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

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ACRONYMS AND ABBREVIATIONS

| C CO CO ₂ | vapor concentration carbon monoxide carbon dioxide |
|--------------------------------------|--|
| K KAFB kg kg/m ³ | Kelvin Kirtland Air Force Base kilogram kilograms per cubic meter |
| m ³ /hr | cubic meters per hour |
| O ₂ | oxygen |
| ppmv | parts per million by volume |
| SVE | soil-vapor extraction |

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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).

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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 (O₂), carbon monoxide (CO), and carbon dioxide (CO₂). 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 Horibameasured 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/m³). Vapor stream concentrations are measured by the Horiba instrument in parts per million by volume (ppmv), which can be converted into kg/m³ for use in the following equation:

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

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) |
| Т | = | 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/m³) Q = extraction flow rate (m³/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:

 $C = \frac{(32,400 \times 10^{-6}) \times 980.0821 \times 290}{M} = (0.075) (74.9) (539.9) = 3,058 \text{ kg}$

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:

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.

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APPENDIX B

Data Quality Evaluation Report and Analytical Data January – March 2011

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ACRONYMS AND ABBREVIATIONS

| Kirtland AFB BFF | May 20 |
|--|--|
| SDG | sample delivery groups |
| SM | Standard Method |
| SVOC | semivolatile organic compound |
| RPD | relative percent difference |
| RRF | relative response factor |
| QAPjP QC QSM quarterly report | BFF Spill site-specific quality assurance/quality control plan quality control Quality Systems Manual Quarterly Pre-Remedy Monitoring and Site Investigation Report for January – March 2011, Bulk Fuels Facility, Solid Waste Management Units ST-106 and SS-111 |
| PAH | polycyclic aromatic hydrocarbon |
| ppb | parts per billion |
| ppm | parts per million |
| OSRTI | Office of Superfund Remediation and Technology Innovation |
| OSWER | Office of Solid Waste and Emergency Response |
| MDL | method detection limit |
| MS | matrix spike |
| MSD | matrix spike duplicate |
| LCS | laboratory control sample |
| LCSD | laboratory control sample duplicate |
| LOD | limit of detection |
| LOQ | limit of quantitation |
| ICP | inductively coupled plasma |
| ICS | interference check sample |
| ICV | initial calibration verification |
| Hg | mercury |
| EDB | 1,2-dibromoethane/ethylene dibromide |
| EPA | U.S. Environmental Protection Agency |
| DoD | U.S. Department of Defense |
| CCV CN | continuing calibration verification cyanide |
| BFF | Bulk Fuels Facility |
| % | percent |
| %D | percent difference |

ACRONYMS AND ABBREVIATIONS (concluded)

| TPH | total petroleum hydrocarbon |
|----------------|--|
| USACE USEPA | U.S. Army Corps of Engineers 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 nondetected 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 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 | Spiked | | Control Limit | 0 |
|------------|--------|--|---------------|--|
| Method | Sample | MS Recovery Outliers (%) | (%) | 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 | | | Control | |
|------------|----------------|------------------------------|-----------|---|
| Method | Calibration ID | CCV Outlier (%) | 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 highperformance 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 | lsopropylbenzene | 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 nondetected (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.

| 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 |

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

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:

$$RPD = \frac{(S-D)}{[(S+D)/2]} \times 100$$

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:

% Contractual Completeness <u>Number of Unqualified Results</u> = Total Number of Results 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:

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

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.

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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 <u>or</u> 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 <u>unusable</u> 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 <u>or</u> 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 <u>unusable</u> for any purposes. |

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

| 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. |
| С | 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. |
| Н | Holding time exceeded. |
| | 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. |
| 0 | Interference check sample outside acceptance criteria. |
| P | Analyte qualified based on the professional judgement of the reviewer. |
| S | Surrogate recovery outside control limit. |
| Τ | Temperature outside acceptance criteria. |
| Tr | Value reported detected between the MDL and practical quantitation limit. |
| W | Pesticide breakdown outside criteria (Level IV). |
| Х | 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. |

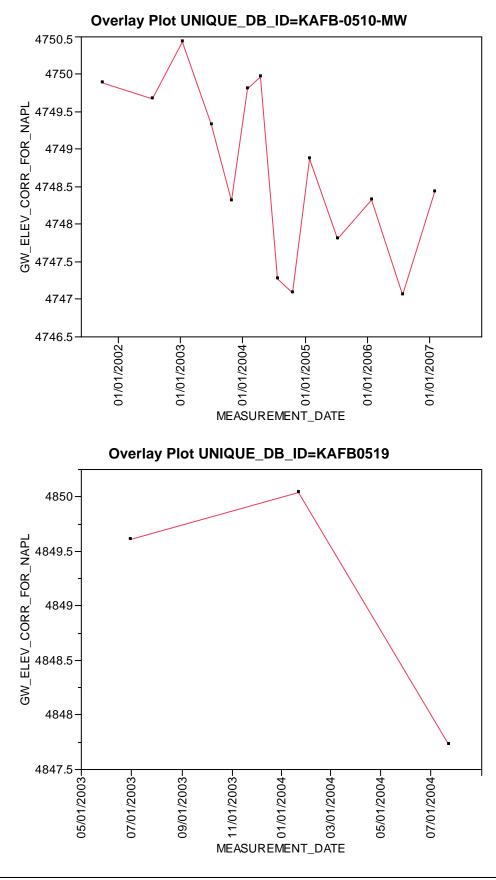
Reason Codes for Data Review and Validation

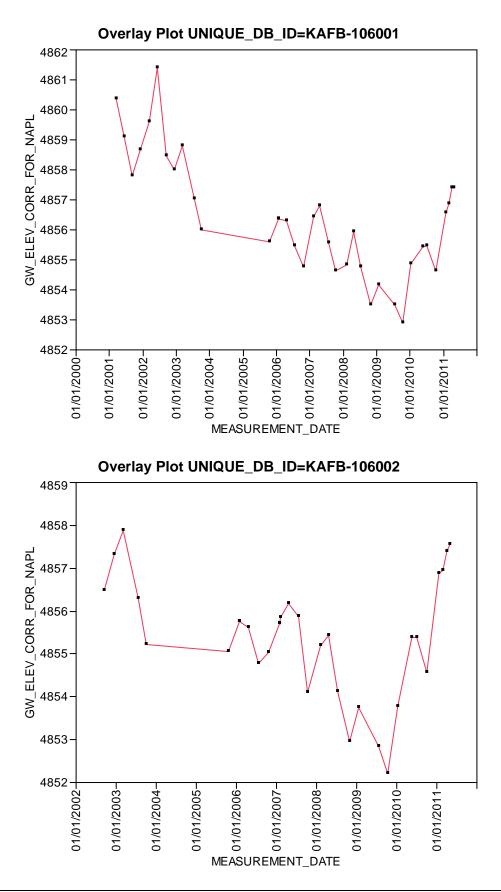
APPENDIX F

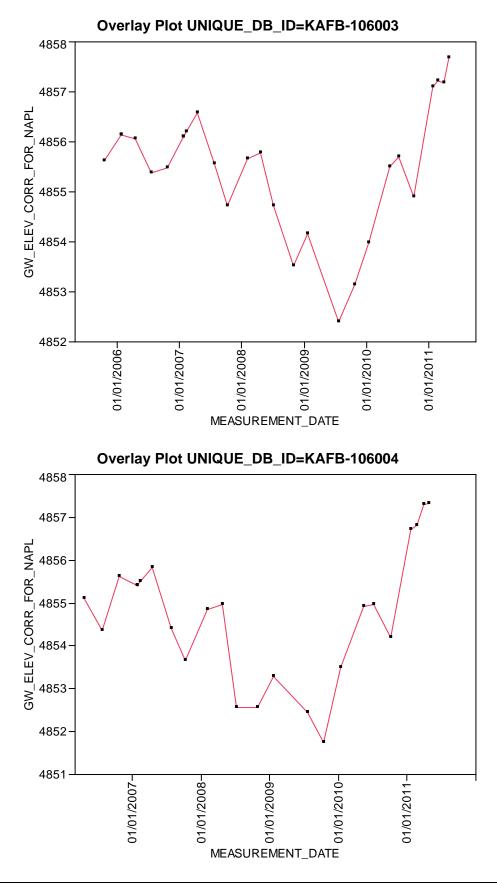
Hydrographs January – March 2011

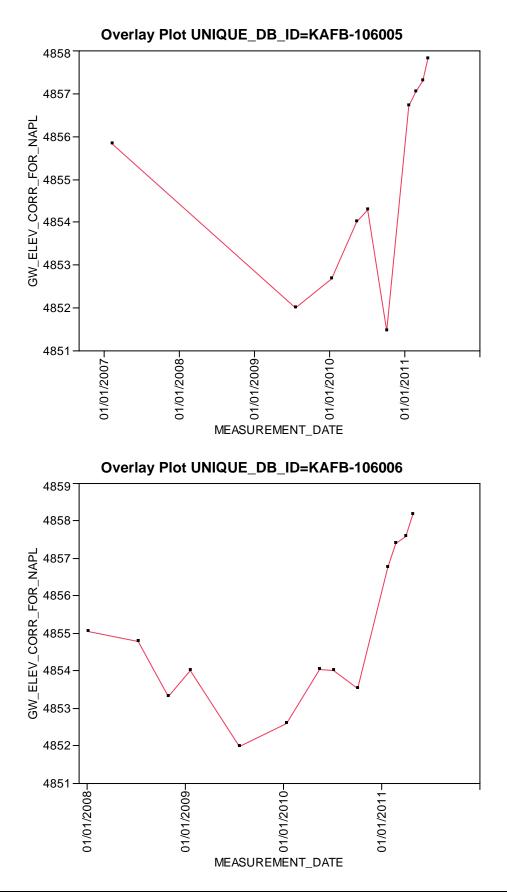
APPENDIX F-1

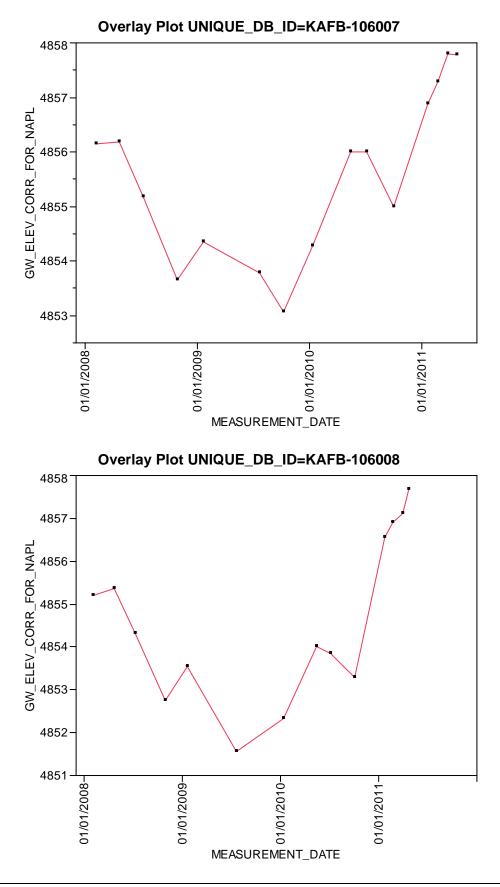
Water-Level Hydrographs January – March 2011

