% fine sand; 10% coarse sand; no odor.	SP		

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420								
425					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 7/2); dry; loose; 80% gravel to 2.3cm; 20% fine sand; rounded to subrounded; no odor.	GW		New 20' connection @ 1440.
430					Well graded SAND with Gravel (SW); brown (7.5YR 5/4); moist; loose; 60% sand; 40% gravel to 1.2cm; subrounded to rounded.	SW	- Bentonite Seal	
435					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); dry; loose; 100% coarse sand; angular to subangular.	SP		
440					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 7/2); dry; loose; 80% sand; 20% gravel; angular to subangular.	SW	- Top of Filter Pack	
					Same as above (435 ft); finer.		- Top of 3" Schedule 80 PVC 0.050 Slot Screen	New 10' and 5' connection @ 1520.
445					Poorly graded SAND with Gravel (SP); brown (7.5YR 5/4); moist; 70% sand; 30% gravel to 2cm; subangular to subrounded; petroleum odor.	SP		
450		SB0099	2.1		Poorly graded SAND (SP); brown (7.5YR 5/4); moist; dense; 100% sand; petroleum odor.		- Bottom of	Blow counts (448.5-450'): 12/26/49.

Borehole ID: KAFB-106114

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/20/2011
Date TD Reached: 2/23/2011
Date Completed: 3/1/2011

Ground Elevation AMSL (ft): 5344.8
Y Coordinate: 1473064.09
X Coordinate: 1541796.70

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

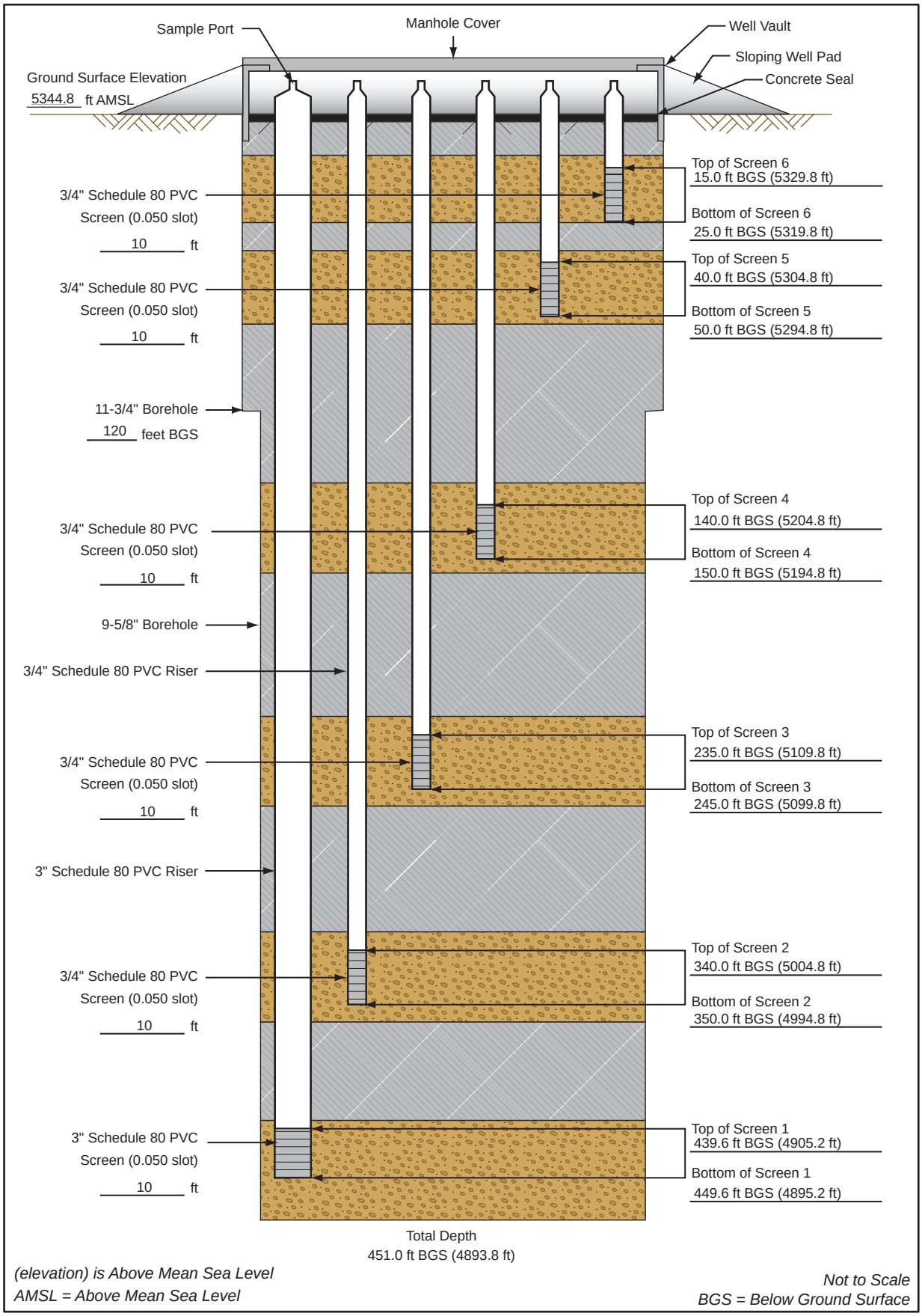
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450						SP	Screen	Total depth = 451 ft. Reached on 2/23/11.
455								Water added during drilling (gallons) = 0
460								Water added during construction (gallons) = 176
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106114

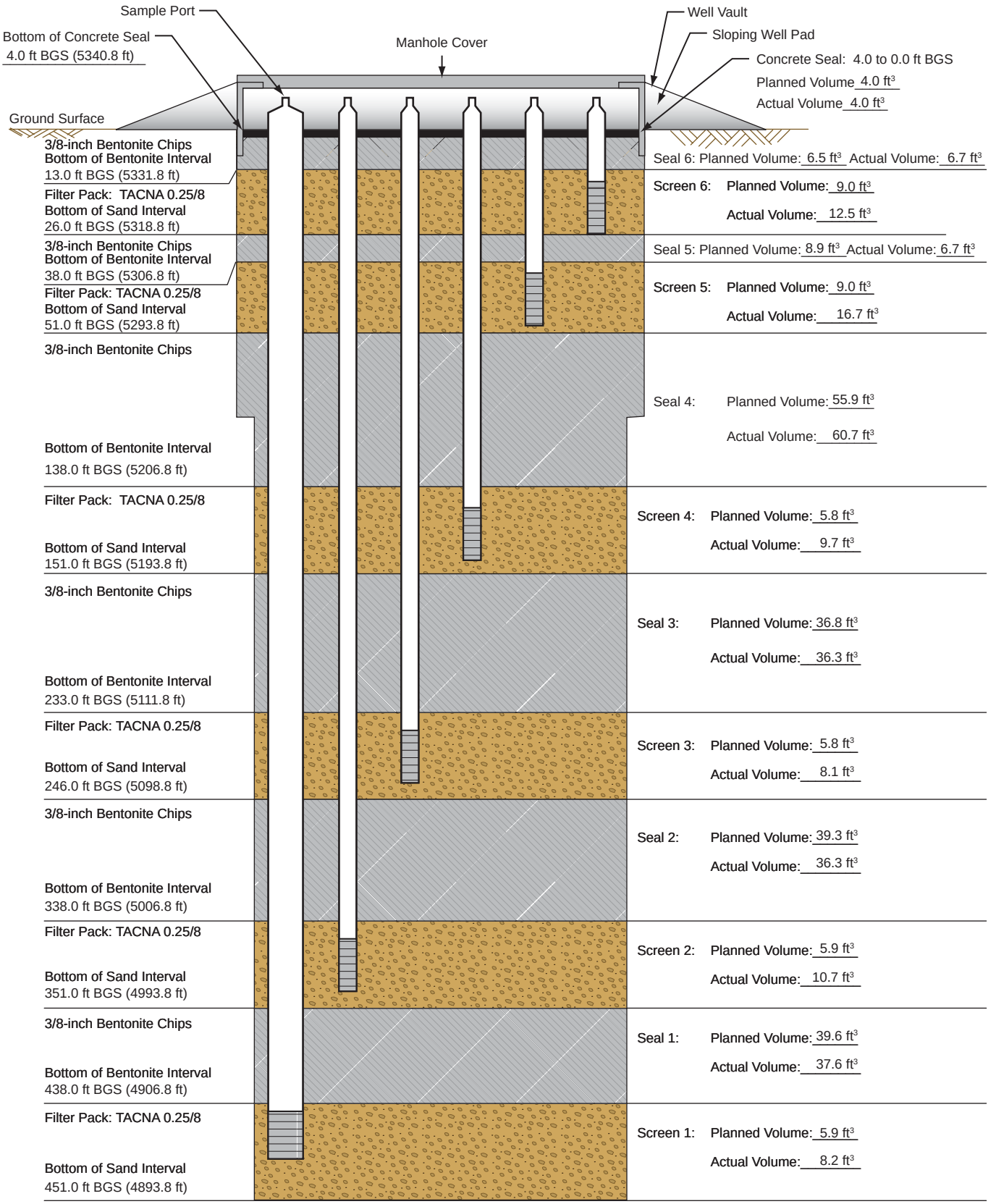
Installation Start Date/Time: 2/23/2011 @ 16:10
Installation End Date/Time: 3/1/2011 @ 17:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106114



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

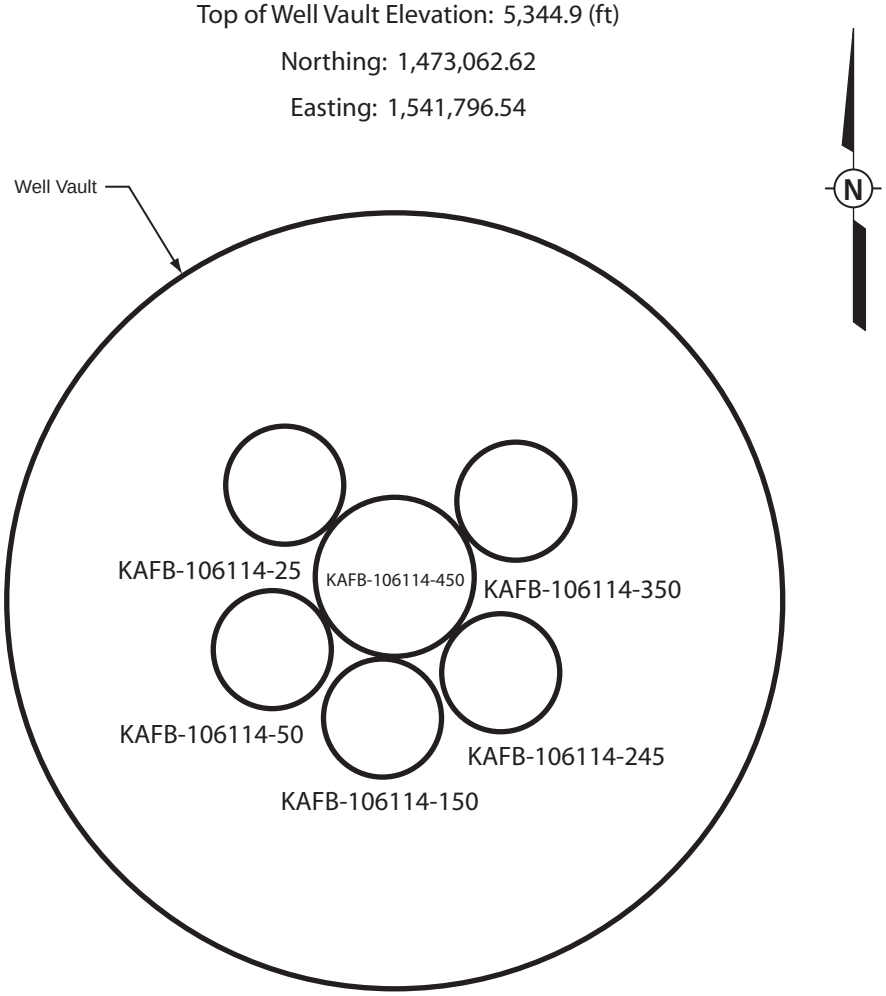
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106114

Top of Well Vault Elevation: 5,344.9 (ft)

Northing: 1,473,062.62

Easting: 1,541,796.54



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106114-25	3/4	25.0	15.0 - 25.0	1,473,062.35	1,541,796.49	5344.6
KAFB-106114-50	3/4	50.0	40.0 - 50.0	1,473,062.13	1,541,796.24	5344.6
KAFB-106114-150	3/4	150.0	140.0 - 150.0	1,473,061.84	1,541,796.37	5344.6
KAFB-106114-245	3/4	245.0	235.0 - 245.0	1,473,061.86	1,541,796.68	5344.6
KAFB-106114-350	3/4	350.0	340.0 - 350.0	1,473,062.17	1,541,796.71	5344.6
KAFB-106114-450	3	449.6	439.6 - 449.6	1,473,062.21	1,541,796.50	5344.6

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106115 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT with Sand (ML); red (2.5YR 5/6); moist; very stiff; 80% silt with minor clay; 20% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; trace fine to coarse gravel to 5cm; subrounded.		Concrete Seal	Hand augered.
5					Same as above (0 ft); no odor.		Bentonite Seal	Began drilling @ 0744 on 2/9/11.
10		SB0100	0.0		SILT (ML); red (2.5YR 5/6); moist; very stiff to hard; 95% silt with clay; 5% very fine to fine sand; trace coarse sand; subrounded; no odor. Note: gravel lense at 12ft.	ML	Top of Filter Pack	Kelly down @ 0752. Blow counts (9-10.5'): 12/16. Blow counts (10.5-12'): 17/39. New connection @ 0822. Resumed drilling @ 0823.
		SB0101	0.0					
15					SILT with Sand (ML); red (2.5YR 4/8); moist; hard; 55% silt; 30% clay; 15% fine to coarse sand; subangular to subrounded; no odor. Note: clay predominantly as clay nodules.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0102	0.0					Kelly down @ 0830. Blow counts (19-20.5'): 19/31.
					Sandy lean CLAY (CL); red (2.5YR 4/8); moist; hard; low to medium plasticity; 55% clay; 15% silt; 30% very fine to fine sand; no odor.			New connection @ 0844. Resumed drilling @ 0845.
25					Same as above (20 ft); no odor.	CL	Bottom of Screen	
							Bentonite Seal	
30		SB0103	0.0					Kelly down @ 0850. Blow counts (29-30.5'): 19/25.

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); red (2.5YR 5/6); moist; hard; 80% silt; 20% clay; no odor.			New connection @ 0905. Resumed drilling @ 0906.
35					Same as above (30 ft); 85% silt; 15% clay; no odor.	ML	Bentonite Seal	
40		SB0104	0.0				Top of Filter Pack	Kelly down @ 0914. Blow counts (39-40.5'): 36/41. Blow counts (40.5-42'): 50/Not Recorded. Blow counts (42-43.5'): 36/64. Blow counts (43.5-45'): 17/50. New connection @ 0950. Resumed drilling @ 0951.
		SB0104			Sandy lean CLAY (CL); red (2.5YR 5/6); moist; hard; low plasticity; 70% clay with minor silt; 30% fine sand; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
		SB0104						
45		SB0104			Same as above (40 ft); no odor.			
50		SB0105	0.0		Same as above (40 ft); no odor.	CL	Bottom of Screen	Kelly down @ 1003. Blow counts (49-50.5'): 30/46. New connection @ 1016. Resumed drilling @ 1017.
55					Same as above (40 ft); 65% clay with silt; 35% very fine to fine sand; no odor.		Bentonite Seal	
60								Kelly down @ 1027.

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); red (2.5YR 4/8); moist; hard; 70% silt; 30% clay; trace very fine to fine sand; no odor.			New connection @ 1046. Resumed drilling @ 1054.
65					Sandy SILT (ML); red (2.5YR 4/8); moist; hard; 70% silt with minor clay; 30% fine to coarse sand; subangular to subrounded; trace fine gravel to 1.5cm; no odor.			
70					SILT (ML); red (2.5YR 4/8); moist; hard; 90% silt with minor clay; 10% fine to coarse sand; subangular; no odor.	ML		
75					SILT (ML); red (2.5YR 4/8); moist; stiff to very stiff; 95% silt with minor clay; 5% fine to medium sand; trace coarse sand; angular to subangular; no odor.		Bentonite Seal	Casing advanced without hammer last ~5ft.
80					Lean CLAY (CL); red (2.5YR 4/8); moist; very stiff to hard; low to medium plasticity; 90% clay with silt; 10% fine sand; trace medium to coarse sand; subangular; no odor.			Kelly down @ 1058. New connection @ 1112. Resumed drilling @ 1114.
85					Same as above (80 ft); 95% clay with minor silt; 5% fine sand; no odor.	CL		
90								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Lean CLAY (CL); red (2.5YR 5/6); moist; very stiff; low plasticity; 70% clay; 30% silt; trace very fine to fine sand; no odor.	CL		No hammer, entire joint.
95					SILT (ML); reddish brown (2.5YR 5/4); moist; very stiff to hard; 85% silt; 15% clay; trace very fine to fine sand; no odor.	ML		Kelly down @ 1118. Blow counts (99-100.5'): 36/50.
100		SB0106	0.0		Sandy SILT (ML); reddish brown (2.5YR 5/4); moist; stiff to very stiff; 70% silt with trace clay; 30% fine sand; no odor.			New connection @ 1211. Resumed drilling @ 1212.
105					Silty SAND (SM); reddish brown (5YR 5/4); moist; loose to medium dense; 70% fine sand; trace medium to coarse sand; subangular; 30% silt with trace clay; no odor.	SM	Bentonite Seal	No hammer, entire joint.
110					Same as above (105 ft); 85% fine to coarse sand; subangular to subrounded; 15% silt with trace clay; no odor.			
115					Well graded SAND with Silt and Gravel (SW-SM); reddish brown (5YR 5/4); moist; loose to medium dense; 75% fine to coarse sand; subangular to subrounded; 15% fine to coarse gravel to 3cm; subrounded; 10% silt with trace clay; no odor.	SW-SM		Kelly down @ 1215. TD 11-3/4" casing at 120'.
120								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); red (2.5YR 4/6); moist; hard; low to medium plasticity; 65% clay; 35% silt; no odor.			New connection @ 1541. Resumed drilling @ 1544.
125					Same as above (120 ft).	CL		
130					SILT (ML); red (2.5YR 5/6); moist; very stiff to hard; 70% silt; 30% clay; no odor.	ML	- Bentonite Seal	
135					Lean CLAY (CL); red (2.5YR 5/6); moist; hard; low to medium plasticity; 70% clay; 30% silt; no odor.	CL		Kelly down @ 1557.
140					Same as above (135 ft); no odor.			New connection @ 1650. Resumed drilling @ 0749 on 2/10/11.
145					Silty SAND (SM); pale red (2.5YR 7/2); moist; medium dense; 85% fine sand; 15% silt; no odor.	SM	- Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Top of Santa Fe Group.
150		SB0107	0.0					Kelly down @ 0813. Blow counts (149-150.5'): 46/50.

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Silty SAND (SM); pale red (2.5YR 7/2); dry to moist; very dense (based on blow counts); 80% very fine to fine sand; 20% silt; no odor.	SM		Blow counts (100.5-102'): 26/49. Blow counts (102-103.5'): 36/50. New connection @ 0935. Resumed drilling @ 0938. Stopped drilling @ 0944, due to plugged discharge. Resumed drilling @ 1015.
		SB0107-MS	0.0					
		SB0107-MSD	0.0					
155					Sandy SILT (ML); red (2.5YR 5/6); moist; very stiff to hard; 70% silt with minor clay; 30% very fine to fine sand; trace medium to coarse sand; subrounded; no odor.	ML	Bottom of Screen	Kelly down @ 1022.
160					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to fine sand; 5% silt; no odor.	SP		New connection @ 1033. Resumed drilling @ 1034.
165					Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; very dense; 90% very fine to coarse sand; subangular to subrounded; 10% fine to coarse gravel to 3cm; subrounded; no odor.	SW	Bentonite Seal	
170					Same as above (165 ft); 100% sand; trace fine gravel to 1.5cm; subrounded; no odor.			
175					Same as above (165 ft).			
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% fine sand; 5% silt; no odor.	SP		Kelly down @ 1048.
180								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% fine sand; 5% silt; no odor.			New connection @ 1057. Resumed drilling @ 1058.
185					Same as above (180 ft); no odor.	SP		
190								Kelly down @ 1104.
					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to medium sand; subangular to subrounded; 5% silt; no odor; pumice clasts/fragments.			New connection @ 1138. Resumed drilling @ 1138.
195							Bentonite Seal	
					Poorly graded SAND with Silt (SP-SM); light reddish brown (2.5YR 7/3); dry to moist; very dense; 90% fine to medium sand; subangular to subrounded; 10% silt with trace clay; no odor. Note: large, rounded, vitric pumice clasts with quartz phenocrysts; altered and unaltered.	SP-SM		Kelly down @ 1145. Blow counts (199-200.5'): 37/50.
200		SB0108	0.0		Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 7/2); dry to moist; very dense; 90% fine to medium sand; subrounded; 10% silt with clay; no odor. Note: 3-4in of lean clay in split spoon; light brown (7.5YR 6/3); high plasticity; moist; black carbonaceous material.	CL		New connection @ 1205. Resumed drilling @ 1206.
205					Lean CLAY (CL); light brown (7.5YR 6/3); moist; hard; high plasticity; 100% clay; black, carbonaceous dendritic material; no odor.	SP-SM		
210					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); moist; very dense; 90% very fine to fine sand; 10% silt with clay; no odor.			

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); dry to moist; very dense; 90% fine sand; 10% silt with minor clay; no odor. Note: pumice present with no alteration/oxidation.	SP-SM		
215					Same as above (210 ft); pale red (2.5YR 7/2); 90% fine to medium sand; trace coarse sand; subangular to subrounded; 10% silt with minor clay; no odor.			Kelly down @ 1225.
220					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% fine to medium sand; trace coarse sand; subrounded to subangular; 5% silt; no odor. Note: very small pumice clasts.	SP	- Bentonite Seal	New connection @ 1250. Resumed drilling @ 1251.
225					Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; very dense; 100% very fine to coarse sand; subangular; trace silt; no odor.	SW		
230					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; very dense; 95% fine to medium sand; subrounded; 5% silt; no odor. Grades into 100% medium to coarse sand; no odor.	SP		
235					Silty SAND with Gravel (SM); pinkish gray (5YR 6/2); moist; very dense to hard; 70% very fine to fine sand; trace medium sand; subangular to subrounded; 15% coarse gravel to 3cm; subrounded; trace cobbles to 5cm; 15% silt with minor clay; no odor.	SM	- Top of Filter Pack - Top of 3/4"	Silt and minor clay at 233' likely represent a perched layer - sample has high moisture content, but is not "wet".
240								Kelly down @ 1330.

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.		Schedule 80 PVC 0.050 Slot Screen	New connection @ 0909. Resumed drilling @ 0910. Experienced problems with casing, hammered below 242 ft.
245					Poorly graded SAND (SP); pinkish gray (5YR 7/2); moist; very dense; 100% fine to medium sand; subrounded to rounded; no odor. Note: sample is primarily volcanic ash with minor lithic fragments; altered.			
250		SB0109	1.0		Poorly graded SAND (SP); pale red (2.5YR 7/2); dry to moist; very dense; 95% very fine to medium sand; trace coarse sand; subangular to subrounded; 5% silt; no odor.	SP	Bottom of Screen	Kelly down @ 1007. Blow counts (249-250.5'): 48/50.
255					Same as above (250 ft); finer than above; no odor.			
260								Kelly down @ 1056.
					Lean CLAY with Sand (CL); pinkish gray (5YR 6/2); moist; hard; low plasticity; 85% clay with minor silt; 15% fine sand; no odor.	CL	Bentonite Seal	New connection @ 1105. Resumed drilling @ 1106.
265					Sandy SILT (ML); pinkish gray (5YR 6/2); moist; very hard to hard; 70% silt with trace clay; 30% very fine to fine sand; no odor.	ML		
270								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Sandy SILT (ML); pinkish gray (5YR 6/2); moist; very hard to hard; 70% silt with minor clay; 30% very fine to fine sand; no odor.	ML		Stopped advancing to empty hopper @ 1132. Resumed drilling @1135.
275					Silty SAND (SM); pinkish gray (5YR 6/2); moist; very dense to dense; 60% very fine to fine sand; 40% silt with trace clay; no odor.	SM		Added water to cyclone for dust supression. Kelly down @ 1159.
280					Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; very dense; 100% very fine to fine sand; some medium sand; subangular to subrounded; no odor.	SP		New connection @ 1207. Resumed drilling @ 1208.
285					Well graded GRAVEL (GW); pinkish gray (5YR 7/2); dry; loose; 95% coarse gravel; subangular to angular; 5% clay; no odor.	GW	Bentonite Seal	Hammer driving slowly. Resumed drilling @ 1640. A. Willmore (geologist) started logging.
290					CLAY (CL); reddish brown (5YR 5/4); dry; soft; medium plasticity; 80% clay; 20% silt; no odor.	CL		
295					Same as above (290 ft); pinkish gray (5YR 6/2).			
300		SB0110	0.8					Blow counts (299-300.5'):

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300								
		SB0110			Well graded GRAVEL (GW); pinkish gray (5YR 6/2); dry; loose; 65% coarse gravel; angular to subrounded; 35% clay; no odor.	GW		14/36/50. Blow counts (300.5-302'): 16/48/50. New connection @ 1300. Began tripping out. Resumed drilling @ 1305.
305					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; 75% sand; 25% coarse gravel; subangular to subrounded; no odor.	SW		
310					Poorly graded SAND (SP); very pale brown (10YR 7/3); dry; loose; 95% sand; 5% fine gravel; no odor.	SP		
315					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; 60% sand; 40% coarse gravel; subangular to subrounded. Note: coarser gravel than 305 ft.		Bentonite Seal	
320					Same as above (315 ft); finer gravel.	SW		New connection @ 1355.
325					Same as above (315 ft).			New connection @ 1415.
330								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; 55% sand; 45% coarse gravel; subangular to subrounded.			
335					Same as above (330 ft); 75% sand; 25% gravel.		- Bentonite Seal	New connection @ 1445.
340					Same as above (330 ft)	SW	- Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Same as above (330 ft); 55% sand; 45% gravel.			Began tripping out to attach spilt spoon sampler @ 1510.
350		SB0111	0.8				- Bottom of Screen	Blow counts (349-350.5'): 14/39/50.
					Well graded GRAVEL with Sand (GW); reddish gray (5YR 5/2); dry; loose; 65% gravel; 35% coarse sand; subangular to to subrounded; no odor.	GW		New 10' connection @ 1615.
355							- Bentonite Seal	
					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/4); moist; medium dense; 90% fine sand; 10% silt; no odor.	SP-SM		
360								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360								
					Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/4); moist; medium dense; 90% fine sand; 10% silt; no odor.	SP-SM		New 20' connection @ 1640.
365								
					Well graded SAND (SW); reddish gray (5YR 5/2); moist; medium dense to loose; 95% coarse sand; subangular to subrounded; 5% silt; no odor.	SW		
370								
					Well graded GRAVEL (GW); reddish gray (5YR 5/2); dry; loose; 90% gravel; 10% coarse sand; angular to subrounded; no odor.	GW		
375							Bentonite Seal	
					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; loose; 60% sand; 40% coarse gravel; angular to subrounded; no odor.			
380								
					Same as above (375 ft); finer gravel.	SW		New connection @ 0755 on 2/17/11.
385								
					Well graded SAND (SW); reddish gray (5YR 5/2); dry; loose; 90% sand; 10% gravel; angular to subrounded; no odor.			
390								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; loose; 60% sand; 40% gravel; angular to subrounded; no odor.			
395					Same as above (390 ft).	SW		
400		SB0112	0.3					Began tripping out to collect spilt spoon samples @ 0835. Blow counts (399-400.5'): 11/16/12. Blow counts (400.5-402'): 6/13/15. Began tripping pipe back in @ 0925.
		SB0113	0.3		Well graded GRAVEL with Sand (GW); reddish gray (5YR 5/2); dry; loose; 70% gravel; 30% coarse sand; subangular to rounded; no odor.	GW		
405					Well graded SAND (SW); pinkish gray (5YR 6/2); moist; loose; 90% sand; 10% coarse gravel; angular to subrounded; no odor.		Bentonite Seal	
410					Same as above (405 ft).	SW		
415					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); moist; loose; 75% sand; 25% coarse gravel; subangular to subrounded; no odor.			
420								

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); moist; loose; 75% sand; 25% coarse gravel; subangular to subrounded; no odor. Note: gravel finer than 415'.			New connection @ 1120.
425					Same as above (420 ft); coarse sand; less gravel.	SW	Bentonite Seal	
430					Same as above (420 ft); pinkish gray (7.5YR 7/2); finer sand; less graded; coarser gravel; subangular to subrounded.			Hammer stuck @ 1148. Began hammering @ 1300.
435					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; loose; 95% fine sand; subangular to subrounded; 5% silt; no odor.	SP	Top of Filter Pack	
440					Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); dry; loose; 60% sand; 40% coarse gravel; subangular to subrounded; no odor.		Top of 3" Schedule 80 PVC 0.050 Slot Screen	Hammer locked @ 1320. New 10' connection @ 1320. Resumed drilling @ 1340.
445					Same as above (440 ft); finer sand; less gravel.	SW		
450		SB0114	0.6				Bottom of	Blow counts (448.5-450'):12/21/33.

Borehole ID: KAFB-106115

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/9/2011
Date TD Reached: 2/17/2011
Date Completed: 2/20/2011

Ground Elevation AMSL (ft): 5347.9
Y Coordinate: 1473056.65
X Coordinate: 1542375.40

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

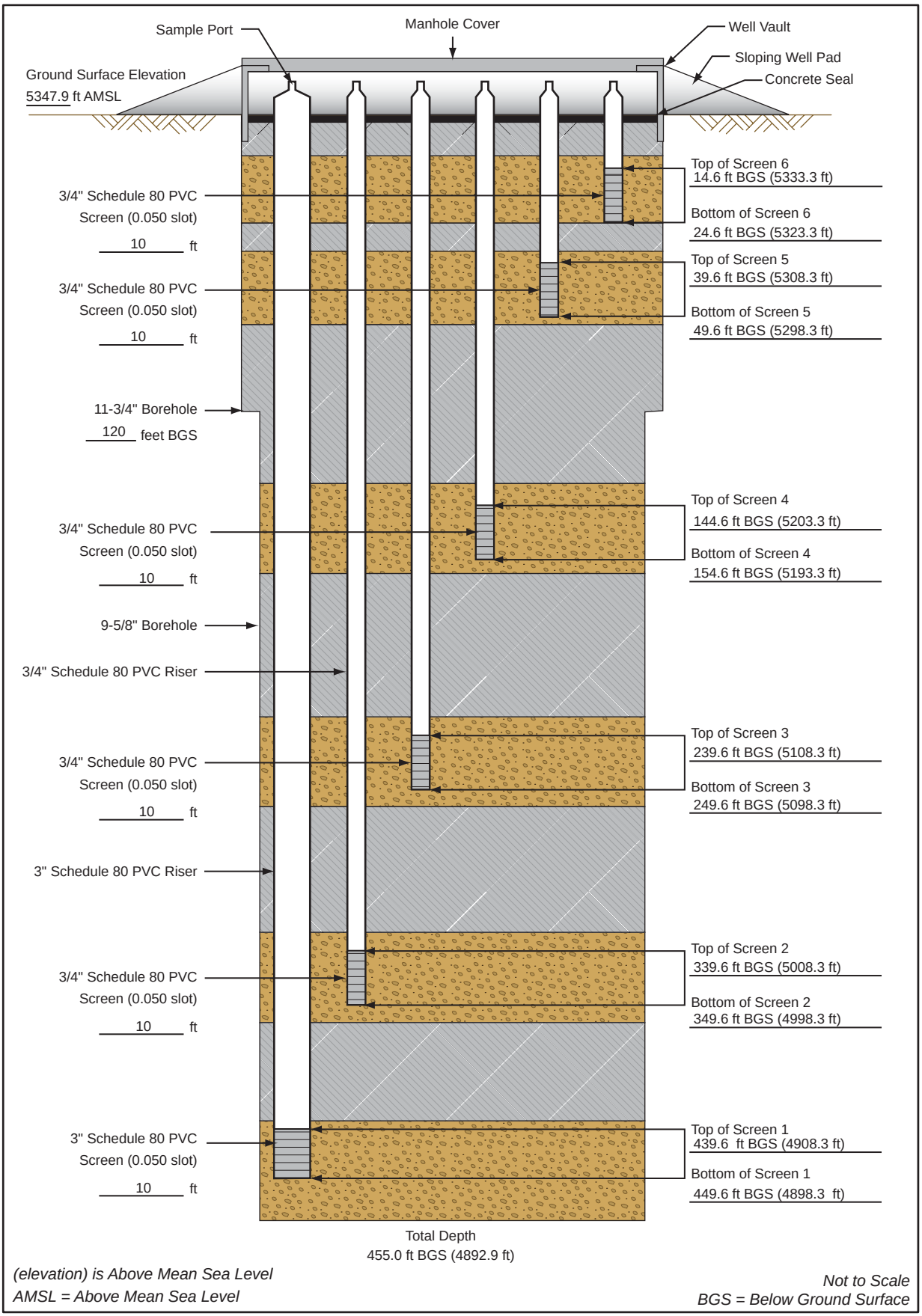
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero / Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
					No description recorded.		Screen	
455								Total Depth = 455 ft. Reached @ 1510 on 2/17/11.
460								Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								Kelly down: TD the joint and ready to make new connection
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106115

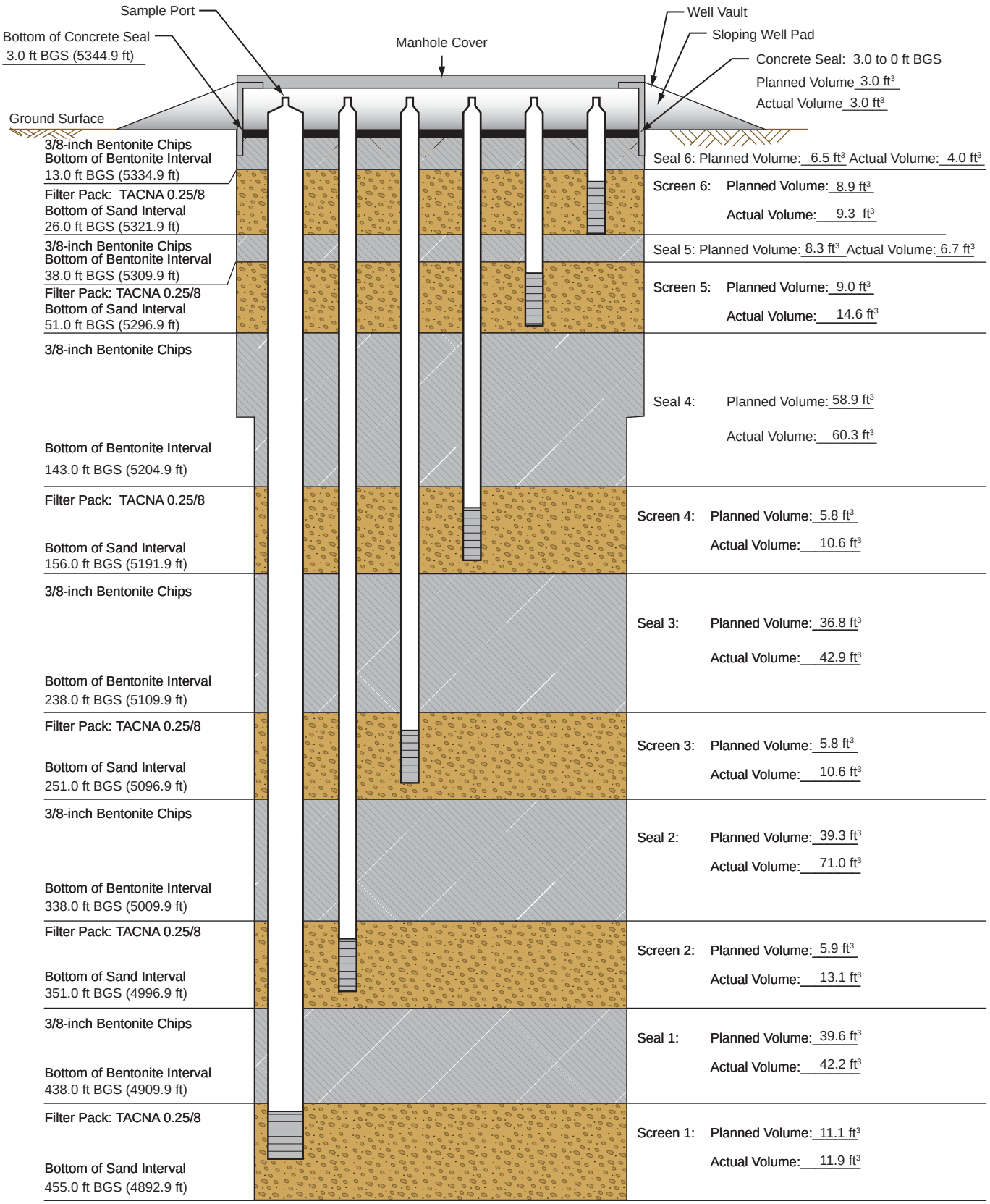
Installation Start Date/Time: 2/18/2011 @ 08:15
Installation End Date/Time: 2/20/2011 @ 9:20



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106115



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

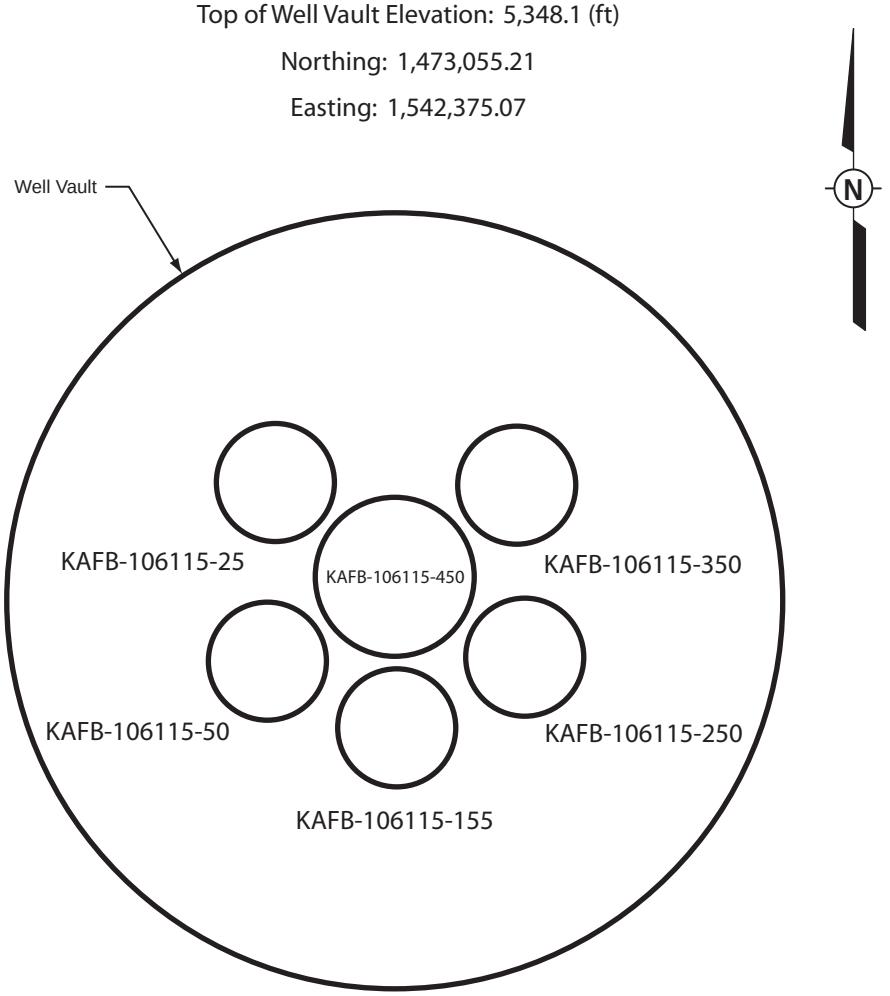
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106115

Top of Well Vault Elevation: 5,348.1 (ft)

Northing: 1,473,055.21

Easting: 1,542,375.07



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106115-25	3/4	24.6	14.6 - 24.6	1,473,054.86	1,542,375.31	5347.6
KAFB-106115-50	3/4	49.6	39.6 - 49.6	1,473,054.62	1,542,375.13	5347.6
KAFB-106115-155	3/4	154.6	144.6 - 154.6	1,473,054.66	1,542,374.86	5347.6
KAFB-106115-250	3/4	249.6	239.6 - 249.6	1,473,054.94	1,542,374.83	5347.7
KAFB-106115-350	3/4	349.6	339.6 - 349.6	1,473,055.00	1,542,375.10	5347.7
KAFB-106115-450	3	449.6	439.6 - 449.6	1,473,054.93	1,542,375.05	5347.7

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106118 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT (ML); brown (7.5YR 5/2); dry; stiff; nonplastic; 95% silt; 5% fine gravel; rounded; no odor.		Concrete Seal	Hand augered.
5					Same as above (0 ft).			Began drilling @ 1127 on 2/24/11.
		SB0143	0.4				Bentonite Seal	Blow counts (7-8.5'): 7/8.
10					Same as above (0 ft); 90% silt; 10% fine to coarse sand; subrounded.		Top of Filter Pack	
15					Same as above (0 ft); non to low plasticity.	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1150. New connection @ 1254. Resumed drilling @ 1256.
		SB0144	0.0					Blow counts (17-18.5'): 16/15. Bow counts (18.5-20'): 16/15.
20		SB0144						
					Same as above (0 ft).			
25					SILT (ML); brown (7.5YR 5/2); dry; firm to stiff; low plasticity; 85% silt; 10% clay; 5% gravel; silt nodules to 1.5cm; no odor.		Bottom of Screen	Kelly down @ 1304.
		SB0145	0.0				Bentonite Seal	Blow counts (27-28.5'): 6/12. Blow counts (28.5-30'): 14/20. New connection @ 1325.
30		SB0146	0.0					

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); brown (7.5YR 5/2); dry; firm; non to low plasticity; 100% silt with clay nodules to 1cm; no odor.			Resumed drilling @ 1325.
35					Same as above (30 ft); 90% silt; 10% clay nodules.		Bentonite Seal	Kelly down @ 1335.
		SB0147	0.0				Top of Filter Pack	Blow counts (37-38.5'): 7/11. New connection @ 1347. Resumed drilling @ 1347.
40					Same as above (30 ft).	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					Same as above (30 ft); very stiff.			Kelly down @ 1353.
		SB0148	0.0					Blow counts (47-48.5'): 23/27. Blow counts (48.5-50'): 47/50. Blow counts (50-51.5'): 42/50. New connection @ 1417. Resumed drilling @ 1418.
50		SB0148					Bottom of Screen	
		SB0148			Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 75% fine to coarse sand; rounded; 10% gravel; rounded; 15% silt; no odor.			
55					Same as above (50 ft); 80% fine to coarse sand; 5% gravel; 15% silt.	SM	Bentonite Seal	Kelly down @ 1420. New connection @ 1430. Resumed drilling @ 1431.
60								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); brown (7.5YR 5/2); dry; firm; nonplastic; 100% silt; no odor.	ML		
65					Well graded SAND with Silt (SW-SM); brown (7.5YR 4/3); dry; dense; 85% fine to coarse sand; subangular to angular; 5% gravel to 1cm; subangular; 10% silt; no odor.	SW-SM		
70					SILT (ML); brown (7.5YR 4/3); very dry; stiff to very stiff; nonplastic; 100% silt; trace gravel to 2cm; no odor.			
75					Same as above (70 ft).		Bentonite Seal	Kelly down @ 1436. New connection @ 1447. Resumed drilling @ 1447.
80					Same as above (70 ft); 90% silt; 10% fine to coarse sand; siltstone fragments to 2cm.	ML		
85					Same as above (70 ft).			
90								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); brown (7.5YR 4/4); dry; stiff to firm; nonplastic; 75% silt; 25% fine sand; rounded; no odor.	ML		
95					Well graded SAND (SW); grayish brown (10YR 5/2); dry; dense; 100% fine to coarse sand; rounded; large quantity of lapilli tuff; rounded; no odor.	SW		Kelly down @ 1500.
		SB0149	0.0					Blow counts (97-98.5'): 16/28. New connection @ 1516. Resumed drilling @ 1517.
100					Same as above (95 ft).			
105					SILT (ML); brown (7.5YR 5/3); dry; stiff; nonplastic; 95% silt; 5% fine to coarse sand; no odor.		Bentonite Seal	
110					Same as above (103 ft).	ML		
115					Same as above (103 ft).			Kelly down @ 1527. Tripped in 9 5/8" casing. End of 2/24/11. New connection @ 0950 on 3/1/11. Resumed drilling @ 0953.
120								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); brown (7.5YR 4/3); dry; stiff to very stiff; medium plasticity; 100% clay; no odor.			
125					Same as above (120 ft); brown (7.5YR 5/3).	CL		
130					Same as above (120 ft); low to medium plasticity.		Bentonite Seal	
135					Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 95% fine to medium sand; rounded; 5% fines; trace mica flakes; no odor.			Kelly down @ 1007. New connection @ 1014. Resumed drilling @ 1015.
140					Same as above (134 ft); trace coarse sand.	SP		
145					SILT (ML); brown (10YR 4/3); dry; stiff to very stiff; low plasticity; 95% silt; 5% gravel to 2cm; rounded; no odor.			Kelly down @ 1020.
		SB0150	0.4			ML	Top of Filter Pack	Blow counts (147-148.5'): 12/50. New connection @ 1040. Resumed drilling @ 1042.
150								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; dense; 95% fine to medium sand; rounded; trace coarse sand; 5% fines; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Approximate top of Santa Fe Group.
155					Same as above (150 ft); 85% fine to medium sand; trace coarse sand; 10% gravel to 1cm; rounded; 5% fines.	SP		Kelly down @ 1045. New connection @ 1052. Resumed drilling @ 1055.
160					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% fine to coarse sand; rounded; trace gravel; rounded; no odor.		Bottom of Screen	
165					Same as above (160 ft); dominantly fine sand.	SW		
170					Same as above (160 ft).		Bentonite Seal	
175					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand; rounded; no odor.	SP		Kelly down @ 1059. New connection @ 1111. Resumed drilling @ 1111.
180								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand; rounded; no odor.	SP		
185					Well graded SAND (SW); brown (10YR 5/3); 95% fine to coarse sand; evenly distributed; rounded; 5% gravel to 1cm; rounded; no odor.	SW		
190					Same as above (185 ft); 35% of coarse fraction of sand is lapilli tuff.			
195					Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 100% fine to medium sand; rounded; no odor. Note: 3cm clay nodule in split spoon sample.		- Bentonite Seal	Kelly down @ 1129.
		SB0151	0.1					Blow counts (197-198.5'): 9/50. New connection @ 1322. Resumed drilling @ 1327.
200					Same as above (195 ft); 100% fine sand.	SP		
205					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% fine to coarse sand; rounded; volcanic in composition; no odor.	SW		
210								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210								
215					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 95% fine to coarse sand; rounded; volcanic in composition; 5% gravel to 2cm; rounded; no odor.	SW		
220					Same as above (210 ft); 90% fine to coarse sand; 10% gravel to 2.5cm; rounded.			Kelly down @ 1333. New connection @ 1340. Resumed drilling @ 1341.
225					Poorly graded GRAVEL (GP); dark yellowish brown (10YR 4/4); dry; dense; 90% fine gravel to 3cm; rounded; 10% fine to coarse sand; rounded; no odor.	GP		
230					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; dense; 95% fine to medium sand; rounded; 5% coarse sand; rounded; trace gravel to 2cm; no odor.	SP	Bentonite Seal	
235					Poorly graded GRAVEL with Sand (GP); dark yellowish brown (10YR 4/6); moist; 60% fine gravel to 1.5cm; rounded; 40% fine to coarse sand; rounded; no odor.	GP		
240					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; dense; 95% fine to medium sand; rounded; 5% gravel; rounded; no odor.	SP		Kelly down @ 1349. New connection @ 1355. Resumed drilling @ 1355.