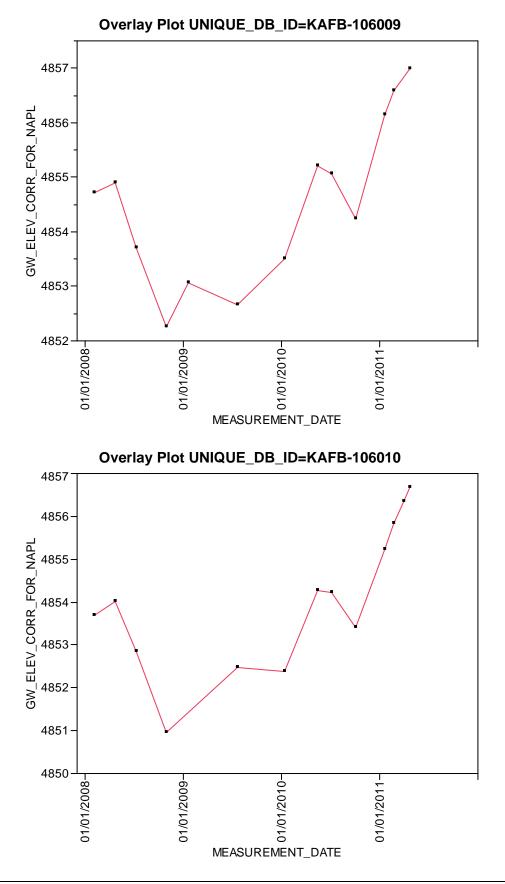


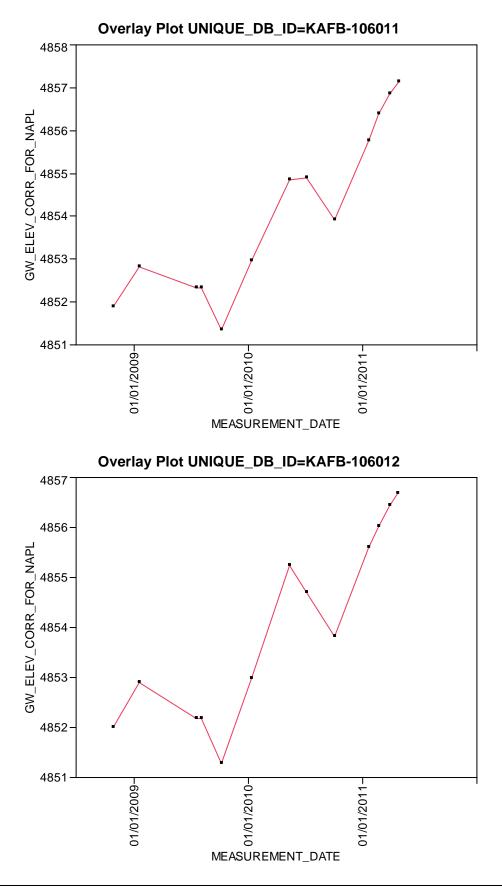


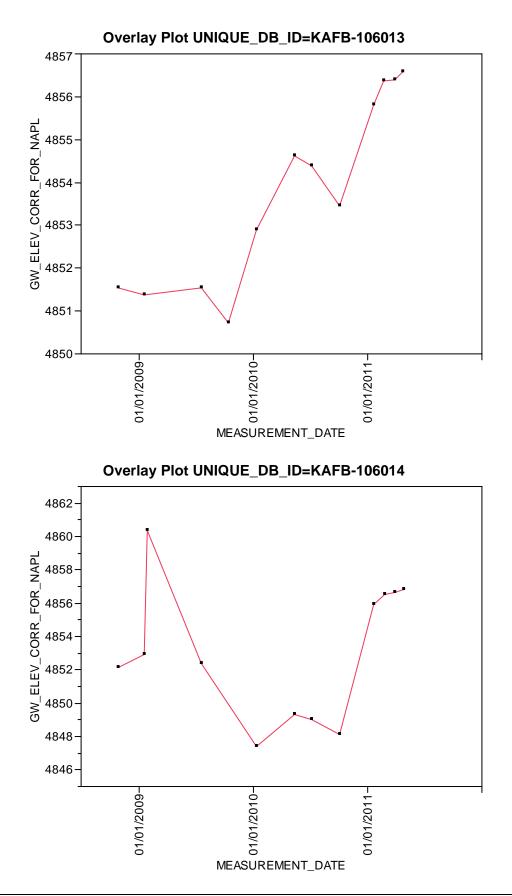


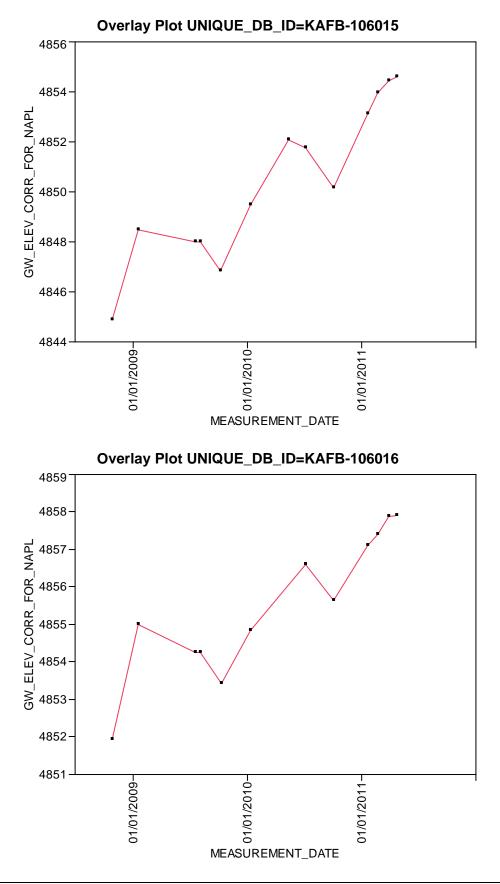


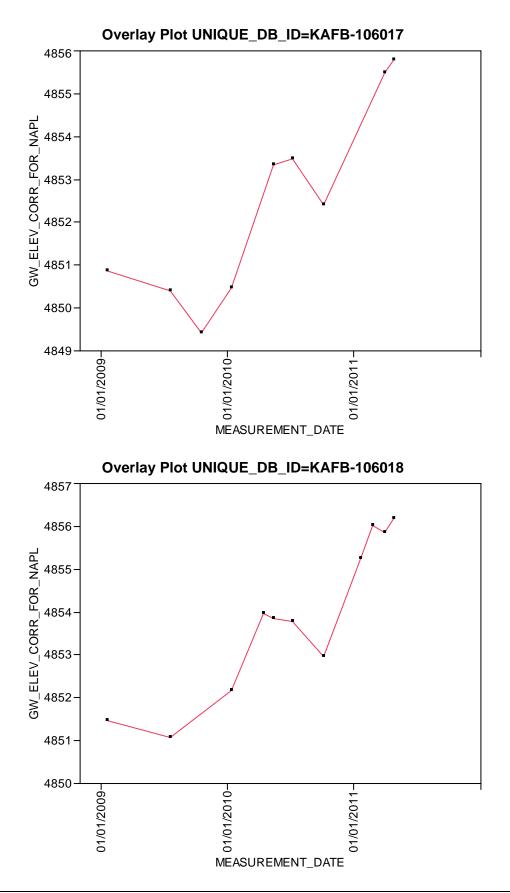


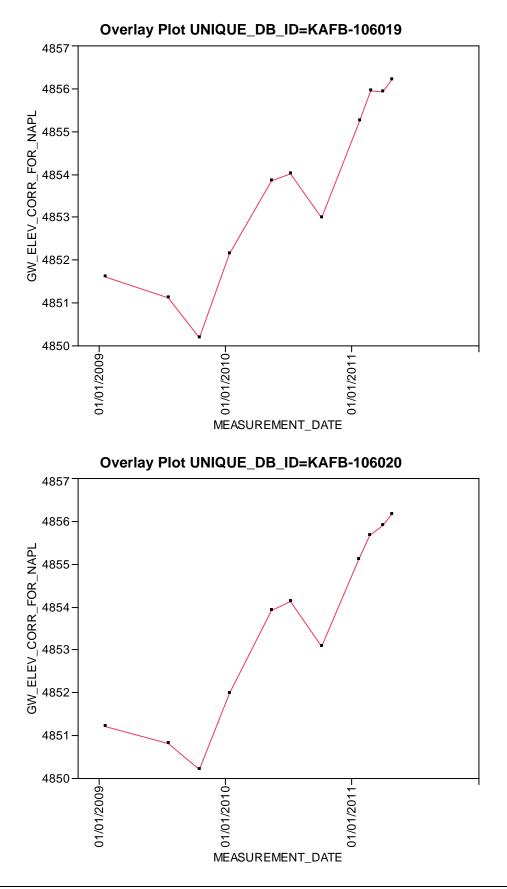


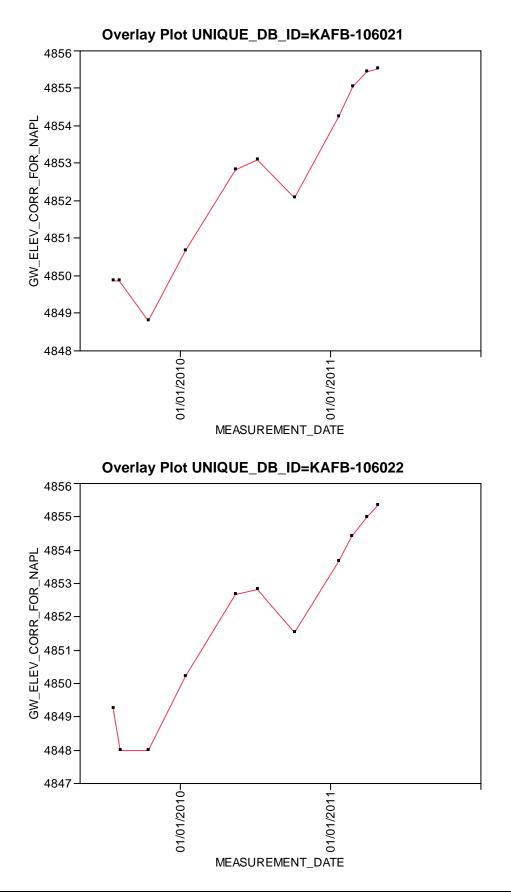


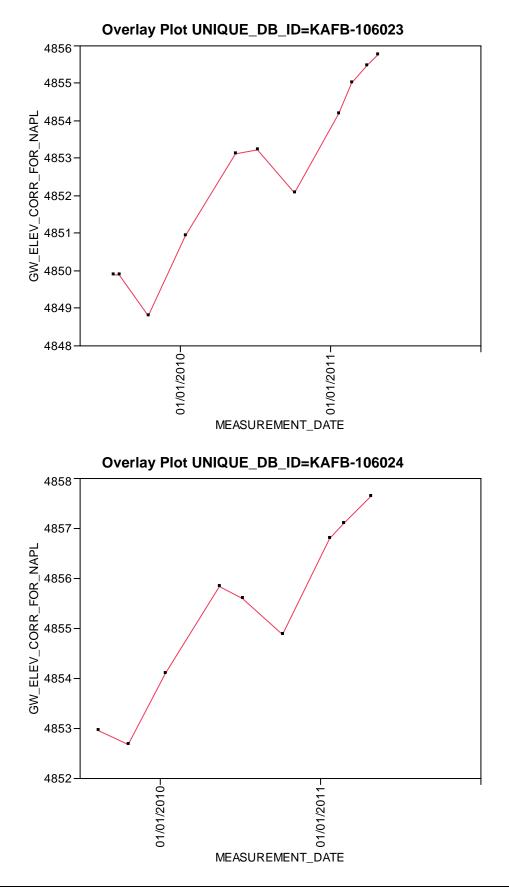


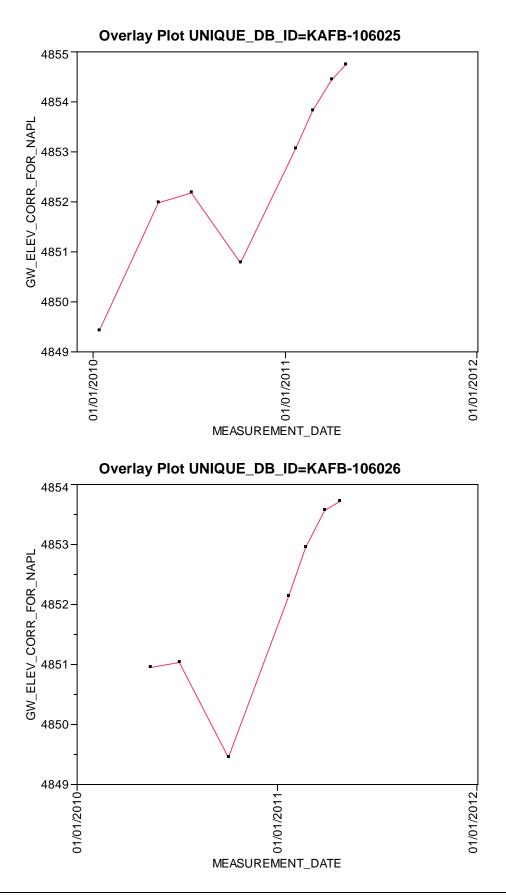


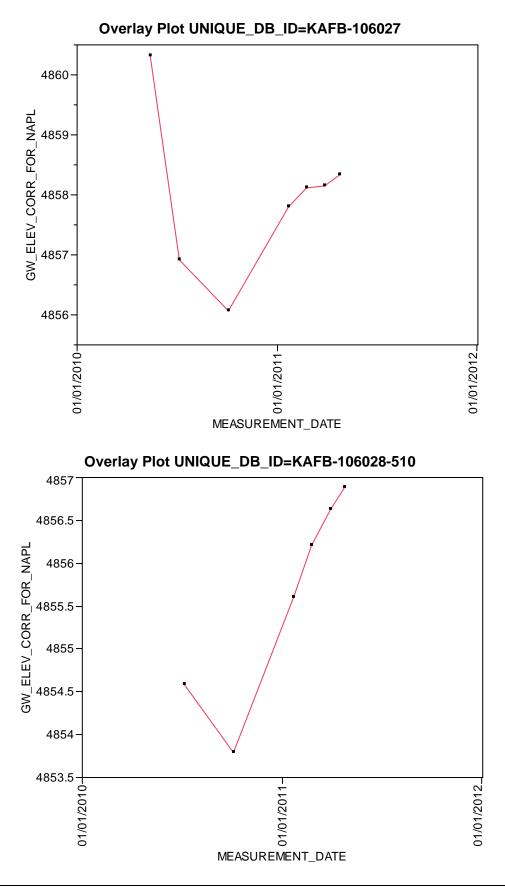


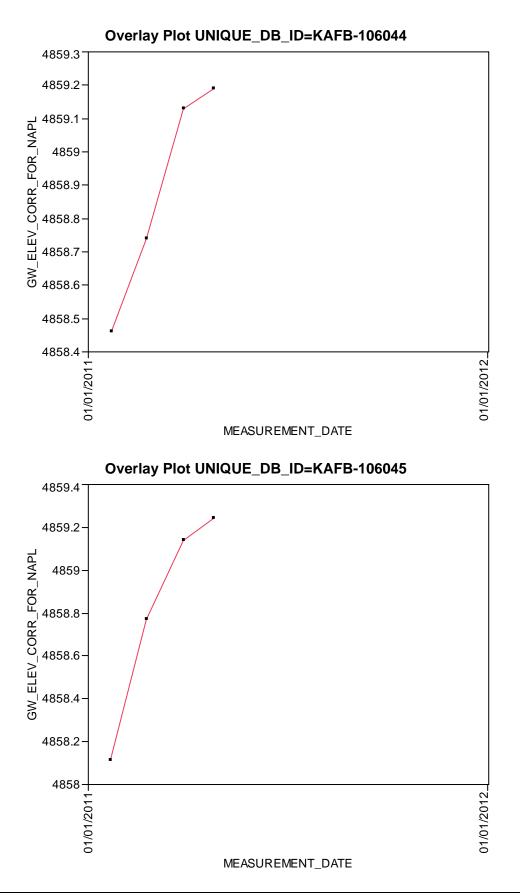


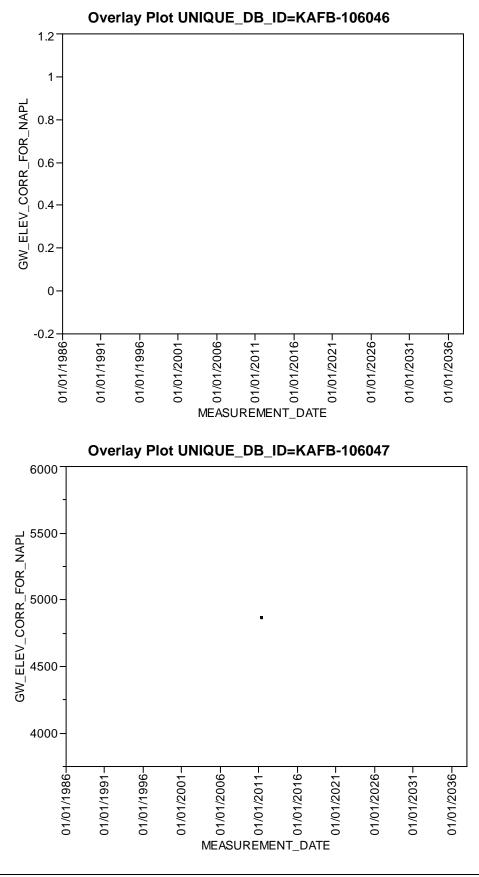


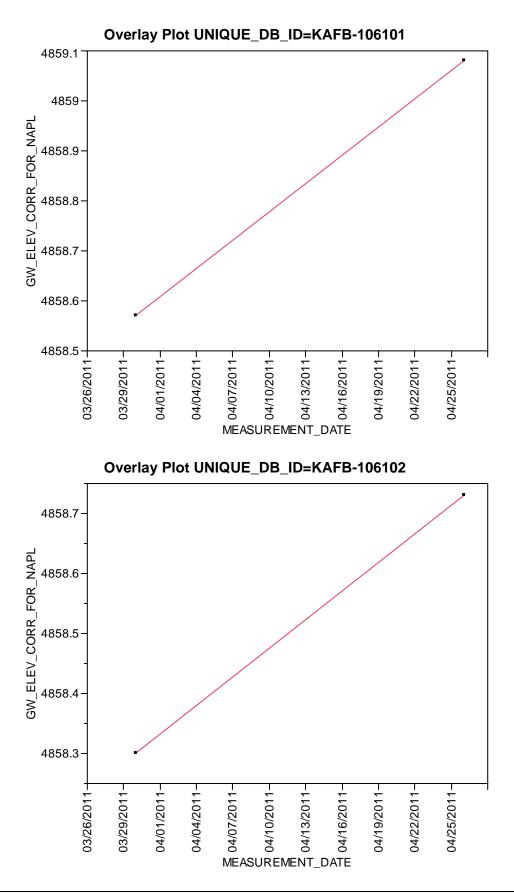


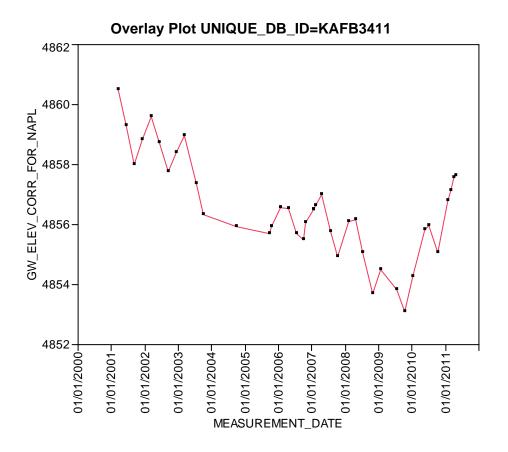






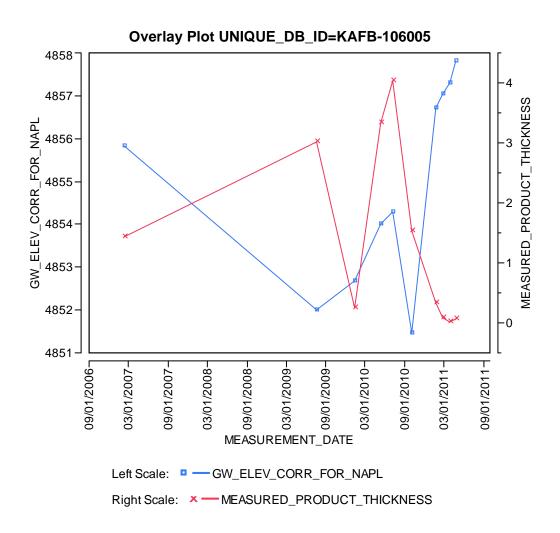


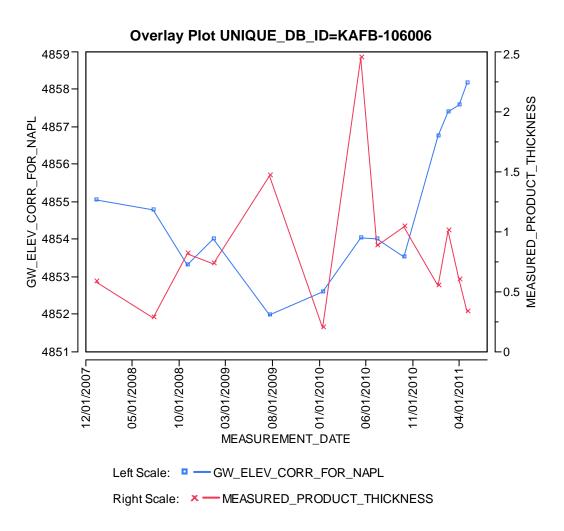


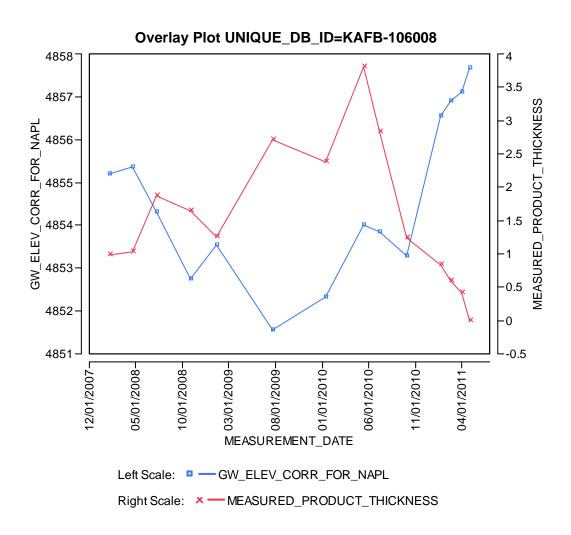


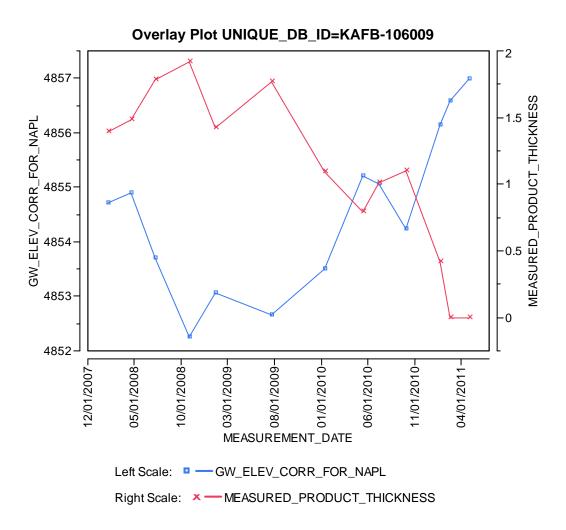
APPENDIX F-2

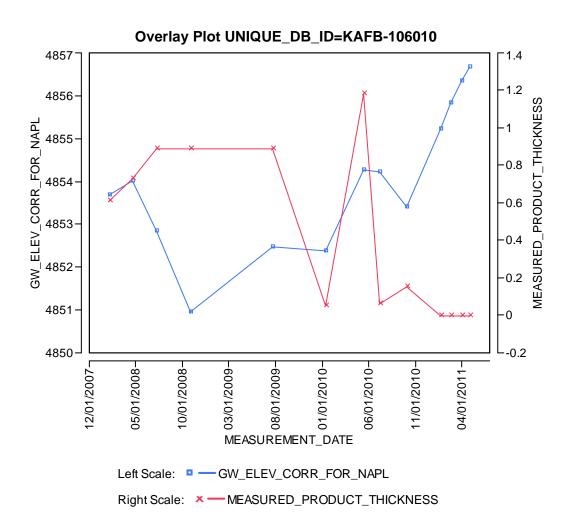
NAPL Measurements January – March 2011

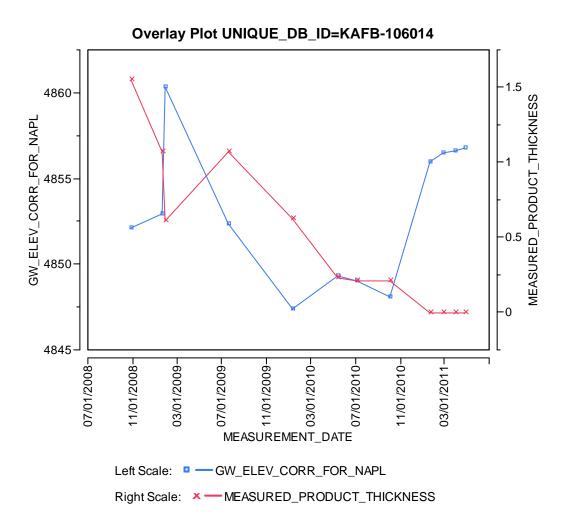


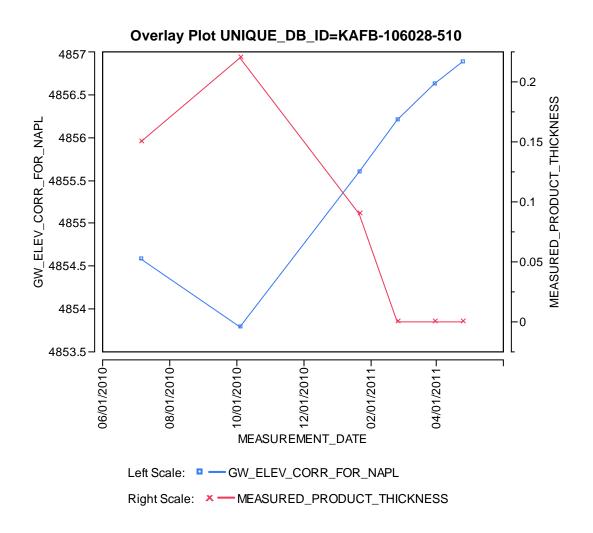












APPENDIX D-2

Shallow Soil Boring Logs

| S | | T [®] | | | | Bor | Borehole ID: KAFB-106143 | | | |
|--------------------------------|-----------------------|----------------|-----------------------------|---------------|---|-----------------------|--|---|---------------------------------------|--|
| Pro Pro | ject L ject N | oca Iam | ation: e: K | : KA (AFE | rps of Engineers AFB, Albuquerque, NM 3 BFF SWMU ST-106 and SS-111 | Hole Di | Hole Diameter Upper (in.): 2 Hole Diameter Lower (in.): 2 Surface Completion Type: | | | |
| Dat Dat | - | rted Rea | l: 2/ [,] acheo | 17/2) d: 2 | | ⊥ At ▼ At I | Time o [.] End of | Levels BGS (ft): f Drilling: N/A Drilling: N/A ng: N/A | | |
| YC | oordi | nate | e: 14 | 1728 | ISL (ft): 5345.1 320.46 550.46 | Drillling Drilling | Contra Metho | actor: JR Drilling d: Direct Push (Geopr Dale Flores | obe) Page 1 of 1 | |
| Depth (ft) | | | | | | | U.S.C.S. | Well Diagram | Remarks | |
| - | 106 ² | 143- 0/ | 0.0 | | Poorly graded SAND with Silt pinkish white; (7.5YR 8/2); dry loose; 90% very fine sand to 0 rounded; 10% silt; no odor. | ; very | SP- SM | | Description from hand auger cuttings. | |
| - | 106 ⁴ 0 | 143- | 0.0 | | Silty SAND (SM); reddish yello 6/6); dry; very loose; 80% very subrounded; 5% fine gravel to subrounded; 15% silt; no odor | y fine sand; 5mm; | SM | | | |
| 10 | 106 ⁻ 1 | 143- 0 | 0.0 | | Same as above (5 ft). | | | | | |
| - | | | | | SILT (ML); strong brown (7.5Y dry; firm; non plastic; 90% silt; fine sand to 0.2mm; no odor. | /R 4/6); 10% very | | | | |
| | 106 ⁻ 1 | | 0.0 | | Same as above (12 ft). | | ML | | | |
| | 106 ⁻ 2 | 143- 0 | 0.0 | | | | | | | |
| 20 | | | | | | | | | Total depth = 20 ft. | |
| 25 | | | | | | | | | | |
| - | | | | | | | | | | |
| 30 | | | | | | | | | | |

| Shaw | | Borehole ID: KAFB-106144 | | | |
|--|---|--|------------------|---|---------------------------------------|
| | B, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 2 Hole Diameter Lower (in.): 2 Surface Completion Type: | | | |
| Project Number: 1407 Date Started: 2/16/201 Date TD Reached: 2/1 Date Completed: 2/16/ | 1 6/2011 | ∑ At T ▼ At E | ime of Ind of | Levels BGS (ft): f Drilling: N/A Drilling: N/A ng: N/A | |
| Ground Elevation AMS Y Coordinate: 147280 X Coordinate: 1542320 | L (ft): 5344.1 7.25 | Drillling Drilling | Contra Metho | actor: JR Drilling d: Direct Push (Geopr Dale Flores | obe) Page 1 of 1 |
| Depth (ft) Sample Type Number Headspace PID Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks |
| | Poorly graded SAND with Silt (Sl pinkish white (7.5YR 8/2); dry; ve loose; 90% very fine sand to 0.2r subrounded; 10% silt; no odor. | ery | SP- SM | | Description from hand auger cuttings. |
| 5 - 106144- 05 - 0.0 | Silty SAND (SM); reddish yellow 6/6); dry; very loose; 80% very fir subrounded; 5% fine gravel to 5r subrounded; 15% silt; no odor. | ne sand; | | | |
| - 106144- 0.0 10 10 | Same as above (5 ft). | | SM | | |
| | SILT (ML); light brown (7.5YR 6/ soft; non plastic; 90% silt; 10% v sand to 0.08mm; no odor. | | | | |
| - - 106144- 20 - 20 | | | ML | | |
| | | | | | Total depth = 20 ft. |
| 25 | | | | | |

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/27/11 14:52 - Z\KAFB BFFIGINTIKAFB_PROJECTIKAFB_BFF.GPJ

| S | Cha | | | | | Borehole ID: KAFB-106145 | | | | |
|-------------------|--------------|---------------------------------|------------------|---------------|--|--|-------------------------------|--|---------------------------------------|--|
| Pro Pro | ojeo ojeo | ct Loca | ation: ie: K | : KA (AFB | ps of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 1705 | Hole Diameter Upper (in.): 2 Hole Diameter Lower (in.): 2 Surface Completion Type: | | | | |
| Da Da | te s te | Starteo TD Rea | l: 2/ ache | 16/20 d: 2 | | ∑ At ¯ ▼ At I | Time o [.] End of | Levels BGS (ft): f Drilling: N/A Drilling: N/A ing: N/A | | |
| YC | Coc | nd Elev ordinate ordinate | e: 14 | 4727 | | Drilling | Metho | actor: JR Drilling d: Direct Push (Geopre Dale Flores | obe) Page 1 of 1 | |
| O Depth (ft) | Sample Type | Number | Headspace PID | Lithologic | Material Description | | U.S.C.S. | Well Diagram | Remarks | |
| - | | 106145- \00/ | 0.0 | | Poorly graded SAND with Silt (pinkish white (7.5YR 8/2); dry; v loose; 90% very fine sand to 0. subrounded; 10% silt; slight odd | /ery 2mm; | SP- SM | | Description from hand auger cuttings. | |
| 5 | | 106145- 05 | 3.2 | | Silty SAND (SM); reddish yellov 6/6); moist; loose; 60% very fine 0.2mm; subrounded; 40% silt; s odor. | e sand to | | | | |
| <u> 10</u> | | 106145- 10 | 0.7 | | Same as above (5 ft). | | SM | | | |
| 15 | | 106145- 15 | NR | | Same as above (5 ft). | | | | | |
| - | _ | | | | SILT (ML); strong brown (7.5YF dry; firm; low plasticity; 90% silt very fine sand to 0.2mm; no od | ; 10% | ML | | | |
| 20 | - | 106145- 20 | 1.7 | | | | | | Total depth = 20 ft. | |
| - - - 25 | | | | | | | | | | |
| 30 | | | | | | | | | | |

| S | L | | | | | Borehole ID: KAFB-106146 | | | |
|--|--|-------------------------|-----------------|----------------|---|--|-------------------------------|--|---------------------------------------|
| Clie Pro Pro | ent: ojec | t US t Loca t Nam | ation: ie: K | : KÁ (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 2 Hole Diameter Lower (in.): 2 Surface Completion Type: | | | |
| Dat Dat | te S te T | | l: 2/ ache | 16/20 d: 2/ | | ∑ At⊺ ▼ At E | Fime o [.] End of | Levels BGS (ft): f Drilling: N/A Drilling: N/A ing: N/A | |
| Ground Elevation AMSL (ft): 5342.8 Y Coordinate: 1472951.78 X Coordinate: 1542082.71 | | | | | | | Metho | actor: JR Drilling d: Direct Push (Geopr Dale Flores | obe) Page 1 of 1 |
| Depth (ft) | O Depth (II) Sample Type Headspace PID PID PiD PiD Naterial Description | | | | | | U.S.C.S. | Well Diagram | Remarks |
| - | 1 | 106146- 00 / | 0.6 | | Poorly graded SAND with Silt (S pinkish white (7.5YR 8/2); dry; va loose; 90% very fine sand to 0.2 subrounded; 10% silt; no odor. | ery | SP- SM | | Description from hand auger cuttings. |
| 5 | 1 | 106146- 05 | 0.0 | | Silty SAND (SM); reddish yellow 6/6); dry; very loose; 80% very fi subrounded; 5% fine gravel to 5 subrounded; 15% silt; no odor. | ne sand; | | | |
| 10 | 1 | 106146- 10 | 0.0 | | Same as above (5 ft). | | SM | | |
| 15 | 1 | 106146- 15 | 0.0 | | SILT (ML); strong brown (7.5YR dry; firm; non plastic; 90% silt; 10 fine sand to 0.2mm; no odor. | | | | |
| 20 | 1 | 106146- 20 | 0.0 | | | | ML | | |
| - | | | | | | | | | Total depth = 20 ft. |
| 25 | | | | | | | | | |
| 30 | | | | | | | | | |

| Shaw | | Bore | eho | le ID: KAFB- | 106147 |
|--|--|--|------------------|---|---|
| Client: US Army Corp Project Location: KAR Project Name: KAFB | B, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 2 Hole Diameter Lower (in.): 2 Surface Completion Type: | | | |
| Project Number: 1407 Date Started: 2/16/20 Date TD Reached: 2/17 Date Completed: 2/17 | 11 17/2011 | ∑ At T ▼ At E | ime of Ind of | Levels BGS (ft): f Drilling: N/A Drilling: N/A ng: N/A | |
| Ground Elevation AMS Y Coordinate: 147285 X Coordinate: 154195 | i0.62 | Drillling Drilling I | Contra Metho | actor: JR Drilling d: Direct Push (Geopi Dale Flores | robe) Page 1 of 1 |