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded GRAVEL with Sand (GP); dark grayish brown (10YR 4/2); dry; dense; 65% gravel to 2cm; rounded; 35% fine to coarse sand; rounded; no odor.	GP		
					SILT (ML); brown (10YR 4/3); dry; stiff; nonplastic; 100% silt; no odor.			Kelly down @ 1358.
245							Bentonite Seal	
		SB0152	2.9					Blow counts (247-248.5'): 26/50. New connection @ 1415. Resumed drilling @ 1416.
250					Same as above (243 ft).	ML	Top of Filter Pack	
255					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; dense; 95% very fine to fine sand; rounded; 5% fines; no odor.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1420. New connection @ 1428. Resumed drilling @ 1429.
260					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel to 1.5cm; rounded.			
265					Same as above (260 ft).	SW	Bottom of Screen	
							Bentonite Seal	
270								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel to 1.5cm; rounded.	SW		
275					SILT (ML); brown (7.5YR 5/2); dry; stiff to very stiff; nonplastic; 100% silt; trace clay nodules to 2cm; no odor.			Kelly down @ 1437. New connection @ 1443. Resumed drilling @ 1446.
280					Sandy SILT (ML); brown (7.5YR 5/2); dry; stiff; nonplastic; 60% silt; 40% fine sand; rounded; no odor.	ML		
285					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; no odor.		Bentonite Seal	
290					Same as above (285 ft).	SW		
295					Same as above (285 ft); medium dense; 90% fine to coarse sand; rounded; 10% gravel to 1.5cm; rounded.			Kelly down @ 1454.
		SB0153	0.0					Blow counts (297-298.5'): 9/11. New connection @ 1510. Resumed drilling @ 1510.
300								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 95% fine to coarse sand; rounded; 5% gravel to 1.5cm; rounded; no odor.			
305					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 65% fine to coarse sand; rounded; 35% gravel to 1.5cm; rounded; no odor.	SW		
310					Same as above (305 ft).			
315					Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; subrounded; no odor.	GP	Bentonite Seal	Kelly down @ 1520. New connection @ 1527. Resumed drilling @ 1528.
320					Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace medium sand; no odor.			
325					Same as above (320 ft); 100% fine to medium sand; rounded.	SP		
330								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 95% fine to medium sand; 5% coarse sand; rounded; no odor.	SP	Bentonite Seal	
340					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; subangular to subrounded; trace gravel to 1cm; rounded; no odor.	SW	Top of Filter Pack	Kelly down @ 1539. New connection @ 1610. Resumed drilling @ 1611.
345					Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 100% very fine to fine sand; rounded; no odor.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
350		SB0154	0.3		Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 90% fine to coarse sand; rounded; 10% fine gravel to 1.5cm; rounded; no odor.			Kelly down @ 1622.
		SB0154						Blow counts (347-348.5'): 5/11. Blow counts (348.5-350'): 9/17. New connection @ 1647. Resumed drilling @ 1647.
355					Same as above (345 ft).	SW	Bottom of Screen	
360					Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 95% fine gravel to 3cm; rounded; 5% fine to coarse sand; rounded; no odor.	GP	Bentonite Seal	Kelly down @ 1700. End of 3/1/11. New connection @ 0828 on 3/2/11. Resumed drilling @ 0834.
					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 100% fine to coarse sand; subrounded to rounded; no	SW		

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					odor.			
365					Same as above (358 ft); trace gravel; rounded.			
370					Same as above (358 ft); subangular to subrounded.			
375					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; medium dense; 80% fine to coarse sand; subrounded to rounded; 20% fine gravel to 1cm; no odor.	SW	Bentonite Seal	Kelly down @ 0926. Casing refusal, pulled 120' of casing and redrilled. End of 3/2/11. New connection @ 1126 on 3/3/11. Resumed drilling @ 1128.
380					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel; rounded; no odor.			
385					Same as above (380 ft); dominantly fine sand.			
390								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 4/3); dry; loose; 100% fine to medium sand; dominantly fine sand; rounded; abundant mica flakes; no odor.			
395					Same as above (390 ft); trace coarse sand.	SP		Kelly down @ 1204.
		SB0155	19.1		Note: 4cm gravel fragment in spilt spoon sample.			Blow counts (397-398.5'): 3/5. Blow counts (398.5-400'): 3/5. New connection @ 1310. Resumed drilling @ 1313.
400		SB0155						
					Well graded SAND (SW); brown (10YR 4/3); dry; loose to medium dense; 100% fine to coarse sand; subangular to rounded; trace gravel; no odor.			
405					Same as above (400 ft).	SW	Bentonite Seal	
410					Poorly graded SAND (SP); brown (10YR 4/3); dry; loose to medium dense; 100% fine to medium sand; rounded; trace coarse sand; rounded; no odor.	SP		
415					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; medium dense; 75% fine to coarse sand; rounded; 25% fine gravel; subrounded; no odor.	SW		Kelly down @ 1346. New connection @ 1422. Resumed drilling @ 1423.
420								

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420								
425					Well graded SAND (SW); brown (10YR 4/3); dry; loose; 85% fine to coarse sand; rounded; 10% fine gravel; rounded; 5% clay nodules; no odor.	SW		
430					Poorly graded SAND (SP); brown (10YR 4/3); dry; loose to medium dense; 95% fine to medium sand; rounded; 5% coarse sand; rounded; trace gravel; rounded; no odor.	SP	- Bentonite Seal	
435					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 100% fine to coarse sand; subrounded to rounded; no odor.	SW		
440					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); dry; medium dense; 60% fine gravel to 1.5cm; subangular to subrounded; 40% fine to coarse sand; rounded; no odor.	GP	- Top of Filter Pack	Kelly down @ 1509. New connection @ 1517. Resumed drilling @ 1520.
445					Poorly graded SAND with Gravel (SP); brown (10YR 4/3); dry; medium dense; 60% fine to medium sand; rounded; 40% fine gravel to 2cm; rounded; trace clay nodules; no odor.	SP	- Top of 3" Schedule 80 PVC 0.050 Slot Screen	
		SB0156	0.0		SILT with Sand (ML); brown (10YR 5/3); slightly moist; firm; nonplastic; 80% silt; 20% very fine sand; no odor.	ML		Kelly down @ 1537.
450		SB0156			Poorly graded SAND (SP); brown (10YR	SP		Blow counts (447-448.5'): 12/11. Blow counts (448.5-450'): 15/12. New connection @ 1605.

Borehole ID: KAFB-106118

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/24/2011
Date TD Reached: 3/3/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5345.8
Y Coordinate: 1473742.98
X Coordinate: 1541791.33

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

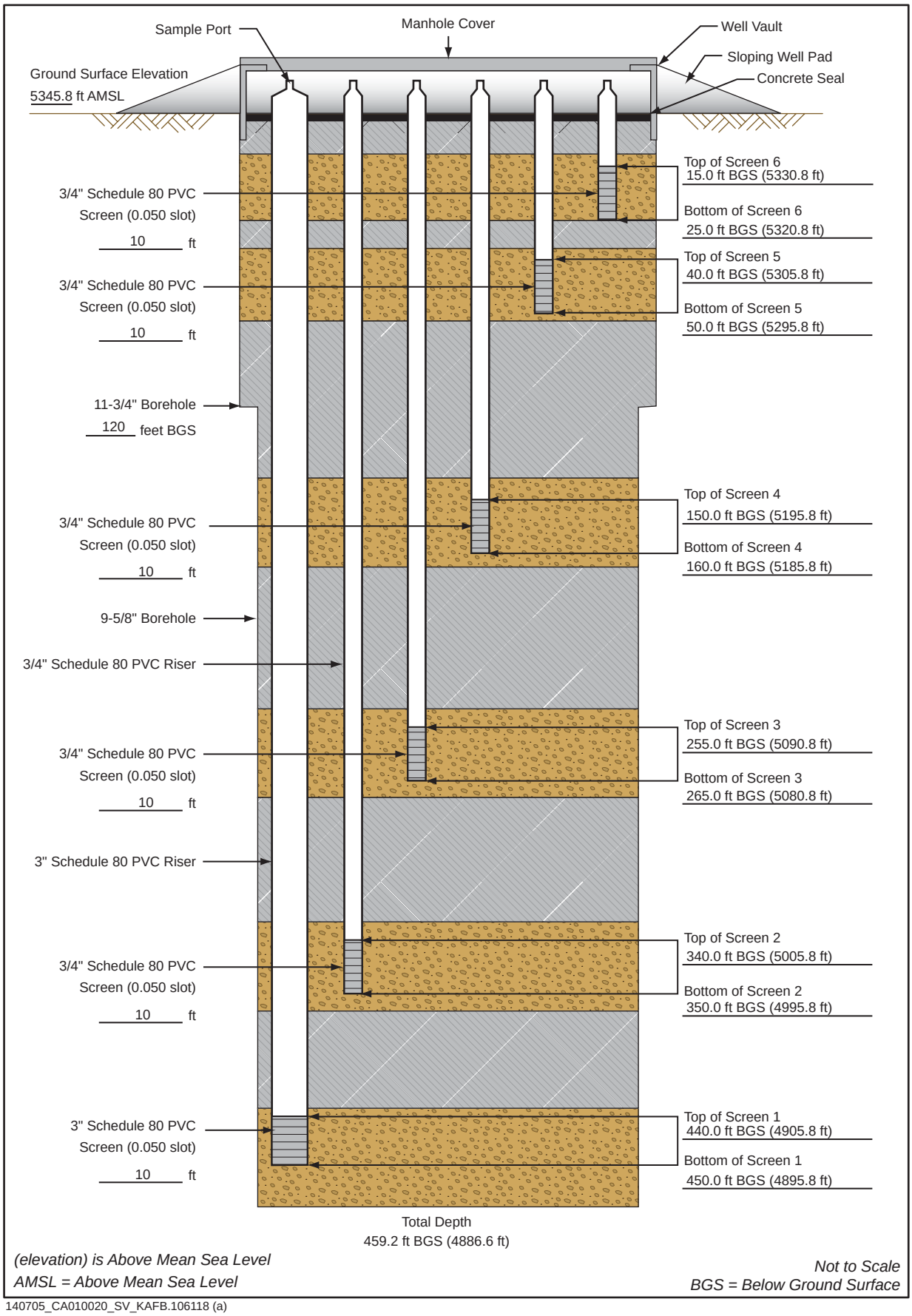
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					4/3); dry; medium dense; 95% fine to medium sand; rounded; 5% coarse sand; rounded; no odor.	SP	Bottom of Screen	Resumed drilling @ 1606.
455					Same as above (449 ft).			
					SILT (ML); brown (10YR 5/3); dry; firm; nonplastic; 100% silt; no odor.	ML		
460								Total depth = 459.2 ft. Reached @ 1626 on 3/3/11.
								Water added during drilling (gallons): 0
465								Water added during construction (gallons): 423.3
470								Kelly down: TD the joint and ready to make new connection.
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106118

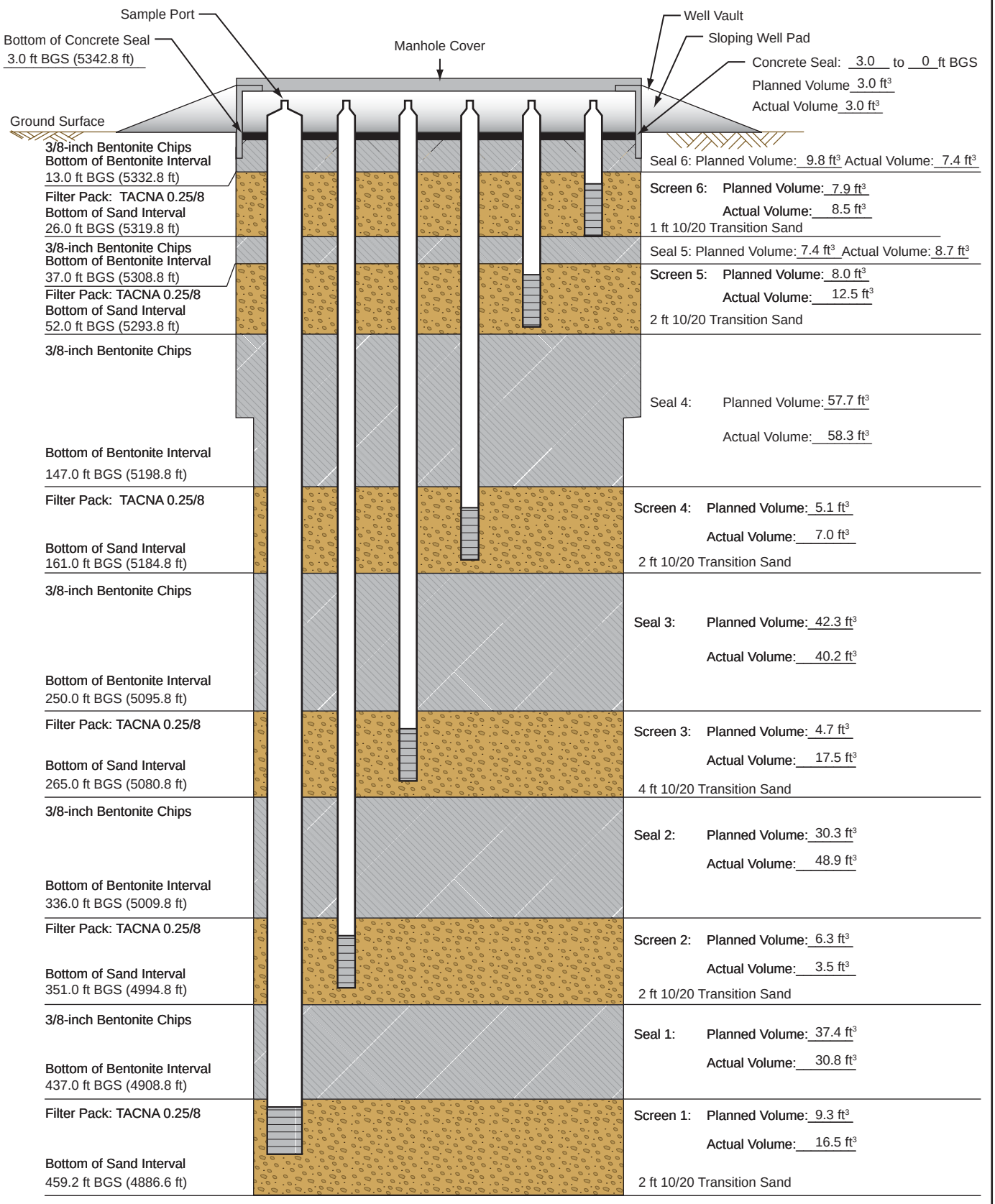
Installation Start Date/Time: 3/4/2011 @ 09:20
Installation End Date/Time: 3/7/2011 @ 10:25



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106118



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

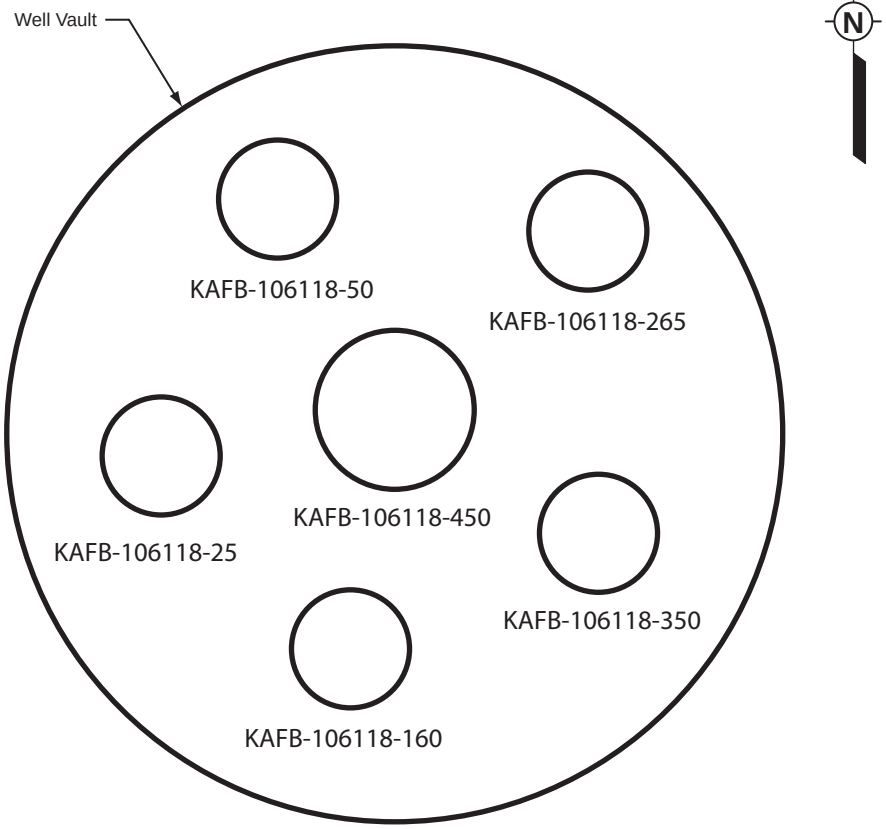
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106118

Top of Well Vault Elevation: 5,345.9 (ft)

Northing: 1,473,741.34

Easting: 1,541,791.64



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106118-25	3/4	25.0	15.0 - 25.0	1,473,740.74	1,541,791.34	5345.5
KAFB-106118-50	3/4	50.0	40.0 - 50.0	1,473,741.03	1,541,791.43	5345.4
KAFB-106118-160	3/4	160.0	150.0 - 160.0	1,473,740.55	1,541,791.54	5345.4
KAFB-106118-265	3/4	265.0	255.0 - 265.0	1,473,741.00	1,541,791.76	5345.5
KAFB-106118-350	3/4	350.0	340.0 - 350.0	1,473,740.65	1,541,791.83	5345.5
KAFB-106118-450	3	450.0	440.0 - 450.0	1,473,740.91	1,541,791.61	5345.4

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106119 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 5/3); moist; loose; low plasticity; 65% silt; 35% very fine to medium sand to 2mm.		Concrete Seal	Hand augered.
5					Same as above (0 ft).			Began drilling @ 1448 on 3/3/11.
		SB0157 SB0158	0.1				Bentonite Seal	Blow counts (7-8.5'): 14/15.
10					Same as above (0 ft); reddish brown (5YR 5/4); very stiff; 60% silt; 5% clay; 35% very fine to meduim sand.			Resumed drilling @ 1504.
							Top of Filter Pack	
15					Same as above (0 ft); reddish brown (5YR 4/4).	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Bottom of casing @ 1510.
		SB0159	0.0					Blow counts (17-18.5'): 14/23. Resumed drilling @ 1521.
20					Sandy SILT (ML); brown (7.5YR 5/4); moist; hard; low plasticity; 60% silt; 40% very fine to coarse sand; trace fine gravel to 1cm.			
25					Same as above (20 ft); 40% very fine to medium sand to 2mm; no gravel.		Bottom of Screen	Bottom of casing @ 1525.
		SB0160 SB0160-MS	0.0				Bentonite Seal	Blow counts (27-28.5'): 8/13. Blow counts (28.5-30'): Not Recorded. Resumed drilling @
30		SB0160-MSD	0.0					

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); brown (7.5YR 5/4); moist; very stiff; low plasticity; 60% silt; trace clay nodules; 40% very fine to coarse sand; trace fine gravel to 1cm.	ML	Bentonite Seal	1541.
35					Same as above (30 ft); hard; 70% silt; 30% very fine to coarse sand to 4.5mm; no clay.			
		SB0161	0.0		Lean CLAY with Sand (CL); reddish brown (5YR 5/4); dry; hard; medium plasticity; 70% clay; 15% silt; 15% very fine to medium sand to 1mm.	CL	Top of Filter Pack	Blow counts (37-38.5'): 11/23.
40					No cuttings returned.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Bottom of casing @ 1546. Resumed drilling @ 1554.
45					Sandy SILT (ML); brown (7.5YR 5/4); dry; hard; low plasticity; 70% silt; 30% very fine to coarse sand; trace fine gravel to 9mm.	ML		
		SB0162	0.0		Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 60% very fine to very coarse sand; 5% fine gravel to 2cm; subrounded; 35% silt.	SM	Bottom of Screen	Blow counts (47-48.5'): 16/32. Bottom of casing @ 1559. Resumed drilling @ 1616.
55					Sandy SILT (ML); brown (7.5YR 4/4); dry; hard; low plasticity; 60% silt; 10% clay; 30% very fine to medium sand to 3mm.	ML	Bentonite Seal	
60								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Sandy SILT (ML); brown (7.5YR 4/4); dry; hard; low plasticity; 60% silt; 10% clay; 30% very fine to coarse sand to 4mm.			Resumed drilling @ 1628.
65					Same as above (60 ft); 60% silt; 40% very fine to coarse sand.	ML		
70					Same as above (60 ft); 50% silt; 20% clay; 30% very fine to fine sand.			
75					Well graded SAND with Silt (SW-SM); brown (7.5YR 5/3); moist; medium dense; 90% very fine to very coarse sand; trace gravel to 1.4cm; subangular; 10% silt with clay.	SW-SM	Bentonite Seal	Bottom of casing @ 1635.
80					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 80% silt; 20% very fine to medium sand to 1mm.			
85					Same as above (80 ft).	ML		
90								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					No cuttings returned.			
95					SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 75% silt; 5% clay nodules; 20% very fine to medium sand to 1mm.	ML		
		SB0163	4.9		Lean CLAY (CL); lense.	CL		Blow counts (97-98.5'): 5/23.
100					Poorly graded SAND (SP); brown (10YR 5/3); damp; loose; 100% medium sand to 0.5mm; rounded; trace clay nodules.	SP		Bottom of casing @ 1652. Resumed drilling @ 1704.
105					Same as above (99 ft); 95% medium sand; 5% silt.		Bentonite Seal	
110					Lean CLAY (CL); brown (10YR 5/3); damp; hard; medium plasticity; 100% lean clay; trace silt (likely from cyclone).	CL		
115					SILT (ML); brown (7.5YR 5/4); moist; hard; low plasticity; 85% silt; 5% clay; 10% very fine sand.	ML		
					Same as above (112 ft).			
120								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					No cuttings returned.			Bottom of casing @ 1709 on 3/3/11. Resumed drilling @ 1105 on 3/4/11.
125					No cuttings returned.			
130					No cuttings returned.		Bentonite Seal	
135					Poorly graded SAND (SP); brown (10YR 5/3); moist; very dense; 100% medium sand to 0.5mm; rounded.	SP	Top of Filter Pack	
140					Well graded SAND (SW); brown (10YR 4/3); damp; medium dense; 100% fine to coarse sand to 3mm; rounded.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Bottom of casing @ 1117. Resumed drilling @ 1124.
145					Same as above (140 ft); very dense.	SW		
		SB0164	0.0					Blow counts (147-148.5'): 23/50. Bottom of casing @ 1128.
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 13:27 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Well graded SAND (SW); brown (10YR 4/3); damp; medium dense; 100% fine to coarse sand to 3mm; rounded.		Bottom of Screen	Resumed drilling @ 1142.
155					Same as above (150 ft); 95% very fine to very coarse sand; 5% fine gravel to 1.1cm.			
160					Same as above (150 ft); 95% very fine to very coarse sand; 5% fine gravel to 1.1cm.			Bottom of casing @ 1145. Resumed drilling @ 1151.
165					Same as above (150 ft); grading finer; no gravel.	SW	Bentonite Seal	
170					Same as above (150 ft); grading finer; some pumice.			
175					Same as above (150 ft).			Bottom of casing @ 1156.
180								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 95% very fine to very coarse sand; trace fine gravel to 9mm; subrounded to rounded; 5% silt with clay nodules.	SW	Bentonite Seal	Resumed drilling @ 1237.
185					Same as above (180 ft).			
190					Same as above (180 ft).			
195					Same as above (180 ft).			
		SB0165	0.0					Blow counts (197-198.5'): 4/4. Bottom of casing @ 1242. Resumed drilling @ 1255.
200					Same as above (180 ft); fine gravel to 2cm.			
205					Same as above (180 ft); 90% very fine to very coarse sand; 5% fine gravel; 5% fines.			
210					Lean CLAY (CL); brown (10YR 5/3);	CL		

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					damp; very stiff; medium plasticity; 100% clay with minor silt; trace fine gravel to 1.9cm; rounded.	CL		
215					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); moist; loose; 90% very fine to very coarse sand; trace fine gravel to 1.5cm; rounded; 10% silt with minor clay nodules.	SW-SM		
220					Well graded SAND (SW); brown (10YR 4/3); moist; medium dense; 100% very fine to very coarse sand; trace fine gravel to 1cm; rounded. Same as above (217 ft).	SW	Bentonite Seal	Resumed drilling @ 1308.
225					Same as above (217 ft); predominantly pumice.			
230					Same as above (217 ft); pumice and lithics.			
235					Same as above (217 ft); trace fine gravel to 2.7cm.		Top of Filter Pack	Bottom of casing @ 1312. Resumed drilling @ 1319.
240								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 100% very fine to very coarse sand; trace fine gravel to 1cm; rounded; grading coarser than 235'.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Poorly graded SAND (SP); brown (10YR 5/3); dry; medium dense; 85% medium sand; 15% fine sand; trace fine gravel to 1.5cm; rounded.			
		SB0166	2.7					Blow counts (247-248.5'): 14/23.
250					Same as above (244 ft); dense; 85% coarse sand; 15% fine to medium sand.	SP	Bottom of Screen	
255					Same as above (244 ft); 85% coarse sand; 15% fine to medium sand.			
260								Resumed drilling @ 1345.
					Well graded SAND (SW); brown (10YR 5/3); dry; medium dense; 100% very fine to very coarse sand to 5mm; subrounded.	SW	Bentonite Seal	
265					Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 4/4); moist; dense; 90% fine to coarse sand to 3mm; rounded; 10% silt.	SW-SM		
270								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% very fine to very coarse sand; trace fine gravel to 6mm; subrounded.	SW		
275					Lean CLAY (CL); brown (10YR 5/3); moist; very stiff; medium plasticity; 95% clay; 5% silt.			Bottom of casing @ 1352.
280					Same as above (275 ft).	CL		
285					Lean CLAY with Sand (CL); brown (10YR 5/3); moist; very stiff; medium plasticity; 75% clay; 25% very fine to medium sand to 1mm.		Bentonite Seal	
290					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; dense; 100% very fine to very coarse sand; trace fine gravel to 1.3cm; rounded.			
295					Well graded SAND with Gravel (SW); dry; dense; 80% very fine to very coarse sand; 20% fine gravel to 3cm.	SW		
		SB0167	5.5					Blow counts (297-298.5'): 12/27. Bottom of casing @ 1408. Resumed drilling @ 1424.
300								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Silty SAND (SM); dark yellowish brown (10YR 4/4); moist; dense; 80% very fine to very coarse sand to 4mm; rounded; 20% silt.	SM		
305					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 90% very fine to very coarse sand; 5% fine gravel to 1.3cm; rounded; 5% silt.	SW		
310					Same as above (305 ft).			
315					Same as above (305 ft).		Bentonite Seal	Resumed drilling @ 1433.
320					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; loose; 90% medium sand; 10% fine gravel to 3.5 cm; well rounded.	SP		
325					Same as above (320 ft); no gravel.			
330								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; loose; 100% fine to medium sand.			
335					Same as above (330 ft); 100% medium sand.	SP	Bentonite Seal	
340					Well graded SAND (SW); brown (10YR 4/3); dry; loose; 95% very fine to very coarse sand; trace fine gravel to 2cm; rounded; 5% silt.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Resumed drilling @ 1452.
345					Same as above (340 ft); grading coarser.			
		SB0168	2.9					Blow counts (347-348.5'): 5/10. Resumed drilling @ 1509.
350					Same as above (340 ft); medium dense; coarser.	SW	Bottom of Screen	
355					Same as above (340 ft); grading finer.		Bentonite Seal	
360								Bottom of casing @ 1513.

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 4/3); dry; loose; 95% very fine to very coarse sand; trace fine gravel to 2cm; rounded; 5% silt.			Resumed drilling @ 1519.
365					Same as above (360 ft).	SW		
370					Same as above (360 ft); grading finer.		Bentonite Seal	
375					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 90% medium sand; 10% coarse sand; trace fine gravel to 1.4 cm; rounded.			Bottom of casing @ 1523. Resumed drilling @ 1530.
380					Same as above (375 ft); trace fine gravel to 3cm.	SP		
385					Same as above (375 ft).		Native Backfill	
390								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 85% medium sand; 15% coarse sand; trace fine gravel to 1.4 cm; rounded.	SP		
395					Same as above (390 ft); 90% medium sand; 10% coarse sand.			
		SB0169	0.3		Well graded SAND (SW); brown (10YR 4/3); dry; loose; 100% very fine to very coarse sand to 4.5mm; subrounded.			Bottom of casing @ 1535. Blow counts (397-398.5'): 5/Not Recorded. Blow counts (398.5-400'): Not Recorded. Resumed drilling @ 1556.
400		SB0170	3.3		Same as above (397 ft).			
405					Same as above (397 ft); grading finer.	SW	Bentonite Seal	
410					Same as above (397 ft); grading finer.			
415					Same as above (397 ft); grading coarser.			Bottom of casing @ 1602.
420								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% medium to coarse sand to 2mm; rounded.			
425					Same as above (420 ft).	SP	Bentonite Seal	
430					Same as above (420 ft).			
435					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; dense; 95% very fine to very coarse sand; trace fine gravel to 1.5cm; rounded; 5% silt.	SW		
					Lean CLAY (CL); lense.	CL		
440					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine sand to 0.2mm; rounded. Note: strong odor from cuttings.		Top of Filter Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen	Resumed drilling @ 1626.
445					Same as above (437 ft); 100% medium sand.	SP		
		SB0171	0.3					Bottom of casing @ 1631. Blow counts (447-448.5'): 10/15. Resumed drilling @
450								

Borehole ID: KAFB-106119

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/3/2011
Date TD Reached: 3/4/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5343.5
Y Coordinate: 1473521.57
X Coordinate: 1541613.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

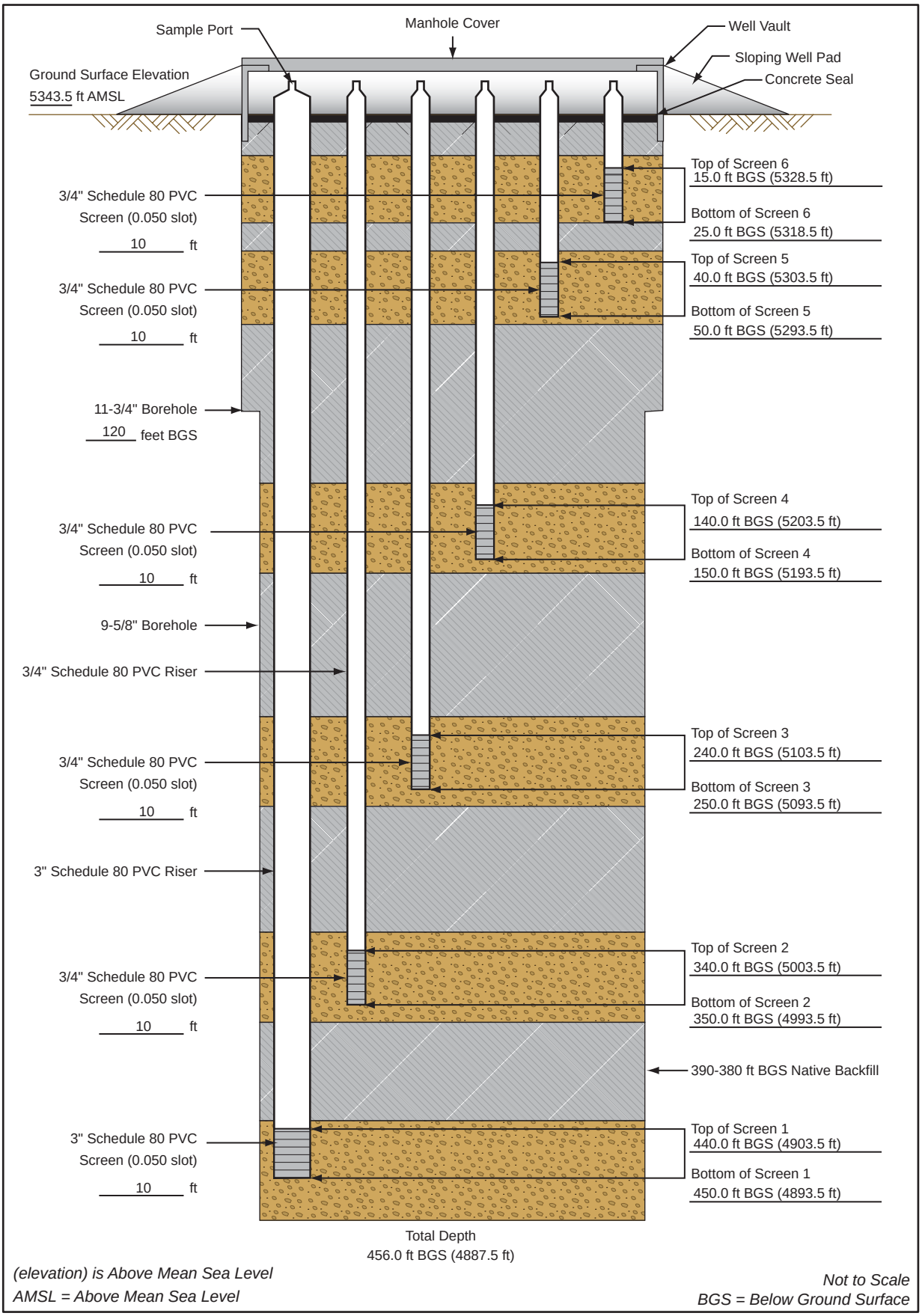
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine sand to 0.2mm; rounded.	SP	Bottom of Screen	1646.
455					Same as above (450 ft).		Bottom of Filter Pack Native Backfill	
460								Total depth = 460 ft. Reached @ 1650 on 3/4/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = 320
475								Bottom of casing: TD the joint and ready to make new connection.
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106119

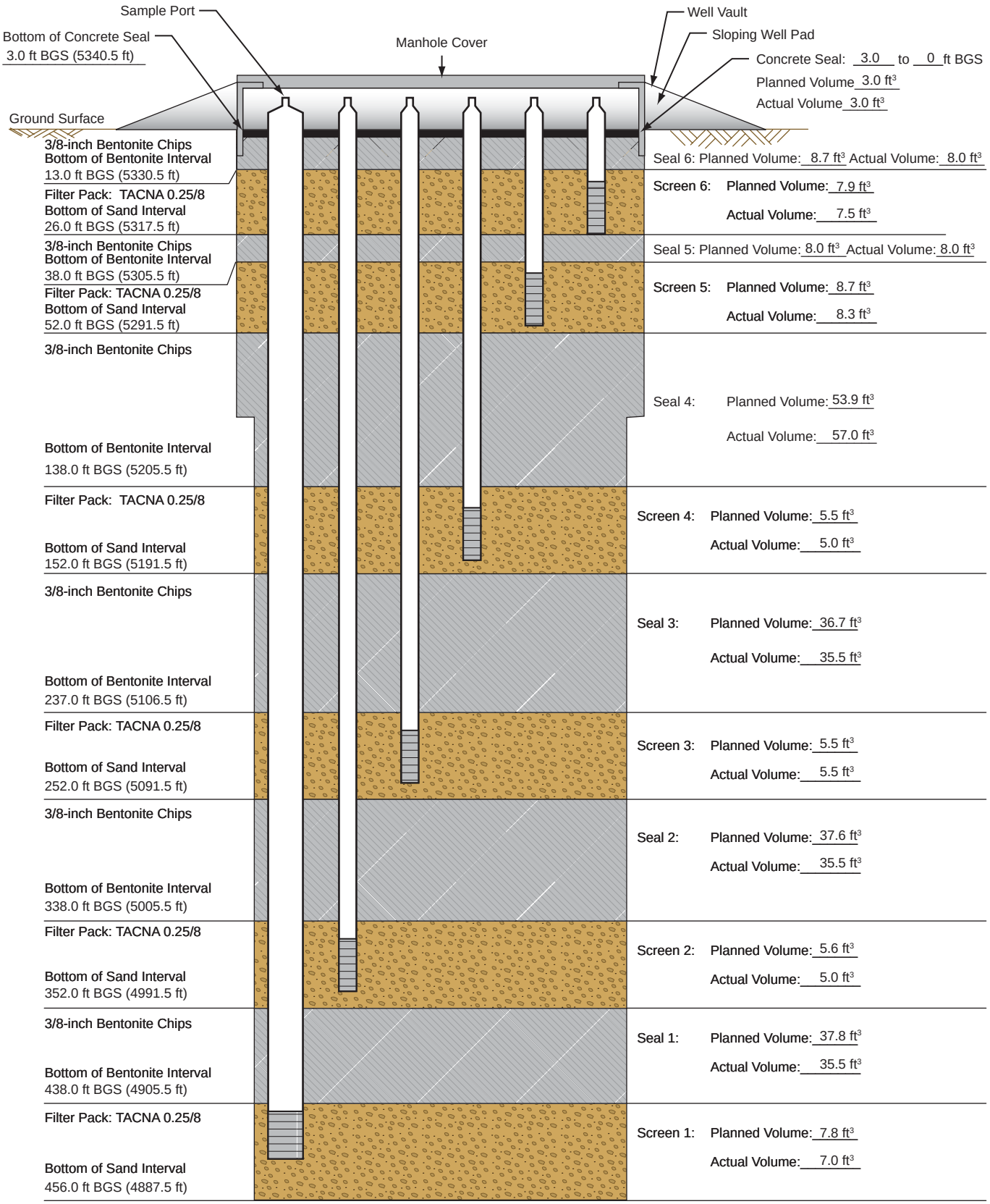
Installation Start Date/Time: 3/5/2011 @ 8:00
Installation End Date/Time: 3/6/2011 @ 15:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106119



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

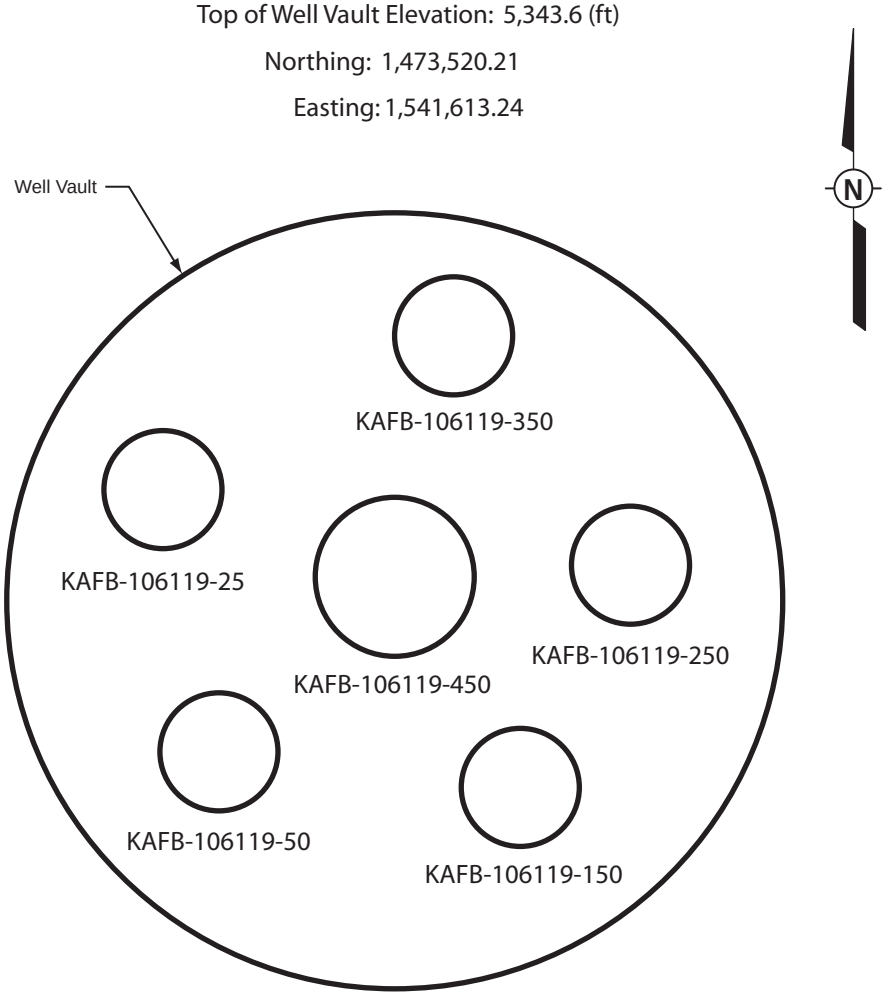
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106119

Top of Well Vault Elevation: 5,343.6 (ft)

Northing: 1,473,520.21

Easting: 1,541,613.24



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106119-25	3/4	25.0	15.0 - 25.0	1,473,519.57	1,541,613.06	5343.2
KAFB-106119-50	3/4	50.0	40.0 - 50.0	1,473,519.32	1,541,613.23	5343.2
KAFB-106119-150	3/4	150.0	140.0 - 150.0	1,473,519.41	1,541,613.50	5343.2
KAFB-106119-250	3/4	250.0	240.0 - 250.0	1,473,519.68	1,541,613.54	5343.2
KAFB-106119-350	3/4	350.0	340.0 - 350.0	1,473,519.79	1,541,613.27	5343.2
KAFB-106119-450	3	450.0	440.0 - 450.0	1,473,519.63	1,541,613.29	5343.2

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106129 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded; disturbed.		Concrete Seal	Hand augered.
5					Silty SAND (SM); light reddish brown (5YR 6/3); dry; loose; 60% very fine to fine sand; 10% fine gravel; 30% silt; trace clay.			Began drilling @ 1145 on 3/1/11.
		SB0300	0.0					Blow counts (7-8.5'): 9/11.
10					Same as above (5 ft).		Bentonite Seal	Stopped drilling @ 1200. Resumed drilling @ 1315.
						SM	Top of Filter Pack	
15					Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 60% very fine to fine sand; subrounded; trace fine gravel; 30% silt; 10% clay.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1329. Resumed drilling @ 1351.
		SB0301	0.0					Blow counts (18-19.5'): 11/16.
20					Clayey SAND (SC); reddish brown (5YR 5/3); moist; medium dense; 70% fine sand; subrounded; trace fine to coarse gravel; 30% clay; medium plasticity; trace carbonate.			
						SC		
25					Same as above (20 ft).		Bottom of Screen	
							Bentonite Seal	
		SB0302	0.0		Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); dry; loose; 90% very fine to fine sand; trace gravel;	SP-SM		Blow counts (28-29.5'): 11/22. Kelly down @ 1409. Resumed drilling
30								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					10% silt and clay. Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/4); moist; medium dense; 90% very fine to fine sand; rounded to subrounded; 10% silt.			@ 1420.
35					Same as above (31 ft); trace clay; mica flakes.	SP-SM	Bentonite Seal	
	X	SB0303	0.0				Top of Filter Pack	Blow counts (38-39.5'): 17/24. Kelly down @ 1435. Resumed drilling @ 1450.
40					Same as above (31 ft); dry; trace caliche.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Same as above (31 ft); 5% coarse sand.			
45					Silty SAND (SM); yellowish red (5YR 5/6); dry; medium dense; 75% very fine to fine sand; subangular to subrounded; trace fine gravel; 20% silt; 5% clay.			
	X	SB0304	0.0					Blow counts (48-49.5'): 50/Not Recorded. Blow counts (49.5-51'): Not Recorded. Kelly down @ 1503. Resumed drilling @ 1526.
50	X	SB0304			Same as above (45 ft).	SM	Bottom of Screen	
55					Well graded GRAVEL with Silt (GW-GM); light brown (7.5YR 6/3); 80% fine to coarse gravel; angular to subangular; 10% fine sand; 10% silt.	GW-GM	Bentonite Seal	
					Silty SAND (SM); yellowish red (5YR 5/6); dry; medium dense; 75% very fine to fine sand; subangular to subrounded;	SM		
60								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					trace fine gravel; 20% silt; 5% clay. Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; loose; 100% very fine to fine sand; trace coarse sand; trace silt.			
65					Same as above (60 ft); 5% coarse sand; 5% fine gravel.	SP		
70					Same as above (60 ft); reddish yellow (7.5YR 6/6).			
75					Well graded SAND with Gravel (SW); yellowish brown (10YR 5/4); dry; medium dense; 60% fine to coarse sand; 35% fine gravel; 5% fines.	SW	Bentonite Seal	
80					Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; loose; 85% fine sand; 15% medium to coarse sand; rounded to subrounded.			
85					Same as above (80 ft); trace gravel.	SP		
90								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; medium dense; 85% fine sand; 15% medium to coarse sand; rounded to subrounded; partially cemented.			
95					Same as above (90 ft); loose; trace fine gravel.	SP		
100		SB0305	0.0		Poorly graded SAND (SP); pale brown (10YR 6/3); dry; medium dense; 100% fine to medium sand; subangular to subrounded; primarily quartz.			Blow counts (98-99.5'): 14/23. Kelly down @ 1620. End of 3/1/11. Resumed drilling @ 0856 on 3/2/11.
105					Well graded SAND with Gravel (SW); very pale brown (10YR 8/2); dry; medium dense; 85% fine to coarse sand; subangular to subrounded; 15% fine gravel; subangular.		Bentonite Seal	
110					Same as above (105 ft); yellowish brown (10YR 5/4).	SW		
115					Same as above (105 ft); light yellowish brown (10YR 6/4).			
120								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 85% very fine sand; trace coarse sand; 15% clay and silt; trace mica.	SC		Started making 9-5/8" connection @ 1204.
125					Poorly graded SAND with Clay (SP-SC); brown (7.5YR 5/4); slightly moist; loose; 90% very fine to fine sand; subrounded; 10% clay.	SP-SC		
130					Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 85% very fine sand; trace coarse sand; 15% clay and silt; trace mica.	SC	Bentonite Seal	
135					Sandy lean CLAY (CL); brown (7.5YR 5/4); moist; firm; low plasticity; 60% clay; 40% fine sand; subrounded.	CL	Top of Filter Pack	
140					Same as above (135 ft); light brown (7.5YR 6/3); dry.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Poorly graded SAND (SP); very pale brown (10YR 7/4); dry; medium dense; 80% fine sand; 15% medium sand; 5% coarse sand; subrounded.	SP		
150		SB0306	2.0		GRAVEL (GP); lense.	GP		Blow counts (148-149.5'): 13/23. Kelly down @ 1420. Resumed drilling

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); very pale brown (10YR 7/4); dry; medium dense; 80% fine sand; 15% medium sand; 5% coarse sand; subrounded.	SP	- Bottom of Screen	@ 1434.
155					Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 80% fine sand; subrounded; 20% clay.	SC		
160					Poorly graded SAND (SP); light yellowish brown (10YR 6/4); slightly moist; loose; 100% fine to medium sand; trace coarse sand; subrounded; trace silt.	SP		Kelly down @ 1440. Resumed drilling @ 1448.
165					Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 80% fine sand; subrounded; 20% clay.	SC	- Bentonite Seal	
170					Poorly graded SAND (SP); pale brown (10YR 6/3); slightly moist; loose; 95% fine to medium sand; subrounded; 5% fine to coarse gravel to 20mm.	SP		
175					Same as above (170 ft); finer sand.			
180								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; loose; 100% fine to coarse sand; subrounded; trace coarse gravel.			Kelly down @ 1505.
185					Same as above (180 ft); more fine and medium sand.	SW		
190					Same as above (180 ft).			
195					Well graded GRAVEL (GW); dark grayish brown; moist; loose; 95% fine to coarse gravel; subangular to subrounded; 5% medium to coarse sand.	GW	Bentonite Seal	
200		SB0307	1.5					Blow counts (198-199.5'): 21/32. Blow counts (199.5-201'): 35/40. Kelly down @ 1525. Resumed drilling @ 1545.
		SB0308	1.5		Poorly graded SAND (SP); light gray (10YR 7/2); slightly moist; dense; 95% fine to medium sand; subangular to subrounded; 5% fine to coarse gravel.			
205					Same as above (200 ft).	SP		
210								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND with Gravel (SW).	SW		
215					Poorly graded SAND (SP); light brownish gray (10YR 6/2); 95% medium to coarse sand; 5% coarse gravel.	SP		
220					Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); slightly moist; loose; 60% fine to coarse sand; 40% fine to coarse gravel.	SW	Bentonite Seal	Kelly down @ 1600. Resumed drilling @ 1608.
225					Well graded SAND with Gravel (SW); light grayish brown (10YR 6/2); slightly moist; loose; 80% fine to coarse sand; 20% fine to coarse gravel.			
230					Same as above (225 ft).			
235					Poorly graded SAND (SP); light grayish brown (10YR 6/2); slightly moist; loose; 80% fine to medium sand; subrounded; 20% coarse sand; rounded; trace gravel to 50mm.	SP	Top of Filter Pack	
240								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); light grayish brown (10YR 6/2); slightly moist; loose; 95% fine sand; subrounded; 5% coarse sand; rounded; trace gravel to 50mm.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1620. Resumed drilling @ 1630.
245					Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); 70% fine to medium sand; subangular; 30% coarse gravel to 60mm.	SW		
250	X	SB0309	0.7		Poorly graded SAND with Gravel (SW); grayish brown (10YR 5/2); 70% fine to medium sand; subangular; 30% coarse gravel to 60mm.		Bottom of Screen	Blow counts (248.5-250'): 27/35. Kelly down @ 1635.
255					Same as above (250 ft).	SP		
260					Clayey SAND (SC); light brownish gray (10YR 6/2); dry; dense; 70% fine sand; 30% clay.		Bentonite Seal	End of 3/2/11. Resumed drilling @ 0750 on 3/3/11.
265					Same as above (260 ft).	SC		
270								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); pale brown (10YR 6/2); slightly moist; medium dense; 95% fine sand; 5% medium sand; trace silt.			
275					Same as above (270 ft); yellowish brown (10YR 5/4); 70% fine sand; 30% medium sand.	SP		
280					Same as above (270 ft).			
285					Sandy SILT (ML); brown (10YR 5/3); slightly moist; firm; 70% silt; 30% fine sand.	ML	Bentonite Seal	
290					Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; medium dense; 90% fine sand; 5% medium sand; 5% coarse sand; subangular to subrounded.			
295					Same as above (290 ft).	SP		
		SB0310	0.0					Blow counts (297-298.5'): 18/27. Kelly down @ 0820. Resumed drilling @ 0843.
300								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; medium dense; 90% fine sand; 5% medium sand; 5% coarse sand; subangular to subrounded.			
305					Poorly graded SAND (SP); yellowish brown (10YR 5/6); slightly moist; medium dense; 70% fine sand; 10% medium sand; 10% coarse sand; subrounded; 10% fine gravel to 7mm; subangular.			
310					Same as above (305 ft); 5% gravel.	SP		
315					Same as above (305 ft); 5% coarse gravel to 40mm.		Bentonite Seal	
320					Well graded SAND (SW); yellowish brown (10YR 5/6); slightly moist; medium dense; 50% fine sand; 20% medium sand; 20% coarse sand; 10% fine to coarse gravel to 30mm.			Kelly down @ 0847.
325					Same as above (320 ft).	SW		
330								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND (SW); dark grayish brown (10YR 4/2); slightly moist; medium dense; 35% coarse sand; 30% medium sand; 30% fine sand; subrounded; trace gravel.		Bentonite Seal	
335					Same as above (330 ft); 5% gravel to 50mm.	SW	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
340					Same as above (330 ft); 40% coarse sand; 25% medium sand; 25% fine sand; rounded to subrounded; 10% gravel to 40mm.			Kelly down @ 0920. Resumed drilling @ 0928.
345					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); slightly moist; medium dense; 50% medium sand; 40% fine sand; 10% coarse sand.	SP	Bottom of Screen	
		SB0311	17.3					Blow counts (347-348.5'): Not Recorded.
350					Silty SAND (SM); brown (7.5YR 5/3); slightly moist; medium dense; 80% fine sand; 20% silt.	SM		Kelly down @ 0937. Resumed drilling @ 0956.
355							Bentonite Seal	
360					Well graded SAND (SW); brown (10YR 5/3); slightly moist; dense; 30% fine sand; 30% medium sand; 30% coarse sand; 10% gravel; subangular to subrounded.	SW		

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 5/3); slightly moist; dense; 40% fine sand; 30% medium sand; 25% coarse sand; 5% gravel; subangular to subrounded.			Kelly down @ 1008. Resumed drilling @ 1015.
365					Same as above (360 ft); 30% fine sand; 30% medium sand; 30% coarse sand; 10% gravel.	SW		
370					Same as above (360 ft); 30% fine sand; 30% medium sand; 30% coarse sand; 10% gravel.			
375					Clayey SAND (SC); dark brown (7.5YR 3/4); slightly moist; medium dense; 60% fine to medium sand; 10% coarse sand; 10% fine to coarse gravel; 20% clay; low plasticity.	SC	Bentonite Seal	
380					Well graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; dense; 30% fine sand; 30% medium sand; 30% coarse sand; 10% gravel; subangular to subrounded.			Kelly down @ 1025. Resumed drilling @ 1041.
385					Same as above (380 ft).	SW		
390								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; medium dense; 80% medium sand; 10% coarse sand; 10% fine sand.	SP		
395					Well graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; medium dense; 100% fine to coarse sand.	SW		
400		SB0312	1.7		Poorly graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; medium dense; 45% fine sand; 45% medium sand; 10% coarse sand; subangular to subrounded.			Blow counts (397-398.5'): 21/29. Kelly down @ 1055. Resumed drilling @ 1115.
405					Same as above (400 ft); trace coarse sand.	SP	Bentonite Seal	
410					Same as above (400 ft).			
415					Well graded SAND (SW); dark grayish brown (10YR 4/2); slightly moist; medium dense; 100% fine to coarse sand.	SW		
420								

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); dark grayish brown (10YR 4/2); slightly moist; medium dense; 100% fine to coarse sand; trace fine gravel.	SW		Kelly down @ 1130.
425					Same as above (420 ft); 50% fine sand; 25% medium sand; 25% coarse sand; no gravel.		Bentonite Seal	
430					Clayey SAND (SC); brown (10YR 5/3); moist; medium dense; 85% fine to coarse sand; subangular to subrounded; 15% clay.	SC		Kelly down @ 1143. Resumed drilling @ 1248.
435					Poorly graded SAND (SP); brown (10YR 4/3); moist; medium dense; 50% fine sand; 40% medium sand; 10% coarse sand.	SP	Top of Filter Pack	
440					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; medium dense; 30% fine sand; 30% medium sand; 30% coarse sand; 10% fine gravel.	SW	Top of 3" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1255. Resumed drilling @ 1302.
445					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 80% fine sand; 10% medium sand; 10% coarse sand; trace fine to coarse gravel to 30mm.	SP		
450		SB0313	1.1					Blow counts (447-448.5'): 17/24.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 13:08 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106129

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/1/2011
Date TD Reached: 3/3/2011
Date Completed: 3/6/2011

Ground Elevation AMSL (ft): 5348.4
Y Coordinate: 1473262.72
X Coordinate: 1542130.45

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

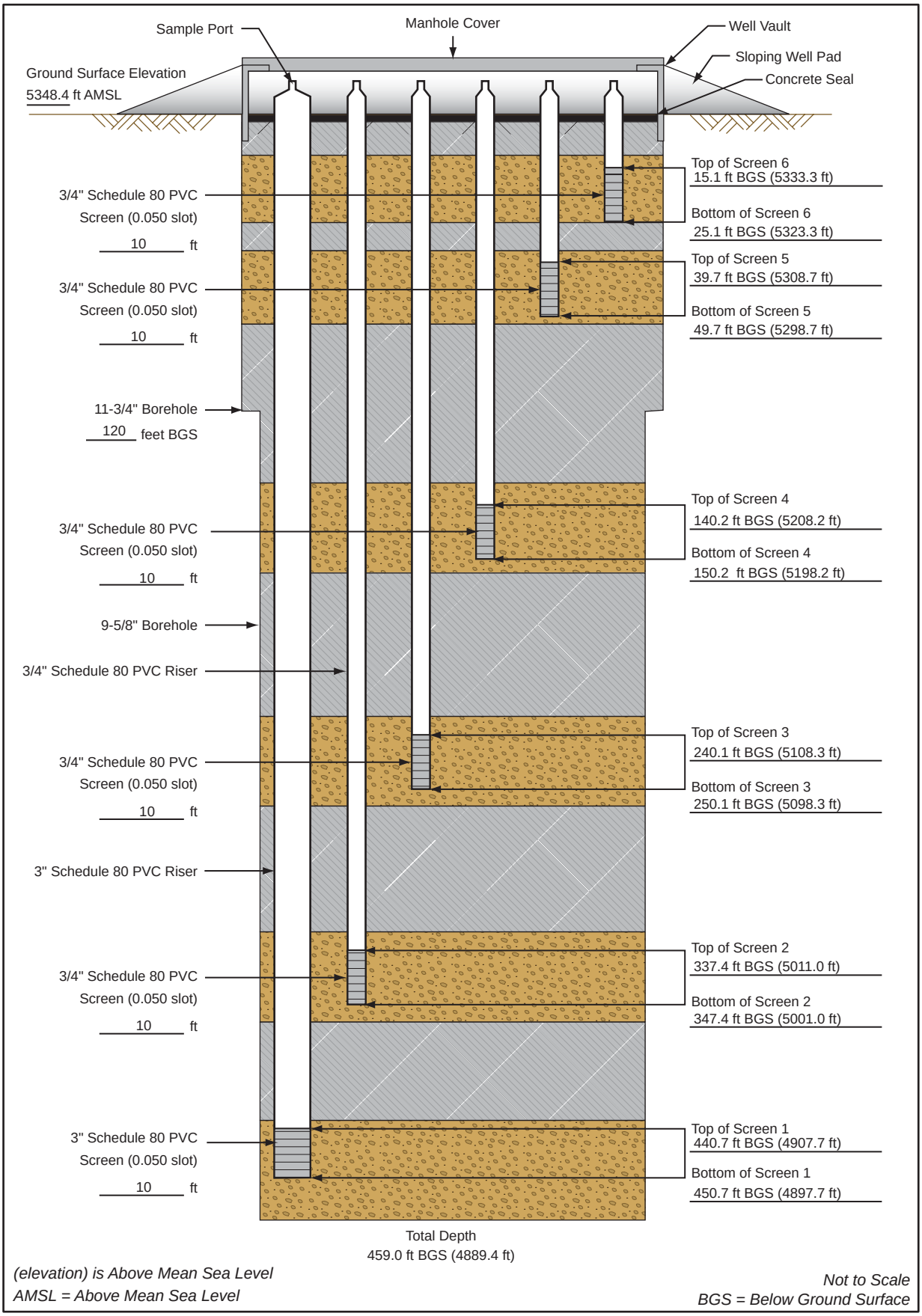
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: William Werner

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
455					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 80% fine sand; 10% medium sand; 10% coarse sand; trace coarse gravel to 30mm.	SP	Bottom of Screen	
					Lean CLAY with Sand (CL); grayish brown (10YR 5/2); moist; firm; 70% clay; 15% silt; 15% fine sand; trace coarse sand and gravel.	CL		
460					Poorly graded SAND (SP); brown (10YR 5/3); moist; medium dense; 80% fine sand; 10% medium sand; 10% coarse sand; trace coarse gravel to 30mm; slight petroleum odor.	SP	Native Backfill	
					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; medium dense; 40% fine sand; 30% medium sand; 25% coarse sand; 5% fine to coarse gravel to 25mm.	SW		Total depth = 460 ft. Reached @ 1348 on 3/3/11. Water added druing drilling (gallons) = 0 Water added during construction (gallons) = Not Recorded Kelly down: TD the joint and ready to make new connection.
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106129

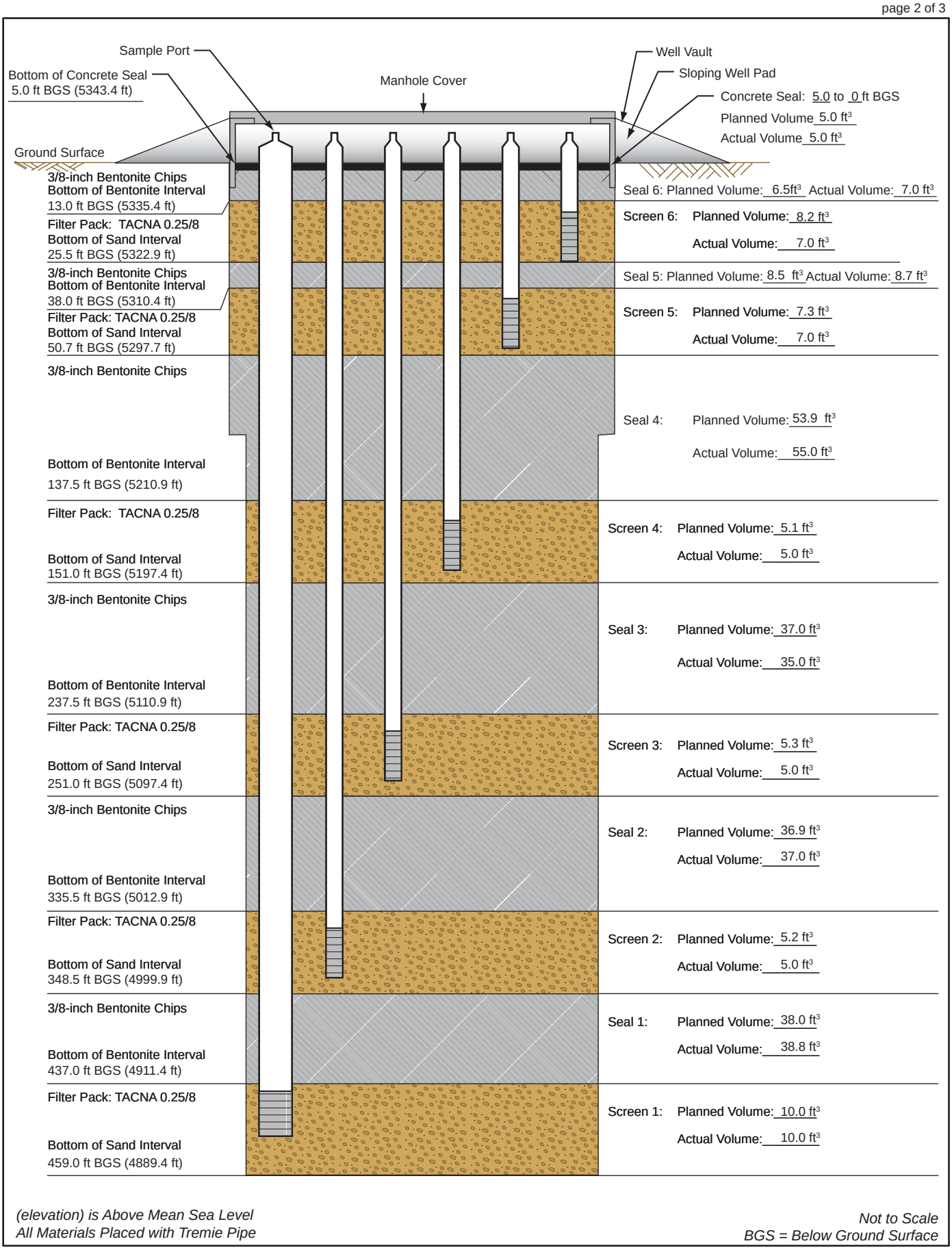
Installation Start Date/Time: 3/3/2011 @ 16:40
Installation End Date/Time: 3/6/2011 @ 14:30



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106129



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

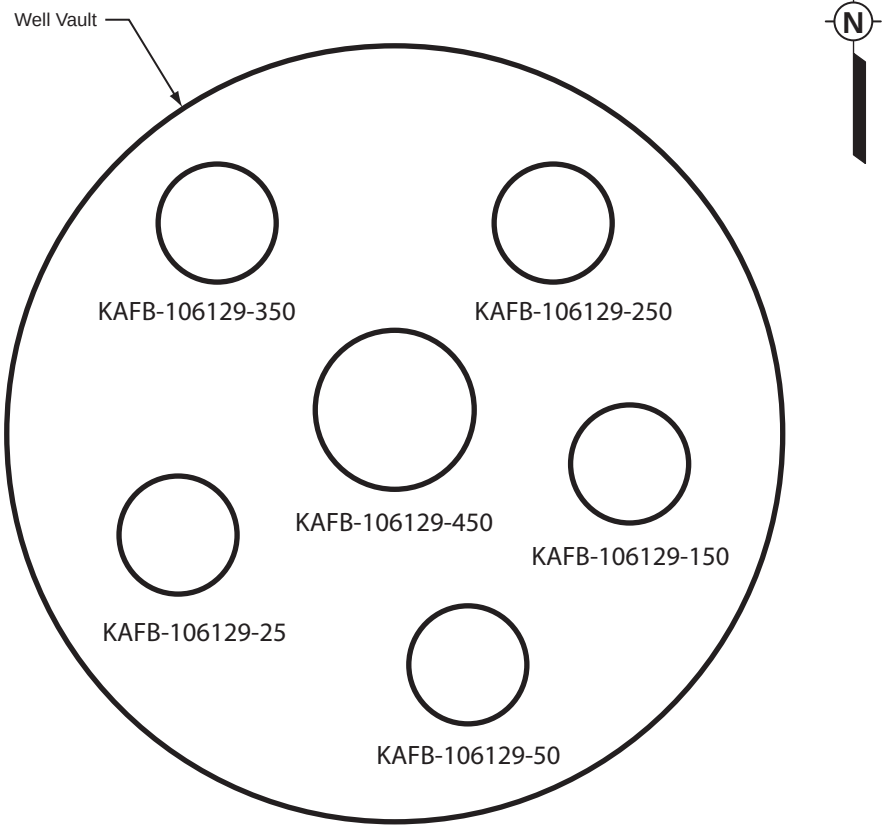
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106129

Top of Well Vault Elevation: 5,348.5 (ft)

Northing: 1,473,261.38

Easting: 1,542,130.76



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106129-25	3/4	25.1	15.1 - 25.1	1,473,260.77	1,542,130.54	5348.1
KAFB-106129-50	3/4	49.7	39.7 - 49.7	1,473,260.63	1,542,130.82	5348.2
KAFB-106129-150	3/4	150.2	140.2 - 150.2	1,473,260.87	1,542,131.04	5348.1
KAFB-106129-250	3/4	250.1	240.1 - 250.1	1,473,261.13	1,542,130.92	5348.1
KAFB-106129-350	3/4	347.4	337.4 - 347.4	1,473,261.10	1,542,130.63	5348.0
KAFB-106129-450	3	450.7	440.7 - 450.7	1,473,260.99	1,542,130.79	5348.2

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106130 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (10YR 4/3); dry; very stiff; low plasticity; 60% silt; 40% very fine to medium sand; trace fine gravel to 1.2cm.		Concrete Seal	Hand augered.
5					Same as above (0 ft).			Began drilling @ 1515 on 2/17/11.
10		SB0314	0.0		Sandy SILT (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 70% silt; 25% fine sand; 5% fine gravel to 8mm.		Bentonite Seal Top of Filter Pack	Blow counts (8.5-10'): 8/15.
15					Same as above (10 ft).	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20		SB0315	0.0		Sandy SILT (ML); reddish brown (5YR 4/4); moist; very stiff; low plasticity; 60% silt; 30% very fine sand; 10% coarse sand; trace fine gravel to 1cm; subangular.			Blow counts (18.5-20'): 10/15. Resumed drilling @ 1556.
25					SILT with Sand (ML); reddish brown (5YR 4/4); dry; nonplastic; 85% silt; 15% very fine sand.		Bottom of Screen Bentonite Seal	
30		SB0316, SB0316-	0.0					Blow counts (28.5-30'): 13/37.

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30		MS SB0316-MSD	0.0		SILT with Sand (ML); reddish brown (5YR 4/4); dry; hard; nonplastic; 85% silt; 15% very fine sand.		Bentonite Seal	Blow counts (30-31.5'): Not Recorded. Resumed drilling @ 1639.
35					Same as above (30 ft); 75% silt; 10% clay; 15% very fine sand.	ML	Top of Filter Pack	
40		SB0317	0.0		Same as above (30 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38.5-40'): 12/44. Kelly down @ 1653. Resumed drilling @ 1705. Cyclone hose detached from cyclone @ 1709. Reattached cyclone hose and resumed drilling @ 1711.
45					Lean CLAY (CL); brown (7.5YR 5/4); dry; hard; low plasticity; 60% clay; 40% silt; trace coarse sand to 4mm; subangular.	CL		
50		SB0318	0.8				Bottom of Screen	Blow counts (48.5-50'): 17/50. Kelly down @ 1709. End of 02/17/11. Resume drilling @ 0815 on 02/18/11.
55					SILT (ML); light reddish brown (5YR 6/4); dry; hard; low plasticity; 90% silt; 10% fine sand; trace fine gravel to 8cm; rounded.			
60					SILT with Sand (ML); light reddish brown (5YR 6/4); dry; hard; low plasticity; 85% silt; 10% fine sand; 5% coarse sand to 2mm; rounded.	ML	Bentonite Seal	

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Sandy SILT (ML); brown (7.5YR 5/3); dry; hard; nonplastic; 60% silt; 35% very fine to fine sand; 5% coarse sand; trace fine gravel to 2cm; rounded.			Resumed drilling @ 0842.
65					SILT with Sand (ML); brown (7.5YR 5/4); dry; hard; low plasticity; 85% silt; 15% very fine sand to 0.08mm.	ML		
70					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; loose; 100% very fine to fine sand to 0.2mm; rounded.	SP		
75					Sandy SILT (ML); strong bown (7.5YR 4/6); dry; hard; low plasticity; 70% silt; 30% very fine to coarse sand; trace fine gravel to 5mm; subangular.		Bentonite Seal	
80					SILT with Sand (ML); strong brown (7.5YR 4/6); dry; hard; low plasticity; 85% silt; 15% very fine sand to 0.08mm.	ML		Kelly down @ 0850. Blew cuttings out of cyclone @ 0851. Resumed drilling @ 0907.
85					Same as above (80 ft); trace coarse sand to 3mm; subangular.			
90								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); strong brown (7.5YR 4/6); moist; hard; low plasticity; 85% silt; 15% very fine sand to 0.08mm.			
95					Same as above (90 ft); dry.	ML		
100		SB0319	0.7		Same as above (90 ft); dry; very stiff; trace clay nodules.			Blow counts (98.5-100'): 5/15. Kelly down @ 0925. Resumed drilling @ 0942. Cyclone hose blew off, stuck with sediment @ 0943. Flange replaced and cyclone reattached @ 1134. Resumed drilling @ 1143.
105					Silty SAND (SM); yellowish brown (10YR 5/4); dry; loose; 85% very fine to fine sand; trace gravel to 3.2cm; rounded; 15% silt.	SM	Bentonite Seal	
110					Lean CLAY (CL); brown (10YR 5/3); moist; hard; low plasticity; 70% clay; 30% silt.	CL		
115					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 95% very fine to coarse sand; trace gravel to 6mm; rounded; 5% silt. Same as above (112 ft).	SW		
120								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120								
125					Silty SAND (SM); brown (7.5YR 4/3); moist; very loose; 60% very fine to coarse sand; trace fine gravel to 1.5cm; rounded; 40% silt.	SM		Kelly down @ 1155. Reached total depth with 11-3/4" casing. Resumed drilling @ 1556 with 9-5/8" casing.
130					SILT (ML); brown (7.5YR 5/4); moist; hard; low plasticity; 80% silt; 10% clay; 10% very fine sand to 0.1mm.	ML		
135					Same as above (125 ft); trace coarse sand to 3mm; rounded.			
					Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; low plasticity; 80% clay; 20% silt.	CL	- Bentonite Seal	
140					SILT with Sand (ML); brown (7.5YR 5/4); dry; hard; low plasticity; 85% silt; 15% very fine to coarse sand to 4mm.	ML		
					Same as above (135); 75% silt; 10% clay; 15% very fine sand.			Resumed drilling @ 1619.
145					Lean CLAY (CL); brown (7.5YR 5/3); moist; hard; low plasticity; 90% clay; 10% silt.	CL		
					Same as above (142 ft).		- Top of Filter Pack	
150		SB0320	0.5		Well graded SAND (SW); grayish brown (10YR 5/2); dry; very dense; 100% very fine to very coarse sand to 5mm;	SW		Blow counts (148.5-150'): 29/50.

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					subrounded.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Resumed drilling @ 1640.
155					SILT with Sand (ML); brown (7.5YR 5/4); moist; hard; 70% silt; 5% clay; 15% very fine to coarse sand; 10% fine gravel to 2cm; well rounded.	ML		
160					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; dense; 80% very fine to very coarse sand; 10% fine gravel to 2cm; subrounded; 10% silt.	SW-SM	Bottom of Screen	Resumed drilling @ 1655.
165					Lean CLAY (CL); brown (10YR 5/3); moist; hard; low plasticity; 80% clay; 20% silt.	CL		
170					Sandy SILT (ML); brown (10YR 5/3); moist; hard; nonplastic; 70% silt; 30% very fine to very coarse sand to 4mm.	ML	Bentonite Seal	
175					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 100% fine to medium sand to 0.5mm; subrounded.	SP		
180								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); brown (10YR 5/3); damp; very loose; 95% fine to very coarse sand; trace fine gravel to 8mm; rounded; 5% fines.			Kelly down @ 1710. Resumed drilling @ 0900.
185					Same as above (180 ft); finer sand; trace clay nodules.	SW		
190					Same as above (180 ft); finer sand.			
195					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); damp; very loose; 90% very fine to coarse sand to 4mm; rounded; 10% silt with clay nodules.	SW-SM	Bentonite Seal	
200		SB0321	0.3		Well graded SAND (SW); grayish brown (10YR 5/2); moist; very dense; 100% fine to very coarse sand; trace fine gravel to 1cm; subrounded.	SW		Blow counts (198.5-200'): 12/50. Kelly down @ 0906.
205					Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine sand; rounded; trace fines.	SP		
210								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 85% fine sand; 15% medium to coarse sand; rounded; trace fines.	SP		
215					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% very fine to coarse sand to 3mm; rounded.	SW		
220					Lean CLAY (CL); dark yellowish brown (10YR 4/4); damp; low plasticity; 60% clay; 40% silt.	CL		Kelly down @ 0931. Resumed drilling @ 0941.
225					Silty SAND with Gravel (SM): brown (10YR 5/3); damp; dense; 60% fine to very coarse sand; 20% fine gravel to 2cm; well rounded; 20% silt. Same as above (221 ft).	SM	Bentonite Seal	
230					Well graded SAND (SW); grayish brown (10YR 5/2); damp; dense; 100% very fine to coarse sand to 4mm; subrounded.	SW		
235					Same as above (228 ft); trace fine gravel to 1.2cm.		Top of Filter Pack	
240								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); grayish brown (10YR 5/2); damp; dense; 95% very fine to very coarse sand; 5% gravel to 1.5cm; subrounded; pumice dominant.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 0949. Resumed drilling @ 0957. Bit packed off.
245					Well graded SAND (SW); grayish brown (10YR 5/2); damp; dense; 100% very fine to coarse sand to 4mm; subrounded.			
250		SB0322	0.7		Same as above (245 ft); coarser; trace gravel to 1.8cm.	SW	Bottom of Screen	Blow counts (248.5-250'): 6/12/50. Resumed drilling @ 1023.
255					Same as above (245 ft); grading finer.			
260					Lean CLAY (CL); brown (10YR 5/3); moist; hard; 80% clay; 20% silt.	CL	Bentonite Seal	Kelly down @ 1027. Resumed drilling @ 1033.
265					Well graded SAND (SW); pale brown (10YR 6/3); dry; dense; 95% very fine to coarse sand to 3mm; rounded; 5% fines.	SW		
270								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					SILT with Sand (ML); brown (10YR 5/3); damp; hard; 70% silt; 10% clay; 20% very fine to medium sand to 0.5mm.	ML		
275					Silty SAND (SM); brown (10YR 4/3); moist; dense; 70% very fine to medium sand; 30% silt.	SM		
280					Well graded SAND (SW); brown (10YR 4/3); dry; dense; 95% very fine to coarse sand to 4mm; subrounded; 5% fines.	SW		Kelly down @ 1040. Resumed drilling @ 1048.
285					Same as above (280 ft).		Bentonite Seal	
					Lean CLAY (CL); brown (7.5YR 4/4); moist; hard; low plasticity; 70% clay; 30% silt.	CL		
290					Clayey SAND (SC); dark yellowish brown (10YR 4/4); moist; very dense; 80% very fine to very coarse sand; 20% clay with silt.	SC		
295					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 90% very fine to very coarse sand; 5% fine gravel to 2.2cm; subrounded; 5% silt.	SW		
300		SB0323	0.9					Blow counts (298.5-300'): 31/50.

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300		SB0324	0.9		Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 90% very fine to very coarse sand; 5% fine gravel to 2.2cm; subrounded; 5% silt.	SW		Blow counts (300-301.5'): Not Recorded. Kelly down @ 1055. Resumed drilling @ 1119.
305					No cuttings returned.			
310					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 85% very fine to very coarse sand; 10% fine gravel to 3.5cm; subrounded; 5% silt.			
315					Well graded SAND (SW); brown (10YR 5/3); dry; very dense; 90% very fine to very coarse sand; 5% fine gravel to 2.2cm; subrounded; 5% silt.		Bentonite Seal	
320					Same as above (315 ft).	SW		Kelly down @ 1126. Resumed drilling @ 1133.
325					Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); dry; very dense; 75% fine to very coarse sand; 25% fine gravel to 2.3cm; well rounded.			
330								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); dry; very dense; 60% fine to very coarse sand; 35% fine gravel to 2.3cm; well rounded; 5% silt.	SW	Bentonite Seal	
335					Same as above (330 ft); 85% very fine to very coarse sand; 15% fine gravel to 2.4cm.			
340					Silty SAND (SM); brown (10YR 4/3); moist; very dense; 85% very fine to coarse sand; trace fine gravel to 6mm; subrounded; 15% silt with clay nodules.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1140. Resumed drilling @ 1230.
345					Well graded SAND (SW); brown (10YR 4/3); dry; very dense; 90% very fine to very coarse sand; subangular; 5% fine gravel to 1.6cm; well rounded; 5% silt.	SW		
350		SB0325	0.6					Blow counts (348.5-350'): 10/12.
355					Same as above (343 ft); medium dense; trace clay nodules.		Bottom of Screen	Resumed drilling @ 1251.
360					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; medium dense; 100% fine to medium sand; trace coarse sand to 4mm; rounded.	SP	Bentonite Seal	

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; medium dense; 100% fine to medium sand; trace coarse sand to 4mm; rounded.	SP		Kelly down @ 1254. Resumed drilling @ 1301.
365					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 95% very fine to very coarse sand; trace fine gravel to 7mm; rounded; 5% silt.			
370					Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; dense; 85% very fine to very coarse sand; 15% fine gravel to 3.5cm; rounded.			
375					Well graded SAND (SW); brown (10YR 5/3); dry; dense; 95% very fine to very coarse sand; trace fine gravel to 7mm; rounded; 5% silt.	SW	Bentonite Seal	
380					Same as above (375 ft); moist; trace clay nodules.			Kelly down @ 1306. Resumed drilling @ 1315.
385					Same as above (375 ft); trace clay nodules.			
390								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390								
					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 95% very fine to very coarse sand; 5% fine gravel to 1cm; rounded; trace fines.	SW		
395								
					Poorly graded GRAVEL with Sand (GP); brown (10YR 4/3); dry; dense; 85% fine gravel to 2.2cm; subangular to rounded; 15% very fine to very coarse sand; rounded; trace fines.	GP		
					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand; 5% fine gravel to 1.1cm; subrounded.			Blow counts (398.5-400'): 15/50.
400		SB0326	0.6					Kelly down @ 1321. Resumed drilling @ 1340.
							Bentonite Seal	
405					Same as above (398 ft); no gravel.			
						SW		
410					Same as above (398 ft); grading finer.			
415					Same as above (398 ft); finer.			
420								

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand; 5% fine gravel to 1.1cm; subrounded.			Kelly down @ 1348. Resumed drilling @ 1359.
425					Same as above (420 ft); finer.		Bentonite Seal	
430					Same as above (420 ft); coarser.	SW		
435					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand to 4mm; rounded; 5% fines.		Top of Filter Pack	
440					Same as above (435 ft); coarser.		Top of 3" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1409. Resumed drilling @ 1420.
445					Poorly graded SAND (SP); brown (10YR 5/3); moist; very dense; 100% very fine to medium sand to 1mm; rounded; trace fines.	SP		
450		SB0327	1.3					Blow counts (448.5-450'): 50/50.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 08:50 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106130

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/17/2011
Date TD Reached: 2/19/2011
Date Completed: 2/21/2011

Ground Elevation AMSL (ft): 5349.0
Y Coordinate: 1473567.70
X Coordinate: 1542131.09

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

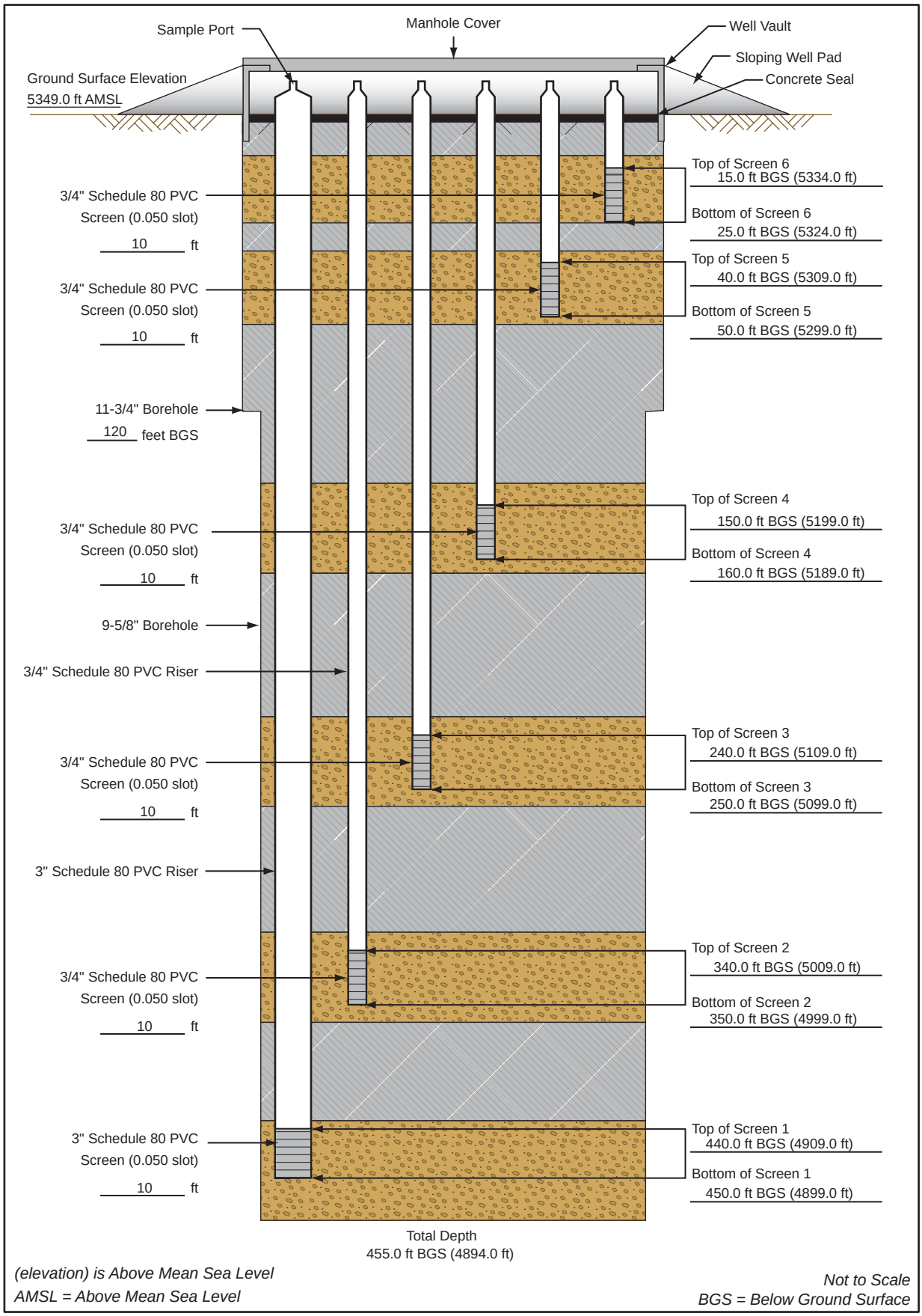
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
		SB0327			Well graded SAND (SW); brown (10YR 4/3); dry; very dense; 100% very fine to very coarse sand; trace gravel to 2.5cm; subrounded.	SW	Bottom of Screen	Blow counts (450-451.5'): Not Recorded. Blow counts (451.5-453'): Not Recorded. Resumed drilling @ 1500. Bit packed off @ 1503. Resumed drilling @ 1506. Total depth = 455 ft. Reached @ 1512 on 02/19/2011.
		SB0327						
455								
460								Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								Kelly down: TD the joint and ready to make new connection
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106130

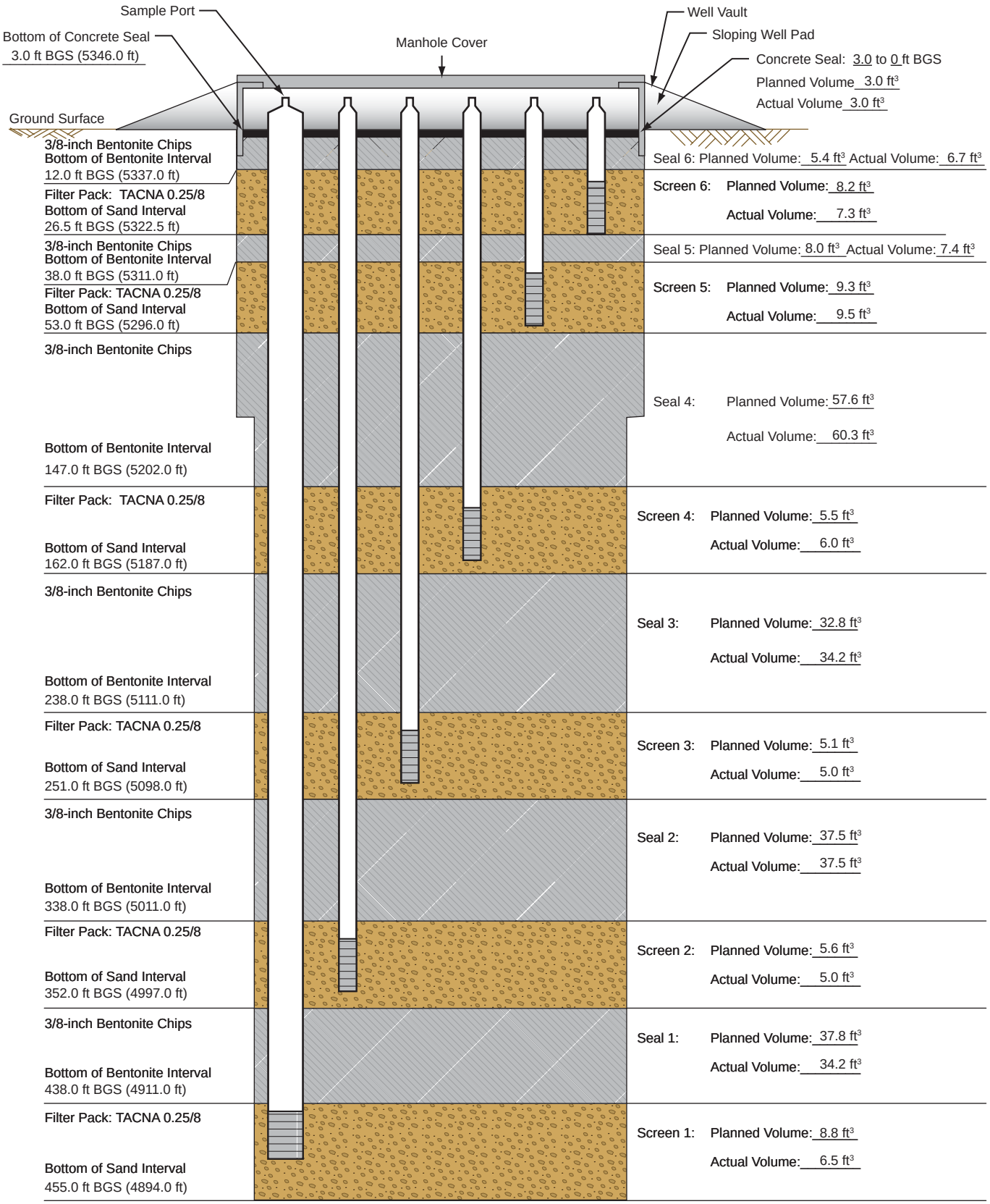
Installation Start Date/Time: 2/20/2011 @ 09:22
Installation End Date/Time: 2/21/2011 @ 16:45



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106130



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

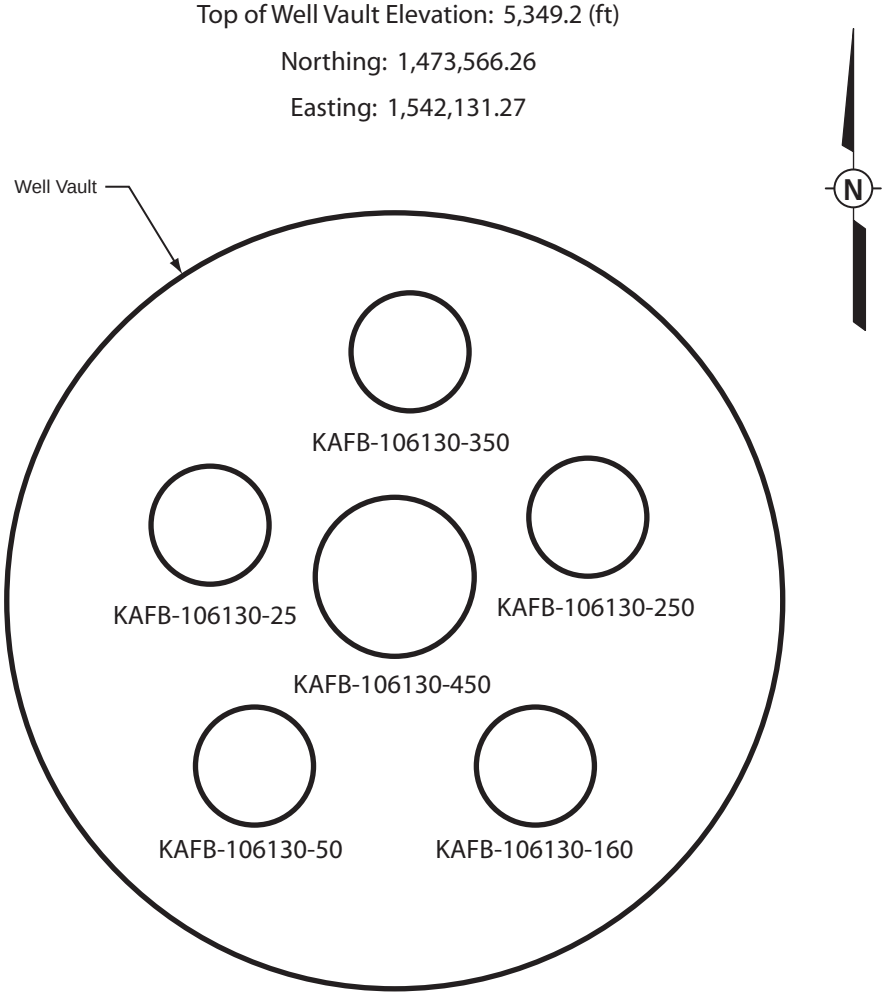
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106130

Top of Well Vault Elevation: 5,349.2 (ft)

Northing: 1,473,566.26

Easting: 1,542,131.27



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106130-25	3/4	25.0	15.0 - 25.0	1,473,565.67	1,542,130.89	5348.7
KAFB-106130-50	3/4	50.0	40.0 - 50.0	1,473,565.54	1,542,131.10	5348.7
KAFB-106130-160	3/4	160.0	150.0 - 160.0	1,473,565.64	1,542,131.37	5348.7
KAFB-106130-250	3/4	250.0	240.0 - 250.0	1,473,565.92	1,542,131.32	5348.7
KAFB-106130-350	3/4	350.0	340.0 - 350.0	1,473,566.00	1,542,131.05	5348.7
KAFB-106130-450	3	450.0	440.0 - 450.0	1,473,565.86	1,542,131.11	5348.8

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106131 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); red (2.5YR 5/6); moist; firm; 70% silt; 30% very fine to fine sand; trace fine to coarse gravel to 5cm; no odor.		Concrete Seal	Hand augered.
5					Same as above (0 ft); more gravel.	ML		Began drilling @ 1225 on 3/2/11.
10	X	SB0328	0.1				Bentonite Seal	Blow counts (8.5-10'): 11/22/26.
					Lean CLAY (CL); light reddish brown (5YR 6/4); moist; soft; low to medium plasticity; 95% clay; 5% sand; no odor.		Top of Filter Pack	New 10' connection @ 1245.
15					Same as above (10 ft).	CL	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20	X	SB0329	0.0					Blow counts (18.5-20'): 17/25/27.
					Same as above (10 ft).			New 10' connection @ 1310.
25					Silty GRAVEL (GM); reddish brown (5YR 5/4); moist; 70% gravel; angular to subrounded; 30% silt; no odor.	GM	Bottom of Screen	
					Lean CLAY (CL); yellowish red (5YR 4/6); moist; soft; low plasticity; 70% clay; 20% silt; 10% gravel; angular to subrounded; no odor.	CL	Bentonite Seal	
30	X	SB0330	0.0					Blow counts (28.5-30'): 11/22/31. Blow counts

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30								
		SB0331	0.0		Lean CLAY (CL); yellowish red (5YR 4/6); moist; hard; low plasticity; 70% clay; 20% silt; 10% gravel; angular to subrounded; no odor.	CL		(30-31.5'): 12/26/50. New 10' connection @ 1345.
					GRAVEL (GW); lense.	GW		
35					Lean CLAY with Gravel (CL); pink (5YR 7/4); moist; medium plasticity; 80% clay; 20% gravel to 0.75cm; no odor.		Bentonite Seal	
40		SB0332	0.0					Blow counts (38.5-40'): 16/28/46.
					Lean CLAY with Sand (CL); yellowish red (5YR 5/6); moist; firm; non to low plasticity; 80% clay; 20% sand; no odor.	CL	Top of Filter Pack	New 10' connection @ 1405.
45					Same as above (40 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
50		SB0333	0.0					Blow counts (48.5-50'): 9/15/46. Blow counts (50-51.5'): 11/42/50. New 10' connection @ 1435.
		SB0333			Well graded SAND with Gravel (SW); pink (5YR 7/4); dry to moist; 70% sand; 30% coarse gravel to 2cm; subangular; no odor.	SW		
55					Lean CLAY with Sand (CL); yellowish red (5YR 5/6); moist; firm; non to low plasticity; 80% clay; 20% sand; no odor.	CL	Bottom of Screen Bentonite Seal	
60								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					Gravelly SILT (ML); reddish yellow (5YR 6/6); moist; soft; 55% silt; 45% gravel to 1cm; rounded; no odor.			New 20' connection @ 1445.
65					Same as above (60 ft); 70% silt; 30% gravel.			
70					Same as above (60 ft).			
75					SILT (ML); reddish yellow (5YR 6/6); moist; soft; 70% silt; 25% clay; 5% gravel to 2cm; rounded.	ML	Bentonite Seal	
80					SILT (ML); reddish yellow (5YR 6/6); dry; soft; low plasticity; 65% silt; 30% clay; 5% gravel; no odor.			New 20' connection @ 1500.
85					Same as above (80 ft); 10% gravel.			
90								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; non to low plasticity; 85% clay; 15% silt; no odor.	CL		
95					Silty SAND (SM); light brown (7.5YR 6/4); moist; loose to dense; 75% sand; 25% silt with clay; no odor.	SM		
100		SB0334	0.0					Blow counts (98.5-100'): 6/8/12. Blow counts (100-101.5'): 16/19/22. New 20' connection @ 1530.
105		SB0334			Clayey SAND with Gravel (SC); light brown (7.5YR 6/3); dry; loose to dense; 40% sand; 25% fine to coarse gravel; 35% clay; no odor.	SC		
110					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% fine to coarse sand; no odor.	SP	Bentonite Seal	
115					SILT (ML); reddish yellow (5YR 6/6); moist; hard; low plasticity; 65% silt; 30% clay; 5% gravel; no odor.	ML		
120					Same as above (110 ft).			End of 3/2/11.

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT (ML); reddish yellow (5YR 6/6); moist; hard; low plasticity; 65% silt; 30% clay; 5% gravel; no odor.	ML		New 20' connection @ 0855 on 3/3/11.
125					Lean CLAY (CL); brown (7.5YR 5/4); moist; soft; medium to high plasticity; 95% clay with silt; 5% gravel to 2cm; no odor.			
130					Same as above (125 ft).	CL	Bentonite Seal	
135					Same as above (125 ft).			
140							Top of Filter Pack	
					Well graded SAND (SW); light brown (7.5YR 6/4); moist; dense to medium dense; 100% sand; subangular; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 0920.
145					Same as above (140 ft); brown (7.5YR 5/3).	SW		
150		SB0335 SB0335-	0.0					Blow counts (148.5-150'): 24/27/54. Blow counts

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 13:14 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150	MS	SB0335-MSD	0.0		SILT (ML): reddish yellow (5YR 6/6); moist; hard; non to low plasticity; 95% silt with clay; 5% sand; no odor.	ML	Bottom of Screen	(150-151.5'): 15/26/42. New 10' connection @ 0955.
155					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense to medium dense; 95% sand; 5% fine gravel to 1cm; no odor.			
160					Same as above (155 ft).			New 20' connection @ 1005.
165					Same as above (155 ft); 10% gravel to 0.5cm; coarsens downward.	SP	Bentonite Seal	
170					Same as above (155 ft).			
175					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; medium dense; 65% sand; 35% coarse gravel to 0.75cm; subrounded to subangular; no odor.	SW		
180								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 95% sand; 5% fine gravel; no odor.	SP		New 20' connection @ 1025.
185					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; 80% sand; 15% gravel; 5% silt and clay; no odor.	SW		
190					Same as above (185 ft).			
195					SILT (ML); brown (7.5YR 5/3); moist; soft; 90% silt with clay; 10% gravel to 2.5cm; subrounded; no odor.	ML	Bentonite Seal	
200		SB0336	0.0		Lean CLAY (CL); brown (7.5YR 5/4); dry; hard; non to low plasticity; 95% clay with silt; 5% sand; no odor.	CL		Blow counts (198.5-200'): 16/32/41. New 20' connection @ 1110.
205					Well graded SAND (SW); brown (7.5YR 5/3); dry; loose to medium dense; 100% sand; no odor.	SW		
210								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Gravelly lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; medium to high plasticity; 70% clay with silt; 30% gravel to 5cm; rounded to well rounded; no odor.	CL		
215					Same as above (210 ft).			
					Poorly graded SAND (SP); lense.	SP		
220					Gravelly lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; medium to high plasticity; 70% clay with silt; 30% gravel to 5cm; rounded to well rounded; no odor.	CL	- Bentonite Seal	
					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; 85% sand; 15% coarse gravel to 0.5cm; no odor.	SW		
225					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry to moist; 90% sand; 10% coarse gravel; no odor.			
230					Same as above (224 ft).	SP		
235							- Top of Filter Pack	
					Well graded GRAVEL with Clay and Sand (GW-GC); brown (7.5YR 5/4); moist; loose to medium dense; 60% gravel to 3cm; subangular to rounded; 30% sand; 10% clay and silt; no odor.	GW-GC	- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
240								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 13:14 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240								
245					Well graded GRAVEL with Clay (GW-GC); brown (7.5YR 5/4); moist; loose to medium dense; 85% gravel to 3cm; subangular to rounded; 5% sand; 10% clay and silt; no odor.	GW-GC	Bottom of Screen	New 10' connection @ 1235.
250		SB0337	0.0		Lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; medium to high plasticity; clay with silt; gravel; no odor.	CL		Blow counts (248.5-250'): 19/46/50.
255					Same as above (245 ft); nonplastic; no gravel.		Bentonite Seal	New 10' connection @ 1310.
260					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry to moist; medium dense to loose; sand; gravel to 1cm; rounded; silt; no odor.	SW		
265					Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; medium plasticity; clay with silt; no odor.	CL		New 20' connection @ 1505.
270					Lean CLAY with Gravel (CL); brown (7.5YR 5/4); moist; hard; medium plasticity; 85% clay with silt; 15% gravel to 4cm; subrounded to subangular; no odor.			

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; medium plasticity; 100% clay with silt; no odor.	CL		
275					Same as above (270 ft).			
280					Well graded SAND with Gravel (SW); pink (7.5YR 7/3); dry; loose; 85% sand; 15% coarse gravel; no odor.	SW		New 20' connection @ 1550.
285					Same as above (278 ft); 40% gravel; angular to subrounded.		Bentonite Seal	
290					Poorly graded SAND (SP); very coarse; angular to subangular.	SP		
295					Same as above (290 ft); fines downward.			
300		SB0338	0.0		GRAVEL (GP); lense; gravel to 2cm;	GP		Blow counts (298.5-300'): 10/26/41.

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					rounded.			
					Gravelly SILT (ML); reddish yellow (7.5YR 7/6); dry to damp; 70% silt; 30% gravel to 3cm; subangular to subrounded; no odor.	ML		End of 3/3/11. New 20' connection @ 0805 on 3/4/11.
305					Well graded SAND with Gravel (SW); pink (7.5YR 7/3); dry; loose; 70% sand; 30% coarse gravel to 5cm; subangular to rounded; no odor.			
310					Same as above (305 ft); 45% gravel.	SW		
315					Same as above (305 ft); more angular gravel.		Bentonite Seal	
320					Well graded GRAVEL with Sand (GW); dry; 80% gravel; angular to subrounded; 20% coarse sand; no odor.	GW		
					Well graded SAND with Gravel (SW); pink (7.5YR 7/3); dry; loose; 60% sand; 40% gravel to 5cm; subangular to rounded; no odor.			New 20' connection @ 1045.
325					Well graded SAND (SW); pink (7.5YR 7/3); dry; loose; 90% sand; 10% gravel to 1cm; subangular to rounded; no odor.	SW		
330								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); pink (7.5YR 7/3); dry; 80% fine sand; 20% medium to coarse sand; no odor.	SP		
					Well graded GRAVEL with Sand (GW); pink (7.5YR 7/3); dry; loose; 80% gravel to 2.5cm; angular to subrounded; 20% coarse sand; no odor.	GW	Bentonite Seal	
335								
					Well graded SAND with Gravel (SW); pink (7.5YR 7/3); dry to damp; loose; 60% sand; 45% coarse gravel to 1cm; subangular to subrounded; no odor.	SW	Top of Filter Pack	
340							Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New 10' connection @ 1150.
					Poorly graded SAND (SP); pink (7.5YR 7/3); dry; 80% fine sand; 20% medium to coarse sand; no odor.	SP		
345					Same as above (340 ft); light brown (7.5YR 6/4); moist; trace gravel to 2cm; rounded to subangular.			
		SB0339	0.0					Blow counts (348-349.5'): 9/35/50. Blow counts (349.5-351'): 49/50. New 10' connection @ 1255.
350		SB0339					Bottom of Screen	
					Well graded GRAVEL (GW); pink (7.5YR 7/3); dry; 90% gravel to 7cm; subangular to rounded; 10% coarse sand; no odor.	GW		
355					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; loose to medium dense; 70% sand; 30% gravel to 1cm; subangular to subrounded; no odor.	SW	Bentonite Seal	
360								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; loose to medium dense; 70% sand; 30% gravel to 3cm; subangular to subrounded; no odor.	SW		New 20' connection @ 1440.
365					Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/4); dry; 80% very fine to fine sand; 20% gravel to 4cm; rounded to subangular; no odor.			
370					Same as above (365 ft); coarser.			
375					Same as above (365 ft); finer.		- Bentonite Seal	
380					Poorly graded SAND with Gravel (SP); pink (7.5YR 7/3); dry; loose; 65% coarse sand; 35% gravel to 0.25cm; angular to subrounded; no odor.	SP		New 20' connection @ 1615.
385					Same as above (381 ft); moist.			
390					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; loose; 100% fine sand; no odor.			End of 3/4/11.