| Depth (ft) Sample Type Number Headspace PID Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks |
| | Poorly graded SAND with Silt (S pinkish white (7.5YR 8/2); dry; ve loose; 90% very fine sand to 0.2 subrounded; 10% silt; slight odor | ery mm; | SP- SM | | Description from hand auger cuttings. |
| - 106147- 450.0 - - | Silty SAND (SM); reddish yellow 6/6); dry; very loose; 60% very fi to 0.5mm; subrounded; 40% silt; odor. | ne sand | | | |
| | Same as above (5 ft). | | SM | | |
| 15 106147- 4.6 4.6 - 106147- 20 20 | SILT (ML); reddish yellow (5YR hard; low plasticity; 90% silt; 5% fine sand to 0.08mm; 5% white c slight odor. | very | | | Very hard drilling from 14 to 17 ft due to caliche cementation. |
| 25 | | | | | Total depth = 20 ft. |
| 30 | | | | | |

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/27/11 14:56 - Z:\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ

APPENDIX D

Well Installation Forms January – March 2011

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

D-2. Shallow Soil Boring Logs

APPENDIX D-1

Well Borehole Logs, Completion Diagrams, and Development Records

APPENDIX D-1

KAFB-106044 Final Well Report



Project Number: 140705

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

Y Coordinate: 1472371.83

Ground Elevation AMSL (ft): 5345.6

Date Started: 1/5/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

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

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

| | | | e: 14723 e: 15414 | | | Jason Ta | Rotary Casing H arbert | Page 1 of 19 |
|------------|---|--------|---------------------------------------|--|----------|----------|-------------------------------------|---|
| Oepth (ft) | | Number | Headspace PID Lithologic Loo | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| | - | | | Silty SAND (SM); pink (7.5YR 7/4); dry; very loose; 85% very fine sand to 0.07mm; rounded; 15% silt. | | | | Hand augered. ***Note: No headspace |
| 5 | | | | Same as above (0 ft). | | | - Concrete Seal | requirement at this location*** Began drilling @ 0915 on 1/5/11. |
| 10 | - | | | Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 75% fine sand; 10% fine gravel to 1cm; rounded; 15% silt. | SM | | | |
| 15 | | | | Same as above (10 ft). | | | • | |
| 20 | - | | | to 2cm; 10% fine sand; angular. | GP | | • | |
| 20 | - | | | Silty SAND with Gravel (SM); brown (7.5YR 5/4); dry; very loose; 70% fine sand; 15% fine gravel to 8mm; subrounded; 15% silt. | - | | - High Solids Bentonite Grout | |
| 25 | | | | Same as above (20 ft). | SM | | • | |
| 30 | - | | | | | | • • • | |



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

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

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

Page 2 of 19

| Х | Coc | ordinat | :e: 1 | 54144 | 7.86 Logged | Logged By: Jason Tarbert Page 2 of 19 | | | | | |
|--------------|--------------------|---------|------------------|-------------------|--|---------------------------------------|---|---|---------|--|--|
| ی Depth (ft) | Sample Type | Num | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks | | |
| 3! | - | | | | 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 | | • • • • • • • • • • • • • • • • • • | | | |
| | - | | | | Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 95% fine sand; 5% coarse sand to 0.2mm; subrounded. | | - 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | • • • • • • • • • • • • • • • • • • | | | |
| 40 | <u>)</u> - - | | | | Same as above (35 ft). | SP | | • • • • • • • • • • • • • • • • • • | | | |
| 4 | 5 | | | | Same as above (35 ft). | | | - High Solids Bentonite Grout | | | |
| _5(|) - - | | | C 0 | Same as above (35 ft). | | | • • • • • • • • • • • • • • • • | | | |
| 5! | 5 | | | | Poorly graded GRAVEL (GP); light reddish brown (5YR 6/3); dry; very loose; 90% fine gravel to 5mm; 10% coarse sand; subangular. | GP | | | | | |
| | | | | | Poorly graded SAND (SP); dry; very loose; 75% very fine sand; 25% coarse sand to 0.5mm; subangular. | SP | • • • • • • • • • • • • • • • • • • • • • • • • | | | | |
| 60 | כ | | | | | | •• | •• | | | |