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; loose; 100% fine sand; no odor.	SP		
395					Silty SAND (SM); strong brown (7.5YR 5/6); moist; dense; 60% sand; 10% gravel; 30% silt; no odor.	SM		
					Same as above (393 ft); dry.			
400	X	SB0340 SB1749	0.0		Same as above (393 ft); light brown (7.5YR 6/4).			Blow counts (398-399.5'): 16/37/43.
					Well graded SAND (SW); dry; lense.	SW		New 20' connection @ 1215 on 3/5/11.
405					Silty SAND (SM); light brown (7.5YR 6/4); moist; dense; 60% sand; 10% gravel; 30% silt; no odor.	SM		
					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 90% very fine to fine sand; 10% gravel to 2cm; angular; no odor.	SP	Bentonite Seal	
410					Well graded SAND (SW); pinkish gray (7.5YR 7/2); damp; loose; 100% sand to 0.3cm; no odor.	SW		
415					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% sand; no odor.	SP		
420								

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% sand; no odor.	SP	Bentonite Seal	New 20' connection @ 1400.
425					Same as above (420 ft); coarser.			
430					Same as above (420 ft); finer.		Top of Filter Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen	
435					Well graded SAND (SW); pinkish gray (7.5YR 7/2); dry; loose; 100% very fine to coarse sand; no odor.	SW		
440					Silty GRAVEL (GM); light brown (7.5YR 6/4); moist.	GM	Bottom of Screen	New 10' connection @ 1500.
					SILT with Sand (ML); light brown (7.5YR 6/4); moist; hard; 85% silt with clay; 15% sand; no odor.	ML		
						CL		
445					Lean CLAY (CL); brown (7.5YR 5/6); dry; hard to stiff; medium plasticity; 90% clay; 10% sand; no odor.	ML		
					SILT with Sand (ML); light brown (7.5YR 6/4); moist; hard; 85% silt with clay; 15% sand; no odor.			
					Poorly graded SAND (SP); light brown (7.5YR 6/4); dry; loose; 100% very fine sand; no odor.	SP		
450		SB0341	0.0					Blow counts (448.5-450'): 15/34/43.

Borehole ID: KAFB-106131

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 3/2/2011
Date TD Reached: 3/5/2011
Date Completed: 3/7/2011

Ground Elevation AMSL (ft): 5344.4
Y Coordinate: 1472929.18
X Coordinate: 1541690.65

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

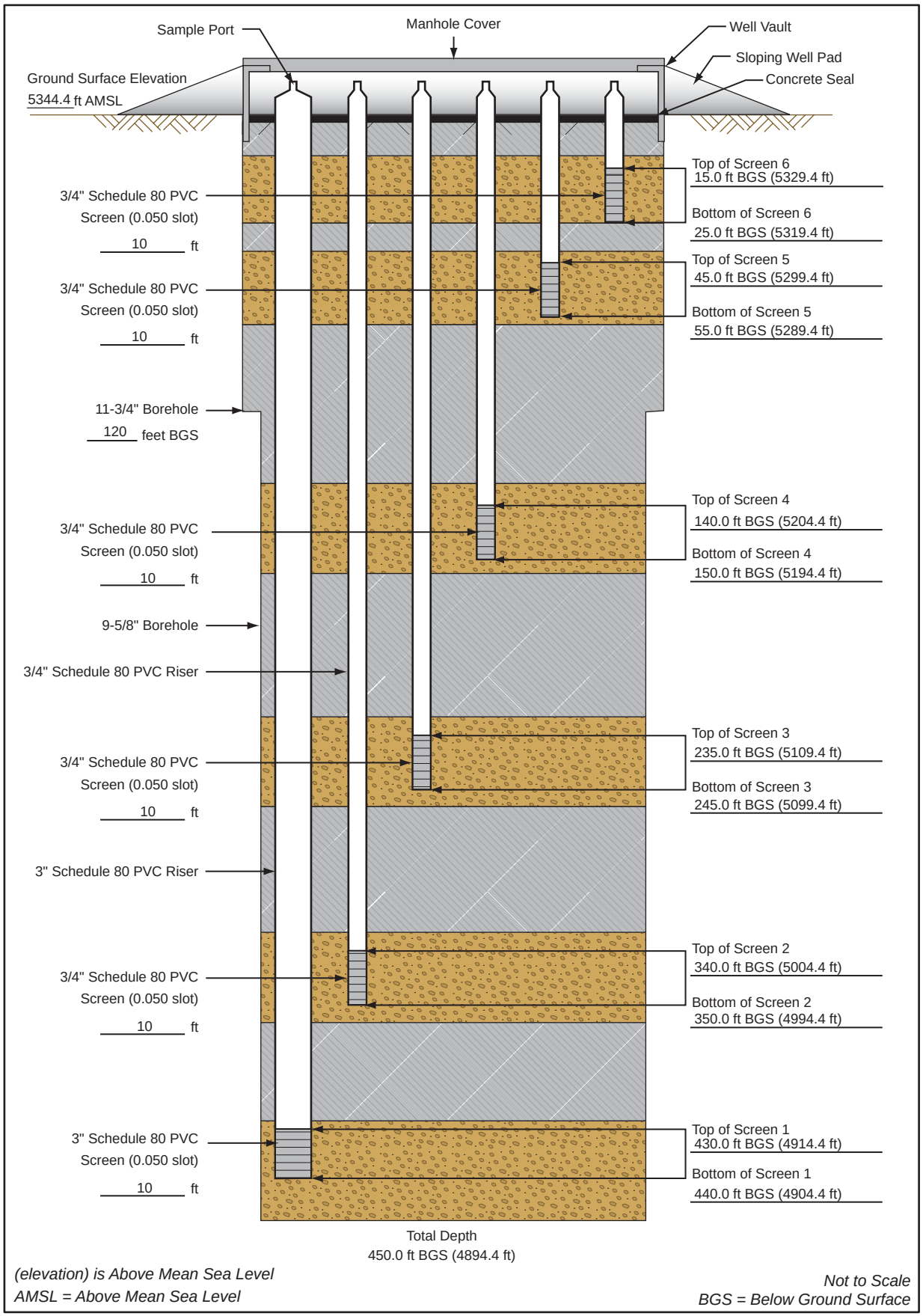
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Allen Willmore

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								Total depth = 450 ft. Reached @ 1515 on 3/5/11. Water added during drilling (gallons) = 0 Water added during construction (gallons) = 187.5
455								
460								
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106131

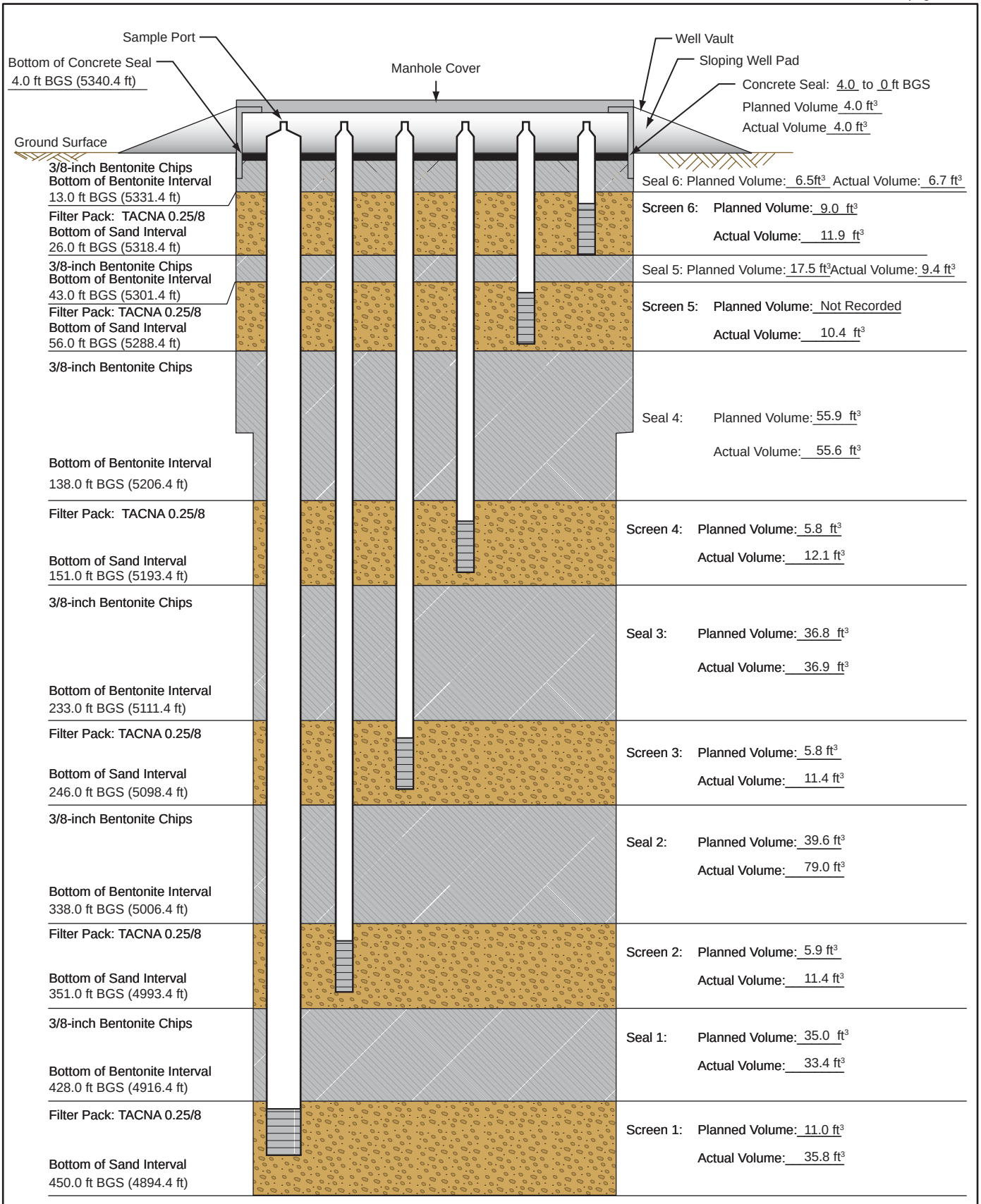
Installation Start Date/Time: 3/6/2011 @ 07:40
Installation End Date/Time: 3/7/2011 @ 16:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106131



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

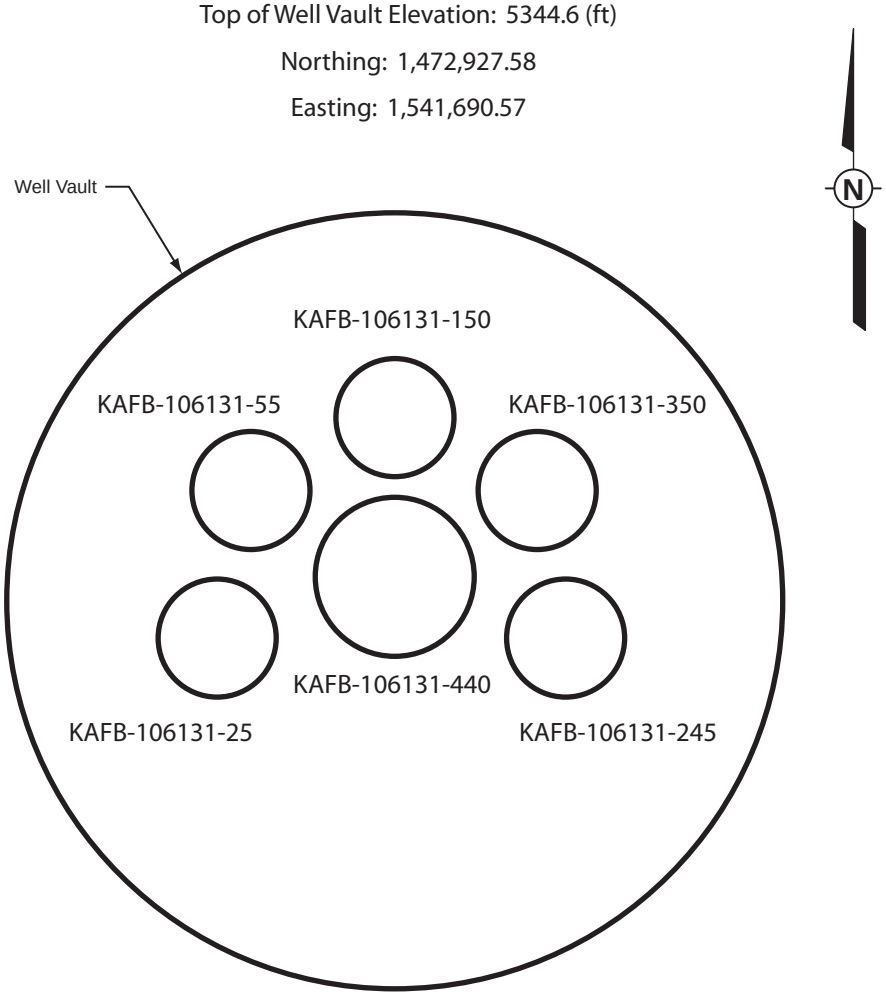
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106131

Top of Well Vault Elevation: 5344.6 (ft)

Northing: 1,472,927.58

Easting: 1,541,690.57



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106131-25	3/4	25.0	15.0 - 25.0	1,472,926.92	1,541,690.40	5344.3
KAFB-106131-55	3/4	55.0	45.0 - 55.0	1,472,926.74	1,541,690.62	5344.3
KAFB-106131-150	3/4	150.0	140.0 - 150.0	1,472,927.23	1,541,690.52	5344.3
KAFB-106131-245	3/4	245.0	235.0 - 245.0	1,472,926.90	1,541,690.89	5344.3
KAFB-106131-350	3/4	350.0	340.0 - 350.0	1,472,927.19	1,541,690.79	5344.3
KAFB-106131-440	3	440.0	430.0 - 440.0	1,472,927.07	1,541,690.63	5344.3

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106132 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); light reddish brown (5YR 6/3); dry; stiff; nonplastic; 60% silt; 40% fine sand; subrounded; no odor.		Concrete Seal	Hand augered.
5					Same as above (0 ft); brown (5YR 5/3); dry; trace coarse sand.		Bentonite Seal	Began drilling @ 1550 on 2/6/11.
10	X	SB0342	0.0		Same as above (0 ft); 70% silt; 30% fine sand; trace gravel.		Top of Filter Pack	Drilling delayed @ 10 ft. Sampled for ~20 min. Blow counts (8.5-10'): 17/24.
15					SILT (ML); reddish brown (5YR 5/4); damp; stiff; low to nonplastic; 90% silt; 10% fine sand; trace coarse sand; no odor.	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20	X	SB0343	0.0		SILT (ML); reddish brown (5YR 5/4); dry to damp; stiff; low plasticity; 95% silt; 5% fine sand; low dry strength; no odor.			Kelly down @ 1640. Blow counts (18.5-20'): 17/50. New connection @ 1641. Resumed drilling @ 0825 on 02/07/11.
25	X	SB0344	0.0		Same as above (20 ft); reddish brown (2.5YR 4/4).		Bottom of Screen	Blow counts (25.5-27'): 17/50.
	X	SB0344					Bentonite Seal	Blow counts (27-28.5'): 50/3.
30	X	SB0344						Blow counts (28.5-30'): 50/5.

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); reddish brown (5YR 4/4); dry; stiff; low plasticity; 90% silt; 5% fine sand; 5% coarse sand; low dry strength; no odor.		Bentonite Seal	Kelly down @ 0833. New connection @ 0930. Resumed drilling @ 0940.
35					Same as above (30 ft); 90% silt; 5% gravel; 5% coarse sand.	ML		
		SB0345	0.0				Top of Filter Pack	Kelly down @ 0945. Blow counts (37-38.5'): 12/23.
40					Sandy lean CLAY (CL); red (2.5YR 4/6); moist; hard (based on blow counts above); medium plasticity; 70% clay with minor silt; 30% very fine to fine sand; no odor.	CL	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1007. Resumed drilling @ 1008.
45					SILT with Sand (ML); red (2.5YR 4/6); moist; medium stiff to stiff; 80% silt with minor clay; 20% very fine to medium sand; trace coarse sand; subrounded to subangular; no odor.			Kelly down @ 1015.
		SB0346	0.0					Blow counts (47-48.5'): 18/32.
50		SB0346						Blow counts (48.5-50'): 17/28.
		SB0347	0.0		Same as above (45 ft); no odor.		Bottom of Screen	Blow counts (50-51.5'): 27/32.
55					SILT (ML); red (2.5YR 4/6); moist; medium stiff to stiff; 95% silt with clay; 5% very fine to fine sand; trace medium to coarse sand; subrounded; no odor.	ML	Bentonite Seal	New connection @ 1054. Resumed drilling @ 1058.
60								Kelly down @ 1103.

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT (ML); red (2.5YR 4/6); moist; medium stiff to stiff; 95% silt with clay; 5% very fine to fine sand; trace medium to coarse sand; subrounded to subangular; no odor.			New connection @ 1112. Resumed drilling @ 1113.
65					SILT (ML); red (2.5YR 5/6); dry to moist; medium stiff; 100% silt with trace clay; trace fine sand; no odor.			
70					Same as above (65 ft); no odor.	ML		
75					SILT (ML); red (2.5YR 5/6); dry to moist; medium stiff; 95% silt with trace clay; 5% fine to coarse sand; angular to subangular; no odor. Note: predominately sharp, dark, lithic fragments.		Bentonite Seal	Kelly down @ 1118.
80					Well graded SAND with Silt (SW-SM); light reddish brown (2.5YR 7/4); dry to moist; loose; 90% fine to coarse sand; subangular to subrounded; 10% silt; no odor.	SW-SM		New connection @ 1140. Resumed drilling @1141.
85					SILT (ML); red (2.5YR 4/6); dry to moist; medium stiff to stiff; 85% silt; 15% clay; no odor.	ML		
90								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT (ML); red (2.5YR 4/6); dry to moist; medium stiff to stiff; 85% silt; 15% clay; no odor.			
95					SILT (ML); red (2.5YR 5/6); dry to moist; medium stiff; 75% silt; 15% clay; 10% fine to coarse sand; subangular to subrounded; no odor.			
		SB0348	0.0					Kelly down @ 1146. Rate of penetration = 4ft/min. Blow counts (97-98.5'): 28/60.
100					Same as above (95 ft); no odor.			New connection @ 1217. Resumed drilling @ 1242.
105					SILT with Sand (ML); red (2.5YR 5/6); dry to moist; medium stiff; 75% silt with minor clay; 25% fine sand; trace medium to coarse sand; subangular; no odor.	ML	Bentonite Seal	
110					Same as above (105 ft); 85% silt with minor clay; 15% fine sand; trace medium to coarse sand; subangular; no odor.			
115					Sandy SILT (ML); light reddish brown (2.5YR 7/4); dry to moist; soft to medium stiff; 65% silt with trace clay; 35% very fine to coarse sand; subangular to subrounded; no odor.			Kelly down @ 1254.
120								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); red (2.5YR 5/6); dry to moist; medium stiff to stiff; 80% silt with trace clay; 20% very fine to coarse sand; subangular to subrounded; no odor.			New connection @ 1304. Resumed drilling @ 1306. Kelly down @ 1309. TD of 11-3/4" casing at 120' bgs.
125					Sandy SILT (ML); red (2.5YR 5/6); dry; stiff; non to low plasticity; 65% silt; 25% coarse sand; angular; 10% gravel; subangular to subrounded; no odor.			New connection @ 0820 on 2/8/11. Resumed drilling @ 0827.
130					SILT (ML); brown (7.5YR 5/4); low plasticity; 95% silt; 5% fine sand; no odor.	ML		
135					Same as above (130 ft).		Bentonite Seal	
140					SILT (ML); brown (7.5YR 4/4); dry; stiff; low plasticity; 90% silt; 10% clay; slight clay nodules; no odor.			Kelly down @ 0835. New connection @ 0850. Resumed drilling @ 0900.
145					Lean CLAY (CL); brown (7.5YR 4/4); dry to damp; very stiff; medium to high plasticity; 100% clay; no odor.	CL		
150		SB0349	0.0					Blow counts (148.5-150'): 30/50.

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Lean CLAY (CL); brown (7.5YR 4/4); dry to damp; very stiff; medium to high plasticity; 100% clay; no odor.	CL		Kelly down @ 0912. New connection @ 0931. Resumed drilling @ 0935. Paused drilling to clear cyclone of fines @ 0937.
155					SILT (ML); brown (7.5YR 4/4); dry; stiff; low plasticity; 100% silt; trace coarse sand; rounded to subrounded; no odor.		- Bentonite Seal	Resumed drilling @ 1002.
160					Same as above (155 ft).	ML		Kelly down @ 1007. New connection @ 1015. Resumed drilling @ 1016.
165					SILT with Sand (ML); brown (7.5YR 4/4); dry; stiff; low plasticity; 75% silt; 25% fine sand; subangular; no odor.		- Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Paused drilling @ 1027, drill string stuck. Resumed drilling @ 1121.
170					Well graded SAND (SW); light brownish gray (2.5Y 6/2); dry; loose; 60% fine sand; 30% medium sand; 10% coarse sand; subrounded; trace gravel; rounded; no odor.			
175					Same as above (170 ft); 50% fine sand; 30% medium sand; 20% coarse sand.	SW	- Bottom of Screen	Kelly down @ 1124.
180								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); light olive brown (2.5Y 5/3); dry; loose; 40% fine sand; 20% medium sand; 20% coarse sand; 20% gravel; rounded; no odor.		- Filter Pack	New connection @ 1137. Resumed drilling @ 1138.
185					Same as above (180 ft).	SW		
190					Poorly graded SAND (SP); dark grayish brown (2.5Y 4/2); dry; loose; 80% fine sand; 20% medium sand; trace coarse sand; rounded; no odor.		- Bentonite Seal	
195					Same as above (190 ft); trace fines.	SP		
200		SB0350	0.0		Same as above (190 ft).			Kelly down @ 1145. Blow counts (198.5-200'): 28/50. New connection @ 1207. Resumed drilling @ 1207.
205					Well graded SAND (SW); dark grayish brown (2.5Y 4/2); dry; dense; 40% fine sand; 30% medium sand; 30% coarse sand; trace gravel; rounded to subrounded; no odor.	SW		
210								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); grayish brown (2.5Y 5/2); dry; dense; 85% fine sand; 15% medium sand; subrounded; no odor.	SP		
215					Well graded SAND (SW); dark grayish brown (2.5Y 4/2); dry; dense; 40% fine sand; 30% medium sand; 30% coarse sand; trace gravel; rounded to subrounded; no odor.	SW		Kelly down @ 1214.
220					SILT (ML); olive brown (2.5Y 4/4); dry; stiff; nonplastic; 90% silt; 10% fine sand; no odor.	ML	- Bentonite Seal	New connection @ 1227. Resumed drilling @1228.
225					SILT with Sand (ML); olive brown (2.5Y 4/4); dry; stiff; nonplastic; 75% silt; 25% fine sand; no odor.			
230					Well graded SAND (SW); light olive brown (2.5Y 5/3); dry; dense; 60% fine sand; 20% medium sand; 20% coarse sand; subrounded to subangular; no odor.	SW		
235					Well graded SAND with Gravel (SW); light olive brown (2.5Y 5/3); dry; dense; 35% fine sand; 20% medium sand; 20% coarse sand; rounded; 25% gravel; rounded; no odor.		- Top of Filter Pack	Kelly down @ 1240.
240								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); light olive brown (2.5Y 5/3); dry; dense; 80% fine sand; 15% medium sand; rounded; 5% gravel; rounded; no odor.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1324. Resumed drilling @ 1325.
245					Well graded SAND (SW); grayish brown (2.5Y 5/2); dry; dense; 55% fine sand; 30% medium sand; 15% coarse sand; subrounded to subangular; trace gravel; no odor.	SW		
250		SB0351	0.1		Same as above (245 ft); 20% fine sand; 40% medium sand; 40% coarse sand; trace gravel; trace clay nodules.		Bottom of Screen	Kelly down @ 1331. Blow counts (248.5-250'): 37/50. New connection @ 1353. Resumed drilling @ 1354.
255					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 70% fine sand; 30% medium sand; angular to subangular; no odor.	SP		Kelly down @ 1357.
260					Same as above (255 ft); trace gravel.		Bentonite Seal	New connection @ 1404. Resumed drilling @ 1404.
265					Same as above (255 ft); mica flakes to 3mm.			
270								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Silty SAND (SM); olive brown (2.5Y 4/3); dry; dense; 45% fine sand; 15% medium sand; 10% coarse sand; rounded to subrounded; 30% silt and clay nodules; no odor.	SM		
275					Poorly graded SAND (SP); light olive brown (2.5Y 5/3); dry; dense; 80% fine sand; 10% medium sand; 10% coarse sand; rounded; no odor.			Kelly down @ 1415.
280					Same as above (275 ft).	SP		New connection @ 1435. Resumed drilling @ 1436.
285					Well graded SAND (SW); olive brown (2.5Y 4/4); dry; dense; 55% fine sand; 30% medium sand; 15% coarse sand; rounded; no odor.	SW	Bentonite Seal	
290					Poorly graded SAND (SP); light olive brown (2.5Y 5/4); dry; dense; 70% fine sand; 30% medium sand; trace coarse sand; subrounded to subangular; no odor.			
295					Same as above (290 ft).	SP		Kelly down @ 1446.
300		SB0352	0.4					Blow counts (298.5-300'): 27/50.

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); olive brown (2.5Y 4/4); dry; dense; 35% coarse sand; 35% medium sand; 30% fine sand; trace gravel; trace clay nodules; no odor.	SW		New connection @ 1510. Resumed drilling @ 1514.
305					Lean CLAY (CL); olive brown (2.5Y 4/4); dry to moist; stiff; medium to high plasticity; 100% clay; no odor.	CL		
310					Well graded SAND (SW); light olive brown (2.5Y 5/3); 65% fine sand; 20% medium sand; 10% coarse sand; subangular; 5% clay nodules; no odor.			
315					Same as above (310 ft); 65% fine sand; 20% medium sand; 15% coarse sand; subangular; trace gravel; subrounded; no clay nodules.		Bentonite Seal	Kelly down @ 1531.
320					Same as above (310 ft).	SW		New connection @ 1541. Resumed drilling @ 1542.
325					Well graded SAND (SW); grayish brown (2.5Y 5/2); dry; dense; 65% fine sand; 20% medium sand; 10% coarse sand; subrounded; 5% gravel to 3cm; well rounded; no odor.			
330								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 100% fine sand; rounded; trace gravel; no odor.	SP	Bentonite Seal	
335								
					Well graded SAND (SW); olive brown (2.5Y 4/3); dry; dense; 50% fine sand; 20% medium sand; 20% coarse sand; 10% gravel; well rounded; no odor.		Top of Filter Pack	Kelly down @ 1551.
340								
					Well graded SAND with Gravel (SW); olive brown (2.5Y 4/3); dry; dense; 35% fine sand; 15% medium sand; 15% coarse sand; subrounded; 35% gravel; rounded; no odor.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1600. Resumed drilling @ 1601.
345								
					Poorly graded GRAVEL with Sand (GP); olive brown (2.5Y 4/3); dry; dense; 70% gravel to 2cm; rounded; 30% fine to coarse sand; rounded; no odor.	GP		
350		SB0353	0.0					Kelly down @ 1606. Blow count (348.5-350'): 7/28.
					Well graded SAND with Gravel (SW); olive brown (2.5Y 4/3); dry; dense; 40% fine sand; 30% medium sand; 15% coarse sand; subrounded; 15% gravel; no odor.	SW	Bottom of Screen	New connection @ 1634. Resumed drilling @ 1635.
355								
					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 100% fine sand; rounded; no odor.	SP	Bentonite Seal	
360								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 100% fine sand; rounded; no odor.			Kelly down @ 1641. New connection @ 1650. Resumed drilling @ 0750 on 2/9/11.
365					Same as above (360 ft); 70% fine sand; 30% medium sand; rounded.			
370					Same as above (360 ft).	SP		
375					Same as above (360 ft).		- Bentonite Seal	
380								Kelly down @ 0805.
					Well graded SAND (SW); olive brown (2.5Y 4/3); dry; dense; 55% fine sand; 25% medium sand; 20% coarse sand; rounded; trace gravel; rounded; trace fines; no odor.			New connection @ 0817. Resumed drilling @ 0818.
385					Well graded SAND with Gravel (SW); olive brown (2.5Y 4/3); dry; dense; 30% fine sand; 30% medium sand; 20% coarse sand; rounded; 20% gravel; rounded; no odor.	SW	- Native Backfill	
390								

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); olive brown (2.5Y 4/3); dry; dense; 60% fine sand; 30% medium sand; 10% coarse sand; subrounded; no odor.			
395					Same as above (390 ft); 30% fine sand; 35% medium sand; 35% coarse sand.		Native Backfill	
400		SB0354	0.1		Same as above (390 ft); 30% fine sand; 30% medium sand; 30% coarse sand; rounded; 10% gravel to 1.5cm; rounded.			Kelly down @ 0834. Blow counts (398.5-400'): 12/28. New connection @ 1005. Resumed drilling @ 1009.
405					Well graded SAND with Gravel (SW); olive brown (2.5Y 4/3); dry; dense; 55% fine sand; 20% medium sand; 10% coarse sand; rounded; 15% gravel; rounded; no odor.	SW		
410					Same as above (405 ft); 50% fine sand; 15% coarse sand.		Bentonite Seal	
415					Same as above (405 ft); 35% fine sand; 20% medium sand; 20% coarse sand; 25% gravel.			
420								Kelly down @ 1022.

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); light yellowish brown (2.5Y 6/4); dry; dense; 100% fine sand; rounded; trace fines; no odor.			New connection @ 1029. Resumed drilling @ 1030.
425					Same as above (420 ft); 85% fine sand; 10% medium sand; rounded; 5% gravel; rounded; clay nodules to 1cm.		Bentonite Seal	
430					Same as above (420 ft); 95% fine sand; 5% fines; trace mica flakes to 2mm.	SP		
435					Same as above (420 ft); trace gravel.			
440							Top of Filter Pack	Kelly down @ 1105.
					Well graded SAND (SW); light olive brown (2.5Y 5/3); dry; dense; 50% fine sand; 25% medium sand; 25% coarse sand; rounded to subrounded; trace clay nodules; no odor.	SW	Top of 3" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1200. Resumed drilling @ 1204.
445					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 75% fine sand; 25% medium sand; rounded; no odor.	SP		Kelly down @ 1215.
450		SB0355	2.0					Blow counts (448.5-450'): 7/50.

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 17:12 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106132

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/6/2011
Date TD Reached: 2/9/2011
Date Completed: 2/17/2011

Ground Elevation AMSL (ft): 5353.0
Y Coordinate: 1473593.29
X Coordinate: 1542804.16

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

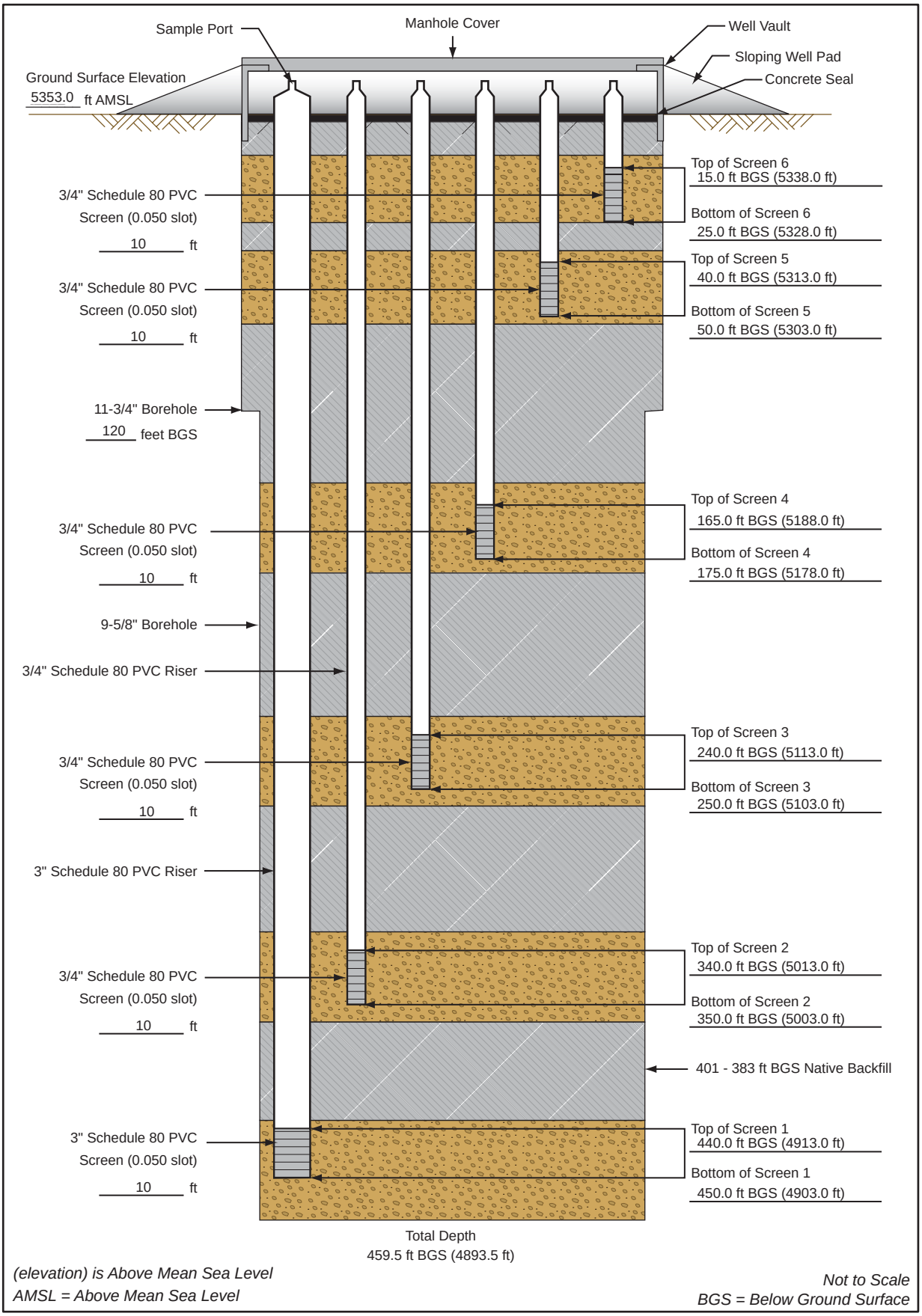
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 75% fine sand; 25% medium sand; rounded; no odor.	SP	Bottom of Screen	Total Depth = 459.5 ft. Reached @ 1545 on 2/9/11. Water added during drilling (gallons) = 0 Water added during construction (gallons) = Not Recorded Kelly down: TD the joint and ready to make new connection.
455								
460								
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106132

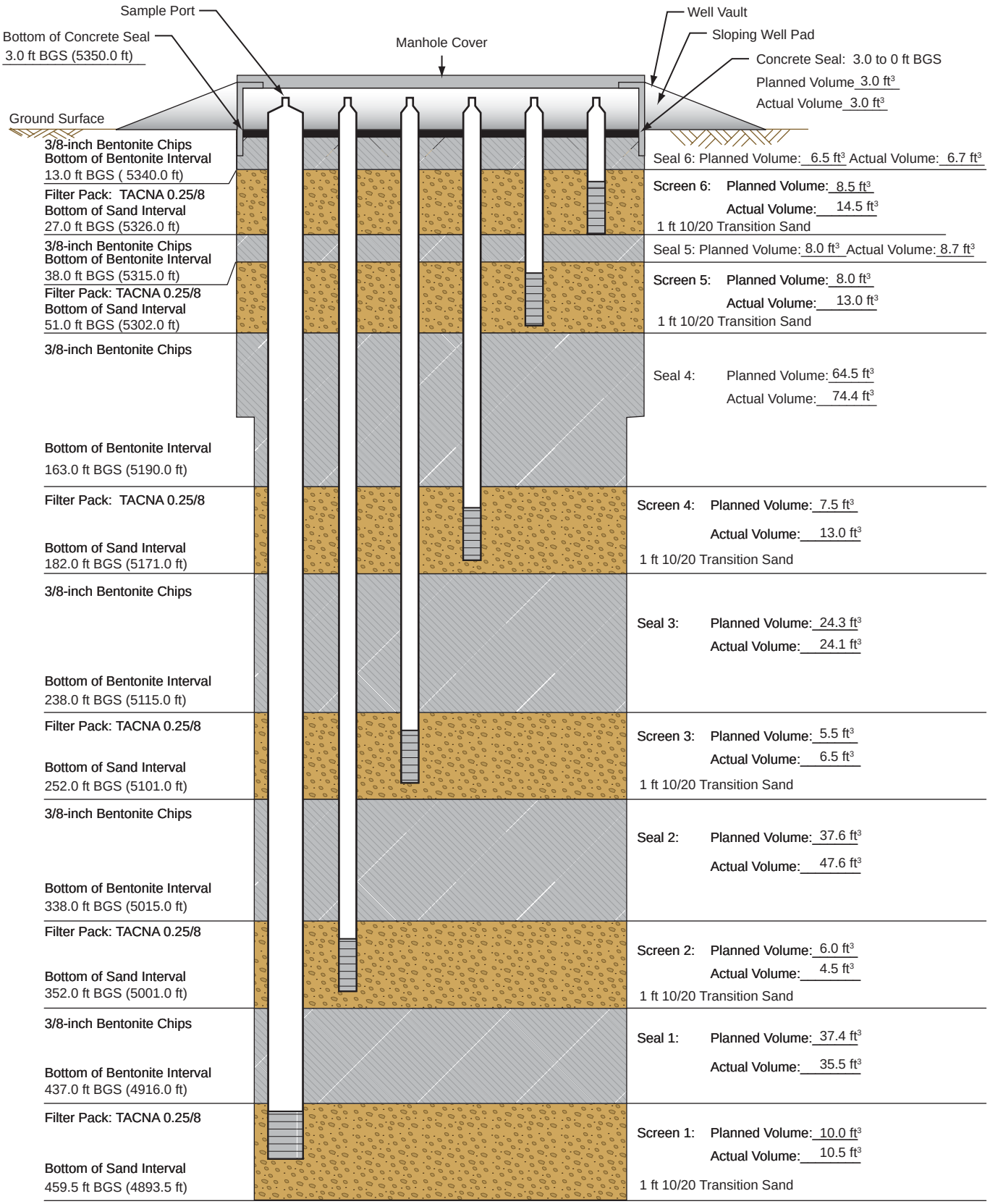
Installation Start Date/Time: 2/10/2011 @ 07:40
Installation End Date/Time: 2/17/2011 @ 08:25



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106132



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

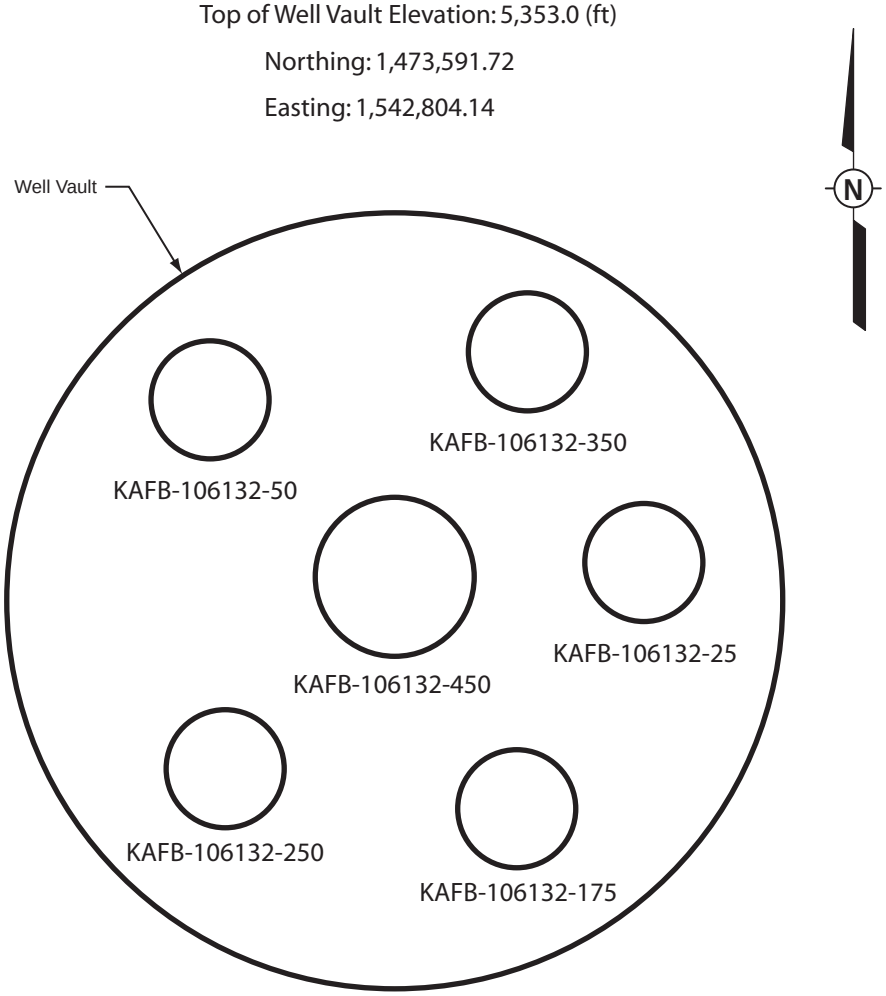
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106132

Top of Well Vault Elevation: 5,353.0 (ft)

Northing: 1,473,591.72

Easting: 1,542,804.14



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106132-25	3/4	25.0	15.0-25.0	1,473,591.31	1,542,804.30	5352.7
KAFB-106132-50	3/4	50.0	40.0-50.0	1,473,591.40	1,542,803.81	5352.7
KAFB-106132-175	3/4	175.0	165.0-175.0	1,473,591.06	1,542,804.13	5352.7
KAFB-106132-250	3/4	250.0	240.0-250.0	1,473,591.09	1,542,803.82	5352.7
KAFB-106132-350	3/4	350.0	340.0-350.0	1,473,591.52	1,542,804.08	5352.7
KAFB-106132-450	3	450.0	440.0-450.0	1,473,591.35	1,542,804.04	5352.7

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106133 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Sandy SILT (ML); brown (7.5YR 4/4); dry; very soft; nonplastic; 50% silt; 40% medium sand; 10% fine gravel to 5mm.		Concrete Seal	Hand augered.
5					Same as above (0 ft); light brown (7.5YR 6/3).	ML		Began drilling @ 1021 on 2/7/11. Sediments stuck in hose. Resumed drilling @ 1030. Sand line spool jumped @ 1050, needs repair. Resumed operations @ 1310.
10		SB0356	0.4				Bentonite Seal	Resumed drilling @ 1330. Kelly down @ 1335. Blow counts (8.5-10'): Not Recorded.
		SB0356			Silty SAND (SM); brown (7.5YR 4/3); dry; very dense; 60% fine sand; 15% coarse sand to 3mm; subrounded; 25% silt.	SM	Top of Filter Pack	Blow counts (10-11.5'): 32/50.
15							Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Sandy SILT (ML); brown (7.5YR 5/4); moist; hard; 55% silt; 40% very fine sand; 5% gravel to 1.5cm; trace clay nodules.			
20		SB0357	0.1					Blow counts (18.5-20'): 27/50.
		SB0357			Same as above (15 ft); hard.			Blow counts (20-21.5'): 27/50.
						ML		10' drill string won't fit through hammer @ 1357, need new one. Resumed drilling @ 1414.
25							Bottom of Screen	
					Sandy SILT (ML); reddish brown (5YR 4/4); moist; hard; 60% silt; 10% clay nodules; 30% fine sand; trace fine gravel to 1cm.		Bentonite Seal	
		SB0358	0.6					Blow counts (28-29.5'): 25/50. Blow counts (29.5-31'): Not Recorded.
30								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30		SB0358			SILT with Sand (ML); reddish brown (5YR 5/4); dry; hard; low plasticity; 60% silt; 20% clay; 15% very fine sand; 5% fine gravel to 1.2 cm.	ML		Blow counts (31-32.5'): Not Recorded.
		SB0358						
35					Lean Clay (CL); brown (7.5YR 4/4); moist; hard; medium plasticity; 60% clay; 40% silt.	CL	Bentonite Seal	
40		SB0359	0.0		SILT (ML); brown (7.5YR 4/4); moist; hard; 70% silt; 20% clay; 10% very fine sand to 0.08mm.	ML	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Blow counts (38.5-40'): 27/50.
45					SILT with Sand (ML); brown (7.5YR 4/4); moist; hard; 60% silt; 20% clay; 10% very fine sand; 10% fine gravel to 1cm.			
		SB0360, SB0360-MS	0.0					Blow counts (47-48.5'): 30/36.
50		SB0360-MSD	0.0		Same as above (45 ft).		Bottom of Screen	Blow counts (48.5-50'): 22/40. String too large diameter @ 1545. Kelly down @ 1557.
55					Sandy SILT with Gravel (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 60% silt with trace clay; 25% fine to coarse sand; 15% fine gravel to 1.2cm.			
60					Lean CLAY (CL); brown (7.5YR 4/4); moist; soft; medium plasticity; 60% clay; 30% silt; 10% fine to very coarse sand to 4mm.	CL	Bentonite Seal	

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60								
65					Lean CLAY with Sand (CL); brown (7.5YR 4/4); moist; soft; medium plasticity; 50% clay; 30% silt; 20% fine to very coarse sand.	CL		
70					Sandy SILT (ML); brown (7.5YR 4/3); dry; soft; low plasticity; 60% silt; 40% fine to coarse sand to 4mm.	ML		
75					Same as above (65 ft); trace fine gravel to 1cm.		Bentonite Seal	
80					SILT with SAND (ML); brown (7.5YR 5/4); dry; soft; low plasticity; 80% silt; 20% very fine sand; trace fine gravel to 1.5cm.			
85					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 100% very fine sand to 0.1mm; rounded.	SP		
90					Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 60% fine to coarse sand to 4mm; rounded; 40% silt.	SM		
					SILT with Sand (ML); brown (7.5YR 5/4); dry; firm; 80% silt; 5% clay; 15% very fine sand to 0.08mm.	ML		

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); brown (7.5YR 5/4); dry; firm; 80% silt; 5% clay; 15% very fine sand to 0.08mm.			
95					Same as above (90 ft).	ML		Kelly down @ 1645.
100		SB0361	0.0					Blow counts (98.5-100'): 50/50. End of 2/7/11.
		SB0361			Same as above (90 ft); hard.			Began sampling at 100' @ 0837 on 2/8/11. Blow counts (100-101.5'): 50/50.
105							Bentonite Seal	
					Lean CLAY (CL), brown (7.5YR 5/4); moist; hard; medium plasticity; 70% clay; 30% silt; trace gravel to 7mm.	CL		New connection @ 0844. Resumed drilling @ 0846. Cuttings stuck in cyclone hose. Unstuck @ 0851.
110					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; very loose; 100% fine sand; trace coarse sand to 2mm; subrounded.	SP		
					Lean CLAY (CL); brown (10YR 4/3); moist; hard; medium plasticity; 70% clay; 30% silt.	CL		
115								
					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; very loose; 60% coarse sand to 2mm; subangular; 40% medium sand.	SP		
120								Kelly down @ 0907

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Sandy SILT (ML); brown (7.5YR 4/4); moist; very soft; low plasticity; 70% silt; trace clay nodules; 30% fine sand to 0.5mm.			TD with 11 3/4" casing @ 0907.
125					SILT (ML); brown (7.5YR 5/4); moist; soft; medium plasticity; 60% silt; 40% clay.	ML		New connection @ 1619. Resumed drilling @ 1620.
130					Sandy SILT (ML); brown (10YR 5/3); moist; very soft; low plasticity; 70% silt; 30% very fine to medium sand to 1mm.			
135					Lean CLAY (CL); yellowish brown (10YR 5/4); moist; firm; medium plasticity; 60% clay; 30% silt; 10% very fine sand to 0.08mm.	CL	Bentonite Seal	
140					SILT (ML); yellowish brown (10YR 5/4); moist; firm; low plasticity; 70% silt; 20% clay; 10% fine sand to 0.5mm.	ML		Kelly down @ 1629. New 10' connection @ 1639. Resumed drilling @ 1640. Kelly down @ 1650. End of 2/8/11.
145					Lean CLAY (CL); yellowish brown (10YR 5/4); moist; firm; low plasticity; 60% clay; 40% silt; trace fine sand to 0.2mm.	CL		Began sampling @ 0802 on 2/9/11. Sampler line too slow, poor recovery.
150		SB0362	0.0					Blow counts (148.5-150'): 50/50. Blow counts

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
		SB0362			Lean CLAY (CL); yellowish brown (10YR 5/4); moist; hard; low plasticity; 60% clay; 40% silt; trace fine sand to 0.2mm.	CL		(150-151.5'): 50/50. New 10' connection @ 0825. Resumed drilling @ 0826.
155							Bentonite Seal	
					SILT with Sand (ML); brown (7.5YR 5/4); moist; soft; nonplastic; 80% silt; 5% clay; 15% very fine sand to 0.08mm.			Cuttings stuck in cyclone @ 0834. Cuttings unstuck @ 0843. Resumed drilling.
							Top of Filter Pack	
160					SILT (ML); brown (7.5YR 5/4); moist; firm; low plasticity; 80% silt; 20% clay.	ML	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 0855. New 20' connection @ 0905. Resumed drilling @ 0906.
165					Same as above (160ft); trace fine sand to 0.5mm.			Hose plugged @ 0915. Resumed drilling @ 1047.
					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 80% fine sand; 20% medium sand to 1mm; subangular.	SP		
170							Bottom of Screen	
					Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 4/4); moist, very loose; 90% fine to coarse sand to 4mm; rounded; 10% silt.	SW-SM		
175								
					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 100% very fine to coarse sand to 5mm; rounded.	SW	Bentonite Seal	
180								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 100% very fine to coarse sand to 5mm; rounded; trace fine gravel to 1cm.			Kelly down @ 1100. Resumed drilling @ 1109.
185					Same as above (180 ft); trace fine gravel to 1.8cm.	SW		
190					Same as above (180 ft).			
195					Poorly graded SAND (SP); brown (10YR 5/3); moist; very loose; 100% fine sand; trace fine gravel to 1cm; trace fines.		Bentonite Seal	
200		SB0363	0.0		Same as above (195 ft); very dense; 100% medium sand.	SP		Kelly down @ 1118. Blow counts (198.5-200'): 27/50. Resumed drilling @ 1145.
205					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very dense; 100% fine to very coarse sand; trace fine gravel to 1cm; subrounded; trace clay nodules.	SW		
210								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); brown (10YR 4/3); moist; very loose; 95% medium sand; 5% coarse sand to 4mm; rounded.	SP		
215					Same as above (210 ft); 100% fine sand to 0.2mm.			
220					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); moist; loose; 80% fine to very coarse sand; 10% fine gravel to 1.5cm; rounded; 10% silt with clay nodules.	SW-SM		Kelly down @ 1154. New connection @ 1205. Resumed drilling @ 1205.
225					Same as above (220 ft).		Bentonite Seal	
					GRAVEL (GP); lense; gravel to 1.5 cm.	GP		
					Lean CLAY (CL); lense.	CL		
230					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); moist; loose; 90% fine to very coarse sand; trace gravel to 1.9cm; rounded; 10% silt with clay.	SW-SM		
235					Well graded SAND (SW); brown (10YR 5/3); moist; very loose; 100% very fine to coarse sand; trace fine gravel to 1.7cm; subrounded.	SW	Top of Filter Pack	
240								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 5/3); moist; very loose; 100% very fine to coarse sand; trace fine gravel to 1.7cm; subrounded.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Kelly down @ 1214. New 10' connection @ 1221. Resumed drilling @ 1223.
245					Same as above (240 ft).			
250		SB0364	0.0					Kelly down @ 1228. Blow counts (248.5-250'): 47/50.
		SB0364			Same as above (240 ft); damp; very dense; 10% fine gravel to 3cm.	SW	Bottom of Screen	Blow counts (250-251.5'): 50. Resumed drilling @ 1308.
255					Same as above (240 ft); damp; very dense; 10% fine gravel to 3cm.			
260					Same as above (240 ft); damp; very dense; 10% fine gravel to 3cm.		Bentonite Seal	Kelly down @ 1310. New 20' connection @ 1318. Resumed drilling @ 1318.
265					Lean CLAY (CL); light brown (7.5YR 6/3); moist; firm; low plasticity; 60% clay; 40% silt.			
					Same as above (262 ft); brown (10YR 5/3).	CL		
270								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Lean CLAY (CL); light brown (7.5YR 6/3); moist; firm; low plasticity; 60% clay; 40% silt.	CL		
275					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 100% fine to medium sand to 0.5mm; subrounded; trace fines.	SP		
280					Same as above (275 ft); slightly finer.			Kelly down @ 1329. Resumed drilling @ 1338.
285					Well graded SAND (SW); brown (10YR 5/3); moist; very loose; 100% very fine to coarse sand to 4.8mm; rounded.	SW	Bentonite Seal	
290					Same as above (285 ft).			
295					SILT (ML); brown (7.5YR 4/3); moist; hard; low plasticity; 70% silt; 20% clay; 10% very fine sand to 0.08mm.	ML		
					Same as above (292 ft); 60% silt; 30% clay; 10% very fine sand.			
300		SB0365	0.0					Kelly down @ 1346. Blow counts (298-299.5'): 12/24.