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

Project Name: KAFB BFF SWMU ST-106 and SS-111



Client: US 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): \square At Time of Drilling: 497.00 \blacksquare At End of Drilling: 489.24 \blacksquare After Drilling: 488.26

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

Page 3 of 19

| Х | Coo | ordinat | te: 1 | 54144 | .86 Logged By: Jason Tarbert Page 3 of | | | | | |
|--------------|-------------|---------|------------------|-------------------|--|----------|-------------------------------|-------------|--|--|
| 9 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagr | ram Remarks | | |
| | - | | | | 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 | | | | |
| 75 | - | | | | 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 | | | | |
| | - | | | | Silty SAND (SM); brown (7.5YR 4/4); dry; very loose; 80% fine sand; 5% coarse sand to 4mm; rounded; 15% silt. | | - High S Bentor 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 | | | | | | | • • • • • • • • • • • • | | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5345.6

Project Number: 140705

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

Y Coordinate: 1472371.83

Date Started: 1/5/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

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

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

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| X | Coo | ordinat | :e: 1 | 54144 | 17.86 Logged | Logged By: Jason Tarbert | | | | |
|--------------|-------------|---------|------------------|-------------------|---|--------------------------|---|---|---------|--|
| g Depth (ft) | Sample Type | Numl | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | , | Well Diagram | Remarks | |
| 95 | - | | | | 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 | | | | |
| | - | | | | Poorly graded SAND (SP); brown (7.5YR 4/4); dry; very loose; 95% medium sand; 5% coarse sand to 1mm; subangular. | | - 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | • •< | | |
| <u>100</u> | - | | | | Same as above (95 ft); trace gravel to 3cm. | | | • • • • • • • • • • • • • • • • | | |
| <u>105</u> | - | | | | 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. | SP | • •< | - High Solids Bentonite Grout | | |
| <u>110</u> | - | | | | 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. | | | • • • • • • • • • • • • • • • • • • | | |
| <u>115</u> | - | | | | Same as above (110 ft); brown (10YR 5/3). | | | | | |
| 120 | | | | | | | •• | •• | | |



Client:US Army Corps of EngineersHeProject Location:KAFB, Albuquerque, NMHeProject Name:KAFB BFF SWMU ST-106 and SS-111SiProject 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

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

Sample Type Headspace PID Lithologic Log Depth (ft) Number Ś S.C. Material Description Remarks Well Diagram Ľ, 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% SPsilt; trace clay nodules. • 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 High Solids Clayey SAND (SC); light brown (7.5YR Bentonite • 6/4), moist, loose, 85% fine sand to Grout 0.1mm; subrounded; 15% clay. SC • 140 Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium • sand; trace coarse to 1mm; subangular. • • 145 • • • • • SP Same as above (140 ft); slightly coarser. • • • . • 150

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Client: US 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): \square At Time of Drilling: 497.00 \blacksquare At End of Drilling: 489.24 \blacksquare After Drilling: 488.26

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

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| X | Coc | ordinat | te: 1 | 54144 | 17.86 Logged | By: 、 | Jason Tarbert | Page 6 of 19 |
|---------------|-------------|---------|------------------|-------------------|---|----------|---|--------------|
| 10 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 155 | | | | | Well graded SAND (SW); brown (7.5YR 5/2); dry; very loose; 90% medium to coarse sand; 10% fine gravel to 1cm; rounded. | SW | | |
| | - | | | | Poorly graded SAND (SP); brown (7.5YR 4/3); dry; loose; 90% fine sand; 5% medium gravel to 2cm; well rounded; 5% silt. | | | |
| <u>160</u> | - | | | | Poorly graded SAND (SP); brown (7.5YR 4/2); dry; loose; 100% fine to medium sand to 0.3mm; subangular. | | | |
| <u>165</u> | | | | | 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. | | | |
| <u>175</u> | - | | | | Same as above (170 ft); 5% fine gravel. | | | |
| 180 | | | | | | | • • • • • • • • • • • • | |



Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

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

Project Number: 140705

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

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

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

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|-------------------|-------------|--------|------------------|-------------------|---|---------------|---|---------|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium to coarse sand to 3mm; rounded. | | | |
| <u>185</u> | - | | | | Poorly graded SAND (SP); brown (7.5YR 5/2); dry; loose; 100% medium to coarse sand to 3mm; rounded. | | | |
| <u>190</u> | - | | | | Same as above (185 ft); slightly finer sand. | SP | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | |
| <u>195</u> 200 | - | | | | 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 | | | | | | | | |



Client: US 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): \square At Time of Drilling: 497.00 \blacksquare At End of Drilling: 489.24 \blacksquare After Drilling: 488.26

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

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|--------------|-------------|--------|------------------|-------------------|--|------------------|-------------------------------------|---------|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | - | | | | Well graded SAND (SW); brown (7.5YR 4/4); moist; very loose, 80% fine to medium sand; 20% coarse sand to 3mm; rounded. | SW | | |
| | - | | | | Poorly graded SAND (SP); brown (7.5YR 4/4); moist; very loose; 100% fine to medium sand to 2mm; subrounded; trace clay. | | | |
| 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. | SP | | |
| 225 | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 100% medium sand to 0.5mm; subrounded | | - High Solids Bentonite Grout | |
| 230 | - | | | | 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 | | |
| 235 | | | | | Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 98% medium sand; 2% coarse sand to 2mm; subangular. | SP | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5345.6

Project Number: 140705

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

Y Coordinate: 1472371.83

Date Started: 1/5/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

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

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

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| | X Coordinate: 1541447.86 Logged By: Jason T | | | | | | | | Page 9 of 19 | | |
|---------------|---|--------|------------------|-------------------|--|----------|--|-------------------------------------|--------------|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | v | Vell Diagram | Remarks | | |
| 245 | - | | | | 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 | | | | | |
| | | | | | 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 | | | |



Client: US 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): \square At Time of Drilling: 497.00 \blacksquare At End of Drilling: 489.24 \blacksquare After Drilling: 488.26

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

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|---------------|-------------|--------|------------------|-------------------|--|-----------|----------|-------------------------------------|---------|
| 20 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | √ell Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand to 0.4mm; angular; 5% silt. | | | | |
| <u>275</u> | - | | | | Same as above (270 ft); damp. | | | | |
| 280 | - | | | | Same as above (270 ft); 1% fine gravel to 1cm. | | | | |
| <u>285</u> | - | | | | 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 | | | | | | | •• | • | |



Client: US 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

Borehole ID: KAFB-106044

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

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

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

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|-------------------|-------------|--------|------------------|-------------------|---|----------|-------------------------------------|---|
| ର Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 305 | - | | | | 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. |
| 310 | - | | | | 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 | | |
| 315 | - | | | | Poorly graded GRAVEL (GP); grey (5YR 6/1); dry; very loose; 90% medium gravel to 4cm; 10% coarse sand; well rounded. | GP | | |
| | - | | | | 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. |
| <u>325</u> 330 | | | | | 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. |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5345.6

Project Number: 140705

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

Date Started: 1/5/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

Groundwater Levels BGS (ft): $\begin{array}{c} \bigtriangledown \\ \hline \\ \blacksquare \end{array} \begin{array}{c} At \text{ Time of Drilling: } 497.00 \\ \hline \\ \blacksquare \end{array} \begin{array}{c} 489.24 \end{array}$ I After Drilling: 488.26

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

| YC | coorc | dinate | e: 14 | 47237 54144 | '1.8́3´ [| Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert Page 12 of 19 | | | | | | | | | |
|---------------------------|-------------|--------|------------------|-------------------|---|--|----------|---|-------------------------------|---|----------|----|--|-----------------------|--|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | w | /ell Diagram | Remarks | | | | | |
| 335 | | | | | Well graded SAND (SW); dark yell brown (10YR 4/4); dry; very loose; fine to coarse sand; 2% fine grave 2.7cm; subangular. | 98% I to 5 | SW | | • | | | | | | |
| - - 340 | - | | | | | | | | | Poorly graded SAND (SP); yellowis brown (10YR 5/4); moist; loose; 90 medium sand; 8% fine sand; 2% fi gravel to 1cm; subangular. |)% ne | SP | | • • • • • | |
| | | | | | Well graded SAND (SW); light yell brown (10YR 6/4); dry; very loose; fine to coarse sand; 5% fine grave 1.5cm; subangular. | 95% I to | SW | | • | Approximately 15 minutes for 20 ft of casing. | | | | | |
| - | | | | | Poorly graded SAND (SP); brown 4/3); moist; loose; 98% medium sa 2% fine gravel to 1cm; subrounded | and; | | | Bentonite | 6 minutes to load new casing. | | | | | |
| <u>350</u> - - - | | | | | Same as above (345 ft); 95% med sand; 5% fine gravel. | | SP | | • | No sample in chip tray 345-355 ft. | | | | | |
| 355 | | | | ₀ ∪ (| Same as above (345 ft). Poorly graded GRAVEL (GP); light | taray | | | • | | | | | | |
| - 360 | | | | 000 | (7.5YR 7/1); dry; very loose; 98% f medium gravel to 3cm; 2% mediur sand; rounded. | ine to | GP SP | | • • • • | | | | | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5345.6

Project Number: 140705

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

Y Coordinate: 1472371.83

Date Started: 1/5/2011

Borehole ID: KAFB-106044

Hole Diameter Upper (in.): 11-3/4 Project Location: KAFB, Albuquerque, NM Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

> Groundwater Levels BGS (ft): \searrow At Time of Drilling: 497.00 \checkmark At End of Drilling: 489.24 I After Drilling: 488.26

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

| | | | | 47237 54144 | 0 | | Jason Tarbert | Page 13 of 19 |
|-------------------|-------------|--------|------------------|-------------------|---|----------|-------------------------------|---------------|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagra | am Remarks |
| 365 | _ | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry to moist; loose; 90% medium sand; 5% coarse sand; 5% fine gravel to 2cm; rounded. Same as above (360 ft); 98% medium sand; 2% fine gravel to 1.5cm. | SP | | |
| <u>370</u> 375 | - | | | | Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% fine to coarse sand to 4mm; subangular; trace fines. | sw | | |
| 380 | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 90% medium sand; 10% fine gravel to 2cm; subangular. | SP | - High Sc Bentoni Grout | |
| 385 | - | | | | Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 100% fine to coarse sand to 4mm; subangular; trace fines. Same as above (380 ft); 95% fine to | SW | | |
| 390 | - | | | | coarse sand; 5% fine gravel. | | | |



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

Ground Elevation AMSL (ft): 5345.6

Date Started: 1/5/2011

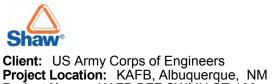
Borehole ID: KAFB-106044

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

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

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

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|---------------|--------------|--------|------------------|-------------------|---|----------------------|----------|--------|-------------------------------------|------------------------|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | W | /ell Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dam loose; 95% medium sand; 5% fin- to 1.5cm; rounded. | ıp; e gravel | | | • | |
| 395 | - | | | | Same as above (390 ft); more da gravel. | mp; no | | | | |
| 400 | | | | | Same as above (390 ft); dry. | | | | | |
| 405 | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); mois loose; 95% medium sand; 5% co sand to 0.5cm; rounded. | st; arse | SP | | - High Solids Bentonite Grout | |
| 410 | - | | | | Same as above (405 ft); damp. | | | | | |
| 415 | - | | | | Poorly graded SAND (SP); pinkis (7.5YR 6/2); damp; loose; 100% i sand to 0.4mm; rounded. | h gray medium | | | | |
| 420 | | | | | Fat CLAY with Sand (CH); reddis | h | СН | | • • • | |



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

Y Coordinate: 1472371.83

X Coordinate: 1541447.86

Ground Elevation AMSL (ft): 5345.6

Date Started: 1/5/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

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

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

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|----------------------|-------------|--------|------------------|-------------------|--|----------|-------------------------------------|---------|
| 50 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - - 425 | | | | | brown (5YR 5/3); dry to moist; firm; medium plasticity; 60% clay, 25% silt; 15% fine sand to 0.02mm. | СН | | |
| - | | | | | Poorly graded SAND (SP); brown (10YR 5/3); moist; loose; 85% medium sand; 10% coarse sand; 5% fine gravel to 1.3mm, subrounded. | | | |
| <u>430</u> - - | | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); moist; loose; 95% medium sand; 5% coarse sand to 2mm; subrounded. | SP | | |
| <u>435</u> - - | - | | | | 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 | | | | | | | | |



Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

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

Project Number: 140705

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

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

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

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|--------------|-------------|--------|------------------|-------------------|--|-----------|-------|---|---------|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | , | Well Diagram | Remarks |
| 455 | _ | | | | Poorly graded SAND (SP); brown (7.5YR 4/3); damp; loose; 95% fine sand to 0.2mm; rounded; 5% silt. | SP | | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | |
| <u>160</u> | _ | | | | 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 | |
| <u>+00</u> | _ | | | | 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 | | • •< | |
| | _ | | | | 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 | | | |
| | | | | | Poorly graded SAND (SP); brown (10YR 4/3); moist; loose; 98% medium sand; 2% coarse sand; trace gravel to 1cm; subangular. | SP | | | |
| 480 | | | | | · · · · · · · · · · · · · · · · · · · | SW | | | |