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300		SB0365			Silty SAND (SM); brown (7.5YR 5/3); moist; dense; 85% fine to medium sand to 0.5mm; subrounded; 15% silt.	SM		Blow counts (299.5-301'): Not Recorded. Resumed drilling.
305					Same as above (300 ft).			
310					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 95% very fine to very coarse sand; 5% fine gravel to 7mm; subangular. Same as above (307 ft); no gravel.	SW	Bentonite Seal	
315					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; very loose; 85% fine to very coarse sand; 15% fine gravel to 3.5cm; well rounded.			
320					Same as above (315 ft); 80% fine to very coarse sand; 20% fine gravel to 1.3cm.			Kelly down @ 1430. Resumed drilling @ 1438.
325					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very loose; 90% fine to very coarse sand; 5% fine gravel to 1cm; rounded; 5% silt.			
330								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; very loose; 85% fine to very coarse sand; 15% fine gravel to 2.1cm; rounded.	SW		
					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 100% fine sand to 0.02mm; subrounded; trace fines.	SP	Bentonite Seal	
335					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 95% very fine to very coarse sand; 5% fine gravel to 8mm; rounded.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
340					Same as above (335 ft); trace gravel.			Kelly down @ 1445. Resumed drilling @ 1454.
345					Same as above (335 ft); no gravel.	SW		Drill bit is packed off @ 1500. Unstuck @ 1504.
350		SB0366	0.1		Same as above (335 ft); dense; no gravel.		Bottom of Screen	Blow counts (348.5-350'): 19/27. Kelly down @ 1507. Rig down to lengthen sand line. Completed sand line attachment @ 1550 and sampled at 350'. Compressor would not start @ 1620. End of 2/9/11. Resumed drilling @ 0824 on 2/10/11.
					Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 85% very fine to fine sand to 0.1mm; rounded; 15% silt; low plasticity.			
355					Same as above (352 ft).	SM	Bentonite Seal	
360								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 85% very fine to fine sand to 0.1mm; rounded; 15% silt; low plasticity.	SM		Kelly down @ 0831. Resumed drilling @ 0842.
365					Well graded SAND (SW); brown (10YR 5/3); moist; dense; 100% very fine to coarse sand; trace gravel to 1 cm; subrounded.			
370					Same as above (363 ft).			
375					Same as above (363 ft); slighty coarser; trace fines.	SW	Bentonite Seal	
380					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; dense; 70% very fine to very coarse sand; 30% fine to medium gravel to 5cm; rounded.			Kelly down @ 0852. Resumed drilling @ 0900.
385					Well graded SAND (SW); yellowish brown (10YR 5/4); moist; dense; 95% very fine to very coarse sand; trace gravel to 1.3cm; subrounded; 5% silt.			
390								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; dense; 95% very fine to very coarse sand; trace gravel to 1.3cm; subrounded; 5% silt.			
395					Same as above (390 ft); moist; finer.			
400		SB0367	0.3		Well graded SAND (SW); yellowish brown (10YR 5/4); moist; very dense; 95% very fine to very coarse sand; trace gravel to 1.3cm; subrounded; 5% silt; trace clay nodules.	SW		Kelly down @ 0911. Blow counts (398.5-400'): 30/50. Resumed drilling @ 0943.
405					Well graded SAND (SW); grayish brown (10YR 5/2); dry; very dense; 95% fine to very coarse sand; 5% fine gravel to 1cm; subangular; trace fines.		Bentonite Seal	
410					Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% medium sand to 0.5mm; subrounded; trace fines.	SP		
415					Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand to 3mm; subrounded; 5% silt.	SW		
420								

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420								Resumed drilling @ 1008.
425					Silty SAND (SM); brown (7.5YR 4/3); moist; very dense; 80% very fine to very coarse sand; 5% fine gravel to 1.4cm; subangular; 10% silt; 5% clay nodules.	SM		
430					Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 100% medium sand to 0.5mm; subrounded.	SP	Bentonite Seal	
435					Well graded SAND (SW); brown (10YR 4/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subangular to rounded; 5% silt.	SW		
440					Poorly graded SAND (SP); brown (10YR 4/3); dry; very dense; 100% medium sand to 1mm; rounded; trace fines. Same as above (432 ft); 100% coarse sand; trace fines.	SP	Top of Filter Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); dry; very dense; 85% very fine to very coarse sand; 15% fine gravel to 1.3cm; rounded.	SW		Kelly down @ 1020. Unwrapped and wrapped sand line. Resumed drilling @ 1036.
450		SB0368	0.6		Well graded SAND with Silt (SW-SM); dark yellowish brown (10YR 4/4); moist; very dense; 90% very fine to coarse sand to 4mm; subrounded; 10% silt.	SW-SM	Bottom of Screen	Kelly down @ 1045. Blow counts (448.5-450'): 40/70.

Borehole ID: KAFB-106133

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/7/2011
Date TD Reached: 2/10/2011
Date Completed: 2/16/2011

Ground Elevation AMSL (ft): 5352.0
Y Coordinate: 1473504.01
X Coordinate: 1542416.28

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

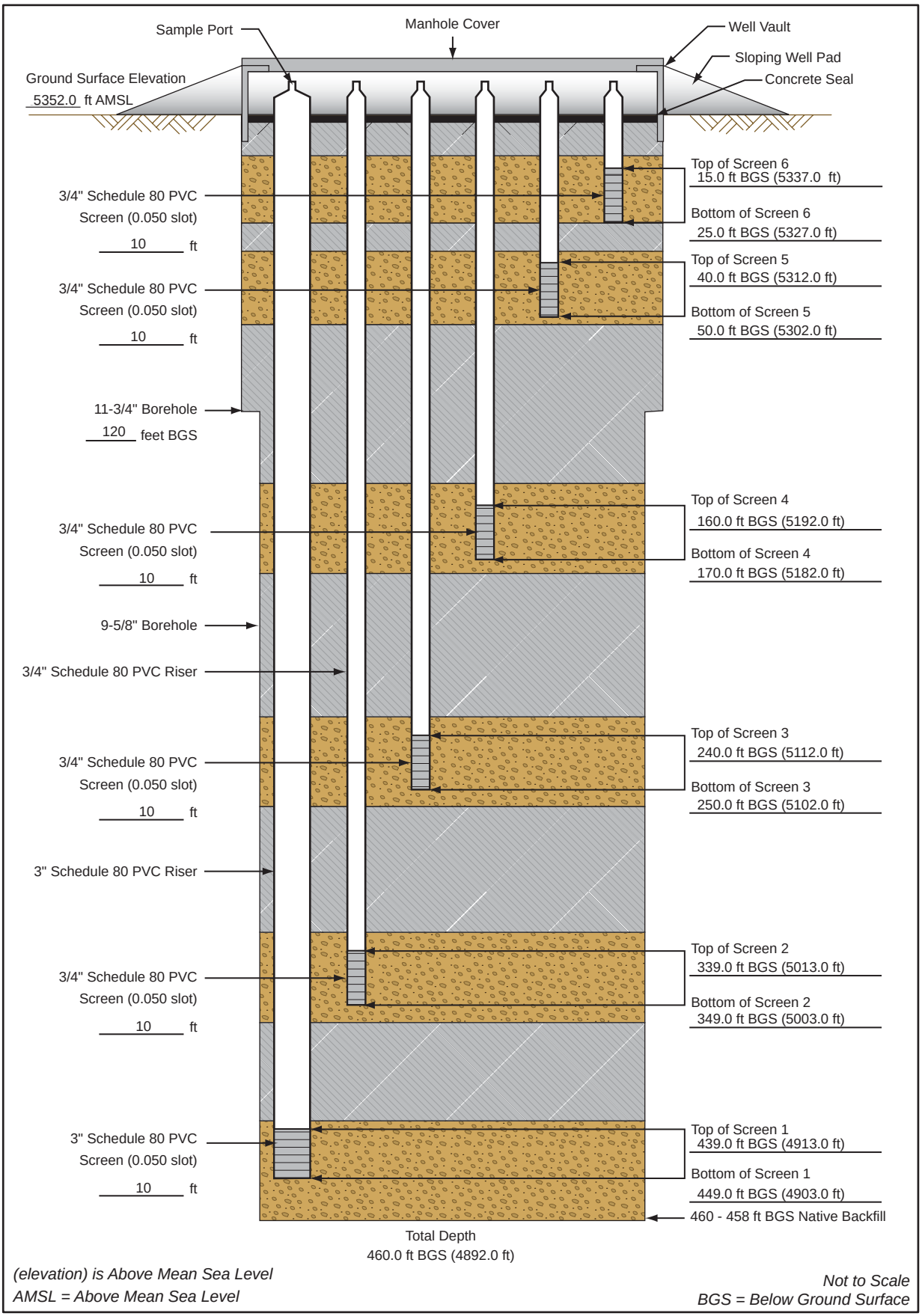
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); brown (10YR 5/3); dry; 95% very fine to coarse sand to 3mm; subrounded; 5% silt.			Resumed drilling @ 1130.
455					Same as above (450 ft).	SW		
460							Bottom of Filter Pack Native Backfill	Total Depth = 460 ft. Reached @ 1140 on 2/10/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = Not Recorded
475								Kelly down: TD the joint and ready to make new connection.
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106133

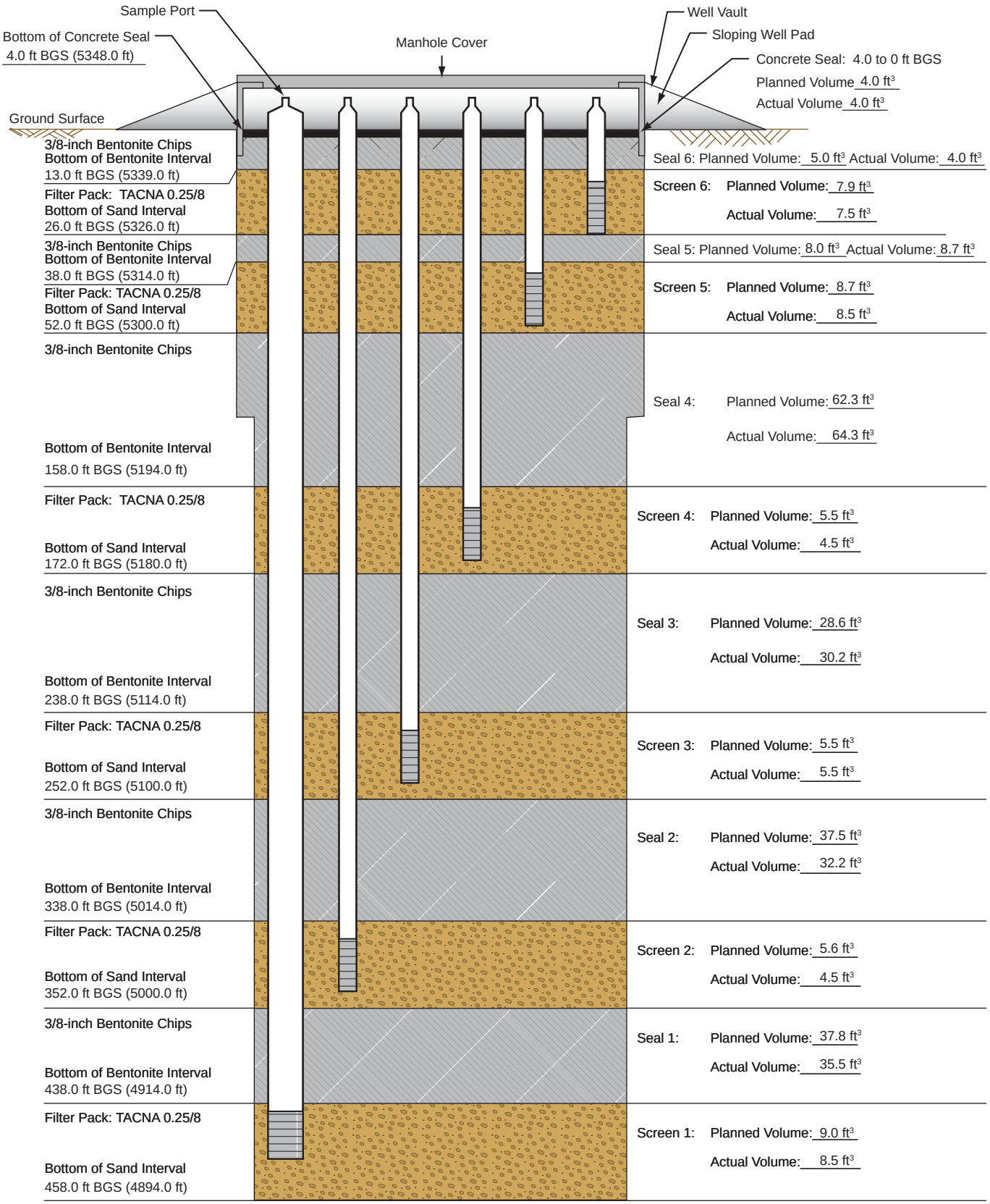
Installation Start Date/Time: 2/15/2011 @ 08:34
Installation End Date/Time: 2/16/2011 @ 16:29



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106133



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

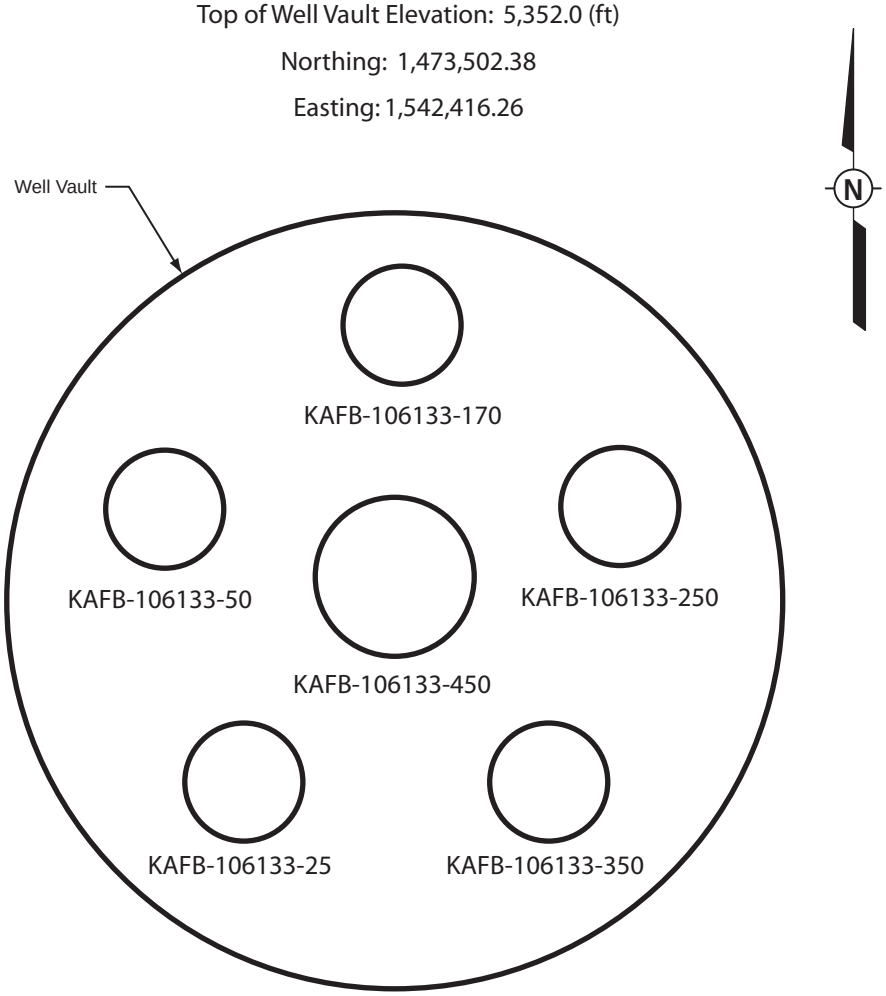
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106133

Top of Well Vault Elevation: 5,352.0 (ft)

Northing: 1,473,502.38

Easting: 1,542,416.26



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106133-25	3/4	25.0	15.0-25.0	1,473,501.59	1,542,416.13	5351.6
KAFB-106133-50	3/4	50.0	40.0-50.0	1,473,501.87	1,542,416.05	5351.6
KAFB-106133-170	3/4	170.0	160.0-170.0	1,473,502.09	1,542,416.29	5351.5
KAFB-106133-250	3/4	250.0	240.0-250.0	1,473,501.93	1,542,416.53	5351.5
KAFB-106133-350	3/4	349.0	339.0-349.0	1,473,501.62	1,542,416.48	5351.6
KAFB-106133-450	3	449.0	439.0-449.0	1,473,501.87	1,542,416.30	5351.6

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106134 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					SILT with Sand (ML); brown (7.5YR 5/4); dry; firm; nonplastic; 85% silt; 15% fine to coarse sand; rounded; caliche on sand; no odor.		Concrete Seal	Hand augered.
5					Same as above (0 ft); low plasticity; clay nodules.			Began drilling @ 1232 on 2/18/11.
10	X	SB0369	0.0		SILT (ML); strong brown (7.5YR 5/6); dry; firm; medium plasticity; 60% silt; 35% clay; 5% medium to coarse sand; no odor.		Bentonite Seal	Blow counts (7.5-9'): 15/7.
15					SILT with Gravel (ML); strong brown (7.5YR 5/6); dry; firm; non to low plasticity; 70% silt; 10% clay; 15% fine to coarse gravel; 5% coarse sand; no odor.	ML	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
	X	SB0370	0.0					Kelly down @ 1250. Blow counts (17.5-19'): 8/10.
20	X	SB0371	0.0		SILT (ML); strong brown (7.5YR 5/6); dry; firm; medium plasticity; 100% silt; trace gravel to 1cm; rounded; no odor.			Blow counts (19-20.5'): Not Recorded. New connection @ 1305. Resumed drilling @ 1306.
25					SILT (ML); brown (7.5YR 5/4); dry; firm; nonplastic; 100% silt with weakly indurated clay nodules to 1cm; no odor.		Bottom of Screen	
	X	SB0372	0.0				Bentonite Seal	Kelly down @ 1308. Blow counts (27-28.5'): 22/50. New connection @ 1350. Resumed drilling @ 1352.
30								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); light yellowish brown (10YR 6/4); dry; soft; nonplastic; 60% silt; 35% fine to coarse sand; angular to subangular; 5% gravel; angular; no odor.			
35					SILT (ML); yellowish brown (10YR 5/4); dry; soft; non to low plasticity; 100% silt; no odor; caliche at 37'.		Bentonite Seal	
		SB0373	0.0				Top of Filter Pack	Kelly down @ 1358. Blow counts (37-38.5'): 50/Not Recorded. Blow counts (38.5-40'): 50/Not Recorded. New connection @ 1430. Resumed drilling @ 1430.
40		SB0373					Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Same as above (35 ft); reddish brown (5YR 5/4).			
45					Same as above (35 ft); light reddish brown (5YR 6/4); 75% silt; 20% clay; 5% medium to fine sand; subrounded; trace gravel; no odor.	ML		
		SB0374	0.0					Kelly down @ 1439. Blow counts (47-48.5'): 12/25. New connection @ 1455. Resumed drilling @ 1456.
50					SILT with Sand (ML); brown (10YR 5/3); dry; firm; nonplastic; 75% silt; trace clay nodules; 25% fine to coarse sand; subangular to subrounded; abundant mica; no odor.		Bottom of Screen	
55					SILT (ML); brown (10YR 4/3); dry; soft; nonplastic; 85% silt; 15% clay; no odor.		Bentonite Seal	
60								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); yellowish brown (10YR 5/4); dry; soft; nonplastic; 75% silt; 25% fine to coarse sand; subrounded to rounded; no odor.			Kelly down @ 1457. New connection @ 1510. Resumed drilling.
65					Sandy SILT (ML); yellowish brown (10YR 5/4); dry; soft; nonplastic; 55% silt; 45% fine to coarse sand; rounded; trace gravel; mica flakes; no odor.			
70					SILT (ML); yellowish brown (10YR 5/4); nonplastic; 100% silt; trace gravel; no odor.			
75					Same as above (70 ft); nonplastic; 85% silt; 15% clay; no gravel.	ML	Bentonite Seal	
80					Same as above (70 ft); clay nodules to 2cm; slightly indurated.			Kelly down @ 1518. New connection @ 1525. Resumed drilling @ 1525.
85					Same as above (70 ft); clay nodules to 1cm; trace sand.			
90								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT (ML); yellowish brown (10YR 5/4); dry; soft; non to low plasticity; 90% silt; 10% fine to medium sand; no odor.			
95					Sandy SILT (ML); yellowish brown (10YR 5/4); dry; soft; nonplastic; 65% silt with clay nodules to 1.5cm; 35% very fine sand; no odor.	ML		
		SB0375	0.0					Kelly down @ 1533. Blow counts (97-98.5'): 18/27. New connection @ 1550. Resumed drilling @ 1551.
100					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose; 55% fine sand; 30% medium sand; 15% coarse sand; rounded to subangular; trace gravel; no odor.	SW		
105					SILT (ML); brown (10YR 4/3); dry; soft to stiff; low to medium plasticity; 70% silt; 30% clay; no odor.		Bentonite Seal	
110					Same as above (105 ft).	ML		
115					Same as above (105 ft); yellowish brown (10YR 5/4); no odor.			Kelly down @ 1558. New connection @ 1607. Resumed drilling @ 1608.
120								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT (ML); yellowish brown (10YR 5/4); dry; soft to stiff; low to medium plasticity; 70% silt; 30% clay; no odor.			Kelly down @ 1610 on 2/18/11. Switched to 9-5/8" casing. New connection @ 1105 on 2/19/11. Resumed drilling @ 1109 on 2/19/11.
125					Same as above (120 ft).	ML		
130					SILT (ML); brown (7.5YR 5/3); dry; firm; nonplastic; 95% silt; 5% fine to medium sand; subangular; no odor.			
135					Well graded SAND (SW); dark grayish brown (10YR 4/2); 95% fine to coarse sand; subangular to subrounded; trace gravel; rounded; 5% fines; no odor.	SW	Bentonite Seal	Kelly down @ 1116. New connection @ 1127. Resumed drilling @ 1128.
140					SILT (ML); brown (7.5YR 5/3); dry; soft to firm; non to low plasticity; 90% silt; 10% clay; trace coarse sand; rounded; no odor.			
145					Same as above (140 ft).	ML		
		SB0376	0.4					Kelly down @ 1131. Blow counts (147.5-149'): 15/28. New connection @ 1146. Resumed
150								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					SILT (ML); dark yellowish brown (10YR 4/4); dry; soft to firm; low plasticity; 80% silt; 20% clay; no odor.			drilling @ 1147.
155					Same as above (150 ft); yellowish brown (10YR 5/4); 90% silt; 10% fine sand; rounded to subrounded.	ML	Bentonite Seal	Kelly down @ 1150. New connection @ 1158. Resumed drilling @ 1203.
160					Silty SAND (SM); dark grayish brown (10YR 4/2); dry; dense; 80% fine to coarse sand; rounded; trace gravel to 1cm; 20% silt; no odor.	SM	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Approximate top of Santa Fe Group.
165					SILT (ML); dark yellowish brown (10YR 4/4); dry; soft; nonplastic; 95% silt; 5% fine sand; no odor.	ML		
170					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; loose to dense; 95% fine to medium sand; 5% coarse sand; rounded; no odor.	SP	Bottom of Screen	
175					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose to dense; 100% fine to coarse sand; rounded; trace gravel; rounded; rounded lapilli tuff sand; no odor.	SW	Bentonite Seal	Kelly down @ 1208. New connection @ 1246. Resumed drilling @ 1247.
180								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose; 100% fine to coarse sand; rounded; no odor.			
185					Same as above (180 ft); clay nodules.			
190					Same as above (180 ft).	SW		
195					Same as above (180 ft); dense; 90% fine to coarse sand; rounded; 10% gravel to 1.5cm; rounded.		Bentonite Seal	Kelly down @ 1253.
200					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); 100% fine to meduim sand; trace coarse sand; rounded; dominantly quartz grains; no odor.			Blow counts (197.5-199'): 25/31. Blow counts (199-200.5'): 20/29. Note: No recovery from split spoons at 200 ft. Sample was collected at 217.5 ft. New connection @ 1314. Resumed drilling @ 1320.
205					Same as above (200 ft); 90% fine sand; 10% medium sand.	SP		
210								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; coarse sand dominantly volcanic tuff.			
215					Same as above (210 ft); trace gravel; rounded; less volcanic tuff sand.			Kelly down @ 1327.
		SB0377	0.1					Blow counts (217.5-219'): 12/15. New connection @ 1401. Resumed drilling.
220					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 85% fine to coarse sand; rounded; 15% gravel to 1.5cm; rounded; no odor.		- Bentonite Seal	
225					Well graded SAND (SW); dark grayish bown (10YR 4/2); dry; dense; 90% fine to coarse sand; rounded; 10% gravel to 2cm; rounded; no odor.	SW		
230					Same as above (225 ft); 95% fine to coarse sand; 5% gravel.			
235					Same as above (225 ft).		- Top of Filter Pack	Kelly down @ 1410. New connection @ 1419. Resumed drilling @ 1420.
240								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 90% fine to coarse sand; rounded; 10% gravel; rounded; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Same as above (240 ft).	SW		Kelly down @ 1424.
		SB0378, SB0378-MS	0.4					Blow counts (247.5-249'): 27/37. Blow counts (249-250.5'): 38/50. New connection @ 1445. Resumed drilling @ 1446.
250		SB0378-MSD	0.4					
					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; medium dense; 95% fine to medium sand; rounded; 5% coarse sand; rounded; trace gravel; rounded; no odor.	SP	Bottom of Screen	
255								
					SILT (ML); dark yellowish brown (10YR 4/4); dry; firm to stiff; nonplastic; 100% silt; no odor.			Kelly down @ 1452. New connection @ 1500. Resumed drilling @ 1501.
260					SILT (ML); dark yellowish brown (10YR 4/4); dry; stiff; medium plasticity; 65% silt; 35% clay; no odor.	ML	Bentonite Seal	
265					Same as above (260 ft); 95% fines; 5% fine to coarse sand.			
270								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					SILT (ML); dark yellowish brown (10YR 4/4); dry; stiff; medium plasticity; 95% silt with clay; 5% fine to coarse sand; rounded; no odor.			
275					SILT (ML); yellowish brown (10YR 5/4); dry; stiff; nonplastic; 95% silt; 5% clay.			Kelly down @ 1511 on 2/19/11. New connection @ 0807 on 2/20/11. Resumed drilling @ 0809 on 2/20/11.
280					SILT (ML); brown (7.5YR 4/3); dry; stiff; low to medium plasticity; 75% silt; 25% clay nodules; trace sand; rounded; no odor.	ML		
285					Same as above (280 ft).		Bentonite Seal	
290					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine to medium sand; subrounded; trace coarse sand; no odor.	SP		
295					Poorly graded SAND with Silt (SP-SM); dark grayish brown (10YR 4/2); dry; dense; 90% fine sand; rounded; 10% silt; nonplastic; no odor.	SP-SM		Kelly down @ 0836.
300		SB0379	0.0					Blow counts (297-298.5'): 17/38. New connection @ 0954. Resumed drilling @ 0954.

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 95% fine to coarse sand; rounded to subrounded; 5% gravel; rounded; no odor.	SW		
305					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine to medium sand; subangular to subrounded; trace coarse sand; no odor.			
310					Same as above (305 ft); 100% fine sand; trace medium sand; rounded; trace gravel; rounded.			
315					Same as above (305 ft); 85% fine sand; 10% medium sand; rounded; 5% gravel to 3cm; rounded	SP	Bentonite Seal	Kelly down @ 1010. New connection @ 1017. Resumed drilling @ 1017.
320					Same as above (305 ft).			
325					Poorly graded GRAVEL with Sand (GP); dark grayish brown (10YR 4/2); dry; dense; 55% fine to medium gravel; rounded; 45% fine to coarse sand; rounded; no odor.	GP		
330								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Poorly graded GRAVEL (GP); dark grayish bown (10YR 4/2); dry; dense; 90% fine to medium gravel; rounded; 10% coarse sand; rounded; no odor.	GP	Bentonite Seal	
340					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine to medium sand; subrounded to subangular; trace gravel; no odor.	SP	Top of Filter Pack	Kelly down @ 1031. New connection @ 1042. Resumed drilling @ 1042.
345					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; no odor.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Same as above (340 ft); 90% fine to coarse sand; 10% gravel to 2cm; rounded.			Kelly down @ 1052.
		SB0380	0.0					Blow counts (347-348.5'): 26/50. Blow counts (348.5-350'): 21/28. New connection @ 1120. Resumed drilling @ 1121.
350		SB0380						
					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 75% fine to coarse sand; rounded; 25% fine gravel to 1.5cm; rounded; no odor.	SW	Bottom of Screen	
355					Same as above (350 ft).		Bentonite Seal	Kelly down @ 1127. New connection @ 1133. Resumed drilling @ 1134.
360								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 90% fine to coarse sand; rounded; 10% gravel to 2cm; rounded; no odor.			
365					Same as above (360 ft); 95% fine to coarse sand; 5% gravel.			
370					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 65% fine to coarse sand; rounded; 35% fine to medium gravel; rounded; no odor.	SW		
375					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 85% fine to coarse sand; rounded; 15% gravel to 2.5cm; rounded; no odor.		- Bentonite Seal	Kelly down @ 1143. New connection @ 1148. Resumed drilling @ 1150.
380					Well graded SAND with Gravel (SW); dark grayish brown (10YR 4/2); dry; dense; 55% fine to coarse sand; rounded; 45% fine to medium gravel; rounded; no odor.			
385					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 95% fine to medium sand; subrounded; 5% coarse sand; rounded; trace gravel; rounded; no odor.	SP		
390								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine sand; rounded; trace medium sand; rounded; no odor.			
395					Same as above (390 ft); 100% fine to medium sand; rounded to subrounded.	SP		Kelly down @ 1158.
		SB0381	0.1					Blow counts (397-398.5'): 29/47. New connection @1220. Resumed drilling @ 1258.
400					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; trace gravel; no odor.	SW		
405					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine to medium sand; rounded to subrounded; trace fines; no odor.		Bentonite Seal	
410					Same as above (405 ft); trace coarse sand; rounded.	SP		
415					Same as above (405 ft).			Kelly down @ 1307. New connection @ 1319. Resumed drilling @ 1320.
420								

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; trace gravel to 1cm; rounded; no odor.	SW		
425					Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine to medium sand; rounded; trace coarse sand; trace fines; no odor.	SP		
430					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; subrounded to subangular; no odor.		- Bentonite Seal	
435					Same as above (430 ft); 90% fine to coarse sand; 10% gravel to 1cm; rounded.			Kelly down @ 1332. New connection @ 1340. Resumed drilling @ 1341.
440					Same as above (430 ft); 95% fine to coarse sand; rounded; 5% gravel; rounded.	SW	- Top of Filter Pack - Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Same as above (430 ft); 100% fine to coarse sand; rounded to angular; evenly distributed.			Kelly down @ 1347.
450		SB0382	NR					Blow counts (447-448.5'): 50/NA. Blow counts (448.5-450'): 50/NA. No recovery. Note:

Borehole ID: KAFB-106134

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 2/18/2011
Date TD Reached: 2/20/2011
Date Completed: 2/23/2011

Ground Elevation AMSL (ft): 5347.6
Y Coordinate: 1473812.20
X Coordinate: 1542371.29

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

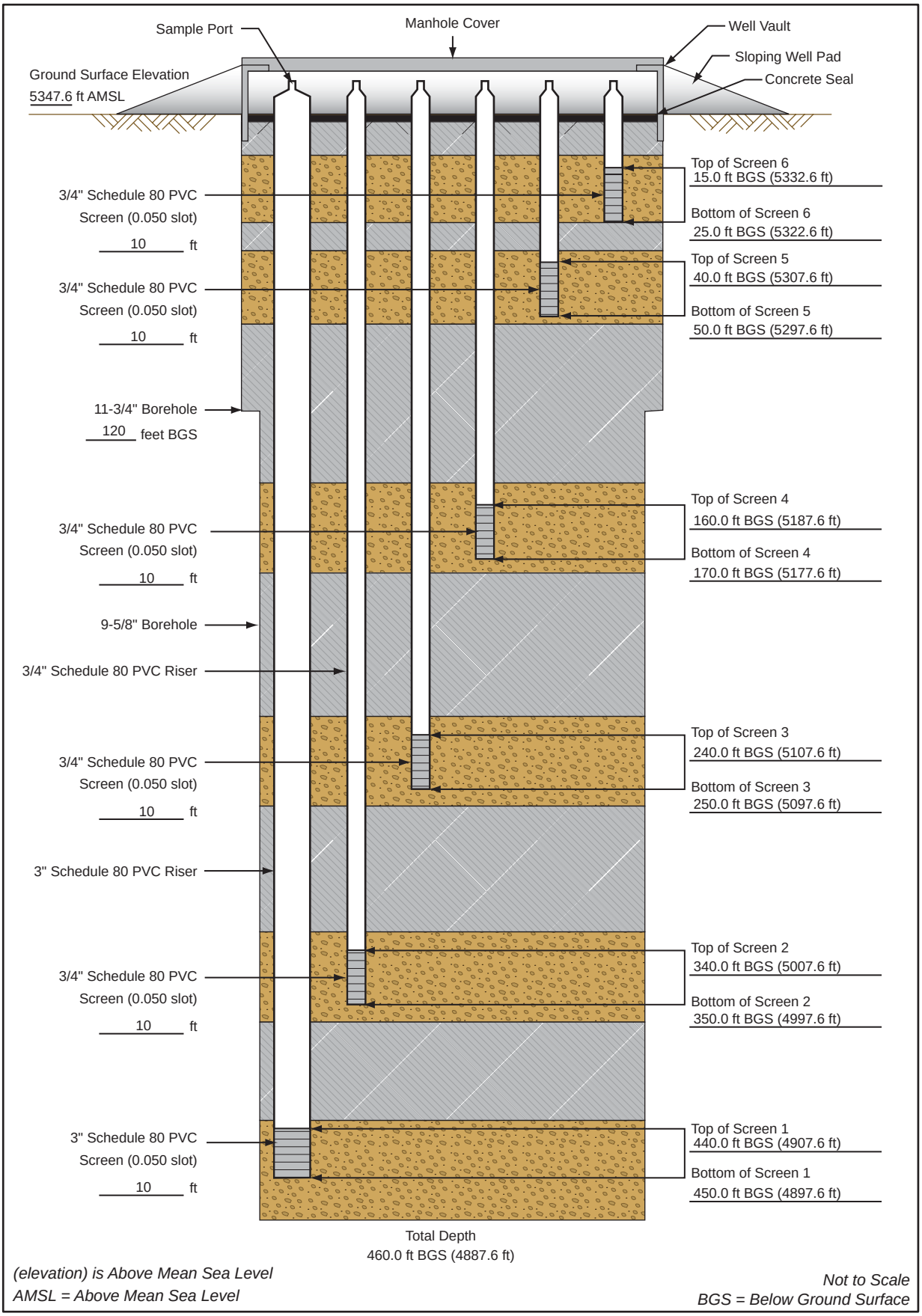
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Greg Peacock

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 95% fine to coarse sand; rounded; 5% fine gravel to 1.5cm; rounded; no odor.		Bottom of Screen	insufficient volume for headspace measurement. New connection @ 1414. Resumed drilling @ 1415.
455					Same as above (450 ft); 95% fine to coarse sand; 5% clay nodules to 3mm.	SW		Kelly down @ 1525.
460					Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 95% fine sand; rounded; 5% gravel to 2.5cm; rounded; no odor.	SP		Attempted to collect additional spilt spoon sample, but no recovery. Blow counts (457-458.5'): 50/Not Recorded. Total depth = 460 ft. Reached @ 1445 on 2/20/11.
465								Water added during drilling (gallons) = 0
470								Water added during construction (gallons) = Not Recorded
475								Kelly down: TD the joint and ready to make new connection
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106134

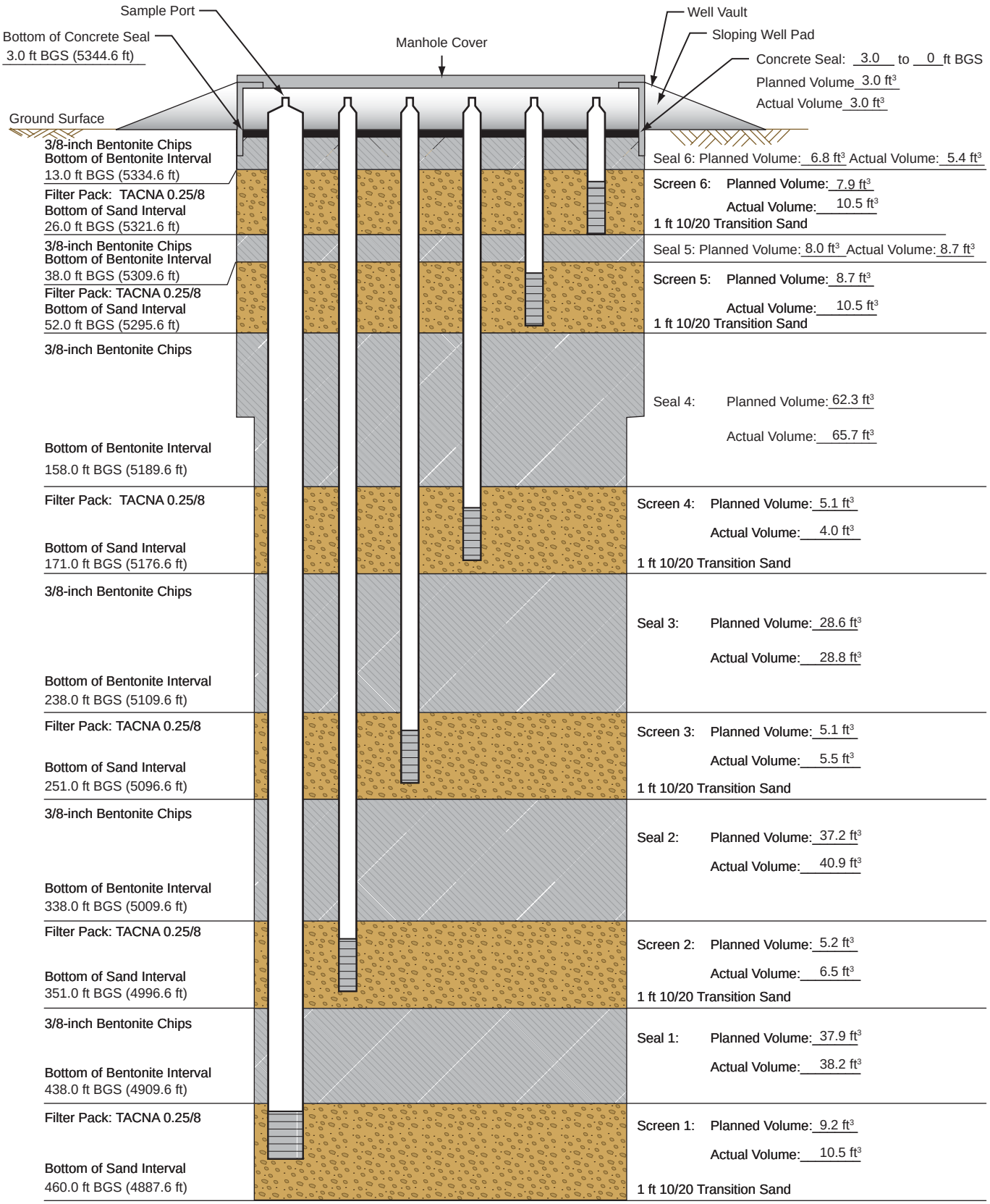
Installation Start Date/Time: 2/21/2011 @ 08:10
Installation End Date/Time: 2/23/2011 @ 12:00



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106134



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

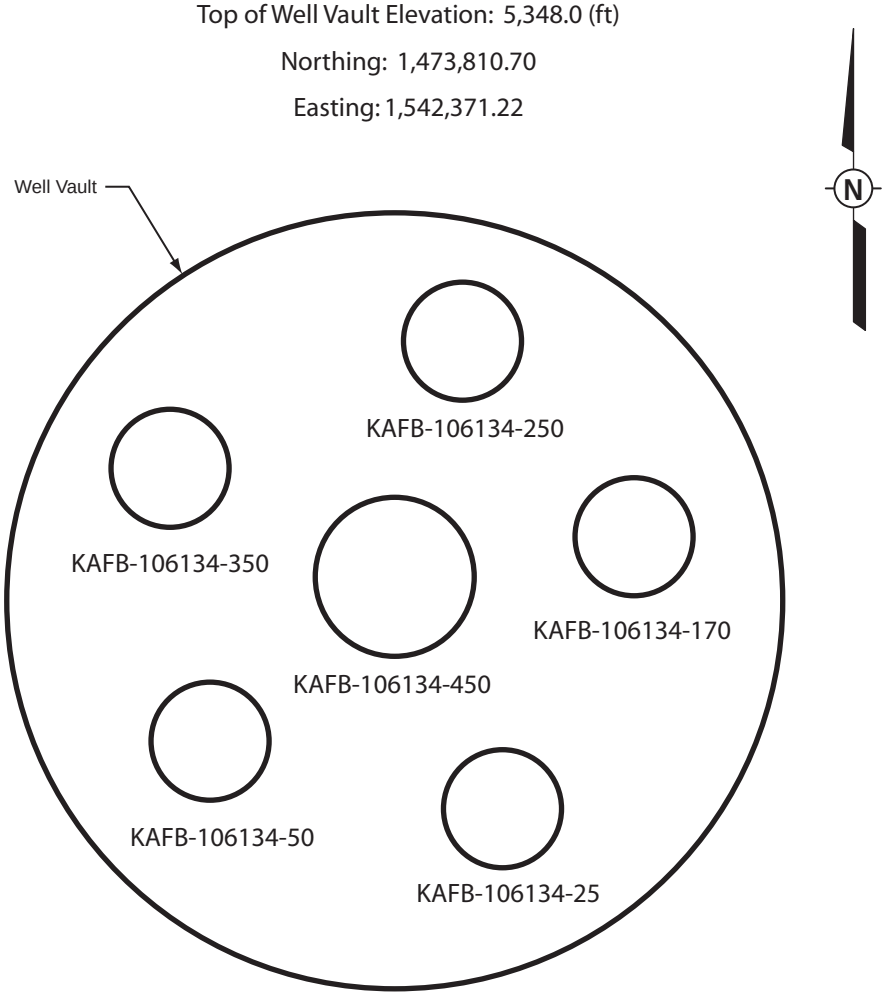
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106134

Top of Well Vault Elevation: 5,348.0 (ft)

Northing: 1,473,810.70

Easting: 1,542,371.22



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106134-25	3/4	25.0	15.0 - 25.0	1,473,809.91	1,542,371.26	5347.5
KAFB-106134-50	3/4	50.0	40.0 - 50.0	1,473,809.94	1,542,370.98	5347.5
KAFB-106134-170	3/4	170.0	160.0 - 170.0	1,473,810.19	1,542,371.37	5347.5
KAFB-106134-250	3/4	250.0	240.0 - 250.0	1,473,810.38	1,542,371.17	5347.4
KAFB-106134-350	3/4	350.0	340.0 - 350.0	1,473,810.22	1,542,370.87	5347.5
KAFB-106134-450	3	450.0	440.0 - 450.0	1,473,810.24	1,542,371.14	5347.5

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106135 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.		Concrete Seal	Hand augered. ***Note: no headspace requirement at this location*** Began drilling @ 0755 on 1/23/11.
5					Sandy SILT (ML); light brown (7.5YR 6/4); dry; very soft; low plasticity; 70% silt; 25% very fine sand; 5% medium sand to 0.4mm.	ML	Bentonite Seal	
10					Sandy SILT (ML); brown (7.5YR 5/4); moist; very soft; low plasticity; 70% silt; trace clay nodules; 25% very fine sand; 5% medium sand to 0.4mm.		Top of Filter Pack	
15					Same as above (10 ft); trace fine gravel to 7mm.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20					Same as above (10 ft); dry.			
25					Same as above (10 ft); dry; no clay.		Bottom of Screen	
30							Bentonite Seal	

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); brown (7.5YR 5/4); moist; very soft; low plasticity; 70% silt; 25% very fine sand; 5% medium sand to 0.4mm.		Bentonite Seal	
35					Same as above (30 ft); trace clay nodules.		Top of Filter Pack	
40					Same as above (30 ft); trace clay nodules.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					SILT with Sand (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 80% silt; 10% coarse sand; 10% fine gravel to 7mm.	ML		
50					SILT with Sand (ML); reddish brown (5YR 5/4); dry; very soft; low plasticity; 80% silt; 5% clay; 15% very fine sand to 0.2mm.		Bottom of Screen	
55					SILT (ML); reddish brown (5YR 5/4); dry; very soft; low plasticity; 80% silt; 10% lean clay; 10% very coarse sand.		Bentonite Seal	
60								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 80% silt; 15% very fine sand; 5% fine gravel to 4mm.			
65					Same as above (60 ft).			
70					Same as above (60 ft); trace clay nodules.			
75					Same as above (60 ft); no gravel.	ML	- Bentonite Seal	
80					Sandy SILT (ML); strong brown (7.5YR 4/6); dry; soft; low plasticity; 60% silt; 30% medium sand; 10% fine gravel to 5mm.			
85					Sandy SILT (ML); strong brown (7.5YR 4/6); dry; soft; low plasticity; 60% silt; trace clay nodules; 40% fine sand to 0.1mm.			
90								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Sandy SILT (ML); brown (7.5YR 5/4); dry; soft; low plasticity; 60% silt; 40% fine sand to 0.1mm.			
95					Same as above (90 ft); 60% silt; 40% very fine sand.			
100					SILT with Sand (ML); brown (7.5YR 5/4); dry; soft; medium plasticity; 70% silt; 15% clay; 15% very fine sand to 0.07mm.			
105					Same as above (100 ft); 70% silt; 10% clay; 15% very fine sand.	ML	- Bentonite Seal	
110					Sandy SILT (ML); brown (7.5YR 5/4); dry; soft; low plasticity; 70% silt; 30% very fine to medium sand to 0.4mm; trace clay nodules.			
115					Same as above (110 ft).			
120								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT (ML); brown (7.5YR 5/4); dry; soft; medium plasticity; 80% silt; 10% clay; 10% very fine sand to 0.06mm.			Pulled drill string and began installing 9-5/8" casing @ 0930.
125					SILT with Sand (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 70% silt; 5% clay; 25% very fine sand.	ML	Bentonite Seal	Began drilling 9-5/8" casing @ 1110.
130					Same as above (125 ft); trace fine gravel to 8mm.			
135					Silty SAND (SM); brown (7.5YR 4/4); dry; very loose; 80% fine sand to 0.1mm; rounded; 20% silt.		Top of Filter Pack	
140					Same as above (135 ft); trace medium sand.	SM	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Sandy SILT (ML); brown (7.5YR 5/4); dry; very soft; 70% silt; 30% very fine to fine sand to 0.2mm.	ML		
150								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 15:07 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Sandy SILT (ML); brown (7.5YR 5/4); dry; very soft; 70% silt; 30% very fine to fine sand to 0.2mm.		Bottom of Screen	
155					Same as above (150 ft); brown (7.5YR 4/3).			
160					Same as above (150 ft); moist; trace fine gravel to 4mm.	ML		
165					Sandy SILT (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 60% silt; 30% fine sand; 10% medium sand; trace fine gravel to 5mm.		Bentonite Seal	
170					Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 80% medium sand; 15% fine sand; 5% coarse sand; trace gravel to 1cm; subrounded.	SP		
175					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 85% very fine to very coarse sand; 10% fine gravel to 1.6cm; subrounded; 5% silt.	SW		
180								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Lean Clay (CL); brown (10YR 5/3); damp; soft; high plasticity; 60% clay; 30% silt; 10% fine sand to 0.08mm.	CL		
185					Well graded SAND with Silt (SW-SM); grayish brown (10YR 5/2); dry; very loose; 80% very fine to coarse sand; 5% very fine gravel to 5mm; subrounded; 10% silt.	SW-SM		
190					Silty SAND (SM); yellowish brown (10YR 5/4); moist; very loose; 75% very fine to very coarse sand; 10% fine gravel to 4mm; rounded; 15% silt; trace clay nodules.	SM	Bentonite Seal	
195					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); dry; very loose; 90% very fine to coarse sand; trace fine gravel to 1cm; rounded; 10% silt.	SW-SM		
200					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 95% very fine to coarse sand; trace gravel to 8mm; subangular; 5% silt.	SW		
205					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% medium sand to 0.4mm; subrounded; 5% silt.	SP	Native Backfill Bentonite Seal	
210								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 95% very fine to coarse sand; trace gravel to 8mm; subangular; 5% silt.	SW		
215					Sandy SILT (ML); brown (10YR 5/3); moist; soft; low plasticity; 60% silt; 40% very fine sand to 0.08mm.	ML		
220					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 90% very fine to very coarse sand; 10% fine gravel to 1cm; subrounded.		Bentonite Seal	
225					Same as above (220 ft); 15% gravel to 3cm.			
230					Same as above (220 ft).	SW		
235					Same as above (220 ft).			
240							Top of Filter Pack	