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

Y Coordinate: 1472371.83

Ground Elevation AMSL (ft): 5345.6

Date Started: 1/5/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

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

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

| | | te: 14723 | | | lason Tarbert | Page 17 of 19 |
|-----------------------------|--------|---------------------------------------|--|----------|---|---|
| B Depth (ft) Sample Type | Number | Headspace PID Lithologic Loq | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 485 | | | 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. Same as above (480 ft); increasing moisture content. | SW | - Betonite Seal | Casing coupler stuck. Cu with torch to remove coupler. Added new casing and resumed drilling. |
| 495 | | | Poorly graded SAND (SP); brown (10YR 5/3); damp; loose; 80% medium sand; 20% fine sand; trace fine gravel to 1.3cm; subrounded. Same as above (490 ft). ∑ Same as above (490 ft); wet. | | - 5" Schedule 80 PVC Riser | |
| 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 | |

| | 1 | |
|---|---|---|
| S | a | W |

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

Ground Elevation AMSL (ft): 5345.6

Date Started: 1/5/2011

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106044

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

Groundwater Levels BGS (ft): I After Drilling: 488.26

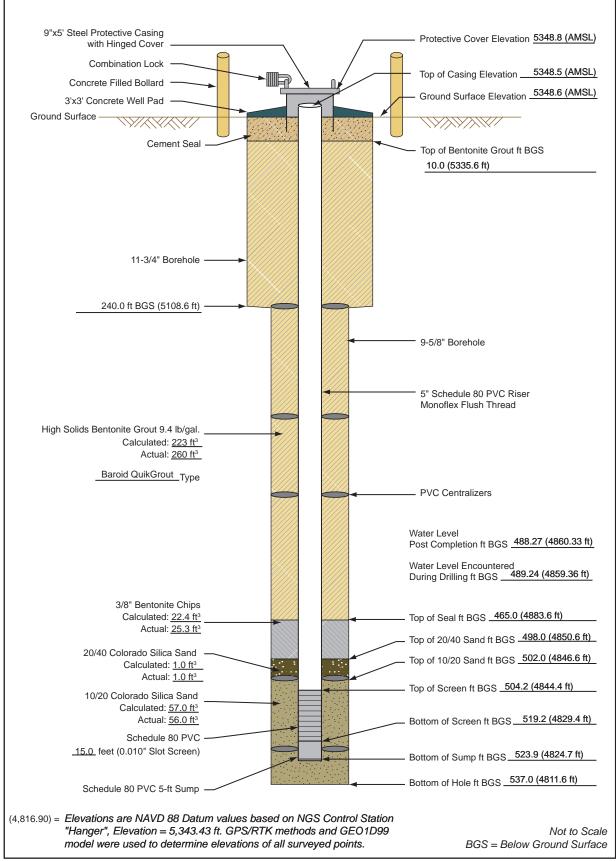
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

| YC | oordir | nate: | on AMS 147237 154144 | 71.83´ C | Drillling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Harr Logged By: Jason Tarbert | | | |
|-------------------------|-------------|-----------|----------------------------|--|---|---|---------------------------|---------|
| 0 Depth (ft) | Sample Type | Headspace | PID Lithologic Log | Material Description | | Ś | Well Diagram | Remarks |
| 515 | | | | Poorly graded SAND with Silt (SP-3 brown (7.5YR 4/3); wet; loose; 80% coarse sand; 10% fine gravel to 1.4 subrounded; 10% silt. | 6 | | | |
| - | | | | Poorly graded SAND (SP); brown (7.5YR 5/4); wet; loose; 100% coar very coarse sand; trace fine gravel 8mm; subrounded. | | | - Bottom of | |
| 520 | | | | Same as above (515 ft); 90% coars sand; 10% fine gravel to 1.4cm. | se | | -Sump | |
| - 525 - - - | | | | Same as above (515 ft). | s | Ρ | - Bottom of Sump | |
| 530 | | | | Same as above (515 ft); 90% medi sand; 10% coarse sand. | ium | | | |
| 535 | | | | Poorly graded SAND (SP); brown (7.5YR 5/3); wet; loose; 90% coars very coarse sand; 10% fine gravel 1.2cm; subrounded. | e to to | | -Bottom of Filter Pack | fill |
| 540 | | | | | | | | |

| S | L | | | | | Borehole ID: KAFB-106044 | | | | |
|--|--------------|---------------|------------------|-------------------|--|--|-------------------|--|--|--|
| Pro Pro | ojec ojec | t Loca Nam | ation e: K | : KÁF (AFB E | s of Engineers ˈB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Stick-up | | | | |
| Project Number: 140705 Date Started: 1/5/2011 Date TD Reached: 1/7/2011 Date Completed: 1/17/2011 | | | | | | ⊥ At T I At E | Time of End of | Levels BGS (ft): f Drilling: 497.00 Drilling: 489.24 ng: 488.26 | | |
| Ground Elevation AMSL (ft): 5345.6 Y Coordinate: 1472371.83 X Coordinate: 1541447.86 | | | | | | Drilling | Metho | actor: WDC Drilling d: Air Rotary Casing H ason Tarbert | ammer Page 19 of 19 | |
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks | |
| - | _ | | | | Poorly graded SAND (SP); brown (7.5YR 4/3); wet; loose; 80% coa sand; 15% very coarse sand; 5% gravel to 8mm; subrounded. | arse | SP | | Total depth = 540 ft. Reached @ 1345 on 1/7/11. | |
| 545 | - | | | | | | | | Water added during drilling (gallons) = 0 | |
| - | - | | | | | | | | Water added after drilling (gallons) = 1,048 | |
| 550 | - | | | | | | | | Water added during construction (gallons) = Not Recorded | |
| | - | | | | | | | | | |
| <u>555</u> | - | | | | | | | | | |
| 560 | - | | | | | | | | | |
| | - | | | | | | | | | |
| 565 | - | | | | | | | | | |
| - - - - | - | | | | | | | | | |
| 570 | | | | | | | | | | |

Monitoring Well Completion Diagram KAFB-106044

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



140705.CB010040_MW_KAFB_106044



| 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.): <u>.42</u> |
| Samplers: G. Peacock | | Total Depth (ft. BGL): <u>523.9</u> |
| Method of Development: X Surging | X Bailing | X Pumping |
| X Original Development | Redevelopment | Other |
| Development Date: 1/23/11-1/24 | ł/11 | |
| Depth to Water Before Develop | ing Well (ft. BGL): 490.3 | |
| Height of Water Column: 33.6 | | gal. * 1 = 44.7 |
| $V = (B + r_c + L_c + 7.4)$ Depth Purging From: <u>502</u> fe | , , , , , , , , , , | 8)+(H ₂ O added during drilling/installation) = <u>44.7</u> gallons Time Purging Begins: <u>0820, 1/24/11</u> |
| | <u>et</u> | |
| Weather: Partly Cloudy, 40's Equipment Nos.: pH Meter: | VSI 6920 122447 | Screened Interval (ft BGL): 504.23-519.23 EC Meter: YSI 6820 1234AZ Turbidity Meter: HACH 2100 |
| | 1010020 123472 | |
| Equipment Decontaminated Pr | ior to Development: Y <u>X</u> | N |
| Describe: Steam Cleaned | | |
| Collected Sample of Water Add Describe: N/A | ed to Well: YN | _X |
| Comment: N/A | | |

Well Development Record

Pg 1 of 2

| Date | Time | Water Level (ft. Below TOC) | Volume Removed (gal.) | Temp.°C | pН | 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

 $\emptyset_{\rm s}$ = porosity of the sand pack

 $\omega_{\rm s}$ = porosity or the sana pack $r_{\rm c}$ = radius of the well casing and screen in feet $L_{\rm s}$ = length of water column inside the casing and screen in feet $r_{\rm w}$ = radius of the well bore in feet $L_{\rm s}$ = length of saturated portion of the sand pack in feet

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

Pg 2 of 2



Well Development Record

Project: KAFB BFF

Project Number: 140705

Date: 1/23/11

Well No: 106044

Samplers: G. Peacock

23/11

Time Start: 1120, 1/23/11

Checked By:

Time Finish: 1215, 1/24/11

Field Chemistry (cont'd)

| | sity (contu) | | | | | | | |
|-----------|--------------|--------------------------------------|-----------------------------|---------|------|------------|---------------------|------------------|
| Date | Time | Water Level (ft. Below TOC) | Volume Removed (gal.) | Temp.°C | рН | 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

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Date Started: 12/16/2010

Y Coordinate: 1472400.50

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

Ground Elevation AMSL (ft): 5345.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106045

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 TAfter Drilling: 488.17

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

| | | ordinat | | | | | Jason Tarbert | Page 1 of 19 |
|------------|------------------|---------|------------------|-------------------|--|----------|--------------------|--|
| Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | 5 | | | | SILT (ML); pink (5YR 7/3); dry; soft; low plasticity; 90% silt; 10% very fine sand to 0.1mm. | | - Concrete Seal | Hand augered. ***Note: No headspace requirement at this location, groundwater level at time of drilling not recorded due to added |
| 1(| - - - D | | | | Same as above (0 ft); reddish brown (5YR 5/4). SILT (ML); reddish brown (2.5 YR 4/4); | | | water*** |
| 1 | - - - 5 | | | | moist; soft; low plasticity; 90% silt; 10% fine gravel. | ML | - High Solids | |
| 20 | - - - D | | | | Same as above (10 ft); light reddish brown (5YR 6/4). | | Bentonite Grout | |
| | - | | | | 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. | | | |
| 3 | - | | | | Same as above (21 ft); gravel to 2mm; angular. | GP | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| | | | | J4 I4 | 18.00 Logged By: Jason Tarbert | | | |
|--------------|-------------|--------|------------------|-------------------|---|----------|-------------------------------------|---------|
| ର Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | | | | | | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| | | | | C. IC | | 10.00 Logged | <u> </u> | | | |
|-------------|------------------------------|---------------|--------|------------------|-------------------|---|----------|-------------------|--|---------|
| 0 Danth (#) | O Deput (II) Samala Tvino | odiliple lype | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| | - | | | | | Silty GRAVEL with Sand (GM); pinkish grey (5YR 6/2); dry; loose; 50% gravel to 20mm; angular; 20% fine to very fine | GM | | • • • • • • | |
| _6 | 5 | | | | | sand; 30% silt with clay. Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 80% fine to very fine sand; rounded; 20% silt with clay. | | | | |
| _7 | - - 0 - | | | | | Same as above (62 ft). | | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | |
| _7 | 5 | | | | | Same as above (62 ft). | SM | | - High Solids Bentonite Grout | |
| 8 | 0 | | | | | Same as above (62 ft). | | | a b b b b b c b c <lic< li=""> c c c c c<!--</td--><td></td></lic<> | |
| 8 | 5 | | | | | Same as above (62 ft). | | | • •< | |
| 9 | 0 | | | | | | | • • • • • • | • • • • • • | |



Client:US Army Corps of EngineersHoleProject Location:KAFB, Albuquerque, NMHoleProject Name:KAFB BFF SWMU ST-106 and SS-111SurfaProject 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| ~ ~ ~ | X Coordinate: 1541418.00 Logged By: Jason Tarbert | | | | | | | | |
|--------------|---|--------|------------------|-------------------|--|----------|-------------------------------------|---------|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| 95 | - | | | | Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 80% fine to very fine sand; rounded; 20% silt with clay. | SM | | | |
| | - | | | | Poorly Graded SAND (SP); brown (7.5YR 5/4); moist; 95% fine to very fine sand; well sorted; 5% fines. | | | | |
| 100 | - | | | | Same as above (95 ft); light brown (7.5YR 6/3). | | | | |
| 105 | - | | | | Same as above (95 ft). | SP | - High Solids Bentonite Grout | | |
| 110 | - | | | | Same as above (95 ft). | | | | |
| 115 | - | | | | Same as above (95 ft). | | | | |
| 120 | | | | | | | | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| | | numat | .e. 1: | 5414 | Io.00 Logged | Бу. с | | |
|---------------|-------------|--------|------------------|-------------------|---|----------|-------------------------------------|---------|
| 12 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | |
| 125 | - | | | | Silty SAND (SM); brown (7.5YR 5/4); moist; loose to medium density; 80% fine to very fine sand; rounded; 20% silt with clay. | | | |
| 130 | - | | | | 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. | | | |
| 145 | - | | | | Same as above (145 ft). | SP | | |
| 150 | - | | | | | | | |



Date Started: 12/16/2010

Y Coordinate: 1472400.50

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

Ground Elevation AMSL (ft): 5345.2

Borehole ID: KAFB-106045

Client:US Army Corps of EngineersHole Diameter Upper (in.):11-3/4Project Location:KAFB, Albuquerque, NMHole Diameter Lower (in.):9-5/8Project Name:KAFB BFF SWMU ST-106 and SS-111Surface Completion Type:Stick-up

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

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

| XC | | dinat | e: 1 | 54141 | | Logged By: Jason Tarbert Page 6 of 19 | | | | | |
|------------------|-------------|--------|------------------|--|--|---------------------------------------|---|---|---------|--|--|
| 15 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | \ \ | Well Diagram | Remarks | | |
| 155 | | | | 00000000000000000000000000000000000000 | 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 | | | | | |
| <u>160</u> | - | | | | Reddish brown sand lense. 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. | SM GP- GM | - • • - • • - • • - • • • • • • • • • • | • • • • • • • • • • • • • • • • • • • | | | |
| 170 | - | | | | 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. Same as above (165 ft). | | - • • • • • • • • • • • • • • • • • • • | - High Solids Bentonite Grout | | | |
| 175 | - | | | | Same as above (165 ft); gravel content decreasing. | SP | • • | • • • • | | | |



Client: US Army Corps of Engineers

Project Number: 140705

Date Started: 12/16/2010

Y Coordinate: 1472400.50

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

Ground Elevation AMSL (ft): 5345.2

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106045

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

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

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

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| XC | Coo | rdinat | e: 18 | 5414 ⁻ | 18.00 Logged | By: 、 | Jason | Tarbert | Page 7 of 19 |
|----------------------|-------------|--------|------------------|-------------------|---|----------|--------|---|---------------------|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | | U.S.C.S. | \ \ | Well Diagram | Remarks |
| - - 185 | - | | | | 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. | | | | |
| - | - | | | | 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. |
| <u>190</u> - - | | | | | Same as above (185 ft). | | | • •< | |
| <u>195</u> - - | - | | | | Same as above (185 ft). | SP | | High Solids Bentonite Grout | |
| <u>200</u> - - | - | | | | Same as above (185 ft). | | | • • • • • • • • • • • • • • • • | |
| <u>205</u> - - | - | | | | Same as above (185 ft). | | | • •< | |
| _ 210 | | | | | | | ••• | • • • • | |



Client: US 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

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

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Sample Type Headspace PID Lithologic Log Depth (ft) Number Ś S.C. Material Description Remarks Well Diagram 5 210 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 SP Same as above (210 ft). • • 220 • No cuttings returned. Drill string plugged, no cuttings returned. Added 5 gallons of water. • 225 **High Solids** Same as above (210 ft). Bentonite • Grout . • • 230 Same as above (210 ft). • • • • SP • • 235 • • • • • Same as above (210 ft). • • • • . • 240



Date Started: 12/16/2010

Y Coordinate: 1472400.50

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

Ground Elevation AMSL (ft): 5345.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106045

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 TAfter Drilling: 488.17

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

| X Coordinate: 1472 X Coordinate: 1547 | | Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert Page 9 of 19 | | | | | |
|---|---|--|-------------------------------------|--|--|--|--|
| 000 Depth (ft) Sample Type Number Headspace PID Lithologic | Material Description | U.S.C.S. | Well Diagram | Remarks | | | |
| | 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. | | | |
| <u>245</u> _ _ _ | 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 | | | | | | | |



Client: US Army Corps of EngineersHoleProject Location: KAFB, Albuquerque, NMHoleProject Name: KAFB BFF SWMU ST-106 and SS-111SurfaProject Number: 140705One

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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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Sample Type Headspace PID Lithologic Log Depth (ft) Number Ś S.C. Material Description Remarks Well Diagram 5 270 Drilling fast. Poorly Graded SAND (SP); pinkish grey . (7.5YR 7/2); moist; very loose; 95% medium sand to 0.5mm; subangular; • well sorted; 5% fines. 275 Same as above (270 ft). • • • • 280 • Same as above (270 ft); gravel content alternating between 0% and 10% ••••• through interval 270 - 299 ft. SP 285 High Solids Same as above (280 ft). Bentonite Grout • 290 Same as above (280 ft). • • • 295 • Same as above (280 ft). • • • • • . • • GP ٠ 300



Date Started: 12/16/2010

Y Coordinate: 1472400.50

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

Ground Elevation AMSL (ft): 5345.2

Borehole ID: KAFB-106045

Client:US Army Corps of EngineersHole Diameter Upper (in.):11-3/4Project Location:KAFB, Albuquerque, NMHole Diameter Lower (in.):9-5/8Project Name:KAFB BFF SWMU ST-106 and SS-111Surface Completion Type:Stick-up

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

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

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| X | Coo | ordinat | e: 1 | 54141 | B.00 Logged By: Jason Tarbert Page 11 of 1 | | | | | |
|---------------|------------------|---------|------|-------|--|----------|--|---|---------|--|
| 00 Depth (ft) | Sample Type | Number | - | | Material Description | U.S.C.S. | | Well Diagram | Remarks | |
| | - | | | | 5% fines; occurs as a lense. | GP | • • • • • • • • • • • • • • • • | | | |
| 305 | - 5 - - | | | | 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. | | | • • • • • • • • • • • • • • • • | | |
| <u>310</u> | - - - - | | | | Same as above (303 ft). | SP | | • •< | | |
| <u>315</u> | - | | | | 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. Same as above (320 ft). | SP | | • •< | | |
| 330 | - - -) | | | | | | • • • • • • | • • • • • • • • | | |



Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111

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

Project Number: 140705

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

Surface Completion Type: Stick-up Groundwater Levels BGS (ft): ✓ At Time of Drilling: Not Recorded
 ✓ At End of Drilling: 512.70

TAfter Drilling: 488.17

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

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| X | 000 | numai | .e. 1 | 54141 | 8.00 Logger | Logged By: Jason Tarbert | | | | |
|---------------|-------------|--------|------------------|-------------------|---|--------------------------|---|---|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | , | Well Diagram | Remarks | |
| 335 | - | | | | 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. Same as above (330 ft). | | | | | |
| <u>340</u> | - | | | | Same as above (330 ft). | | • •< | • •< | Drilling rate: 1 ft/min from 340 ft to 360 ft. | |
| <u>345</u> | - | | | | 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 | | | | | | | • • • • • • | • • • • | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| ~ ~ ~ | X Coordinate: 1541418.00 Logged By: Jason Tarbert | | | | | | | | |
|--------------------------|---|--------|------------------|-------------------|---|----------|---|---------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| | - | | | | 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 | | | |
| 365 | - | | | | 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 | | |
| <u>380</u> | - | | | | Same as above (369 ft). | | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | | |
| <u>385</u> 385 390 | - | | | 0 0 | 6 inch gravel lense up to 2cm in diameter. 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 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| ~ | | iunat | C. 1 | 54141 | 6.00 LOgyer | Jason Tarbert | | |
|---------------|-------------|--------|------------------|-------------------|--|---------------|-------------------------------------|---------|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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). | | | |
| <u>405</u> | - | | | | Same as above (390 ft); moisture content increasing. | SP | - High Solids Bentonite Grout | |
| <u>410</u> | - | | | | Same as above (390 ft). | | | |
| <u>415</u> | - | | | | Same as above (390 ft). | | | |
| 420 | - | | | | | | | |



Client: US 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

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

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| | | iunat | <u>.</u> | | 10.00 209900 | <u> </u> | | |
|-------------------|-------------|--------|------------------|-------------------|--|----------|-------------------------------------|---------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| <u>425</u> | - | | | | Same as above (420 ft); no gravel. | | | |
| <u>430</u> | - | | | | 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 | | |
| <u>445</u> 450 | _ | | | | Poorly Graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% medium sand to 0.3mm; subrounded; trace fines. | SP | | |



Client: US Army Corps of Engineers

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

Project Location: KAFB, Albuquerque, NM

Borehole ID: KAFB-106045

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

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

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

| Y | Coo | rdinat | e: 14 | 4724(| | Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert Page 16 of 19 | | | | |
|-------------------|-------------|--------|------------------|-------------------|---|--|--------|----------------------------|---------------------------------------|--|
| 65 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | j j | Well Diagram | Remarks | |
| 455 | - | | | | Poorly Graded SAND (SP); browr (7.5YR 5/4); moist; very loose; 10 medium sand to 0.3mm; subround trace fines. Same as above (450 ft); trace gra | 0% ded; | Ρ | | Started adding water, ~10 gallons. | |
| <u>460</u> 465 | - | | | | Well Graded SAND with Gravel (dark brown (7.5YR 3/3); moist; ve loose; 60% very coarse sand; 40 ^o gravel to 1.5cm; subrounded; trac Same as above (460 ft). | ery % | N | - High Solids Bentonite | Added ~30 gallons of water. | |
| 470 | - | | | | Poorly Graded SAND (SP); dark t (7.5 YR 3/3); moist; very loose; 10 medium to coarse sand to 0.5 mn subrounded; trace fines. | 00% | P | Grout | Added ~50 gallons of water. | |
| <u>475</u> 480 | - | | | | Well Graded SAND with Gravel (dark brown (7.5YR 3/3); moist; ve loose; 60% very coarse sand; 409 gravel to 1.5cm; subrounded; trac | SW); ery % | | - Top of Bentonite Seal | | |



Client: US 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

Borehole ID: KAFB-106045

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

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

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

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| | .00 | Tuinat | C. I. | | 18.00 Logged | г Бу . с | | |
|----------------------|-------------|--------|------------------|-------------------|--|-----------------|-------------------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Loa | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 485 | | | | | 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. |
| 490 | | | | | Silty SAND (SM); reddish brown (5YR 4/3); damp; loose; 75% medium to coarse sand to 3mm; rounded; 25% silt. | SM | | |
| 495 | | | | | 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. |
| - | | | | | Silty SAND (SM); reddish brown (5YR 4/3); saturated; loose; 75% medium to coarse sand to 3mm; rounded; 25% silt. | | - Native Backfill | Difficult to determine fines content due to saturation. |
| <u>500</u> - - | | | | | Same as above (495 ft). | SM | | |
| <u>505</u> - - | | | | | Same as above (495 ft). | | | |
| 510 | | | | | | | | |



Date Started: 12/16/2010

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

Ground Elevation AMSL (ft): 5345.2

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 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 TAfter Drilling: 488.17

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

| Y (X (| Cool Cool | rdinat rdinat | e: 14 | 17240 | SL (ft): 5345.2 00.50 18.00 | Drilling Logged | Metho | d: Air F | Rotary Casing H arbert | lammer Page 18 of 19 |
|---------------|--------------|------------------|------------------|-------------------|---|--------------------|-----------|--------------|---|---|
| 10 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | | Remarks |
| 515 | - | | | | Poorly Graded SAND (SP); reddi brown (5YR 5/3); wet; very loose coarse sand to 0.1mm; subround <u></u> trace fines. | ; 100% | SP | | -5" PVC Schedule 80 Riser | Driller added ten gallons of water. Producing water from aquifer. |
| 520 | - | | | <u></u> | No cuttings returned. | | | | - Bentonite Seal - Top of 20/40 | |
| 525 | - | | | | No cuttings returned. | | | | - Top of 10/20 Sand | |
| 530 | - | | | | Poorly Graded SAND with Silt (S brown (7.5YR 4/3); wet; very loos medium to coarse sand to 0.5mn silt; trace gravel; subangular; gra 3cm. | se; 90% n; 10% | | | - Top of Schedule 80 PVC 0.010 Slot Screen | |
| 535 | _ | | | | Same as above (525 ft). | | SP- SM | | | |
| 540 | - | | | | Same as above (525 ft); <5% silt becoming coarser. | ; sand | | | | |



Client:US Army Corps of EngineersHProject Location:KAFB, Albuquerque, NMHProject Name:KAFB BFF SWMU ST-106 and SS-111SProject 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): \square At Time of Drilling: Not Recorded \blacksquare At End of Drilling: 512.70 \blacksquare After Drilling: 488.17