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 90% very fine to very coarse sand; 10% fine gravel to 1cm; subrounded.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Same as above (240 ft).			
250					Same as above (240 ft).		Bottom of Screen	
255					Same as above (240 ft).	SW		
260					Same as above (240 ft).		Bentonite Seal	
265					Same as above (240 ft).			
270								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Lean Clay (CL); brown (10YR 5/3); moist; soft; low plasticity; 90% clay; 10% silt to 0.01mm.	CL		
275					Well graded SAND with Silt (SW-SM); grayish brown (10YR 5/2); moist; loose; 90% very fine to very coarse sand; trace gravel to 4mm; subrounded; 10% silt.	SW-SM		
280					Same as above (275 ft).			
285					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% very fine sand to 0.04mm; rounded; 5% silt.	SP	Bentonite Seal	
290					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; very loose; 70% medium sand; 30% fine sand; trace fine gravel to 5mm; rounded; trace fines.			
295					Well graded SAND (SW); brown (10YR 4/3); moist; very loose; 100% very fine to very coarse sand; trace fine gravel to 8mm; subrounded; trace fines.	SW		
300								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Silty SAND (SM); brown (10YR 4/3); damp; loose; 70% fine sand to 0.08mm; subrounded; 20% silt; 10% clay.	SM		
305					Lean CLAY (CL); brown (10YR 5/3); moist; soft; medium plasticity; 70% clay; 30% silt to 0.01mm.	CL		
310					Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 90% medium sand; 10% coarse sand to 3mm; subrounded.	SP	Bentonite Seal	
315					Same as above (310 ft); trace clay nodules.			
320					Same as above (310 ft); moist; 5% gravel to 6mm.			
325					Same as above (310 ft); 90% coarse sand; gravel to 1.4cm.			
330								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 90% medium sand; 10% coarse sand to 3mm; subrounded.		Bentonite Seal	
335					Poorly graded SAND with Gravel (SP); dark yellowish brown (10YR 4/4); moist; loose; 80% fine sand; 15% fine gravel to 7mm; subangular; 5% fines.	SP	Top of Filter Pack	
340					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; very loose; 90% coarse sand; 10% fine gravel to 8mm; subrounded.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
					Poorly graded GRAVEL with Sand (GP); yellowish brown (10YR 5/4); dry; loose; 80% fine to medium gravel to 3.5cm; well rounded; 20% medium to coarse sand.	GP		
345					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 100% coarse sand to 2mm; rounded; trace fines.	SP		Driller added ~10 gallons H2O.
350					No cuttings returned.		Bottom of Screen	
355					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 100% coarse sand to 2mm; rounded; trace gravel to 9mm; trace fines;	SP	Bentonite Seal	
360								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 100% coarse sand to 2mm; rounded; trace fines.			
365					Same as above (360 ft); 100% medium sand; trace clay nodules.	SP		
370					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; very loose; 85% very fine to coarse sand; 15% fine gravel to 5mm; well rounded.			
375					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 95% very fine to coarse sand; 5% fine gravel to 5mm; well rounded.	SW	- Bentonite Seal	
380					Same as above (375 ft).			Driller added ~10 gallons H2O.
385					Poorly graded SAND with Gravel (SP); dark yellowish brown (10YR 4/4); dry; loose; 85% medium sand; 15% fine gravel to 2cm; subrounded.	SP		
390								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 95% coarse to very coarse sand; 5% fine gravel to 1.6cm; rounded.			
395					Same as above (390 ft); no gravel.			Driller added ~10 gallons H2O.
400					Same as above (390 ft); no gravel.	SP		
405					As above (390 ft); 95% medium sand; 5% coarse sand; no gravel.		Bentonite Seal	
410					As above (390 ft); 95% medium sand; 5% coarse sand; no gravel.			
415					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; very loose; 100% fine to very coarse sand to 3mm; subangular; trace fines.	SW		
420								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Well graded SAND (SW); dark yellowish brown (10YR 4/4); damp; very loose; 100% fine to very coarse sand to 3mm; subangular; trace fines.	SW		
425					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 100% medium sand; trace gravel to 8mm.		Bentonite Seal	Driller added ~10 gallons H2O.
430					Same as above (425 ft); 5% fine gravel to 1 cm.			
435					Same as above (425 ft); 100% coarse sand; trace clay nodules.	SP	Top of Filter Pack	
440					Same as above (425 ft); no gravel.		Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Same as above (425 ft); no gravel.			
450								

Borehole ID: KAFB-106135

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/23/2011
Date TD Reached: 1/23/2011
Date Completed: 2/5/2011

Ground Elevation AMSL (ft): 5351.1
Y Coordinate: 1474070.68
X Coordinate: 1542905.14

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

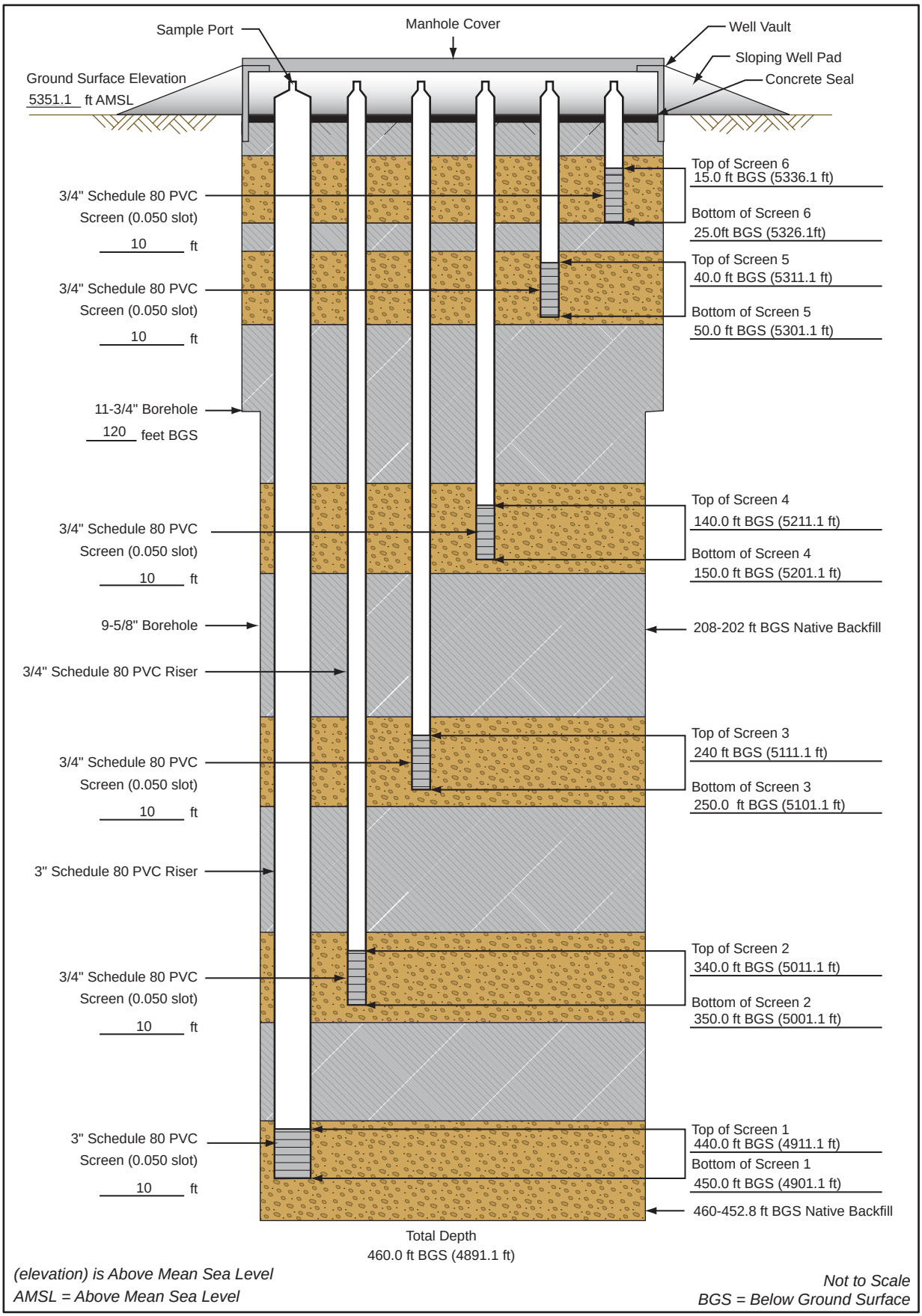
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 100% medium sand; no gravel.	SP	Bottom of Screen; Bottom of Filter Pack	
455					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 85% medium sand; 10% coarse sand to 1.2mm; subrounded; 5% fines.		Native Backfill	
460					Well graded SAND (SW); dark yellowish brown (10YR 4/4); dry; very loose; 95% very fine to very coarse sand; 5% fine gravel to 4mm; subangular.	SW		
					Poorly graded SAND (SP); yellowish brown (10YR 5/4); dry; very loose; 90% medium sand to 0.7mm; 10% fine sand; subangular.	SP		Total depth = 460 ft. Reached @ 1550 on 1/23/11. Water added during drilling (gallons) = 40 Water added during construction (gallons) = Not Recorded
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106135

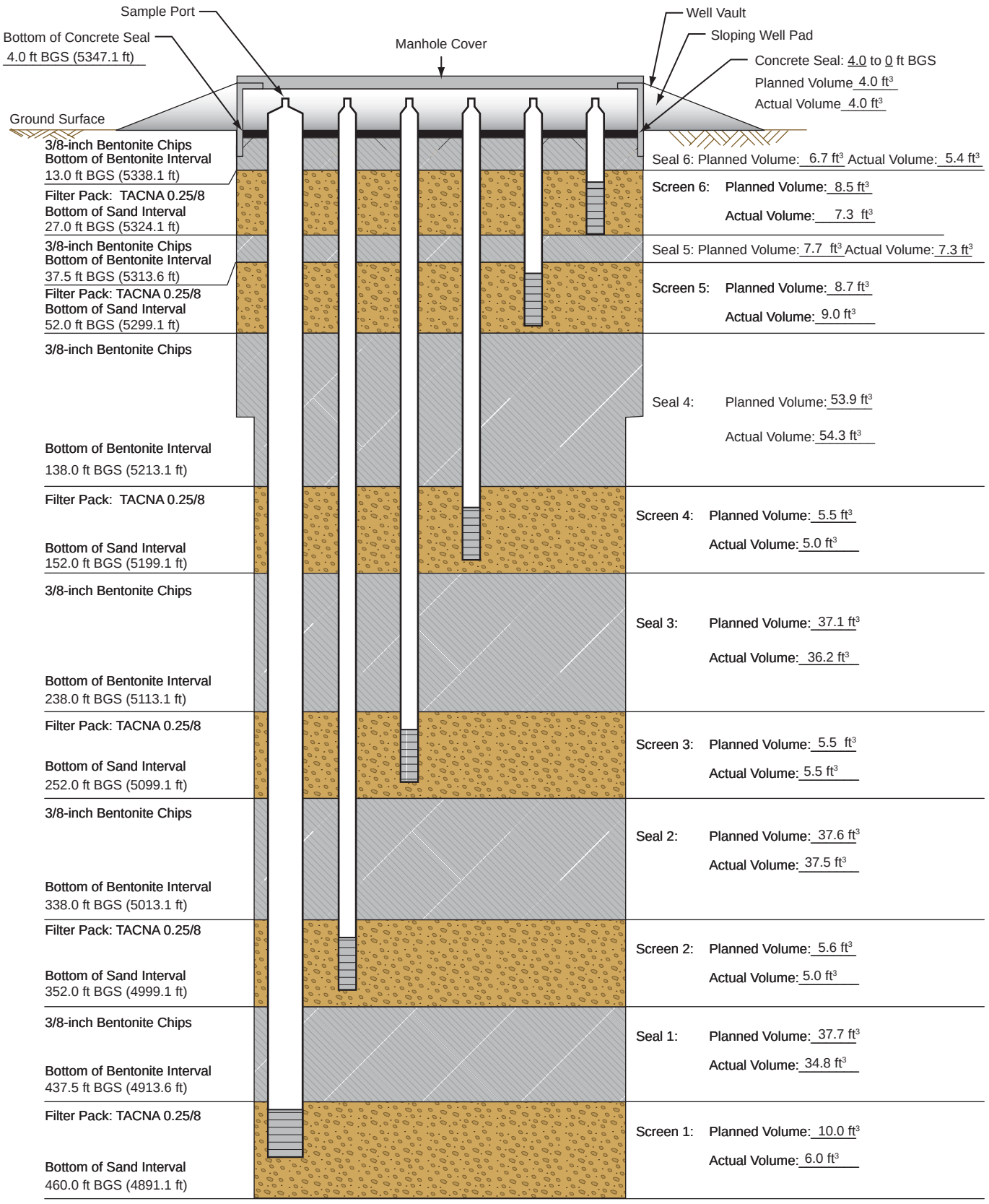
Installation Start Date/Time: 2/3/2011 @ 12:30
Installation End Date/Time: 2/5/2011 @ 16:45



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106135



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

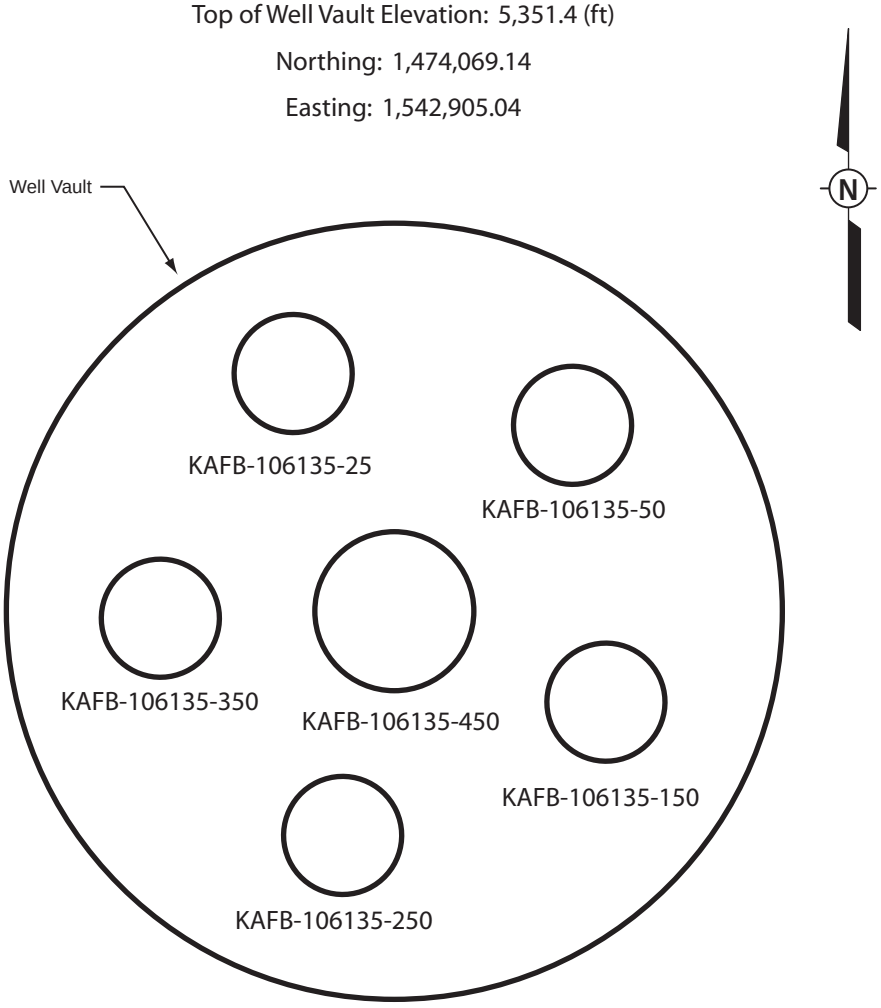
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106135

Top of Well Vault Elevation: 5,351.4 (ft)

Northing: 1,474,069.14

Easting: 1,542,905.04



Well Number	Well Diameter (in)	Well Depth (ft BGS)	Screened Interval (ft BGS)	Northing	Easting	Elevation (ft AMSL)
KAFB-106135-25	3/4	25.0	15.0-25.0	1,474,068.94	1,542,905.05	5,350.9
KAFB-106135-50	3/4	50.0	40.0-50.0	1,474,068.73	1,542,905.26	5,350.9
KAFB-106135-150	3/4	150.0	140.0-150.0	1,474,068.42	1,542,905.12	5,350.9
KAFB-106135-250	3/4	250.0	240.0-250.0	1,474,068.53	1,542,904.79	5,350.9
KAFB-106135-350	3/4	350.0	340.0-350.0	1,474,068.83	1,542,904.80	5,350.9
KAFB-106135-450	3	450.0	440.0-450.0	1,474,068.80	1,542,904.98	5,350.9

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106137 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.		Concrete Seal	Hand augered. ***Note: no headspace requirement at this location*** Began drilling @ 1212 on 1/18/11.
5					SILT with Sand (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 80% silt; 15% fine sand; 5% fine gravel to 1.4cm.	ML	Bentonite Seal	
10					Same as above (5 ft).		Top of Filter Pack	
15					Same as above (5 ft); 7% gravel.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20					Same as above (15 ft).			
25					Same as above (15 ft).		Bottom of Screen	
30							Bentonite Seal	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT with Sand (ML); brown (7.5YR 4/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse sand to 4mm.	ML	Bentonite Seal	
35					Same as above (30 ft); no coarse sand; trace fine gravel to 1.5cm; trace clay nodules.		Top of Filter Pack	
40					Same as above (30 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					Same as above (30 ft).			
50					Gravelly SILT (ML); brown (7.5YR 5/4); dry; very soft; nonplastic; 70% silt; 30% fine gravel to 1.2 cm.		Bottom of Screen	
55					Same as above (50 ft).		Bentonite Seal	
60								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); brown (7.5YR 4/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse sand to 4mm.	ML		
65					Same as above (60 ft).			
70					Same as above (60 ft); trace fine gravel to 8 mm.			
75					Same as above (60 ft); 80% silt; 10% very fine sand; 10% coarse sand; trace gravel to 9mm.		Bentonite Seal	
80					SILT (ML); brown (7.5YR 4/4); dry; soft; medium plasticity; 80% silt; 15% clay; 5% very fine sand; trace coarse sand to 2mm.			
85					SILT with Sand (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 70% silt; 5% clay nodules; 15% very fine sand; 10% coarse sand to 3mm.			
90								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					SILT with Sand (ML); brown (7.5YR 5/4); dry; very soft; low plasticity; 75% silt; 15% very fine sand; 10% coarse sand to 3mm.		Bentonite Seal	
95					Same as above (90 ft).	ML		
100					SILT with Sand (ML); brown (7.5YR 4/4); moist; soft; medium plasticity; 65% silt; 10% clay; 20% very fine sand; 5% coarse sand to 3mm.			
105					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 90% medium sand; 5% coarse sand to 2mm; subangular; 5% fine sand.		Native Backfill	
110					Same as above (105 ft); trace gravel to 1.7cm.	SP		
115					Sandy SILT (ML); brown (7.5YR 4/4); dry; very soft; low plasticity; 70% silt; 25% fine sand; 5% coarse sand to 5mm.		Bentonite Seal	
120						ML		

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					SILT with Sand (ML); brown (7.5YR 5/4); moist; soft; medium plasticity; 60% silt; 20% clay; 15% very fine sand; 5% coarse sand to 5mm.	ML		Reached 120' with 11-3/4" casing @1346.
125					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine sand to 0.04mm; rounded; 40% silt; trace clay nodules.	SM	- Bentonite Seal	Began drilling on 1/19/11 @ 1000.
130					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 70% silt; 20% very fine sand; 10% medium sand; trace coarse sand to 4mm.	ML		
135					Well graded SAND (SW); brown (10YR 5/3); dry; very loose; 100% very fine to coarse sand to 5mm; subangular.	SW	- Top of Filter Pack	
140					SILT (ML); pale brown (10YR 6/3); moist; firm; medium plasticity; 60% silt; 35% clay; 5% very fine sand to 0.04mm.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					SILT with Sand (ML); yellowish brown (10YR 5/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse sand to 3mm.	ML		
150								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					SILT with Sand (ML); yellowish brown (10YR 5/4); moist; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse sand to 3mm.		Bottom of Screen	
155					SILT (ML); brown (7.5YR 5/4); moist; soft; medium plasticity; 70% silt; 25% clay; 5% very fine sand to 0.04mm.	ML		
160					Silty SAND (SM); dark yellowish brown; dry; very loose; 80% medium sand to 0.4mm; subangular; 20% silt.	SM		
165					Well graded SAND with Silt (SW-SM); brown (10YR 5/3); moist; very loose; 80% fine to coarse sand; 10% fine gravel to 1cm; subrounded; 10% silt.	SW-SM	Bentonite Seal	
170					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 90% fine to medium sand; 10% coarse sand to 2mm; subrounded.			
175					Same as above (170 ft); moist.	SW		
180								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 90% fine to medium sand; 10% coarse sand to 2mm; subrounded.			
185					Well graded SAND (SW); brown (10YR 5/3); moist; loose; 90% fine to medium sand; 10% coarse sand to 2mm; rounded.			
190					Same as above (185 ft); 15% coarse sand; trace fine gravel to 1.1cm.	SW		
195					Same as above (185 ft).		Bentonite Seal	
200					Same as above (185 ft).			
205					Poorly graded SAND (SP); brown (10YR 4/3); moist; very loose; 70% medium sand; 20% fine sand; 10% coarse sand to 3mm; rounded.	SP		
210								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND (SP); brown (10YR 4/3); moist; very loose; 70% medium sand; 20% fine sand; 10% coarse sand to 3mm; rounded.			
215					Same as above (210 ft); dry; 70% medium sand; 30% very fine sand.	SP		
220					Same as above (210 ft).		Bentonite Seal	
225					Well graded SAND (SW); grayish brown (10YR 5/2); moist; loose; 95% very fine to very coarse sand; 5% fine gravel to 1.3cm; rounded.			
230					Same as above (225 ft); 10% fine gravel.	SW		
235					Same as above (225 ft).			
240							Top of Filter Pack	

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND (SW); grayish brown (10YR 5/2); moist; loose; 95% very fine to very coarse sand; 5% fine gravel to 1.3cm; rounded; less coarse sand.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245					Well graded SAND (SW); grayish brown (10YR 5/2); moist; loose; 90% very fine to coarse sand; 10% fine gravel to 1.3cm; rounded.			
250					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; loose; 85% fine to very coarse sand; 15% fine gravel to 2.3cm; well rounded.	SW	Bottom of Screen	
255					Well graded SAND (SW); brown (10YR 4/3); moist; loose; 90% fine to very coarse sand; 5% fine gravel to 1.8cm; well rounded.			
260					SILT (ML); brown (10YR 5/3); damp; soft; medium plasticity; 60% silt; 30% clay; 10% very fine sand; trace medium gravel to 3.5cm.	ML	Bentonite Seal	
265					Silty SAND (SM); brown (10YR 5/3); moist; loose; 80% fine sand; 20% silt; trace fine gravel to 8mm; rounded; 20% silt.	SM		
270								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					SILT (ML); brown (10YR 4/3); dry to moist; soft; medium plasticity; 60% silt; 40% clay.			
275					SILT (ML); yellowish brown (10YR 5/4); moist; soft; medium plasticity; 80% silt; 10% clay; 10% coarse sand to 1mm.	ML		
280					SILT (ML); brown (10YR 4/3); dry to moist; soft; medium plasticity; 60% silt; 40% clay.			
					Silty SAND (SM); dark yellowish brown (10YR 4/4); moist; very loose; 80% very fine to very coarse sand to 4mm; subrounded; 15% silt; 5% clay nodules.	SM		
285					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% fine sand to 0.04mm; rounded; 5% silt.		Bentonite Seal	
290					Same as above (284 ft); slightly coarser.	SP		
295					Same as above (284 ft); dry to moist.			
300								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% medium sand to 0.04mm; rounded; 5% silt.	SP		
305					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 100% fine to very coarse sand; trace fine gravel to 7mm; subrounded.	SW		
310					Same as above (305 ft).			
315					Well graded SAND with Gravel (SW); brown (10YR 4/3); dry; very loose; 85% fine to very coarse sand; 15% fine gravel; subrounded.		Bentonite Seal	
320					Well graded SAND with Silt and Gravel (SW-SM); dark yellowish brown (10YR 4/6); dry; very loose; 70% fine to very coarse sand; 20% fine to medium gravel to 3.2cm; well rounded; 10% silt.	SW-SM		
325					Same as above (320 ft).			
330								

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330								
335					Poorly graded GRAVEL with Sand (GP); dark yellowish brown (10YR 4/4); dry; very loose; 80% fine to medium gravel to 4cm; 20% medium to coarse sand; well rounded.	GP	Bentonite Seal	
					No cuttings returned.			Driller added ~20 gallons of water. No cuttings returned @ 335 ft.
340							Top of Filter Pack	
					Poorly graded SAND with Gravel (SP); dark yellow brown (10YR 4/4); dry; very loose; 70% medium to very coarse sand; 30% fine gravel to 8mm; rounded.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Stopped to fix rubber on top of hammer to keep cuttings from blowing out @ 1300. Resumed drilling @ 1332.
345								
					Poorly graded SAND with Silt (SP-SM); brown (10YR 4/3); wet; loose; 90% medium sand to 0.4mm; rounded; 10% silt.	SP-SM		
350								
					Same as above (345 ft); dry to moist.		Bottom of Screen	
355								
					Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; very loose; 90% medium sand; 10% coarse sand to 2mm; subrounded; trace fines.	SP	Bentonite Seal	
360								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 95% fine to very coarse sand to 3mm; subrounded; 5% silt.		Bentonite Seal	
365					Same as above (360 ft); 5% fine gravel to 1cm; overall slightly coarser.	SW	Native Backfill	
370					Same as above (360 ft).		Bentonite Seal	
375					Poorly graded SAND with Gravel (SP); dark yellowish brown (10YR 4/4); moist; very loose; 80% medium sand; 5% fine sand; 15% fine gravel to 1.7cm; well rounded.			
380					Same as above (375 ft); 90% medium sand; 5% gravel.	SP	Native Backfill	
385					Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; very loose; 85% fine to very coarse sand; 15% fine gravel to 1cm; subrounded.	SW		
390							Bentonite Seal	

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:45 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 100% fine to very coarse sand; subrounded.		Bentonite Seal	
395					Same as above (390 ft); trace gravel.	SW		
400					Same as above (390 ft); trace gravel.		Native Backfill	
405					Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 90% medium sand; 5% fine sand; 5% coarse sand; trace fine gravel to 8mm; subangular.			
410					Same as above (405 ft); dry.	SP		
415					Same as above (405 ft); dry.		Bentonite Seal	
420								

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420								
425					Poorly graded SAND with Silt (SP-SM); yellowish brown (10YR 5/4); moist; loose; 80% medium sand; 10% fine gravel to 2cm; rounded; 10% silt.	SP-SM		
430					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% medium sand to 0.4mm; rounded; 5% fines.	SP	- Bentonite Seal	
435					Same as above (425 ft).			
440					Well graded SAND (SW); brown (10YR 5/3); dry; very loose; 95% fine to very coarse sand; 5% fine gravel to 1.1cm; subangular.	SW	- Top of Filter Pack - Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Same as above (435 ft).			
450					Same as above (435 ft); slightly coarser.			

Borehole ID: KAFB-106137

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/18/2011
Date TD Reached: 1/19/2011
Date Completed: 1/25/2011

Ground Elevation AMSL (ft): 5347.3
Y Coordinate: 1474079.39
X Coordinate: 1542321.46

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

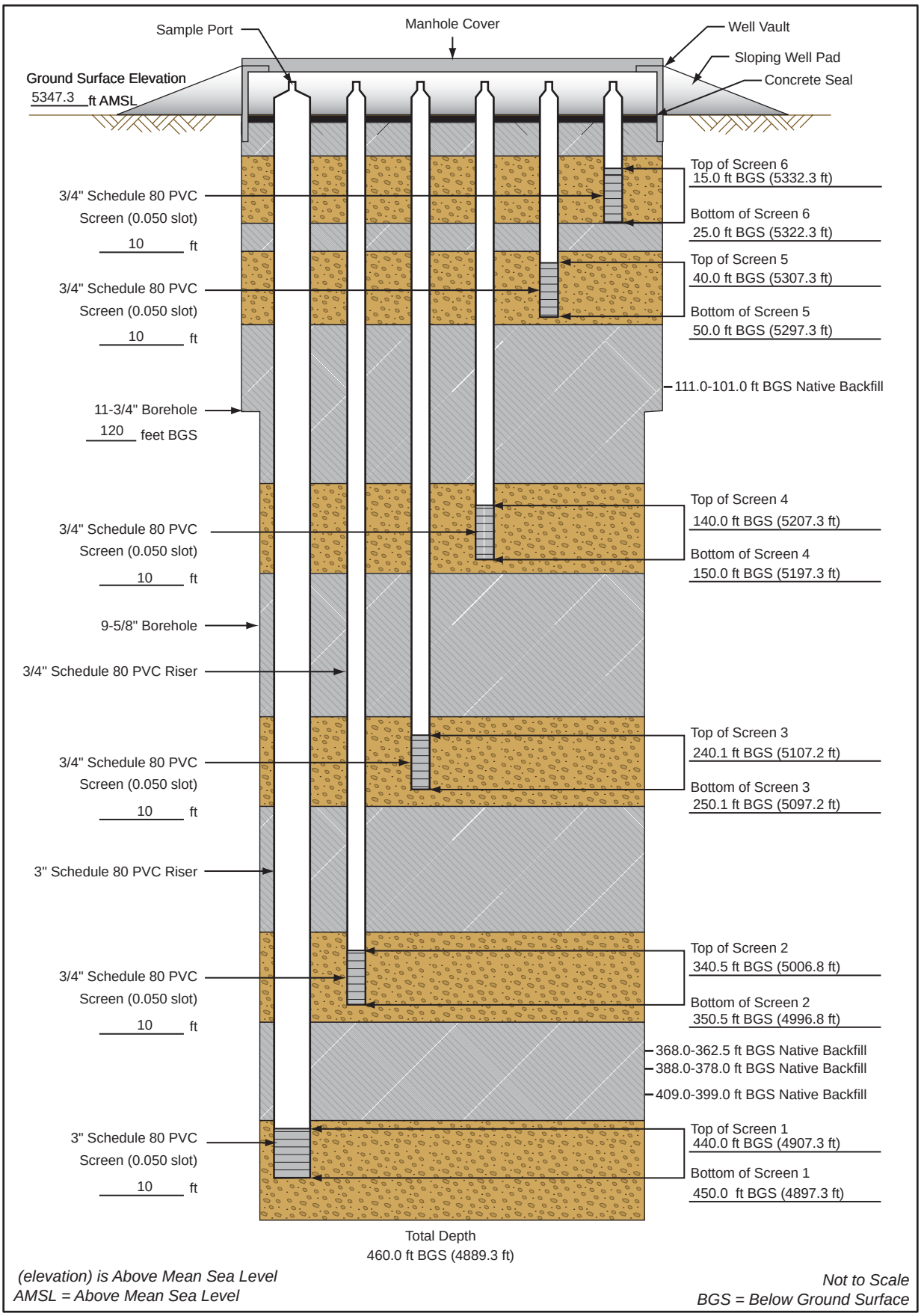
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
455					Well graded SAND (SW); brown (10YR 5/3); dry; very loose; 95% fine to very coarse sand; 5% fine gravel to 1.1cm; subangular.	SW	Bottom of Screen	
					Well graded GRAVEL with Silt and Sand (GW-GM); yellowish brown (10YR 5/4); moist; very loose; 60% fine gravel to 2.6cm; well rounded; 30% medium to coarse sand; 10% silt; trace clay nodules.	GW-GM		
460					Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 70% medium sand; 20% coarse sand to 1mm; rounded; 10% fine sand.	SP		Total Depth = 460 ft. Reached @ 1510 on 1/25/11.
465								Water added during drilling (gallons) = 20
470								Water added during construction (gallons) = Not Recorded
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106137

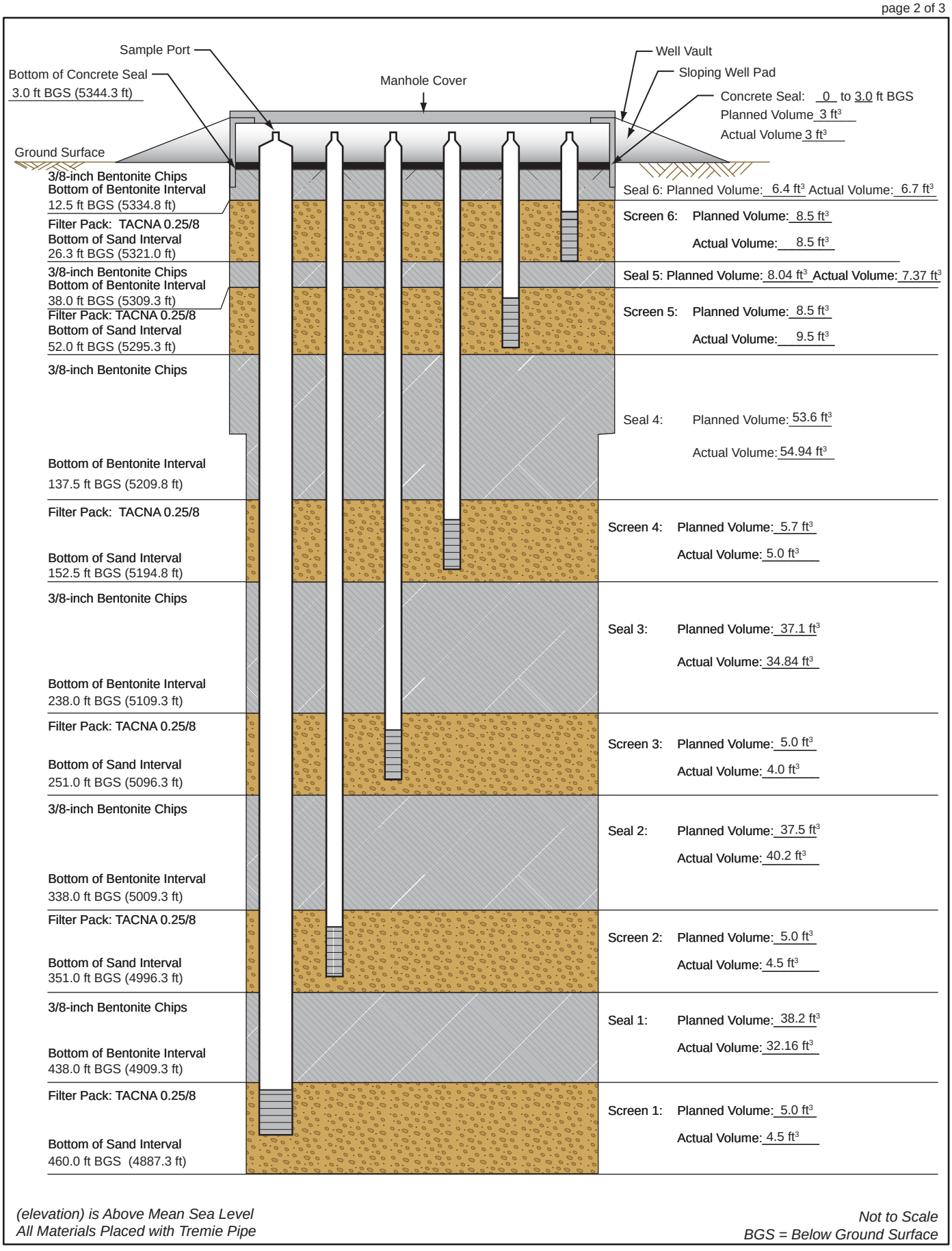
Installation Start Date/Time: 1/20/2011 @ 08:00
Installation End Date/Time: 1/22/2011 @ 11:37



(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram for KAFB-106137



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

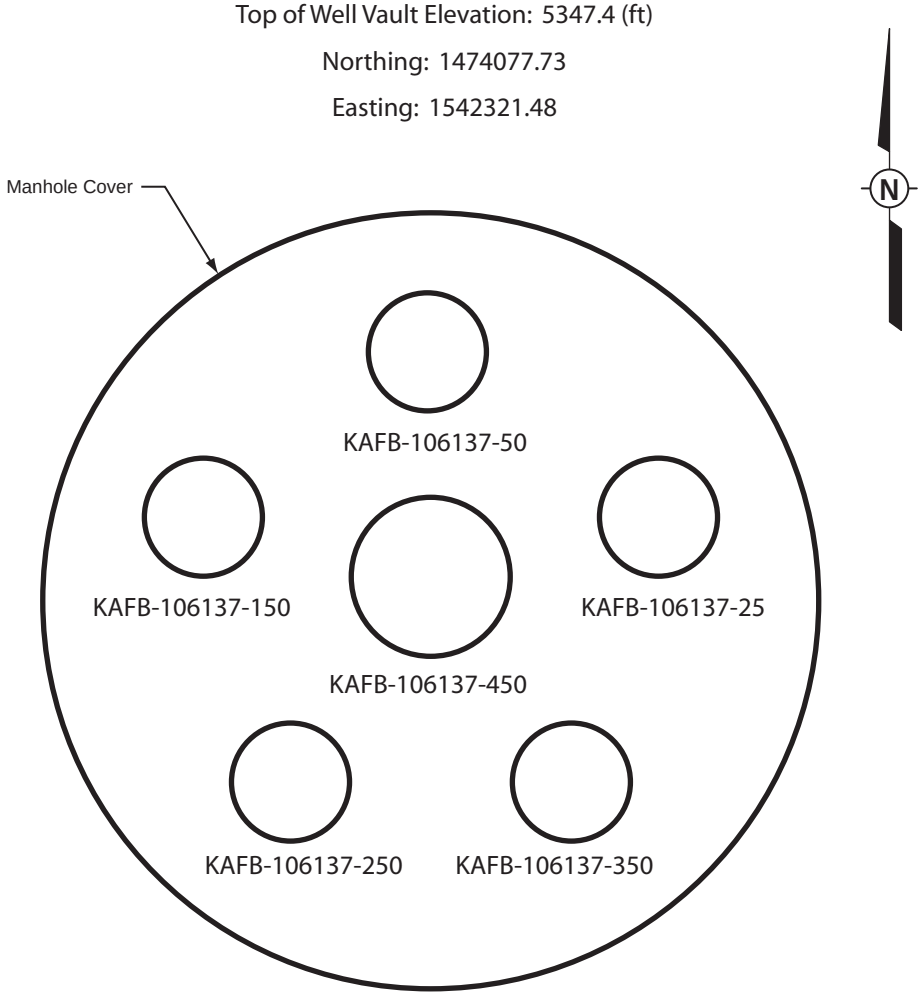
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106137

Top of Well Vault Elevation: 5347.4 (ft)

Northing: 1474077.73

Easting: 1542321.48



Well Number	Well Diameter	Well Depth	Screened Interval	Northing	Easting	Elevation
KAFB-106137-25	3/4	25.0	15.0 - 25.0	1,474,077.36	1,542,321.63	5,346.8
KAFB-106137-50	3/4	50.0	40.0 - 50.0	1,474,077.54	1,542,321.39	5,346.7
KAFB-106137-150	3/4	150.0	140.0 - 150.0	1,474,077.35	1,542,321.11	5,346.7
KAFB-106137-250	3/4	250.1	240.1 - 250.1	1,474,077.08	1,542,321.25	5,346.9
KAFB-106137-350	3/4	350.5	340.5 - 350.5	1,474,077.09	1,542,321.59	5,346.9
KAFB-106137-450	3	450.0	440.0 - 450.0	1,474,077.42	1,542,321.39	5,346.9

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106139 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					Silty SAND (SM); light reddish brown (2.5YR 7/4); dry; loose; 60% fine sand; trace medium to coarse sand; 10% fine to coarse gravel to 3cm; subangular; 30% silt with clay.	SM	Concrete Seal	Hand augered. ***Note: No headspace requirement at this location***
5					Sandy SILT (ML); yellowish red (5YR 5/6); dry; soft; 65% silt with clay; 35% fine sand.		Bentonite Seal	Began drilling 11-3/4" borehole @ 1600 on 1/5/11.
10					Same as above (5 ft); yellowish red (5YR 4/6).		Top of Filter Pack	
15					Same as above (5 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20					SILT with Gravel (ML); light reddish brown (5YR 6/4); dry; soft; 75% silt with clay; 25% fine gravel to 1cm.	ML		
25					SILT with Sand (ML); reddish brown (5YR 5/4); dry; soft; 80% silt with minor clay; 20% fine to coarse sand; subrounded.			New connection @ 1637.
30					Same as above (20 ft); reddish brown (2.5YR 4/4).		Bottom of Screen Bentonite Seal	

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					Sandy SILT (ML); reddish brown (2.5YR 4/4); dry; soft; 70% silt with minor clay; 25% fine to coarse sand; 5% fine gravel to 1.5cm; subangular.		Bentonite Seal	
35					Same as above (30 ft).	ML		
40							Top of Filter Pack	End of 1/5/11.
					Silty SAND with Gravel (SM); reddish brown (2.5YR 4/4); dry; loose; 60% fine to coarse sand; subrounded; 20% fine gravel to 1cm; subrounded; 20% silt with clay.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Resumed drilling on 1/6/11. New connection @ 0809. Resumed drilling @ 0811.
45					Silty SAND (SM); red (2.5YR 4/6); dry; loose; 60% fine sand; 10% fine gravel to 1cm; subangular; 30% silt and clay.			
50					Same as above (45 ft).	SM	Bottom of Screen	
55					Same as above (45 ft).		Bentonite Seal	
60								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
60					SILT with Sand (ML); red (10R 4/6); dry; soft; 75% silt with minor clay; 25% fine to coarse sand; subangular to subrounded.			New connection @ 0837. Resumed drilling @0840.
65					SILT (ML); red (2.5YR 4/6); dry; soft; 90% silt with minor clay; 10% fine sand.			Rate of penetration slowed past 65'.
70					SILT with Sand (ML); red (2.5YR 4/6); dry; soft; 80% silt with minor clay; 20% fine to coarse sand; subangular to subrounded.	ML		
75					Same as above (70 ft); red (2.5YR 5/6); 85% silt with minor clay; 15% sand.		Bentonite Seal	Rig chatter past 75'.
80					Sandy SILT (ML); reddish brown (2.5YR 5/4); dry; moderate cementation; 70% silt; 25% fine to coarse sand; subrounded; 5% fine gravel to 1cm; subangular.			New connection @ 0917. Resumed drilling @ 0921. Rig chatter past 80', trouble driving casing. Bit stuck below below 80'.
85					Well graded SAND with Gravel (SW); weak red (2.5YR 5/2); dry; loose; 80% fine to coarse sand; 20% fine gravel to 1cm; subrounded.	SW		Bit free @ 0935, drove casing easily.
90								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Well graded SAND (SW); weak red (2.4YR 5/2); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% fine gravel to 1cm; subrounded; gravel consists of lithic fragments (granite, some volcanics) and trace feldspars.	SW		
95					Same as above (90 ft).			
100					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 100% fine sand.	SP	- Bentonite Seal	New connection @ 0954. Resumed drilling @ 0959.
105					Same as above (100 ft).			
110					Poorly graded SAND with Silt (SP-SM); weak red (2.5YR 5/2); dry; loose; 90% fine sand; 10% silt.	SP-SM		
115					SILT (ML); reddish brown (2.5YR 4/4); moist; soft; low plasticity; 90% silt with clay; 10% fine sand. Same as above (113 ft).	ML		
120								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Lean CLAY (CL); reddish brown (2.5YR 4/4); moist; firm; medium plasticity; 90% silty clay; 10% fine sand.	CL		New connection @ 1103. Began driving to TD 11-3/4" @1105. Stopped drilling @ 120' at 1110. Bit packed off @ TD.
125					Silty SAND (SM); weak red (2.5YR 5/2); dry; loose; 70% fine sand; 30% silt and clay nodules.	SM	- Bentonite Seal	Bit free @ 1131, began tripping out.
130					Well graded SAND with Silt (SW-SM); weak red (2.5YR 5/2); dry; loose; 90% fine to coarse sand; subangular to subrounded; 10% silt and trace clay.	SW-SM		9-5/8" to TD, new connection made (140' total). Resumed drilling @ 1604. Resumed @ 1615.
135					Poorly graded SAND with Silt (SP-SM); reddish brown (2.5YR 5/3); dry; loose; 90% fine sand; 10% silt.	SP-SM	- Top of Filter Pack	
140					Same as above (135 ft); 5% fine gravel to 1.5cm; rounded.		- Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @ 1658. Resumed drilling @ 1700.
145					Well graded SAND with Clay and Gravel (SW-SC); weak red (2.5YR 5/2); dry; loose; 75% fine to coarse sand; subangular to subrounded; 15% gravel to 2cm; subangular; 10% clay nodules.	SW-SC		
150								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 90% fine to medium sand; 10% fine gravel to 1cm; subangular.		Bottom of Screen	
155					Same as above (150 ft).			End of 1/6/11.
160					Same as above (150 ft).	SP		New connection @ 0938 on 1/7/11. Resumed drilling @ 0940.
165					Same as above (150 ft); coarser sand; sand is predominantly quartz, feldspars, and lithic fragments.		Bentonite Seal	
170					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 100% fine to medium sand; subrounded.			
175					Well graded SAND (SW); weak red (2.5YR 5/2); dry; loose; 100% fine to coarse sand; subrounded; trace fine gravel to 1cm; subrounded.	SW		
180								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Well graded SAND with Gravel (SW); weak red (2.5YR 5/2); dry; loose; 85% fine to coarse sand; subrounded; 15% fine to coarse gravel to 3cm; subrounded.	SW		New connection @ 0958. Resumed drilling @ 1000. 200' total in drill string.
185					Well graded SAND with Silt and Gravel (SW-SM); reddish gray (5YR 5/2); dry; loose; 70% fine to coarse sand; subrounded; 20% fine to coarse gravel to 2cm; subrounded; 10% silt.	SW-SM	- Bentonite Seal	Pumice clasts noted
190					Same as above (185 ft); 75% sand; 15% gravel; 10% silt.			
195					Same as above (185 ft); quartizite gravel.			Stopped drilling @ 1010. New connection @ 1046. Resumed drilling @ 1048.
200					Same as above (185 ft); 70% sand; 20% gravel; 10% silt.			2nd compressor online.
205					Silty SAND with Gravel (SM); reddish gray (5YR 5/2); moist; loose; 65% fine to coarse sand; 20% gravel to 4cm; subrounded; 15% silt with minor clay.	SM		
210								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Poorly graded SAND with Silt (SP-SM); reddish gray (5YR 5/2); dry; loose; 90% fine sand; trace fine gravel to 1cm; 10% silt.	SP-SM		
215					Silty SAND (SM); reddish gray (5YR 5/2); dry; loose; 80% fine sand; 20% silt.	SM		
220					Well graded SAND (SW); reddish grey (5YR 5/2); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% fine gravel to 1.5cm; subrounded.	SW	Bentonite Seal	New connection @ 1139. Resumed drilling @ 1141.
225					Same as above (220 ft).			
230					Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; loose; 85% fine to coarse sand; subangular to subrounded; 15% gravel to 4cm; subangular to subrounded.			
235					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; loose; 100% fine sand; some medium; trace silt.	SP	Top of Filter Pack	Stopped drilling @ 1157.
240								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; loose; 100% fine sand; some medium; trace silt.	SP	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	New connection @1209. Resumed drilling @ 1210.
245					Poorly graded SAND with Silt (SP-SM); reddish gray (5YR 5/2); dry to moist; loose; 90% sand; 10% silt.	SP-SM		Rate of penetration slowed below 235' bgs.
250					Same as above (245 ft).		Bottom of Screen	
255					Same as above (245 ft).			Stopped drillng @ 1238. End of 1/7/11.
260					Silty SAND (SM); brown (7.5YR 4/3); dry to moist; loose; 80% fine sand; 20% silt.	SM	Bentonite Seal	New connection @ 1000 on 1/8/11. Resumed drilling @ 1006.
265					Well graded SAND (SW); weak red (2.5YR 5/2); dry to moist; loose; 95% fine to coarse sand; subangular to subrounded; 5% fine gravel to 1cm; subangular.	SW		
270								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270								
					Well graded SAND (SW); weak red (2.5YR 5/2); dry to moist; loose; 95% fine to coarse sand; subangular to subrounded; 5% fine to medium gravel to 3cm; subrounded.	SW		Rate of penetration increased.
275								
					Silty GRAVEL with Sand (GM); brown (7.5YR 4/4); moist; loose; 60% fine to coarse gravel to 5cm; subrounded to subangular; 25% fine to coarse sand; subrounded; 15% silt and clay.	GM		
280								
					Poorly graded SAND with Silt (SP-SM); weak red (2.5YR 4/2); dry; loose; 90% fine sand with minor medium sand; 10% silt.			Stopped drilling @ 1010. New connection @ 1022.
285								
					Same as above (280 ft); trace coarse sand; subrounded to subangular.	SP-SM	Bentonite Seal	
290								
					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; 5% silt.			
295								
					Same as above (290 ft).	SP		Stopped drilling @ 1036.
300								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND with Gravel (SW); reddish gray (2.5YR 6/1); dry; loose; 85% fine to coarse sand; subrounded; 15% fine to coarse gravel to 7cm; subrounded; with trace cobbles to 8cm; rounded.	SW		New connection @ 1046. Resumed drilling @1047.
305					Poorly graded SAND with Silt (SP-SM); brown (7.5YR 4/3); dry to moist; loose; 90% fine sand; trace medium to coarse sand; 10% silt.	SP-SM		
310					Poorly graded SAND (SP); dark reddish gray (5YR 4/2); dry; loose; 95% fine sand; 5% silt.	SP	Bentonite Seal	Rate of penetration slowed down.
315					Same as above (310 ft).			
320					Well graded SAND (SW); dark reddish gray (5YR 4/2); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% fine gravel to 1cm; subangular.	SW		Stopped drilling @ 1102. New connection @ 1155. Resumed drilling @ 1157.
325					Same as above (320 ft).			
330								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium to coarse sand; subrounded; 5% silt.			
335					Same as above (330 ft); 95% fine sand; 5% silt.	SP	Bentonite Seal	Rig chatter around 335'.
340					Well graded SAND (SW); weak red (2.5YR 5/2); dry; loose; 95% fine to coarse sand; trace fine gravel to 1cm; subrounded; 5% silt.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	Stopped drilling @ 1208. New connection @ 1223. Resumed drilling @ 1225.
345					Well graded SAND with Gravel (SW); weak red (2.5YR 5/2); dry; loose; 80% fine to coarse sand; subrounded; 15% fine to coarse gravel to 4cm; subrounded to rounded; 5% silt.			
350					Well graded SAND (SW); weak red (2.5YR 5/2); dry to moist; loose; 95% fine to coarse sand; subrounded to subangular; trace fine gravel to 1cm; 5% silt.	SW	Bottom of Screen	
355					Same as above (350 ft).		Bentonite Seal	Stopped drilling @ 1238.
360								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND with Silt (SP-SM); weak red (2.5YR 5/2); dry; loose; 90% fine sand; 10% silt.	SP-SM		New connection @ 1247. Resumed drilling @ 1249.
365					Same as above (360 ft); brown (7.5YR 4/3); dry to moist; color change possibly due to oxidation (weathering surface?).			
370					Well graded SAND (SW); weak red (2.5YR 5/2); dry; loose; 95% fine to coarse sand; subangular; 5% silt; sand grains consistant of lithics (granite, volcanics), quartz and quartzite, and feldspars (including weathered).	SW		
375					Silty SAND (SM); brown (7.5YR 4/3); dry to moist; loose; 85% fine sand; minor medium to coarse sand; subangular; 15% silt.	SM	Bentonite Seal	
380					Well graded SAND (SW); brown (7.5YR 4/3); dry to moist; loose; 95% fine to coarse sand; subangular to angular; 5% silt.	SW		Stopped drilling @ 1305. New connection @ 1321. Resumed drilling @ 1323.
385					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium sand; 5% silt.	SP		
390								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium sand; 5% silt.			
395					Same as above (390 ft); 95% very fine to fine sand; 5% silt.			
400					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium sand; 5% silt.			Stopped drilling @ 1338. New connection @ 1345. Resumed drilling @ 1346.
405					Same as above (400 ft); 95% fine sand; 5% silt.	SP	Bentonite Seal	
410					Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine to medium sand; subangular to subrounded; 5% silt.			
415					Same as above (410 ft); 95% fine sand, 5% silt.			Stopped drilling @ 1407.
420								

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420								
425					Well graded SAND (SW); weak red (2.5YR 5/2); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% silt.	SW		
430					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; 60% silt with minor clay; 40% fine sand; trace medium to coarse sand.	ML	- Bentonite Seal	
435					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; loose; 75% fine sand; 25% silt with trace clay. Same as above (430 ft); moist.	SM		
440							- Top of Filter Pack	
445					Sandy SILT (ML); brown (7.5YR 4/4); moist; soft to firm; 60% silt with minor clay; 40% fine sand.	ML	- Top of 3" Schedule 80 PVC 0.050 Slot Screen	Poor recovery. Poor to no cuttings returned. Stopped drilling @ 1436. New connection @ 1449. Resumed drilling @ 1450.
450					Silty SAND (SM); brown (7.5YR 5/3); dry to moist; 75% very fine to fine sand; 25% silt with trace clay. Same as above (445 ft); sand becoming coarser; fine to coarse sand.	SM		

Borehole ID: KAFB-106139

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/5/2011
Date TD Reached: 1/8/2011
Date Completed: 1/8/2011

Ground Elevation AMSL (ft): 5341.3
Y Coordinate: 1474051.40
X Coordinate: 1541248.76

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

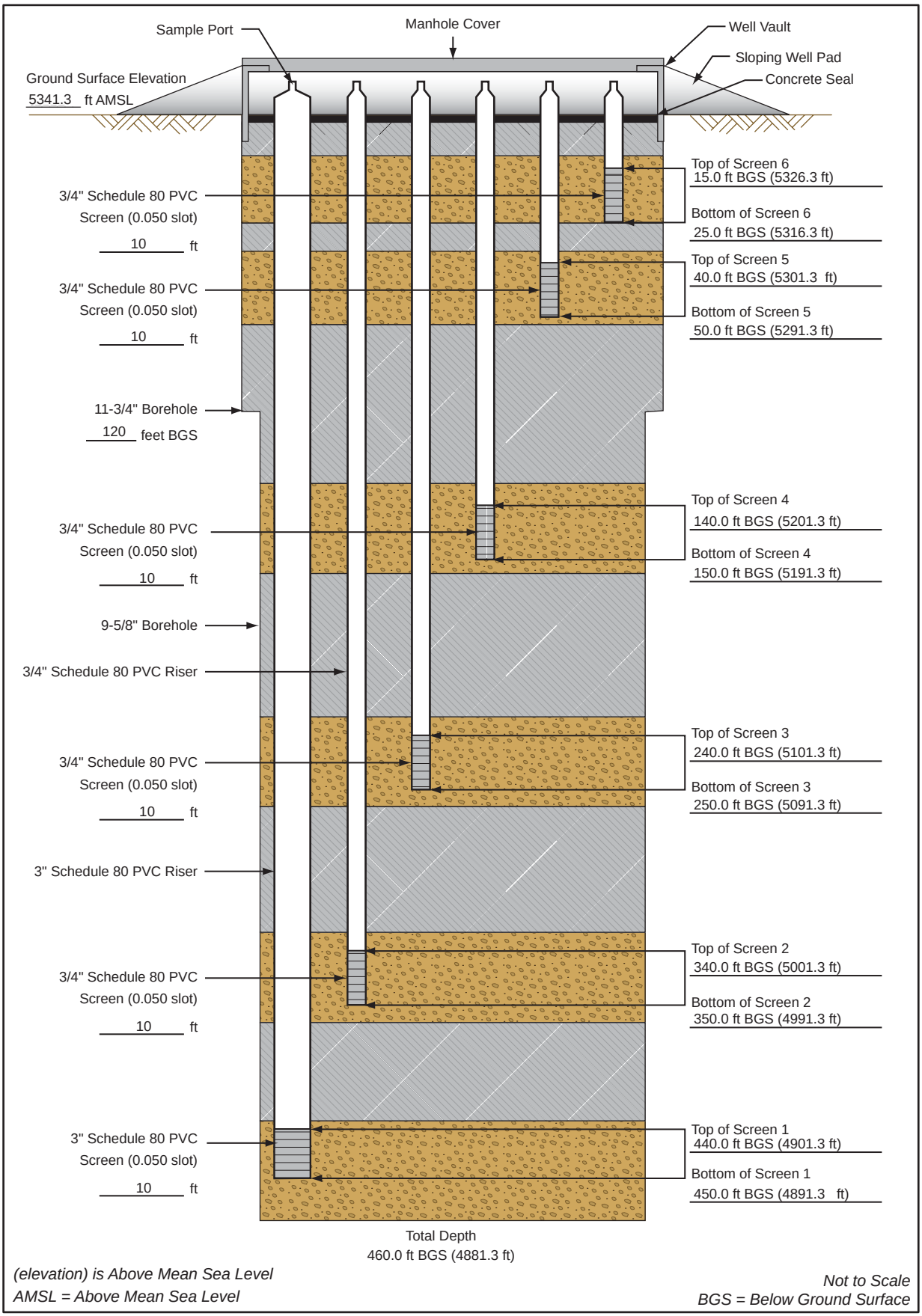
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Brian Lucero

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450								
455					Well graded SAND with Silt (SW-SM); brown (7.5YR 5/3); moist; loose; 90% fine to coarse sand; subrounded; 10% silt with trace clay.	SW-SM	Bottom of Screen	
460					Silty SAND (SM); weak red (2.5YR 5/2); dry; loose; 70% fine sand; 30% silt.	SM		Total depth = 460 ft. Reached @1511 on 1/8/2011. Water added during drilling (gallons) = 0 Water added during construction (gallons) = Not Recorded
465								
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106139

Installation Start Date/Time: 1/11/2011 @ 11:26
Installation End Date/Time: 1/14/2011 @ 15:00

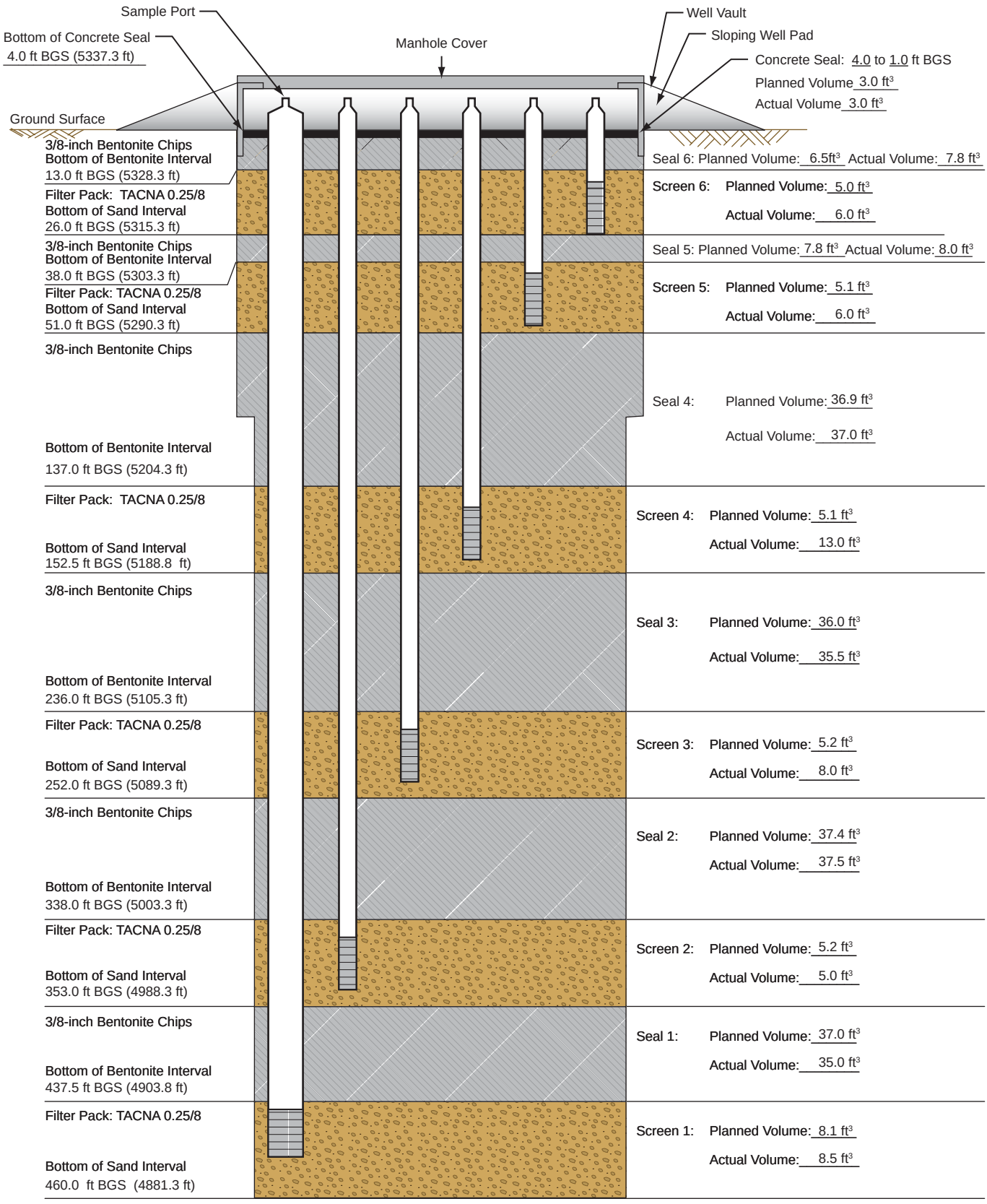


(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106139 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106139



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

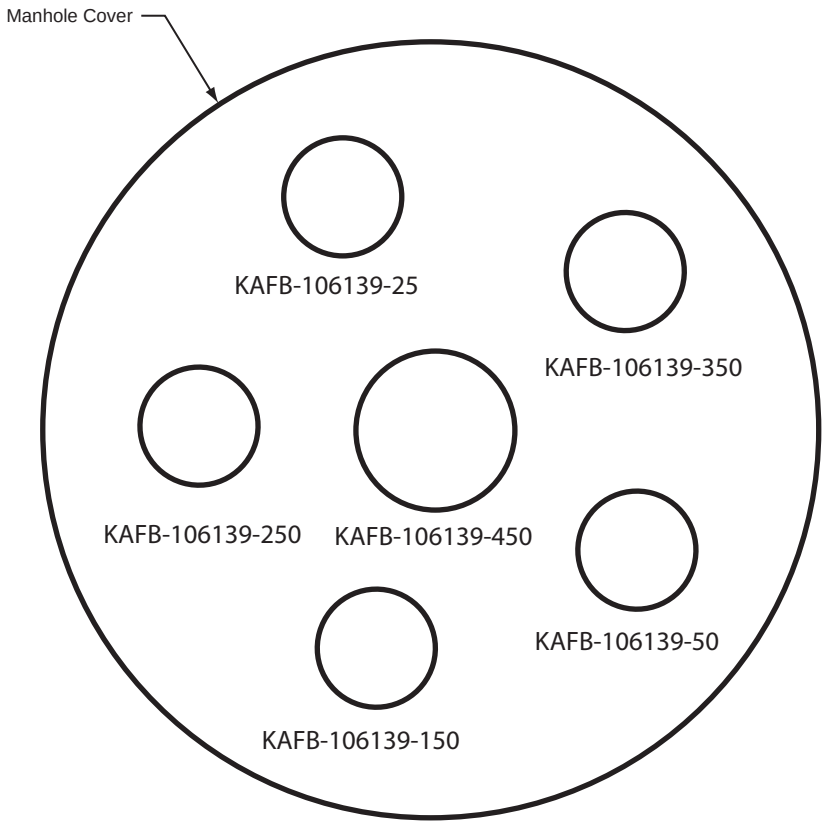
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106139

Top of Well Vault Elevation: 5341.5 (ft)

Northing: 1474050.07

Easting: 1541248.52



Well Number	Well Diameter	Well Depth	Screened Interval	Northing	Easting	Elevation
KAFB-106139-25	3/4	25.0	15.0 - 25.0	1,474,049.85	1,541,248.32	5,341.0
KAFB-106139-50	3/4	50.0	40.0 - 50.0	1,474,049.41	1,541,248.53	5,341.0
KAFB-106139-150	3/4	150.0	140.0 - 150.0	1,474,049.29	1,541,248.26	5,341.0
KAFB-106139-250	3/4	250.0	240.0 - 250.0	1,474,049.60	1,541,248.11	5,341.0
KAFB-106139-350	3/4	350.0	340.0 - 350.0	1,474,049.74	1,541,248.60	5,341.0
KAFB-106139-450	3	450.0	440.0 - 450.0	1,474,049.68	1,541,248.45	5,341.0

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX D-1

KAFB-106140 Final Well Report

THIS PAGE INTENTIONALLY LEFT BLANK

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
0					No description recorded.		Concrete Seal	Hand augered. ***Note: no headspace requirement at this location*** Began drilling @1600 on 1/10/11.
5					Sandy SILT (ML); light reddish brown (5YR 6/3); moist; soft; low plasticity; 70% silt; 30% fine sand; trace gravel to 7mm.	ML	Bentonite Seal	
10					Same as above (5ft); reddish brown (5YR 3/4); increasing gravel to 1.5cm.		Top of Filter Pack	
15					Same as above (10ft); trace clay nodules; less gravel.		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
20					Same as above (10ft); increasing clay nodules.			
25					SILT (ML); reddish brown (5YR 5/4); moist; soft; low plasticity; 70% silt; 20% lean clay; 10% fine sand to 0.1mm.		Bottom of Screen	
30							Bentonite Seal	

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
30					SILT (ML); reddish brown (5YR 5/4); moist; soft; low plasticity; 70% silt; 20% lean clay; 10% fine sand to 0.1mm.		Bentonite Seal	
35					Same as above (30 ft).			
40					SILT with Sand (ML); reddish brown (2.5YR 5/3); moist; soft; low plasticity; 80% silt and clay; 15% fine sand; 5% fine gravel to 1cm.		Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
45					SILT with Sand (ML); yellowish red (5YR 4/6); dry; very soft; 80% silt; 15% medium sand; 5% fine gravel to 7mm; trace clay nodules.	ML		
50					SILT with Sand and Gravel (ML); reddish brown (5YR 5/4); dry; very soft; 60% silt; 20% medium to very coarse sand; 20% fine gravel to 1.5cm.		Bottom of Screen	
55					Same as above (50 ft); soft; 70% silt; 20% coarse sand; 10% fine gravel to 2cm.		Bentonite Seal	
60								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Material Description	U.S.C.S.	Well Diagram	Remarks
60	SILT with Sand and Gravel (ML); reddish brown (5YR 5/4); dry; very soft; 60% silt; 20% medium to very coarse sand; 20% fine gravel to 1.5cm.	ML		End of 1/10/11 @ 1715.
65	Silty SAND with Gravel (SM); reddish brown (5YR 4/4); dry; very loose; 60% fine to very fine sand; 20% gravel to 1.5cm; subangular to subrounded; granitic clasts; 20% silt.	SM		Beginning of 1/11/11 @ 0915. P. Ostrye (Geologist) began logging.
70	Sandy lean CLAY (CL); reddish brown (5YR 4/4); dry; very soft; medium plasticity; 60% clay; 40% fine to very fine sand; no gravel.	CL		Cylcone hose popped off of casing hammer @ 0930. Resumed drilling @ 1055.
75	Same as above (70 ft); 5% very coarse sand; subangular.		Bentonite Seal	
80	Well graded SAND (SW); light reddish brown (2.5YR 6/3); dry; very loose; 95% very coarse to very fine sand; 5% gravel to 6mm; angular to subangular.	SW		
85	Silty SAND (SM); reddish brown (5YR 4/4); dry; very loose; 80% fine to very fine sand; 20% silt.	SM		Stopped drilling to clean out cyclone @ 1115. Casing collar stuck.
90	Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; very loose; 95% very fine to fine sand; 5% silt.	SP		Resumed drilling @ 1320.

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
90					Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; very loose; 95% very fine to fine sand; 5% silt.	SP		Resumed drilling @ 1320.
95					Clayey SAND (SC); reddish brown (5YR 5/4); dry; very loose; 70% well graded very fine to coarse sand; 5% gravel to 10mm; angular to subrounded; 20% clay and silt.	SC		
100					Lean CLAY with Sand (CL); reddish brown (5YR 4/3); dry; firm; high plasticity; 80% clay; 20% fine to very fine sand.	CL	Bentonite Seal	
105					Lean CLAY with Sand (CL); reddish brown (5YR 4/3); dry; firm; medium to high plasticity; 75% clay; 25% medium to very fine sand.			
110					Lean CLAY with Sand (CL); reddish brown (5YR 4/3); dry; soft; high plasticity; 85% clay; 15% very fine sand.			Air hammer hose blew off @1410. End of 1/11/11.
115					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); dry; very loose; 95% medium to very fine sand; angular to subrounded; 5% fines.	SP		Beginning of 1/12/11.
120					Same as above (110 ft).	SW		

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
120					Well graded SAND (SW); light reddish brown (5YR 5/3); dry; loose; 90% very coarse to very fine sand; 5% gravel to 10mm; subrounded; tuft clasts; 5% fines. Well graded SAND with Gravel (SW); light reddish brown (5YR 5/3); 80% very coarse to very fine sand; 15% gravel to 20mm; 5% fines.	SW		Telescope to 9-5/8". Stopped drilling @ 0820. Resumed drilling @ 1155.
125					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% fine to very fine sand; 40% clay.	SC	Bentonite Seal	
130					Clayey SAND (SC); strong brown (7.5YR 5/6); moist; loose; 60% medium to very fine sand; 40% clay.			
135					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% fine to very fine sand; 40% clay.			
140					Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; very loose; 95% coarse to fine sands; 5% fines.	SP	Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
145					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); 80% sand; 15% gravel to 2.5cm; angular to subrounded; 5% fines.	SW		
150					Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% medium to very fine sand; 40% clay.	SC		

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
150								
155					Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 70% sand to 3mm; 30% silt.	SM	Bottom of Screen	
160					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); moist; very loose; 90% medium to very fine sand; 10% silt.	SP-SM		
165					Well graded SAND with Gravel (SW); gray (5YR 6/1); dry; very loose; 60% sand; 40% gravel to 30mm; angular to subrounded.	SW	Bentonite Seal	
170					Well graded SAND with Gravel (SW); gray (5YR 6/1); moist; very loose; 85% sand; 15% fine gravel to 9mm; subangular to subrounded.			
175					Silty SAND with Gravel (SM); reddish brown (5YR 4/4); moist; loose; 70% well graded sand; 15% gravel; some tuft clasts; 15% silt.	SM		
180					Well graded SAND with Gravel (SW); brown (7.5YR 4/4); 80% sand; 20% gravel to 7mm; rounded; tuft clasts.	SW		

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
180					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; very loose; 95% coarse to fine sand; 5% fines.	SP	Bentonite Seal	
185					Well graded SAND (SW); light gray (2.5YR 7/1); dry to moist; 90% sand; 5% gravel to 11mm; subangular to subrounded; 5% fines.	SW	Native Backfill	
190					Well graded SAND (SW); light brownish gray (2.5Y 6/2); moist; very loose; 90% sand; 10% gravel to 12mm; trace fines.			
195					Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; very loose; 95% coarse to fine sand; 5% fines.	SP	Bentonite Seal	
200					Well graded SAND (SW); light brown (7.5YR 6/3); dry; very loose; 95% sand; 5% fines.	SW	Native Backfill	
205					Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; very loose; 95% fine to very fine sand; 5% fines.	SP		
210								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
210					Well graded SAND (SW); light gray (5YR 6/1); moist; very loose; 90% sand; 5% gravel to 17mm; subrounded to rounded; 5% fines.			
215					Well graded SAND with Gravel (SW); gray (5YR 6/1); 85% sand; 15% gravel to 17mm; angular to subrounded; trace fines.	SW	Native Backfill	
220					Poorly graded SAND with Gravel (SP); reddish gray (2.5YR 5/1); dry to moist; loose; 80% very coarse to coarse sand; 20% gravel to 30mm; subangular to subrounded.	SP	Bentonite Seal	
225					Well graded SAND (SW); gray (5YR 5/1); dry; very loose; 100% sand to 5mm.	SW	Native Backfill	
230					Poorly graded SAND (SP); pink (5YR 7/3); damp; very loose; 95% coarse to fine sand; 5% fines.	SP		
235					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 7/2); dry; very loose; 80% sand; 15% gravel to 22mm; angular to rounded; mostly tuft clasts; 5% fines.	SW	Bentonite Seal	
240					Poorly graded SAND (SP); pink (5YR 7/3); 95% coarse to fine sand; 5% gravel to 5mm; subrounded.	SP	Top of Filter Pack	

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
240					Well graded SAND with Gravel (SW); light gray (5YR 7/1); dry; very loose; 85% sand; 15% gravel to 10mm; subangular to subrounded. Well graded SAND with Gravel (SW); light gray (5YR 7/1); dry; very loose; 60% sand; 40% gravel to 15mm; angular to rounded.	SW	Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
245								
250					Silty SAND (SM); light brown (7.5YR 6/4); moist; loose; 60% medium to very fine sand; 5% gravel to 40mm; subangular to subrounded; 35% silt.		Bottom of Screen	
255					Silty SAND (SM); light brown (7.5YR 6/4); moist; loose; 70% medium to very fine sand; 30% silt.			
260					Same as above (255 ft); 80% medium to very fine sand; 20% silt.	SM	Bentonite Seal	
265					Poorly graded SAND with Silt (SP); brown (7.5YR 7/3); moist; loose; 90% medium to very coarse sand; trace gravel to 7mm; 10% silt.			
270								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
270					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; very loose; 95% coarse to fine sand; 5% fines.			
275					Same as above (270 ft).	SP		
280					Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very loose; 95% very coarse to medium sand; 5% fines.			
285							Bentonite Seal	
290					Well graded SAND with Silt (SW-SM); pinkish gray (5YR 7/2); moist; loose; 85% sand; 5% gravel; angular to subrounded; 10% silt.	SW-SM		
295					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/4); 90% coarse to fine sand; 10% silt.	SP-SM		
300					Clayey SAND (SC); reddish brown (7.5YR 6/6); 80% fine sand; 20% clay.	SC		

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
300					Well graded SAND with Gravel (SW); brownish yellow (10YR 6/6); moist; very loose; 80% sand; 15% gravel to 20mm; subangular to subrounded; 5% fines.			
305					Well graded SAND (SW); very pale brown (10YR 7/3); moist; very loose; 95% sand; 5% gravel; subrounded.	SW		
310					Well graded GRAVEL with Sand (GW); pinkish gray (7.5YR 6/2); moist; very loose; 55% gravel to 45mm; 40% sand; angular to subrounded; 5% fines.	GW		
315					Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; very loose; 80% sand; 20% gravel to 20mm; subangular to subrounded.	SW	Bentonite Seal	
320					Poorly graded SAND (SP); pink (7.5YR 7/3); 95% coarse to medium sand; 5% fines.			
325					Poorly graded SAND with Gravel (SP); light pinkish brown gray (10YR 6/2); dry; loose; 80% coarse to fine sand; 15% gravel to 11mm; angular to rounded; 5% fines.	SP		
330								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
330					Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; very loose; 80% sand; 20% gravel to 35mm; angular to subrounded.	SW	Bentonite Seal	
335					Poorly graded SAND (SP); pale brown (10YR 6/3); moist; very loose; 95% medium to very fine sand; 5% gravel to 12mm.		Top of Filter Pack	
340					Same as above (335 ft).		Top of 3/4" Schedule 80 PVC 0.050 Slot Screen	
345					Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 95% medium to very fine sand; 5% gravel.	SP		
350					Poorly graded SAND with Gravel (SP); pinkish gray (7.5YR 6/2); dry; very loose; 80% fine to coarse sand; 20% gravel to 12mm; angular to subrounded.		Bottom of Screen	Asked driller to slow down @ 1440.
355					Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); dry; very loose; 95% medium to fine sand; 5% fines.		Bentonite Seal	
360								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
360					Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% coarse to medium sand; 5% fines.			
365					Same as above (360 ft); 95% medium to fine sand.	SP		
370					Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/3); moist; very loose; 90% coarse to medium sand; 10% silt.	SP-SM		
375					Well graded SAND (SW); brown (7.5YR 5/3); dry; loose; 95% sand; 5% fines.		Bentonite Seal	
380					Well graded SAND with Gravel (SW); reddish brown (5YR 5/3); moist; very loose; 80% sand; 15% gravel to 10mm; subangular to subrounded; 5% fines.	SW		
385					Poorly graded SAND (SP); brown (7.5YR 5/3); dry to moist; very loose; 95% coarse to fine sand; 5% fines.	SP		
390								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
390					Poorly graded SAND with Gravel (SP); reddish brown (5YR 4/3); moist; loose; 80% coarse to fine sand; 15% gravel to 11mm; angular to subrounded; 5% fines.			
395					Poorly Graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% medium to very fine sand; 5% fines.	SP		
400					Same as above (395 ft); fine to medium sand.			
405					Well graded SAND (SW); brown (5YR 5/3); moist; very loose; 95% sand; 5% fines.	SW	Bentonite Seal	
410					Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% fines.			
415					Poorly graded SAND (SP); pinkish gray (5YR 7/2); moist; very loose; 95% fine to medium sand; 5% fines.	SP		
420								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

Groundwater Levels BGS (ft):
▽ At Time of Drilling: N/A
▼ At End of Drilling: N/A
▼ After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
420					Poorly graded SAND (SP); pinkish gray (5YR 7/2); moist; very loose; 95% fine to medium sand; 5% fines.			
425					Poorly graded SAND (SP); pink (7.5YR 7/3); moist; very loose; 95% coarse to medium sand; 5% fines.		- Bentonite Seal	
430					Poorly graded SAND (SP); pink (7.5YR 7/3); moist; very loose; 95% very coarse to fine sand; 5% fines.			
435					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; very loose; 95% very coarse to medium sand; 5% fines.	SP	- Top of Filter Pack	
440					Same as above (435 ft).		- Top of 3" Schedule 80 PVC 0.050 Slot Screen	
445					Same as above (435 ft).			
450								

Borehole ID: KAFB-106140

Client: US Army Corps of Engineers
Project Location: KAFB, Albuquerque, NM
Project Name: KAFB BFF SWMU ST-106 and SS-111
Project Number: 140705

Date Started: 1/10/2011
Date TD Reached: 1/12/2011
Date Completed: 1/20/2011

Ground Elevation AMSL (ft): 5345.3
Y Coordinate: 1472634.47
X Coordinate: 1542237.30

Hole Diameter Upper (in.): 11-3/4
Hole Diameter Lower (in.): 9-5/8
Surface Completion Type: Flush mount

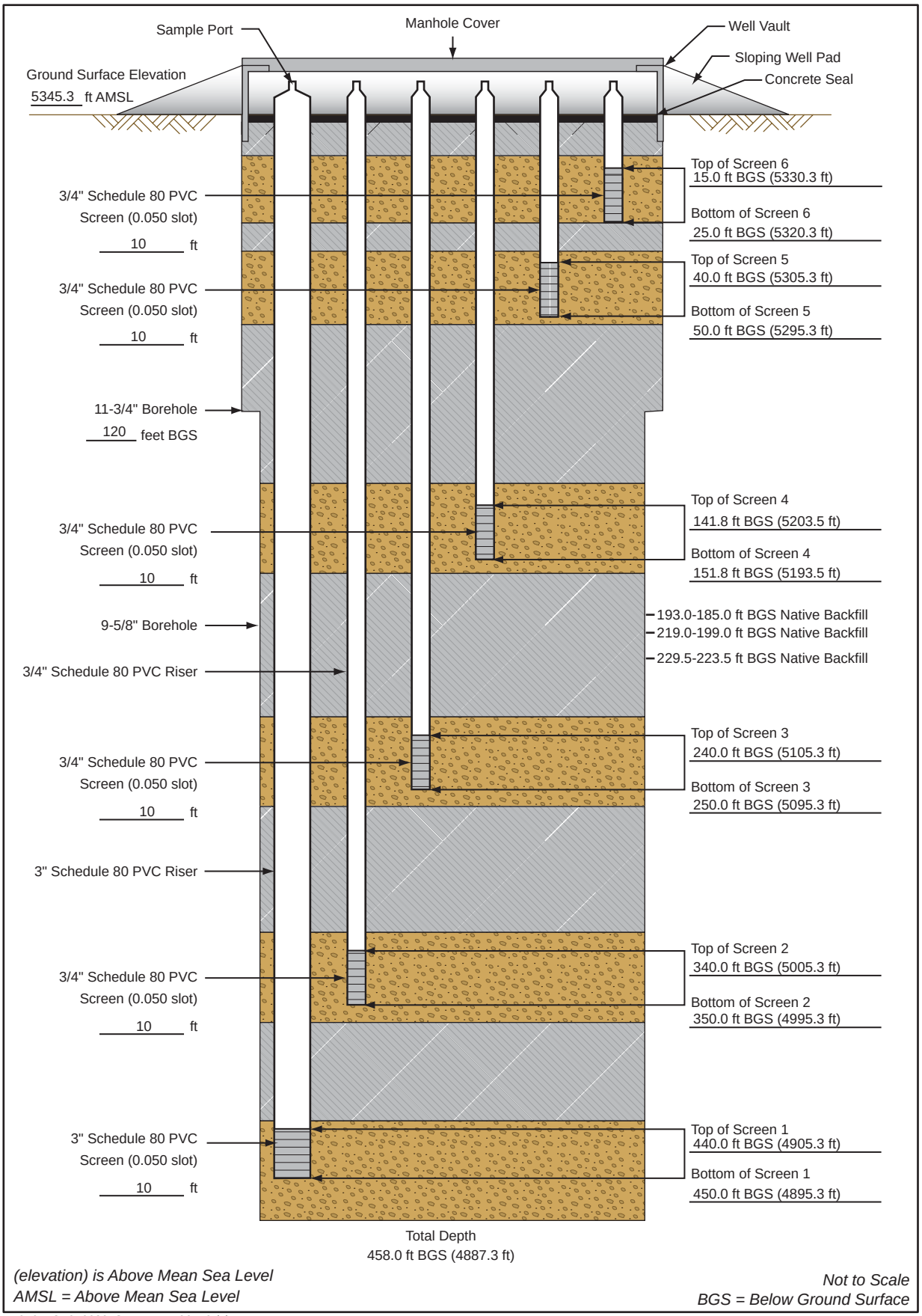
Groundwater Levels BGS (ft):
At Time of Drilling: N/A
At End of Drilling: N/A
After Drilling: N/A

Drillling Contractor: WDC Drilling
Drilling Method: Air Rotary Casing Hammer
Logged By: Jason Tarbert

Depth (ft)	Sample Type	Number	Headspace PID	Lithologic Log	Material Description	U.S.C.S.	Well Diagram	Remarks
450					Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; very loose; 95% very coarse to medium sand; 5% fines.	SP	Bottom of Screen	
455					Lean CLAY (CL); moist; firm; high plasticity; 90% clay; 10% sand.	CL		
					Poorly graded SAND (SP); dry, very loose; 95% medium to fine sand; 5% fines.	SP		Total depth = 458 ft. Reached @1630 on 1/12/11.
460								Water added during drilling (gallons) = 0
465								Water added during construction (gallons) = Not Recorded
470								
475								
480								

Nested Soil Vapor Well Completion Diagram for KAFB-106140

Installation Start Date/Time: 1/13/2011 @ 09:10
Installation End Date/Time: 1/20/2011 @ 13:05

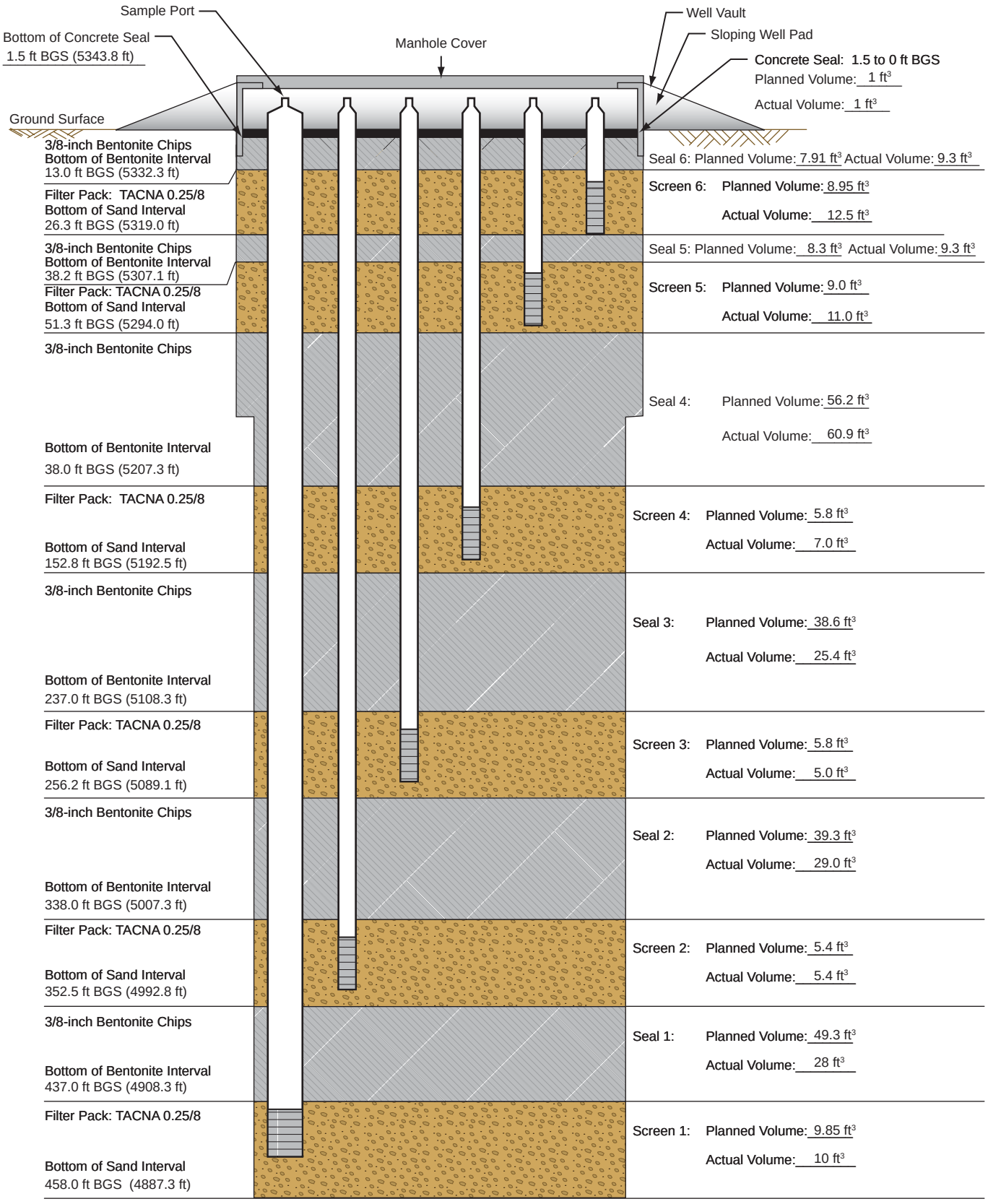


(elevation) is Above Mean Sea Level
AMSL = Above Mean Sea Level

Not to Scale
BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106140 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106140



(elevation) is Above Mean Sea Level
All Materials Placed with Tremie Pipe

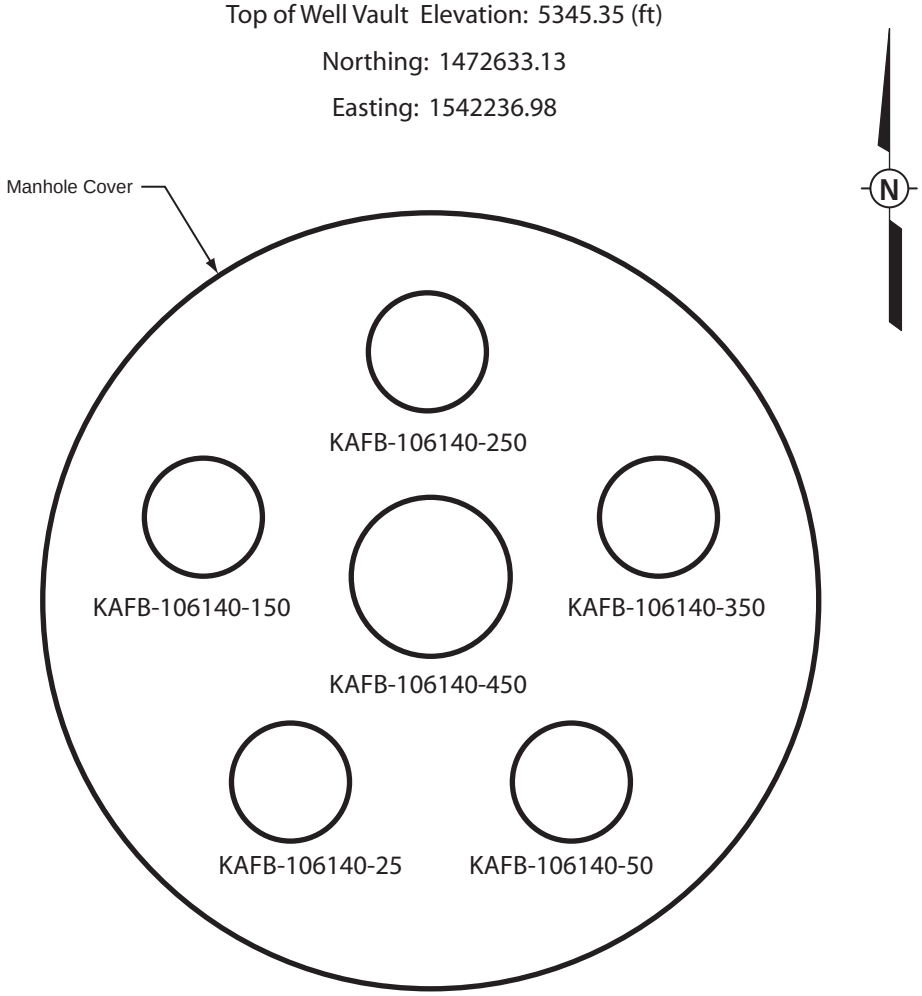
Not to Scale
BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram
Map View for KAFB-106140

Top of Well Vault Elevation: 5345.35 (ft)

Northing: 1472633.13

Easting: 1542236.98



Well Number	Well Diameter	Well Depth	Screened Interval	Northing	Easting	Elevation
KAFB-106140-25	3/4	25.0	15.0 - 25.0	1,472,632.54	1,542,236.62	5,345.0
KAFB-106140-50	3/4	50.0	40.0 - 50.0	1,472,632.40	1,542,236.96	5,345.0
KAFB-106140-150	3/4	151.8	141.8 - 151.8	1,472,632.87	1,542,236.66	5,345.0
KAFB-106140-250	3/4	250.0	240.0 - 250.0	1,472,632.93	1,542,236.96	5,345.0
KAFB-106140-350	3/4	350.0	340.0 - 350.0	1,472,632.68	1,542,237.19	5,345.1
KAFB-106140-450	3	450.0	440.0 - 450.0	1,472,632.75	1,542,236.88	5,344.9

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C

Waste Disposal Documentation

C-1. IDW Soil Disposal

C-2. Off-Site Waste Disposal Manifest

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C-1

IDW Soil Disposal

THIS PAGE INTENTIONALLY LEFT BLANK

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

13 January, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 12 January, 2011
USACE Contract No. W912DY-10-D-0014 / Task Order No. 0002

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 1 each monitoring wells, KAFB-106045 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 2 each, Rinchem roll-offs, S/N 20B-28; and 104053 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

January 12, 2011
KAFB-011-0001

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Subject: Disposal of Soil Drill Cuttings from the Installation of Groundwater Monitoring Well KAFB-106045 Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings from monitoring well installation and the associated plastic liners from the rolloff containers, to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the drill cuttings are discussed below.

During December 2010, Shaw E&I directed the installation of groundwater monitoring well KAFB-106045 at the Kirtland AFB Bulk Fuels Facility (BFF). The well is located in the southwestern corner of the BFF area outside of the known fuel plume.. The monitoring well was drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in three plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 35 cubic yards of soil drill cuttings were generated and stored in three 20-cubic yard rolloff containers at the well location. Two of the rolloffs contained dry soil drilling cuttings and were sampled on 28 December 2010. The third rolloff contains saturated cuttings and will be sampled and submitted for disposal at a later date.

A composite sample was collected from each of the two rolloff containers (Nos. 20B-28 and 104053) and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the two composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E&I requests your review of the attached analytical data and determinationfor disposal at the Kirtland AFB C&D landfill. Upon receiving notification of acceptance for disposal, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper, PG
Project Manager

Attachment
Hall Environmental Analysis Laboratory Report No. 1012939 - Analytical Results for Drill Cuttings from Groundwater Monitoring Well KAFB-106045

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Tuesday, January 11, 2011

Pam Moss
Shaw Environmental, Inc.
2440 Louisiana Blvd NE
Suite 300
Albuquerque, NM 87110

TEL: (505) 262-8920
FAX

RE: Kirtland AFB

Order No.: 1012939

Dear Pam Moss:

Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 12/28/2010 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. NM9570024423

Manifest Document No.

2. Page 1 of

GENERATOR

3. Generator's Name and Mailing Address
KIRTLAND AIRFORCE BASE
2050 WYOMING BLVD SE
ALBUQUERQUE, NM 87117

4. Generator's Phone (505) 846-2803

5. Transporter 1 Company Name
RINCON CO INC

6. US EPA ID Number
NMD0020897?

A. State Transporter's ID

B. Transporter 1 Phone (505) 881-3651

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
KIRTLAND AIRFORCE BASE LANDFILL
2 MILES SOUTH OF ROBOTICS RD
ALBUQUERQUE, NM 87117

10. US EPA ID Number
NM9570024423

E. State Facility's ID

F. Facility's Phone (505) 846-0114

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOLID	1	CM		Y
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
BIN# 22-23
DISPOSAL APPROVAL#

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
24 HOUR EMERGENCY CONTACT CHEMTREC @ 800 424 9300
CONTRACT: CRM0067063R

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Terry Rucker
Signature: Terry Rucker
Date: Month 1 Day 10 Year 12

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name
Signature
Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.
Printed/Typed Name
Signature
Date: Month Day Year

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NM9570024423

Manifest Document No.:

2. Page 1 of 1

3. Generator's Name and Mailing Address:
KIRTLAND AIRFORCE BASE
2050 WYOMING BLVD SE
ALBUQUERQUE, NM 87117

4. Generator's Phone (505) 846-2803

5. Transporter 1 Company Name: [illegible] CO INC

6. US EPA ID Number: NMD002208627

A. State Transporter's ID:

B. Transporter 1 Phone: [illegible]

7. Transporter 2 Company Name:

8. US EPA ID Number:

C. State Transporter's ID:

D. Transporter 2 Phone:

9. Designated Facility Name and Site Address:
KIRTLAND AIRFORCE BASE LANDFILL
2 MILES SOUTH OF ROBOTICS RD
ALBUQUERQUE, NM 87117

10. US EPA ID Number: NM9570024423

E. State Facility's ID:

F. Facility's Phone: (505) 846-4014

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOILS	1	CM		Y
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above:
BIN# [illegible]
DISPOSAL APPROVAL#

H. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:
24 HOUR EMERGENCY CONTACT: CHEMTREC @ 800-424-9300
CONTRACT: CRM00670638

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
Terry Ruben	[signature]	1	[illegible]	[illegible]

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
[illegible]	[signature]	[illegible]	[illegible]	[illegible]

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date Month	Day	Year
NAT SANCHEZ	[signature]	[illegible]	[illegible]	

NON-HAZARDOUS WASTE

KAFB LONG-TERM LANDFILL PASS

No. 3030

ENVIRONMENTAL MANAGEMENT DIVISION
377 ABW/EM
KIRTLAND AFB NM 87117-5659
TELEPHONE: (505) 846-9014

AFC

CONTRACTOR: Shaw Environmental
CONTRACT NO. W912DY-10-D-0014
VEHICLE LICENSE: WD104078

CONSTRUCTION AND DEMOLITION DEBRIS ONLY

(1-4-11 SA)	2d Qtr (Apr-Jun)
3d Qtr (Jul-Sep)	4th Qtr (Oct-Dec)

KAFB FORM 530, MAR 97 (See Reverse)

Cindy 6-6704

KAFBI 32-7002

PROHIBITED OR UNACCEPTABLE MATERIALS FOR LANDFILL DISPOSAL

- POWER POLES (TREATED WITH CREOSOTE)
- WOOD (TREATED WITH CREOSOTE)
- FLUORESCENT BULBS
- ELECTRONIC BALLASTS
- EMPTY OIL CONTAINERS
- MATTRESSES & BOXSPRINGS
- WHOLE TIRES
- CONTAMINATED SOIL
- COMPUTER COMPONENTS AND ACCESSORIES
- APPLIANCE
  - TV'S

RECYCLING

METAL AND CARDBOARD WILL BE SEPARATED AND RECYCLED
BY CUSTOMER

IF YOU HAVE ANY QUESTIONS PLEASE FEEL FREE TO CALL THE LANDFILL 505-846-5994

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

21 January, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 20 January, 2011
USACE Contract No. W912DY-10-D-0014 / Task Order No. 0002

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106044 & KAFB-106045 and 1 each soil vapor monitoring well, KAFB-106139 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 3 each, Rinchem roll-offs, S/N 20B-001, 20B-27 and 104056 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

January 20, 2011

Project No. 140705
KAFB-011-0003

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Groundwater Monitoring Wells KAFB-106044, KAFB-106139, and KAFB-106045
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in our rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cutting are discussed below.

During January 2011, Shaw E&I installed two groundwater monitoring wells (KAFB-106044 and KAFB-106045) and one soil vapor monitoring well (KAFB-106139) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106044 and KAFB-106045wells are located in the southwestern corner of the BFF area, which is outside of the known fuel plume on the groundwater. The KAFB-106139 well is located along Randolph Ave SE. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 30 to 35 cubic yards of soil drill cuttings were generated for each 40-cubic yard rolloff container and one rolloff each is stored at the three well locations.

A composite sample was collected from the rolloff containers (20B001, 20B-27, and 104056) and sent to Hall Environmental Analysis Laboratory for testing. Rolloff containers are hauled and owned by Rhino Environmental SVCS, Inc. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino with rolloff numbers 20B001, 20B-27, and 104056.

Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1101216 and No. 1101168 – Analytical Results for Drill Cuttings from Groundwater Monitoring Well KAFB-106044, KAFB-106045, and KAFB-106139

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Wednesday, January 19, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB FF 654194

Order No.: 1101216

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 1/6/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

ect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec. 1.

ignee KIRTLAND AIRFORCE BASE LANDFILL

t 2 MILES SOUTH OF ROBOTICS RD

ALBUQUERQUE State, NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Vehicle Number 0915

No. of Units Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
CM		Non Hazardous Waste Solids	20 YARDS			
CM		NON Hazardous Waste Solids	20 YARDS			
		BR# 208-001, 208-27, 104056.				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding ________ per ________."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

________ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked — Check box if charges are to be collect ☐

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E&I

PER [signature]

CARRIER [signature]

PER

DATE 1/21/11

1

Permanent post-office address of shipper.

STYLE CF365-4 © 2003 LABELMASTER® (800) 621-5808 www.labelmaster.com

PRINTED ON RECYCLED PAPER USING SOYBEAN INK

This Memorandum is an acknowledgment that a Bill of Lading has been issued and is not Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date _____

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:
Consignee KIRTLAND AIRFORCE BASE LANDFILL

Street 2 MILES SOUTH OF ROBOTICS RD

City ALBUQUERQUE State, NM Zip Code 87117

FROM: KIRTLAND AIRFORCE BASE
Shipper

2050 WYOMING BLVD SE
Street

City ALBUQUERQUE State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM			20 yards			
1 CM			20 yards			

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO:
ADDRESS

COD Amt: $

C.O.D. FEE:
PREPAID ☐
COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect.

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER _____

PER _____

CARRIER _____

PER _____

DATE _____

4

Permanent post-office address of shipper.

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

25 January, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 20 January, 2011
USACE Contract No. W912DY-10-D-0014 / Task Order No. 0003

Disposal of Soil Drill Cuttings from the Installation of Groundwater Monitoring Wells KAFB-106044, KAFB-106139, and KAFB-106140 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106040; KAFB-106044 & KAFB-106139 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 3 each, Rhino roll-offs, S/N 104052, 104057, 104050, 104051 and 20B-29 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

January 24, 2011

Project No. 140705
KAFB-011-0004

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0003

Subject: Disposal of Soil Drill Cuttings from the Installation of Groundwater Monitoring Wells KAFB-106044, KAFB-106139, and KAFB-106140
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in our rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cutting are discussed below.

During January 2011, Shaw E&I installed one groundwater monitoring well (KAFB-106044) and two soil vapor monitoring wells (KAFB-106139 and KAFB-106140) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106044 well is located in the southwestern corner of the BFF area and the KAFB-106140 well is located along the southern perimeter of the BFF area, both of which are outside of the known fuel plume on the groundwater. The KAFB-106139 well is located along Randolph Ave SE. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container and one rolloff each is stored at the three well locations.

A composite sample was collected from the rolloff containers (104052, 104057, 104050, 104051, and 20B-29) and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include - 104052, 104057, 104050, 104051, and 20B-29. Upon receiving notification of

Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1101264 and No. 1101390 – Analytical Results for Drill Cuttings from Groundwater Monitoring Well KAFB-106044, KAFB-106139, and KAFB-106140

This Memorandum is an acknowledgment that a Bill of Lading has been issued and is not Original Bill of Lading, nor a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date _____

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:
Consignee: KIRTLAND AIRFORCE BASE LANDFILL
Street: 2 MILES SOUTH OF ROBERTS RD
City: ALBUQUERQUE State: NM Zip Code: 87117

FROM: Shipper: KIRTLAND AIRFORCE BASE
Street: 2050 WYOMING BLVD SE
City: ALBUQUERQUE State: NM Zip Code: 87117
24 hr. Emergency Contact Tel. No. [illegible]

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM		Non Hazardous Waste Soils	20 yards			
1 CM		non Hazardous Waste Soils	20 yards			
1 CM		non Hazardous waste Soils	20 yards			
1 CM		non Hazardous waste Soils	20 yards			
		Non-Haz Soil, disposed of on site 5 containers				
		RINC# [illegible]				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper, and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(e) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Signature _____

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER KAFB

PER [illegible]

CARRIER [illegible]

PER [illegible]

DATE 1-26-11

4

Permanent post-office address of shipper.

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# ________

RINCHEM COMPANY., INC
Carrier

1/20/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[✓] DELIVERY OF EMPTY ROLL-OFF BIN
BIN # A20-037 LOC# 106110

[ ] DELIVERY OF EMPTY ROLL-OFF BIN
BIN # ________ LOC# ________

[ ] DELIVERY OF EMPTY ROLL-OFF BIN
BIN # ________ LOC# ________

[✓] DELIVERY OF 1 ROLL-OFF LINERS

[✓] DELIVERY OF 1 TARP

[ ] LANDFILL TRANS / OTHER (SEE BELOW)

Landfill ✓ BIN# 104052 LOC# 106116 LOC# [illegible]
Landfill ✓ BIN# 104057 LOC# 106110 LOC# [illegible]
Landfill BIN# 104060 LOC# 106139 LOC# 106115
Landfill ✓ BIN# 104061 LOC# [illegible] LOC# [illegible]
Landfill ✓ BIN# 20B-29 LOC# [illegible] LOC# 106441
BIN# 104053 LOC# 106113 LOC# 106115
BIN# 20B-27 LOC# 106106 LOC# 106108
20B-28 106108 106108

TIME ON SITE: 9:15 TIME RELEASED: 3:00

THE TRANSPORT TO LANDFILL / OTHER ENTRY NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

WE DO IT WELL BECAUSE WE CARE

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE [signature]
DELIVERED Deposit Drums ________ RETURNED Deposit Drum ________
RECEIVED BY [signature] 1/20/11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

This Memorandum is an acknowledgment that a Bill of Lading has been issued and is not Original Bill of Lading, not a copy or duplicate, covering the property named herein, and is intended solely for filing or record.

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date _____

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in item 430, Sec.1.

TO:

Consignee: KIRTLAND AIRFORCE BASE LANDFILL

Street: 2 MILES SOUTH OF ROBOTICS RD

City: ALBUQUERQUE State: NM Zip Code: 87117

FROM: Shipper: KIRTLAND AIRFORCE BASE

Street: 2050 WYOMING BLVD SE

City: ALBUQUERQUE State: NM Zip Code: 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM		Non Hazardous Waste Soils	20 yards			
1 CM		non Hazardous waste Soils	20 yards			
1 CM		non Hazardous waste Soils	20 yards			
1 CM		non Hazardous waste Soils	20 yards			
		Non-Haz Soil, disposed of on site 5 containers				
		BIN# [illegible]				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER KATH

PER [signature]

CARRIER [signature]

PER [signature]

DATE 1-26-11

4

Permanent post-office address of shipper.

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

9 February, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 8 February, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 002

Disposal of Soil Drill Cuttings from the Installation of Groundwater Monitoring Wells KAFB-106044, KAFB-106139, and KAFB-106140 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 4 each monitoring wells, KAFB-106109; KAFB-106113; KAFB-106135 & KAFB-106137 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 6 each, Rhino roll-offs, S/N 104058; 20B008; 20B001;104056; A20-67; and 20B-25 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

February 8, 2011

Project No. 140705
KAFB-011-0006

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106109, KAFB-106113, KAFB-106135, and KAFB-106137
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in our rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cutting are discussed below.

During January 2011, Shaw E&I installed four soil vapor monitoring wells (KAFB-106109, KAFB-106113, KAFB-106135, and KAFB-106137) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106109 well is located 300 feet east of building 1029. The KAFB-106113 well is located in the BFF area approximately 200 feet north of tank 2420. The KAFB-106135 and KAFB-106137 wells are located along the north side of Randolph Ave SE across from the BFF. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. One rolloff is stored at KAFB-106109, one rolloff is stored at KAFB-106113, two rolloffs are stored at KAFB-106135, and two rolloffs are stored at KAFB-106137.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the

containers for disposal include - 104058, 20B008, 20B001, 104056, A20-67 and 20B-25. Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1101584, No. 1101635, No. 1101697 and No. 1101714 – Analytical Results for Drill Cuttings from SVM Wells KAFB-106109, KAFB-106113, KAFB-106135, and KAFB-106137

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY, INC
Date: 02/10/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☒ LANDFILL TRANSPORTATION

BIN# 104058	LOC# 106127	LOC# 106134
BIN# 20-003	LOC# 106137	LOC# 106134
BIN# 20-001	LOC# 106125	LOC# 106130
BIN# 104056	LOC# 106135	LOC# 106130
BIN# 20-07	LOC# 106109	LOC# 106114
BIN# 20-25	LOC# 106113	LOC# 106114
BIN#	LOC#	LOC#
BIN#	LOC#	LOC#

☒ DELIVERY OF 8 ROLL-OFF LINERS Dropped @ 106114

☐ DELIVERY OF _____ TARP(S)

TIME ON SITE: 9:15a TIME RELEASED: 2:00

THE TRANSPORT TO LANDFILL / OTHER ENTRY NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4934 (CELL).

WE DO IT – RETURN COMPLETED BOL TO ROB GOFF 02/10/11

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED Deposit Drums _____ RETURNED Deposit Drum _____

RECEIVED BY Terry Hudson

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. NM9570024423	Manifest Document No.	2. Page 1 of 1

3. Generator's Name and Mailing Address
KIRTLAND AIRFORCE BASE
2050 WYOMING BLVD SE
ALBUQUERQUE, NM 87117

4. Generator's Phone (505) 846 2803

5. Transporter 1 Company Name	6. US EPA ID Number	A. State Transporter's ID
RINCHEM CO INC	NMD002208627	B. Transporter 1 Phona [illegible]
7. Transporter 2 Company Name	**8. US EPA ID Number**	C. State Transporter's ID
		D. Transporter 2 Phone
9. Designated Facility Name and Site Address	**10. US EPA ID Number**	E. State Facility's ID
KIRTLAND AIRFORCE BASE LANDFILL 2 MILES SOUTH OF ROBOTICS RD ALBUQUERQUE, NM 87117	NM9570024423	F. Facility's Phone (505) 846 9014

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOILS	1	CM	20	Y
b.	1	CM	20	Y
c.	1	CM	20	Y
d. [illegible]	1	CM	20	Y

G. Additional Descriptions for Materials Listed Above
BIN# 20?-?5, 20?-008, 10105?, 1?20-067
DISPOSAL APPROVAL#

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
ADDRESS BIN SHIPPED FROM: 24 HOUR EMERGENCY CONTACT: CHEMTREC @ 800 424 9300
CONTRACT: CRM0067063R

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste ragulations.

Printed/Typed Name	Signature	Date Month	Day	Year
[illegible]	[signature]	2	1?	11

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
[illegible]	[signature]	2		11

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date Month	Day	Year

GENERATOR · TRANSPORTER · FACILITY · NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. NM9570024423	Manifest Document No.	2. Page 1 of 1
3. Generator's Name end Mailing Address KIRTLAND AIRFORCE BASE 2050 WYOMING BLVD SE ALBUQUERQUE, NM 87117 4. Generator's Phone (505) 846 2801			
5. Transporter 1 Company Name RINCHEM CO INC.	6. US EPA ID Number NMD002208627	A. State Transporter's ID B. Transporter 1 Phone (505) 345 3655	
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID D. Transporter 2 Phone	
9. Designated Facility Name and Site Address KIRTLAND AIRFORCE BASE LANDFILL 2 MILES SOUTH OF ROBOTICS RD ALBUQUERQUE, NM 87117	10. US EPA ID Number NM9570024423	E. State Facility's ID F. Facility's Phone (505) 846 9014	

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOILS	1	CM	20	Y
b. Non [illegible] Waste Soils	1	Cm	20	Y
c.				
d.				

G. Additional Descriptions for Materials Listed Above

RIN# 202 [illegible] 10056

DISPOSAL APPROVAL# ____

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

ADDRESS RIN SHIPPED FROM: 24 HOUR EMERGENCY CONTACT: CHEMTREC @ 800 424 9300

CONTRACT: CRN000706318

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
[illegible]	[illegible]	2	10	11

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
[illegible]	[illegible]	02	[illegible]	11

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date Month	Day	Year

GENERATOR — TRANSPORTER — FACILITY — NON-HAZARDOUS WASTE

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

22 February, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 22 February, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106109 and KAFB-106113 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106109 and KAFB-106113 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 2 each, Rhino roll-offs, S/N A20-081and A20-043 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

February 22, 2011

Project No. 140705
KAFB-011-0007

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Well KAFB-106109 and KAFB-106113
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed two soil vapor monitoring wells (KAFB-106109 and KAFB-106113) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106109 well is located 300 feet east of building 1029. The KAFB-106113 well is located in the BFF area approximately 200 feet north of tank 2420. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. One rolloff is stored at KAFB-106109 and one rolloff is stored at KAFB-106113.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – A20-081and A20-043. Upon receiving notification of Kirtland AFB's

acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1102163 – Analytical Results for Drill Cuttings from SVM Wells KAFB-106109 and KAFB-106113

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Monday, February 21, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102163

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 5 sample(s) on 2/7/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: NM9570024423

Manifest Document No.:

2. Page 1 of 1

3. Generator's Name and Mailing Address:
KIRTLAND AIRFORCE BASE
2050 WYOMING BLVD SE
ALBUQUERQUE, NM 87117

4. Generator's Phone (505) - 846-8546

5. Transporter 1 Company Name: RINCHEM CO INC.

6. US EPA ID Number: NMD002208627

A. State Transporter's ID:

B. Transporter 1 Phone: (505) 345-3655

7. Transporter 2 Company Name:

8. US EPA ID Number:

C. State Transporter's ID:

D. Transporter 2 Phone:

9. Designated Facility Name and Site Address:
KIRTLAND AIRFORCE BASE LANDFILL
2 MILES SOUTH OF ROBOTICS RD
ALBUQUERQUE, NM 87117

10. US EPA ID Number: NM9570024423

E. State Facility's ID:

F. Facility's Phone: (505)-846-9014

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOILS	1	CM	20	Y
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above:
BIN# AZO-081
DISPOSAL APPROVAL#

H. Handling Codes for Wastes Listed Above:

15. Special Handling Instructions and Additional Information:
ADDRESS BIN SHIPPED FROM:
24 HOUR EMERGENCY CONTACT: Rhino Env Svcs 1-800-762-0241

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date (Month Day Year)

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Aden Heyman		02 26 11

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date (Month Day Year)

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. NM9570024423	Manifest Document No.	2. Page 1 of

3. Generator's Name and Mailing Address: KIRTLAND AIRFORCE BASE
2050 WYOMING BLVD SE
ALBUQUERQUE, NM 87117

4. Generator's Phone (505) - 846-8546

5. Transporter 1 Company Name	6. US EPA ID Number	A. State Transporter's ID
RINCHEM CO INC.	NMD002208627	B. Transporter 1 Phone (505)-345-3655
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID
		D. Transporter 2 Phone

9. Designated Facility Name and Site Address	10. US EPA ID Number	E. State Facility's ID
KIRTLAND AIRFORCE BASE LANDFILL 2 MILES SOUTH OF ROBOTICS RD ALBUQUERQUE, NM 87117	NM9570024423	F. Facility's Phone (505)-846-9014

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE SOILS	1	CM	20	Y
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above
BIN# A20-043
DISPOSAL APPROVAL#_____

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
ADDRESS BIN SHIPPED FROM: **24 HOUR EMERGENCY CONTACT: Rhino Env Svcs 1-800-762-0241**

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date (Month Day Year)

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Adam Heyman	[signature]	02 25 11

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date (Month Day Year)

R boxes on-site disposal

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY, INC
Carrier

02/24/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[✓] LANDFILL TRANSPORTATION

BIN# AZO-042 LOC# 106113 LOC# 106129

BIN# AZO-81 LOC# 106109 LOC# 106118

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

[ ] DELIVERY OF _____ ROLL-OFF LINERS

[ ] DELIVERY OF _____ TARP(S)

TIME ON SITE: 10:15 am TIME RELEASED: 1:00 p.m

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-498 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED RETURNED

Deposit Drums _____ Deposit Drum _____

RECEIVED BY _____

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of

3. Generator's Name and Mailing Address

4. Generetor's Phone ( )

5. Transporter 1 Company Name

6. US EPA ID Number

A. State Transporter's ID

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address

10. US EPA ID Number

E. State Facility's ID

F. Facility's Phone

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a.				
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest ara not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date: Month	Day	Year

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Neme	Signature	Date: Month	Day	Year

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of

GENERATOR

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

5. Transporter 1 Company Name

6. US EPA ID Number

A. State Transporter's ID

B. Transporter 1 Phone

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address

10. US EPA ID Number

E. State Facility's ID

F. Facility's Phone

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON HAZARDOUS WASTE LIQUID	1	DM	20	
b.				
c.				
d.				

G. Additional Descriptions for Materials Listed Above

NON H2O - OIL

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date Month	Day	Year
		3	2	11

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year
		3	2	11

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date Month	Day	Year

FACILITY

19. Discrepancy Indication Space

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

Printed/Typed Name	Signature	Date Month	Day	Year

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

28 February, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 25 February, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106132 and KAFB-106133 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106132 and KAFB-106133 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 3 each, Rhino roll-offs, S/N 104054, 104055 and 104052 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

February 25, 2011

Project No. 140705
KAFB-011-0008

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Well KAFB-106132 and KAFB-106133
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed two soil vapor monitoring wells (KAFB-106132 and KAFB-106133) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106132 well is located in the parking lot north of KAFB building 1044. The KAFB-106133 well is located immediately west of KAFB building 1055. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106132 and one rolloff is stored at KAFB-106133.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – 104054, 104055, and 104052. Upon receiving notification of Kirtland AFB's

acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1102257 – Analytical Results for Drill Cuttings from SVM Wells KAFB-106132 and KAFB-106133

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Thursday, February 24, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102257

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 2/9/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

for Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

3 boxes on-site disp.

STRAIGHT BILL OF LADING

ORIGINAL — NOT NEGOTIABLE

Shipper No. _____

Carrier No. _____

Date 3-1-11

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee ~~KIRTLAND AIRFORCE BASE LANDFILL~~

Street ~~2 MILES SOUTH OF ROBOTICS RD~~

City ALBUQUERQUE State, NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. ~~1-800-424-9300~~

Vehicle Number

Route

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM		104054	20yd			
1 CM		104055	20yd			
1 CM		104052	20yd			

BIN# _____

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____." (2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172. (3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading. Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER _____ 3/1/11

CARRIER Rinchem

PER _____

DATE 3-1-2011

1

Permanent post-office address of shipper.

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

3 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 1 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106115 and KAFB-106133 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106115 and KAFB-106133 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 2 each, Rhino roll-offs, S/N 104053, and 104057 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 1, 2011

Project No. 140705
KAFB-011-0009

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Well KAFB-106115 and KAFB-106133
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed two soil vapor monitoring wells (KAFB-106115 and KAFB-106133) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106115 well is located approximately 150 feet north of tank 2422. The KAFB-106133 well is located immediately west of KAFB building 1055. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. One rolloff is stored at KAFB-106115 and one rolloff is stored at KAFB-106133.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – 104053 and 104057. Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1102293 – Analytical Results for Drill Cuttings from SVM Wells KAFB-106115 and KAFB-106133

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Friday, February 25, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102293

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 2 sample(s) on 2/10/2011 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued February 24, 2011.

No determination of compounds below these (denoted by the ND or < sign) has been made.

Reporting limits are determined by EPA methodology.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date 3-1-11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee KIRTLAND AIRFORCE BASE LANDFILL

Street 2 MILES SOUTH OF ROBOTICS RD

City ALBUQUERQUE State, NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM		104054	20yd			
1 CM		104055	20yd			
1 CM		104052	20yd			
		BIN# _____				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT
C.O.D. TO:
ADDRESS

COD Amt: $

C.O.D. FEE:
PREPAID ☐
COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER _____ 3/1/11

CARRIER Rinchem

PER _____

DATE 3-1-2011

2

Permanent post-office address of shipper.

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

03/01/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☒ LANDFILL TRANSPORTATION Empty Bins

BIN# 104054 LOC# ~~CT~~ 106122 LOC# 106111

BIN# 104055 LOC# 106132 LOC# 106129

BIN# 104022 LOC# 106133 LOC# 106131

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

☐ DELIVERY OF _____ ROLL-OFF LINERS

☐ DELIVERY OF _____ TARP(S)

TIME ON SITE: 10:00 AM TIME RELEASED: ~~2:~~ 1:45

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

WE DO IT [illegible] *RETURN COMPLETED BOL TO ROB GOFF* [illegible]

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED RETURNED

Deposit Drums _____ Deposit Drum _____

RECEIVED BY _____ 3.1.11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

3 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 3 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106115, KAFB-106101 and KAFB-106108 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 3 each monitoring wells, KAFB-106115, KAFB-106101 and KAFB-106108 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 3 each, Rhino roll-offs, S/N 104050, A20-088, 20B-027 and 20B-028 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 3, 2011

Project No. 140705
KAFB-011-0010

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Well KAFB-106115, KAFB-106101 and KAFB-106108
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed three soil vapor monitoring wells (KAFB-106115, KAFB-106101 and KAFB-106108) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106115 well is located approximately 150 feet north of tank 2422. The KAFB-106101 well is located at the northwest corner of the intersection of Randolph Ave SE and Ventura Ave SE. The KAFB-106108 well is located directly south of KAFB building 1025. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. One rolloff is stored at KAFB-106115, one rolloff is stored at KAFB-106101, and two rolloffs are stored at KAFB-106108.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – 104050, A20-088, 20B-27 and 20B-028. Upon receiving notification of Kirtland

AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diana Agrew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1102634 and 1102584 – Analytical Results for Drill Cuttings from SVM Wells KAFB-106115, KAFB-106101 and KAFB-106108

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Monday, February 28, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102584

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 5 sample(s) on 2/17/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Tuesday, March 01, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102634

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 3 sample(s) on 2/18/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC
(Name of carrier) (SCAC)

Date 3/4/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee KIRTLAND AIRFORCE BASE LANDFILL

Street 2 MILES SOUTH OF ROBOTICS RD

City ALBUQUERQUE, State NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
1 CM		NON-Hazardous Waste Solids	20yd			
1 CM		NON-Hazardous WASTE Solids	20yd			
1 CM		NON-Hazardous Waste Solids	20yd			
1 CM		NON-Hazardous waste Solids	20yd			
1 CM		NON-Hazardous waste Solids	20yd			
		BIN# 104053, 104057, 104050, 424-028 20B-27, 20B-028				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER M Sweetland 3/4/11

CARRIER Rinchem

PER _____

DATE 3-4-11

2

Permanent post-office address of shipper.

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

9 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 8 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106130 and KAFB-106134 and Groundwater Monitoring Well KAFB-106101 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 3 each monitoring wells, KAFB-106130, KAFB-106134 and KAFB-106101 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 6 each, Rhino roll-offs, S/N 20B-001, 104056, 104058, 20B-008, 104051 and 20B-029 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 8, 2011

Project No. 140705
KAFB-011-011

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106130 and 106134 and Groundwater Monitoring Well KAFB-106101
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed two soil vapor monitoring wells (KAFB-106130 and KAFB-106134) and one groundwater monitoring well (KAFB-106101) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106130 well is located approximately 300 feet west of KAFB building 1055. The KAFB-106134 well is located along the south side of Randolph Ave SE, 300 feet east of KAFB building 1024. The KAFB-106101 well is located at the northwest corner of the intersection of Randolph Ave SE and Ventura Ave SE. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106130, two rolloffs are stored at KAFB-106101, and two rolloffs are stored at KAFB-106134.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the

containers for disposal include – 20B-001, 104056, 104058, 20B-008, 104051 and 20B-029. Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diane Lagrew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1102662– Analytical Results for Drill Cuttings from SVM Wells KAFB-106130 and KAFB-106134 and groundwater monitoring well KAFB-106101

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Monday, March 07, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102662

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 8 sample(s) on 2/21/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

1 1 RINCHEM CO., INC

Date 3/9/11

Page _____ of _____

(Name of carrier) (SCAC)

KIRTLAND AIRFORCE BASE

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO: KIRTLAND AIRFORCE BASE LANDFILL
Consignee

2 MILES SOUTH OF ROBOTICS RD
Street

ALBUQUERQUE NM 87117
City State, Zip Code

FROM:
Shipper 2050 WYOMING BLVD SE

Street ALBUQUERQUE, NM 87117

City State Zip Code

1-800-424-9300
24 hr. Emergency Contact Tel. No.

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS	20 YARDS			
		208001				
		104056	20yd			
		104058	20yd			
		208008	20yd			
		104057	20yd			
		208-29	20yd			
		BIN#				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO:
ADDRESS

COD Amt: $

C.O.D. FEE:
PREPAID ☐
COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER [signature] 3/9/11

CARRIER Rinchem

PER [signature]

DATE 3-9-11

2

Permanent post-office address of shipper.

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

1 1 RINCHEM CO., INC

Page _____ of _____

(Name of carrier)

Date 3/10/11

(SCAC)

KIRTLAND AIRFORCE BASE

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO: KIRTLAND AIRFORCE BASE LANDFILL
Consignee

2 MILES SOUTH OF ROBOTICS RD
Street

ALBUQUERQUE, NM 87117
City State Zip Code

FROM:
Shipper 2050 WYOMING BLVD SE

Street

ALBUQUERQUE, NM 87117
City State Zip Code

1-800-424-9300
24 hr. Emergency Contact Tel. No.

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS 104058	20 YARDS			
1 CM		20B-008	20 yds			
		BIN#				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____
(Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER M Sandoval 3/10/11

CARRIER Rinchem

PER _____

DATE 3/10/11

2

Permanent post-office address of shipper.

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY, INC
Carrier

03/07/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[X] DELIVERY OF EMPTY ROLL-OFF BIN
BIN # A20-078 LOC# 106076 3-8-11

[ ] DELIVERY OF EMPTY ROLL-OFF BIN
BIN A20 033 LOC# 106076 3/9/11

[ ] DELIVERY OF EMPTY ROLL-OFF BIN
BIN # _____ LOC# _____

[ ] DELIVERY OF 1 ROLL-OFF LINERS

[ ] DELIVERY OF 3 TARP

TIME ON SITE: _____ TIME RELEASED: _____

USED FOR PLACING BINS ONLY. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED RETURNED
Deposit Drums _____ Deposit Drum _____

RECEIVED BY _____

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

3/9/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[X] LANDFILL TRANSPORTATION

✓	BIN# 20B001	LOC# 106130	LOC# 106047	
✓	BIN# 104056	LOC# 106130	LOC# 106076	
	BIN# ~~104058~~	LOC# ~~106134~~	LOC# ~~106080~~	Moved 3/10/11
	BIN# ~~20B008~~	LOC# ~~106134~~	LOC# 106047	Moved 3/10/11
✓	BIN# 104051	LOC# 106101	LOC# 106076	
✓	BIN# 20B-29	LOC# 106101	LOC# 106047	
	BIN#	LOC#	LOC#	
	BIN#	LOC#	LOC#	

[ ] DELIVERY OF _____ ROLL-OFF LINERS

[ ] DELIVERY OF _____ TARP(S)

TIME ON SITE: _____ TIME RELEASED: _____

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____ 3-9-11

DELIVERED
Deposit Drums _____

RETURNED
Deposit Drum _____

RECEIVED BY _____ 3/10/11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

3/10/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☒ DELIVERY OF EMPTY ROLL-OFF BIN
BIN #A20-024 LOC# 106080

☒ DELIVERY OF EMPTY ROLL-OFF BIN
BIN #A20-074 LOC# 106080

☐ DELIVERY OF EMPTY ROLL-OFF BIN
BIN # _____ LOC# _____

☒ DELIVERY OF 15 ROLL-OFF LINERS

☒ DELIVERY OF 3 TARP

☐ LANDFILL TRANS / OTHER (SEE BELOW)
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____

TIME ON SITE: _____ TIME RELEASED: _____

THE TRANSPORT TO LANDFILL / OTHER ENTRY NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

DO IT WELL. BECAUSE WE CARE

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED
Deposit Drums _____

RETURNED
Deposit Drum _____

RECEIVED BY _____

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

17 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 15 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106110 and KAFB-106114 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 2 each monitoring wells, KAFB-106110 and KAFB-106114 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 4 each, Rhino roll-offs, S/N 20B-030, SD1102.20, 20B-25, and A20-067 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 15, 2011

Project No. 140705
KAFB-011-012

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106110 and 106114
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During February 2011, Shaw E&I installed two soil vapor monitoring wells (KAFB-106110 and KAFB-106114) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106110 well is located approximately 350 feet west of KAFB building 1033. The KAFB-106114 well is located 300 feet northeast of KAFB tank 2526. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106110 and two rolloffs are stored at KAFB-106114.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – 20B-030, SD1102.20, 20B-25, and A20-067. Upon receiving notification of

Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diane Agnew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1102748– Analytical Results for Drill Cuttings from SVM Wells KAFB-106110 and KAFB-106114

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Thursday, March 10, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1102748

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 4 sample(s) on 2/23/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

STRAIGHT BILL OF LADING

ORIGINAL — NOT NEGOTIABLE

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date 3/17/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee ~~KIRTLAND AIRFORCE BASE LANDFILL~~

Street ~~2 MILES SOUTH OF ROBOTICS RD~~

City ~~ALBUQUERQUE~~ State, ~~NM~~ Zip Code ~~87117~~

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. ~~1-800-424-9300~~

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS 20B-030	20 YARDS			
1CM		SD 1102.20	20yd			
1 CM		~~MES 20B-25~~	~~20yd~~	MES		
1 CM		~~MES A20-067~~	~~20yd~~	MES		
		BIN# 20B-030, SD1102.20, ~~20B-25, A20-067~~ MES				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER M Swetland

CARRIER Rinchem

PER Tony

DATE 3-17-11

1

Permanent post-office address of shipper.

STRAIGHT BILL OF LADING
ORIGINAL — NOT NEGOTIABLE

Shipper No. ________

Carrier No. ________

Page 1 of 1 — RINCHEM CO., INC (Name of carrier) (SCAC) — Date 3/18/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:
Consignee ~~KIRTLAND AIRFORCE BASE LANDFILL~~
Street ~~2 MILES SOUTH OF ROBOTICS RD~~
City ~~ALBUQUERQUE~~ State, ~~NM~~ Zip Code ~~87117~~

FROM: Shipper KIRTLAND AIRFORCE BASE
Street 2050 WYOMING BLVD SE
City ALBUQUERQUE, State NM Zip Code 87117
24 hr. Emergency Contact Tel. No. ~~1-800-424-9300~~

Route ________ Vehicle Number ________

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class, UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS 208-25	20 YARDS			
1 CM		A20-067	20yd			
		BIN#________				

PLACARDS TENDERED: YES ☐ NO ☐

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

TOTAL CHARGES $

FREIGHT CHARGES — FREIGHT PREPAID except when box at right is checked — Check box if charges are to be collect ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding ________ per ________."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

________ Signature

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

________ (Signature of Consignor)

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E&I — CARRIER RinChem
PER [signature] — PER [signature]
DATE 3/18/11

1

Permanent post-office address of shipper.

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

3 / 17 / 2011

RINCHEM COMPANY., INC
Carrier

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☒ LANDFILL TRANSPORTATION

BIN#	202-030	LOC# 106110	LOC# BFF
BIN#	SD1102.20	LOC# 106110	LOC# BFF
MES BIN#	~~202-25~~	LOC# 106114	LOC# BFF
MES BIN#	~~A20-067~~	LOC# 106114	LOC# BFF
BIN#		LOC#	LOC#
BIN#		LOC#	LOC#
BIN#		LOC#	LOC#
BIN#		LOC#	LOC#

☐ DELIVERY OF _____ ROLL-OFF LINERS

☐ DELIVERY OF _____ TARP(S)

TIME ON SITE: 10 30 TIME RELEASED: 3 30

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED _____ RETURNED _____

Deposit Drums _____ Deposit Drum _____

RECEIVED BY _____

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 377TH AIR BASE WING (AFMC)

COPY

20110318

MEMORANDUM FOR: Whom it May Concern

FROM: 377 MSG/CEAN

SUBJECT: Approval of Disposal of Investigative Derived Waste inot the KAFB Construction Debris Landfill

To Whom it May Concern, 377 MSG/CEAN, John S. Pike, Director Environmental Management, has reviewed the analytical data for the soil contained in roll-off containers SD0605.20, SD0606.20, SD0608.20, 20B-004, and 104059 and finds the soil contained to be suitable for deposition into the landfill.

If you have any questions concerning this authorization, please contact me at (505) 264-9546.

JOHN S. PIKE
Chief, Environmental Management
Kirtland AFB Civil Engineer Division

notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper
Project Manager
Dale Hahn for Tom Cooper

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1103060– Analytical Results for Drill Cuttings from Groundwater Monitoring Well KAFB-106102 and SVM Well KAFB-1061142

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Thursday, March 17, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1103060

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 5 sample(s) on 3/1/2011 for the analyses presented in the following report.

This report is a revised report and it replaces the original report issued March 16, 2011.

No determination of compounds below these (denoted by the ND or < sign) has been made.

Reporting limits are determined by EPA methodology.

Please don't hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

3/17/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[X] LANDFILL TRANSPORTATION

BIN# SDa605.20 LOC# ~~106002~~ 106102 was LOC# 106062

BIN# SDa606.20 LOC# ~~106001~~ 106102 was LOC# 106061

BIN# SDa608.20 LOC# ~~106047~~ 106102 was LOC# 106047

BIN# 20B004 LOC# ~~106080~~ 106112 ~~79~~ was LOC# 106080

BIN# 104059 LOC# ~~106080~~ 106112 was LOC# 106080

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

BIN# _____ LOC# _____ LOC# _____

[ ] DELIVERY OF _____ ROLL-OFF LINERS

[ ] DELIVERY OF _____ TARP(S)

TIME ON SITE: 745 TIME RELEASED: 1330

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED Deposit Drums _____

RETURNED Deposit Drum _____

RECEIVED BY _____ 3/19/11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

This Shipping Order Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. ______

Carrier No. ______

Page 1 of 1 RINCHEM CO., INC (Name of carrier) (SCAC) Date 3/19/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:
Consignee KIRTLAND AIRFORCE BASE LANDFILL
Street 2 MILES SOUTH OF ROBOTICS RD
City ALBUQUERQUE State, NM Zip Code 87117

FROM:
Shipper KIRTLAND AIRFORCE BASE
Street 2050 WYOMING BLVD SE
City ALBUQUERQUE, State NM Zip Code 87117
24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS SD0605.20	20 YARDS			
1 CM		Non Hazardous waste Soils SD0606.20	20 yd			
1 CM		Non Hazardous WASTE Soils SD0608.20	20 yd			
1 CM		NON-HAZARDOUS WASTE Soil 20B-004	20 yd			
1 CM		NON-HAZARDOUS WASTE Soils 104059	20 yd			
		BIN# SD0605.20, SD0606.20, SD0608.20 20B-004, 104059				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding ______ per ______."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

______ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER [signature]

CARRIER Rinchem

PER [signature]

DATE 3/19/11

2

Permanent post-office address of shipper.

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

22 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 22 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106111, KAFB-106118, KAFB-106129 and KAFB-106131 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 4 each Soil Vapor Monitoring Wells; KAFB-106111, KAFB-106118, KAFB-106129 and KAFB-106131 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 6 each, Rhino roll-offs, S/N SD1103.20; 104054; SD1101.20; A20-043; 104055 and 104052 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 22, 2011

Project No. 140705
KAFB-011-015

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106111, KAFB-106118, KAFB-106129, and KAFB-106131
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During March 2011, Shaw E&I installed four soil vapor monitoring wells (KAFB-106111, KAFB-106118, KAFB-106129, and KAFB-106131) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106111 well is located 100 feet southwest of KAFB building 1033. The KAFB-106118 well is located 200 feet southwest of KAFB building 1048. The KAFB-106129 well is located 125 feet southeast of KAFB building 1041. The KAFB-106131 well is located 50 feet northeast of KAFB tank 2526.The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106111, one rolloff is stored at KAFB-106118, two rolloffs are stored at KAFB-106129, and one rolloff is stored at KAFB-106131.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the

containers for disposal include – SD1103.20, 104054, SD1101.20, A20-043, 104055, and 104052. Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diana Agnew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1103173– Analytical Results for Drill Cuttings from SVM Wells KAFB-106111, KAFB-106118, KAFB-106129, and KAFB-106131

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Monday, March 21, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1103173

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 7 sample(s) on 3/3/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

3/22/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☐ LANDFILL TRANSPORTATION

X BIN# SD110320 LOC# 106111 LOC# _____
X BIN# 104054 LOC# 106111 LOC# _____
X BIN# SD1101-20 LOC# 106118 LOC# _____
X BIN# 420-043 LOC# 106129 LOC# _____
X BIN# 104055 LOC# 106129 LOC# _____
X BIN# 104052 LOC# 106131 LOC# _____
BIN# _____ LOC# _____ LOC# _____
BIN# _____ LOC# _____ LOC# _____

☐ DELIVERY OF _____ ROLL-OFF LINERS

☐ DELIVERY OF _____ TARP(S)

TIME ON SITE: 933 TIME RELEASED: 3:30

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

WE DO IT RIGHT — RETURN COMPLETED BOL TO ROB GOFF — BECAUSE WE CARE

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLABSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED
Deposit Drums _____

RETURNED
Deposit Drum _____

RECEIVED BY _____ 3/23/11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC (Name of carrier) (SCAC)

Date 3/23/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee KIRTLAND AIRFORCE BASE LANDFILL

Street 2 MILES SOUTH OF ROBOTICS RD

City ALBUQUERQUE State, NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS SD1103.20	20 YARDS			
1 CM		NON HAZARDOUS WASTE Soils 104054	20yd			
1 CM		NON HAZARDOUS WASTE Soils SD1101.20	20yd			
1 CM		NON HAZARDOUS WASTE Soils 420-043	20yd			
1 CM		NON HAZARDOUS WASTE Soils 104055	20yd			
1 CM		NON-HAZARDOUS WASTE Soils 104052	20yd			
		BIN# SD 1103.20, 104054, SD1101.20, 420-043 104055, 104052				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

SD

Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

420-043

SHIPPER Shaw E+I

PER M Swickard

CARRIER RINCHEM

PER _____

DATE 3/23/11

2

Permanent post-office address of shipper.

104052

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL#________

RINCHEM COMPANY, INC
Carrier

2-22 2011

RHINO - KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

☐ LANDFILL TRANSPORTATION

X BIN# 5211023-20 LOC# 106111 LOC#________

X BIN# 104251 LOC# 106111 LOC#________

X BIN# 201101-20 LOC# 106112 LOC#________

X BIN# A20-043 LOC# 106129 LOC#________

X BIN# 104255 LOC# 106129 LOC#________

X BIN# 104052 LOC# 106131 LOC#________

BIN#________ LOC#________ LOC#________

BIN#________ LOC#________ LOC#________

☐ DELIVERY OF ______ ROLL-OFF LINERS

☐ DELIVERY OF ______ TARP(S)

TIME ON SITE: 935 TIME RELEASED: 330

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT [illegible] OR [illegible] (CELL).

WE DO IT [illegible] RETURN COMPLETED BOL TO ROB GOFF [illegible]

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE ________

DELIVERED Deposit Drums ______ RETURNED Deposit Drum ______

RECEIVED BY [signature] 3/22/11

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

24 March, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 24 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106116, KAFB-106118, and KAFB-106119 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 4 each Soil Vapor Monitoring Wells; KAFB-106116, KAFB-106118, and KAFB-106119 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 8 each, Rhino roll-offs, S/N SD0607.20; 22027; A20-081; 22025; 22026; 20B-27; A20-088 and 22023 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

3/30/11
Spoke w/ Steve K. H.
well Locations:
KAFB-106128
KAFB-106131
make Left off Letter but
Roll-offs 20B-27 + A20-088 + 22023
were included. Steve will make
internal corrections.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 24, 2011

Project No. 140705
KAFB-011-016

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106116, KAFB-106118, KAFB-106119, KAFB-106128, and KAFB-106131
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During March 2011, Shaw E&I installed five soil vapor monitoring wells (KAFB-106116, KAFB-106118, KAFB-106119, KAFB-106128, and KAFB-106131) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106116 well is located 50 feet southwest of KAFB building 2401. The KAFB-106118 well is located 200 feet southwest of KAFB building 1048. The KAFB-106119 well is located 150 feet northwest of KAFB building 1026. The KAFB-106128 well is located 100 feet southwest of KAFB building 1032. The KAFB-106131 well is located 50 feet northeast of KAFB tank 2526.The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106116, one rolloff is stored at KAFB-106118, two rolloffs are stored at KAFB-106119, two rolloffs are stored at KAFB-106128, and one rolloff is stored at KAFB-106131.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – SD0607.20, 22027, A20-081, 22025, 22026, 20B-27, A20-088, and 22023. Upon receiving notification of Kirtland AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diane Agnew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Reports No. 1103222 and 1103296– Analytical Results for Drill Cuttings from SVM Wells KAFB-106116, KAFB-106118, KAFB-106119, KAFB-106128, and KAFB-106131

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Wednesday, March 23, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1103222

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 1 sample(s) on 3/4/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

This Shipping Order

Must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. _____

Carrier No. _____

Page 1 of 1

RINCHEM CO., INC
(Name of carrier) (SCAC)

Date 3/30/11

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:

Consignee KIRTLAND AIRFORCE BASE LANDFILL

Street 2 MILES SOUTH OF ROBOTICS RD

City ALBUQUERQUE State, NM Zip Code 87117

FROM: Shipper KIRTLAND AIRFORCE BASE

Street 2050 WYOMING BLVD SE

City ALBUQUERQUE, State NM Zip Code 87117

24 hr. Emergency Contact Tel. No. 1-800-424-9300

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION Proper Shipping Name, Hazard Class UN or NA Number, Packing Group or UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
1 CM		NON HAZARDOUS WASTE SOILS SD0607.26 ✓	20 YARDS			
1 CM		NON HAZARDOUS WASTE Soils 22027 ✓	20yd			
1 CM		NON HAZARDOUS WASTE Soils A20-081	20yd			
1 CM		NON HAZARDOUS WASTE Soils 22025	20yd			
1 CM		NON HAZARDOUS WASTE Soils 22026	20yd			
1 CM		NON HAZARDOUS WASTE Soil 208-27 ✓	20yd			
1 CM		NON HAZARDOUS WASTE Soil A20-088	20yd			
1 CM		NON HAZARDOUS WASTE Soil 22023	20yd			
		BIN# SD 0607.26, 22027, A20-081, 22025, 22026, 208-27, A20-088, 22023				

PLACARDS TENDERED: YES ☐ NO ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding _____ per _____."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of Item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

_____ Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

_____ (Signature of Consignor)

TOTAL CHARGES $

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked ☐ Check box if charges are to be collect

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.

Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER Shaw E+I

PER M Swickard

CARRIER Rinchem

PER _____

DATE 3/30/11

2

Permanent post-office address of shipper.

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# _____

RINCHEM COMPANY., INC
Carrier

3/5/2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[X] LANDFILL TRANSPORTATION

X	BIN# 420-088	LOC#	LOC#
X	BIN# 22026	LOC#	LOC#
X	BIN# 420-081	LOC#	LOC#
X	BIN# 220-25	LOC#	LOC#
X	BIN# 22023	LOC#	LOC#
	BIN#	LOC#	LOC#
	BIN#	LOC#	LOC#
	BIN#	LOC#	LOC#

[X] DELIVERY OF 6 ROLL-OFF LINERS

[ ] DELIVERY OF _____ TARP(S)

TIME ON SITE: 8:15 TIME RELEASED: 11:45

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE _____

DELIVERED
Deposit Drums _____

RETURNED
Deposit Drum _____

RECEIVED BY _____

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

RINCHEM COMPANY, INC.
6133 EDITH BOULEVARD NE
ALBUQUERQUE, N.M. 87107
PHONE (505) 345-3655

BOL# ____________

RINCHEM COMPANY., INC
Carrier

3 30 2011

RHINO – KAFB / SHAW
KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC
6133 EDITH NE
ALBUQUERQUE, NM 87107

[X] LANDFILL TRANSPORTATION

x BIN# 500607,20 LOC# 166059 LOC# ____________

x BIN# 22027 LOC# 166046 LOC# ____________

x BIN# 20B-27 LOC# 166046 LOC# ____________

x BIN# ~~A22032~~ LOC# ____________ LOC# ____________

BIN# ~~22023~~ MGS LOC# ____________ LOC# ____________

BIN# ____________ LOC# ____________ LOC# ____________

BIN# ____________ LOC# ____________ LOC# ____________

BIN# ____________ LOC# ____________ LOC# ____________

[ ] DELIVERY OF ______ ROLL-OFF LINERS

[ ] DELIVERY OF ______ TARP(S)

TIME ON SITE: 8:15 TIME RELEASED: 12:45

THE TRANSPORT TO LANDFILL NEEDS ALL THREE LINES COMPLETED, MEANING THE BIN# BEING MOVED, THE LOCATION NUMBER IT WAS PULLED FROM AND THE LOCATION NUMBER IT IS PLACED AFTER DUMPING AT THE LANDFILL OR IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CELL).

RETURN COMPLETED BOL TO ROB GOFF

WE DO IT RIGHT BECAUSE WE CARE

THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED AND LABELED AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATION OF THE DEPARTMENT OF TRANSPORTATION.

SIGNATURE [signature]

DELIVERED Deposit Drums ____________ RETURNED Deposit Drum ____________

RECEIVED BY ____________

FOR CHEMICAL EMERGENCY
SPILL, LEAK, FIRE EXPOSURE OR ACCIDENT
CALL CHEMTREC • DAY OR NIGHT
800-424-9300

DEPARTMENT OF THE AIR FORCE
377th Civil Engineer Division (AFMC)

4 April, 2011

MEMORANDUM FOR: 377 MSG/CEANR

FROM: 377 MSG/CEANC (Solid Waste Program Manager)

SUBJECT: Landfill Disposal

Reference: Shaw Environmental Ltr. dated: 31 March, 2011
USACE Contract No. W912DY-10-D-0014 / Delivery Order No. 0002

Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Wells KAFB-106117, and Groundwater Monitoring Wells KAFB-106062, and KAFB-106076 on Kirtland AFB as part of Base Fuels Facility Site Investigation

1. Authorization is granted to Shaw Environmental to dispose of soil drill cuttings and debris in support of continued monitoring of Bulk Fuels Facility from the installation of 3each Monitoring Wells; Soil Vapor Monitoring Well KAFB-106117, and Groundwater Monitoring Wells KAFB-106062, and KAFB-106076 at the Kirtland AFB construction and demolition landfill. Debris will be delivered by Rhino Waste in 8 each, Rhino roll-offs, S/N 104050, 104053, 104057 and A20-028 to the landfill. Debris will consist of drill cuttings and plastic liners from roll-offs. Lab results are on file in the Solid Waste Management office. Shaw shall be issued a Kirtland AFB landfill pass for this disposal action. A copy of this letter will accompany each roll-off and be left with the gate keeper at the landfill.

2. Please direct questions to me at 846-9014.

STEVEN C. KITT
Solid Waste Program Manager
Environmental Management

Shaw® Shaw Environmental & Infrastructure, Inc.

A World of **Solutions**™

March 31, 2011

Project No. 140705
KAFB-011-023

Mr. Steve Kitt
377 MSG/CEANC
2050 Wyoming Blvd NE
Albuquerque, NM 87117-5270

Reference: USACE Contract No. W912DY-10-D-0014, Delivery Order 0002

Subject: Disposal of Soil Drill Cuttings from the Installation of Soil Vapor Monitoring Well KAFB-106117 and Groundwater Monitoring Wells KAFB-106062 and KAFB-106076
Kirtland AFB, New Mexico

Dear Mr. Kitt:

Shaw Environmental and Infrastructure (Shaw E&I) is requesting permission to dispose of nonhazardous soil drill cuttings and plastic liners used in rolloff containers to the Kirtland Air Force Base (Kirtland AFB) Construction and Demolition (C&D) debris landfill. The generation of and analyses performed on the soil drill cuttings are discussed below.

During March 2011, Shaw E&I installed one soil vapor monitoring well (KAFB-106117) and two groundwater monitoring wells (KAFB-106062 and KAFB-106076) at the Kirtland AFB Bulk Fuels Facility (BFF). The KAFB-106117 well is located just south of KAFB building 1026. The KAFB-106062 well is located 400 feet east of KAFB building 1024. The KAFB-106076 well is located just southeast of KAFB building 1032. The monitoring wells were drilled using air rotary casing hammer (ARCH) and the drill cuttings were containerized in plastic lined steel rolloffs pending laboratory analysis for waste characterization. Approximately 10 to 15 cubic yards of soil drill cuttings were generated for each 20-cubic yard rolloff container. Two rolloffs are stored at KAFB-106117, one rolloff is stored at KAFB-106062, and one rolloff is stored at KAFB-106076.

A composite sample was collected from each of the rolloff containers and sent to Hall Environmental Analysis Laboratory for testing. The samples were analyzed for the required parameters per the Kirtland AFB Landfill Acceptance Memorandum (January 2009). The analytical results for the composite samples confirm that the drill cuttings are not considered to be hazardous waste and meet the requirements for disposal at the Kirtland C&D landfill.

Shaw E & I requests your review of the attached analytical data and determination for disposal at Kirtland AFB C&D landfill. The rolloff containers are owned by Rhino Environmental SVCS, Inc. and the numbers on the containers for disposal include – 104050, 104053, 104057, and A20-028. Upon receiving notification of Kirtland

AFB's acceptance of the soil and plastic, Shaw E&I will coordinate transport of the rolloffs and disposal of the waste with Rhino.

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Diana Agrew for Tom Cooper

Thomas Cooper
Project Manager

Enclosures:
Hall Environmental Analysis Laboratory Report No. 1103421 – Analytical Results for Drill Cuttings from SVM Well KAFB-106117 and Groundwater Monitoring Wells KAFB-106062 and KAFB-106076

HALL
ENVIRONMENTAL
ANALYSIS
LABORATORY

COVER LETTER

Friday, March 25, 2011

Pamela Moss
Shaw Environmental, Inc.
7604 Technology Way, Suite 300
Denver, CO 80237

TEL: (720) 554-8252
FAX

RE: KAFB BFF

Order No.: 1103421

Dear Pamela Moss:

Hall Environmental Analysis Laboratory, Inc. received 7 sample(s) on 3/9/2011 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. Below is a list of our accreditations. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites.

Reporting limits are determined by EPA methodology.

Please do not hesitate to contact HEAL for any additional information or clarifications.

Sincerely,

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901
AZ license # AZ0682
ORELAP Lab # NM100001
Texas Lab# T104704424-08-TX

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX C-2

Off-Site Disposal Waste Manifest

THIS PAGE INTENTIONALLY LEFT BLANK

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
	NM9570024423	1 of 1	505-846-2803	003403798 FLE

GENERATOR

5. Generator's Name and Mailing Address
Kirtland Airforce Base
2050 Wyoming Blvd SE
Albuquerque, NM 87117
Generator's Phone: 505 846-2803

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name
RINCHEM CO INC

U.S. EPA ID Number
NMD002208627

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address
Rinchem Company, Inc.
6133 Edith Blvd NE
Albuquerque, NM 87107
Facility's Phone: (505)345-3855

U.S. EPA ID Number
NMD002208627

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	Ø	DM	Ø	P	D001	D018	
X	2. RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	3	DF	1500	P	D001	D018	
	3.							
	4.							

14. Special Handling Instructions and Additional Information
~~1) RC8578~~
2) RC8578
24 hour emergency contact: Terry Rulon (303)887-8464
~~1) ERG# 128~~
2) ERG# 128

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: John S. Pike
Signature:
Month: 01 Day: 14 Year: 11

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: CHAD NELSON
Signature:
Month: 01 Day: 14 Year: 11

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) 505-846-8546 Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1	3. Emergency Response Phone	4. Manifest Tracking Number
	NM8570024423	1 of 1	505-846-2800	003403734 FLE

5. Generator's Name and Mailing Address: Kirtland Airforce Base Attn: Wayne Bitner
2050 Wyoming Blvd SE
Albuquerque, NM 87117
Generator's Phone: 505-846-8546 505-846-2800

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: RINCHEM CO INC — U.S. EPA ID Number: NMD002208627

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: Rinchem Company, Inc.
6133 Edith Blvd NE
Albuquerque, NM 87107
Facility's Phone: (505)345-3855 — U.S. EPA ID Number: NMD002208627

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	1	DM	450	P	D001 D018
X	RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	2	DF	900	P	D001 D018
	3.					
	4.					

14. Special Handling Instructions and Additional Information
2) RC8578
24 HR EMERGENCY CONTACT: TERRY RULON 303-807-8464 Rhino Env. Svs. 1-800-762-0241
1) ERG# 128
2) ERG# 128

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: John S. Pike — Signature — Month 01 Day 25 Year 11

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Kenny Sanchez — Signature — Month 01 Day 25 Year 11

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) 9546

Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number: NM9570024423
2. Page 1 of 1
3. Emergency Response Phone: 505-846-2803
4. Manifest Tracking Number: 003403732 FLE

5. Generator's Name and Mailing Address
Kirtland Airforce Base
2050 Wyoming Blvd SE
Albuquerque, NM 87117
Generator's Phone: 505 846-2803

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: RINCHEM CO INC
U.S. EPA ID Number: NMD002208627

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
Rinchem Company, Inc.
6133 Edith Blvd NE
Albuquerque, NM 87107
Facility's Phone: (505)345-3655
U.S. EPA ID Number: NMD002208627

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
X	RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	2	~~DM~~ DF	1,000	P	D001 D018
X	RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (benzene, water), 3, PG II (D001)	2	DF	1,000	P	D001 D018
	3.					
	4.					

14. Special Handling Instructions and Additional Information
~~1) RQ8578~~
2) RC8578
24 HR EMERGENCY CONTACT: ~~TERRY RULON 505-887-8464~~ RHINO ENV. SYS. 1800-762-0241
1) ERG# 128
2) ERG# 128

15. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent. I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: L.W. BITNER
Signature:
Month Day Year: 02 09 11

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: AWEN HEYMAN
Signature:
Month Day Year: 02 09 11
Transporter 2 Printed/Typed Name
Signature
Month Day Year

18. Discrepancy
18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

18b. Alternate Facility (or Generator) Manifest Reference Number:
U.S. EPA ID Number
Facility's Phone:
18c. Signature of Alternate Facility (or Generator)
Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)
1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a
Printed/Typed Name
Signature
Month Day Year

Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

GENERATOR

WASTE MANIFEST | NMD9570024423 | 1 of 1 | 505-846-8546 | 003403744 FLE

5. Generator's Name and Mailing Address: Kirtland Airforce Base, 2050 Wyoming Blvd SE, Albuquerque, NM 87117

Generator's Site Address (if different than mailing address)

Generator's Phone: 505 846-9005

6. Transporter 1 Company Name: RINCHEM CO INC — U.S. EPA ID Number: NMD002208627

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: Rinchem Company, Inc., 6133 Edith Blvd NE, Albuquerque, NM 87107 — U.S. EPA ID Number: NMD002208627

Facility's Phone: (505)345-3655

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. RQ, UN1993, WASTE FLAMMABLE LIQUIDS, N.O.S. (Benzene, Water), 3, PG II (D001)	4	DF	1500	P	D001	D018	
	2.							
	3.							
	4.							

14. Special Handling Instructions and Additional Information: 1) RO8578 1) ERG# 128

24 hour emergency contact: RHINO ENV SVCS 1-800-762-0241

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: John S. Pike — Signature: [signature] — Month 03 Day 04 Year 11

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: [initial] — Signature: Ron Starks — Month 03 Day 04 Year 11

Transporter 2 Printed/Typed Name — Signature — Month Day Year

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month Day Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. 2. 3. 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name — Signature — Month Day Year

GENERATOR | INT'L | TRANSPORTER | DESIGNATED FACILITY

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)