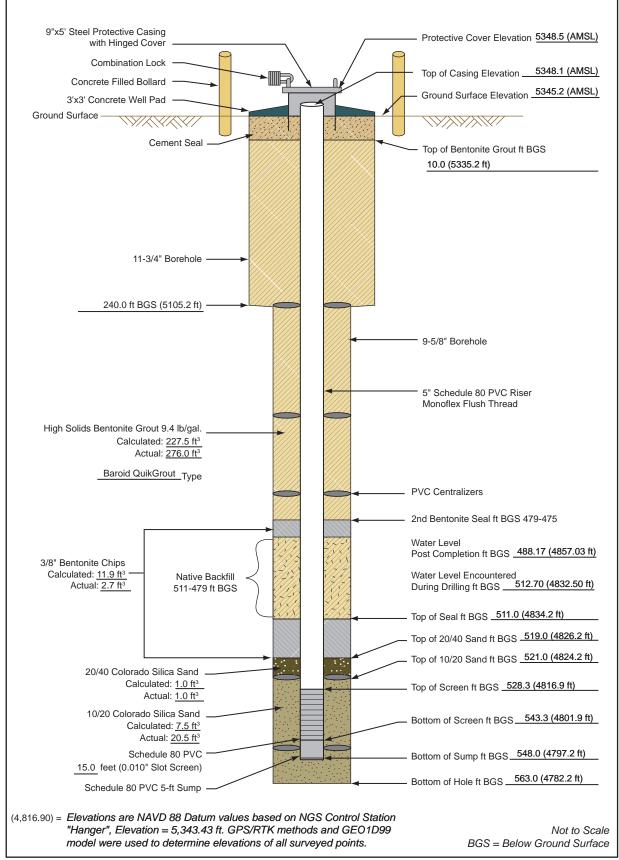
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| X | Coo | ordinat | e: 1 | 5414 | 18.00 Logged | By: 、 | lason Tarbert | Page 19 of 19 |
|--------------|-------------|---------|------------------|-------------------|---|-----------|-----------------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | |
| <u>545</u> | - | | | | Same as above (540 ft). | | - Sump | |
| <u>550</u> | - | | | | Same as above (540 ft). | SP- SM | - Bottom of Sump | |
| <u>555</u> | - | | | | Same as above (540 ft). | | | |
| <u>560</u> | - | | | | Silty SAND (SM); reddish brown (5YR 5/3); wet; very loose; 85% medium sand to 1mm; subrounded; 15% silt. | SM | | _ Total depth = 563 ft. |
| <u>565</u> | - | | | | | | | Reached @ 1530 on 12/17/11. Water added during drilling (gallons) = 160. |
| 570 | - | | | | | | | Water added during construction (gallons) = 1700. |

Monitoring Well Completion Diagram KAFB-106045

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



140705.CB010040_MW_KAFB_106045



| 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.): <u>.42'</u> | | | | | |
| Samplers: G. Peacock | | Total Depth (ft. BGL): <u>523.9</u> | | | | | |
| Method of Development: X Surging | X Bailing | X Pumping | | | | | |
| X Original Development | Redevelopment | Other | | | | | |
| Development Date: 1/23/11-1/24 | ł/11 | | | | | | |
| Depth to Water Before Develop | ing Well (ft. BGL): 490.3 | | | | | | |
| Height of Water Column: <u>33.6</u> | | gal. * 1 = 44.7 | | | | | |
| V=(B * r _c * · L _c * 7.46 Depth Purging From: <u>502</u> fe | , | 48)+(H ₂ O added during drilling/installation) = <u>44.7 gallons</u> Time Purging Begins: <u>0820, 1/24/11</u> | | | | | |
| | <u>et</u> | | | | | | |
| Weather: Partly Cloudy, 40's Equipment Nos.: pH Meter: | VSI 6920 122447 | Screened Interval (ft BGL): 504.23-519.23 EC Meter: YSI 6820 1234AZ Turbidity Meter: HACH 2100 | | | | | |
| | 1010020 123472 | | | | | | |
| Equipment Decontaminated Pr | ior to Development: Y <u>X</u> | <u>(N</u> | | | | | |
| Describe: Steam Cleaned | | | | | | | |
| Collected Sample of Water Add Describe: N/A | led to Well: YN | X | | | | | |
| Comment: N/A | | | | | | | |

Well Development Record

Pg 1 of 2

| Date | Time | Water Level (ft. Below TOC) | Volume Removed (gal.) | Temp.°C | pН | 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

 $\emptyset_{\rm s}$ = porosity of the sand pack

 $\omega_{\rm s}$ = porosity or the sana pack $r_{\rm c}$ = radius of the well casing and screen in feet $L_{\rm s}$ = length of water column inside the casing and screen in feet $r_{\rm w}$ = radius of the well bore in feet $L_{\rm s}$ = length of saturated portion of the sand pack in feet

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

Pg 2 of 2



Well Development Record

Project: KAFB BFF

Project Number: 140705

Date: 1/23/11

Well No: 106044

Samplers: G. Peacock

23/11

Time Start: 1120, 1/23/11

Checked By:

Time Finish: 1215, 1/24/11

Field Chemistry (cont'd)

| Date | Time | Water Level (ft. Below TOC) | Volume Removed (gal.) | Temp.°C | рН | 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

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Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

Ground Elevation AMSL (ft): 5337.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

Groundwater Levels BGS (ft): \searrow At Time of Drilling: 485.00 \checkmark At End of Drilling: 480.45 TAfter Drilling: 482.40

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

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|--------------------------|-------------|--------|------------------|-------------------|--|----------|--------------|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagrar | n Remarks |
| - | | | | | 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. |
| <u>10</u> | | | | | Same as above (0 ft); trace coarse sand; subangular; no odor. | | - Cement S | Seal |
| <u>15</u> - - - | | | | | 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. | | | |

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| - | 4 | |
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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

Borehole ID: KAFB-106101

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

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

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

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|--------------|-------------|--------|------------------|-------------------|--|---------------|---|--|
| ର Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 35 | - | | | | 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'. |
| | - | | | | 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 | | - Top of High Solids Bentonite Grout | Rig chatter @ 45'. |
| 50 | - | | | | dominantly granitic composition; no odor. 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 | | | | | | | | |



Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

Ground Elevation AMSL (ft): 5337.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

Groundwater Levels BGS (ft): \searrow At Time of Drilling: 485.00 \checkmark At End of Drilling: 480.45 TAfter Drilling: 482.40

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

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|-------------------------------|-------------|--------|------------------|-------------------|--|----------|---|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - 65 - 70 - 75 | | | | | 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. 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. Same as above (65 ft); clay mainly as nodules; no odor. | CL | - High Solids | Kelly down @ 1629. New connection @ 1639. Resumed drilling @ 1641. |
| - | | | | | 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 | Bentonite Grout | |
| 80 - - 85 | | | | | Poorly graded SAND (SP); light gray (5YR 7/1); moist; dense to very dense; 95% very fine to fine sand; 5% silt; no odor. Same as above (79 ft); no odor. | SP | • •< | 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. |
| 90 | | | | | | | <pre>v • • • • • • • • • • • • • • • • • • •</pre> | |

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Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

Ground Elevation AMSL (ft): 5337.2

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

Groundwater Levels BGS (ft): \searrow At Time of Drilling: 485.00 \checkmark At End of Drilling: 480.45 TAfter Drilling: 482.40

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

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



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

Borehole ID: KAFB-106101

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

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

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

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



Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

Ground Elevation AMSL (ft): 5337.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

Groundwater Levels BGS (ft): \searrow At Time of Drilling: 485.00 \checkmark At End of Drilling: 480.45 TAfter Drilling: 482.40

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

| | | | | 47403 | | By: | Brian | Ir Rotary Casing H Lucero | Page 6 of 18 |
|---------------|-------------|--------|------------------|-------------------|---|----------|-------|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| 155 | - | | | | 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. Same as above (150 ft); no odor. | SP | | • • | |
| 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. | | | | 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. | SM | | - 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. | | | | |
| 175 | | | | | Same as above (170 ft); no gravel; no odor. | SW | | | |
| 180 | | | | | Clayey SAND with Gravel (SC); reddish | SC | •• | •• | |



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

Borehole ID: KAFB-106101

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|-------------------------------------|--|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | brown (5YR 4/3); moist; dense to very dense; 65% fine to coarse sand; subrounded to subangular; 15% fine | SC | | Kelly down @ 1502. New connection @ 1520. Resumed drilling @ |
| 185 | - | | | | gravel to 12mm; subrounded to subangular; 20% clay as nodules and as coating on gravel; low plasticity; no odor. Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); moist; very dense; 100% fine sand; no odor. | SP | | 1522. Lost cutting returns at 188'; driller stopped |
| 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. | | | 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 |
| 195 | - | | | | Same as above (190 ft); slightly finer; no odor. | SW | - High Solids Bentonite Grout | hose. |
| 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 | | 02/17/11. |
| 210 | | | | | | | | |



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

Borehole ID: KAFB-106101

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

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

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

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|---|-------------|--------|------------------|-------------------|--|--------------|---|---|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | - | | | | Poorly graded SAND (SP); weak red (2.5YR 5/2); moist; medium dense; 100% very fine to medium sand; subrounded to subangular; no odor. Same as above (210 ft); 95% very fine to fine sand; trace medium sand; subrounded to subangular; 5% silt; no odor. | SP | | |
| 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. Same as above (218 ft); no odor. | SM | - High Solids Bentonite Grout | Kelly down @ 1246. New connection @ 1254. Resumed drilling @ 1255. Did not have to hammer casing 200-225'. Began driving casing below 225'. |
| - 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 | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | |
| <u>235</u> - - 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 | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | |

| S | L | | | | | Bore | eho | le l | D: KAFB | 106101 |
|---------------|----------------|------------------------------|------------------|-------------------|---|---------------------------------|-------------------|--------------------------|---|---|
| Pro Pro | ojec ojec | t Loca Nam | ation ne: K | : KÁI (AFB | s of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Di | amete | r Low | oer (in.): 11-3/4 ver (in.): 9-5/8 n Type: Stick-up | |
| Da Da | ite S ite T | | d: 2/ ache | 15/20 d: 2/ | | ∑ At⊺ ▼ At E | Time of End of | f Drill Drilliı | ls BGS (ft): ling: 485.00 ng: 480.45 482.40 | |
| YO | Coo | d Elev rdinate rdinate | e: 14 | 47403 | | Drillling Drilling Logged | Metho | d: A | : WDC Drilling ir Rotary Casing Lucero | Hammer Page 9 of 18 |
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | | Well Diagram | Remarks |
| | | | | | Silty SAND (SM); pale red (2.5Yl dry to moist; dense; 85% very fin medium sand; trace coarse san | e to l; | SM | • • • • • • • • | • • • • • • • • | Kelly down @ 1305. New connection @ 1316. Resumed drilling @ |
| 245 | - | | | | subrounded to subangular; 15% trace clay; no odor. Lean CLAY (CL); reddish brown 5/3); moist; very stiff to hard; me plasticity; 95% clay; 5% silt; no o | (5YR dium | CL | | | 1320. |
| 250 | - | | | | Silty SAND (SM); reddish brown 5/3); moist; dense to very dense; very fine to medium sand; subro 15% silt with minor clay; no odor | 85% unded; | SM | | | |
| | - | | | | Poorly graded SAND with Silt (S reddish brown (5YR 5/3); moist; very dense; 90% very fine to fine subrounded; 10% silt; no odor. | dense to | | | | |
| 255 | - | | | | Same as above (250 ft); no odor | | SP- SM | | - High Solids Bentonite Grout | |
| 260 | - | | | | Well graded SAND with Silt (SW reddish brown (5YR 5/3); moist; very dense; 90% very fine to coa sand; subrounded; 10% silt; no c | dense to irse | SW- SM | | | Kelly down @ 1334. New connection @ 1343. Resumed drilling @ 1344. |
| 270 | - | | | | Well graded SAND with Gravel (reddish brown (5YR 5/3); moist; 80% fine to coarse sand; subrou subangular; 15% fine to coarse g 2.5cm; subrounded; 5% silt with clay; no odor. | dense; nded to gravel to | sw | | | |



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

Borehole ID: KAFB-106101

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

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

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

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|---------------|-------------|--------|-----------|-------------------|---|----------|-------------------------------------|---|
| 02 Depth (ft) | | Number | Headspace | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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. |
| 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 | Resumed drilling @ 1407. |
| <u>290</u> | | | | | 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 | SC | | |
| 300 | - -) | | | | odor. Sandy lean CLAY (CL); reddish brown (7.5YR 4/3); moist; stiff; low plasticity; 70% clay with trace silt; 30% very fine to | CL | | |



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

Borehole ID: KAFB-106101

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

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

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

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| ~ ~ ~ | 500 | Tunia | .e. 1 | | | <i>Б</i> у. 1 | | |
|--------------|-------------|--------|------------------|-------------------|---|---------------|---|---|
| S Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 305 | - | | | | fine sand; no odor. 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 | | Kelly down @ 1417. New connection @ 1426. Resumed drilling @ 1426. |
| | - | | | | 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 | GW | - • • • • • • • • • • • • • • • • • • • | |
| 325 | - | | | | coarse gravel; angular to subrounded; 5% coarse sand; angular to subrounded; no odor. 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 | | Kelly down @ 1438. New connection @ 1449. Resumed drilling @ 1452. |
| 330 | | | | *`*`*`* **** | | | | |



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

Borehole ID: KAFB-106101

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

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

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

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| ^ | C00 | numai | .e. it | 94040 | | Б у. 1 | | lcelo | - |
|--------------|-----|--------|------------------|----------------------------------|---|---------------|---|-------------------------------------|--|
| S Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | /ell Diagram | Remarks |
| 335 | - | | | | 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. Well graded SAND (SW); pale red (2.5YR 7/2); dry to moist; dense; 95% very fine to coarse sand; subrounded to | SW | | • | |
| 340 | - | | | | subangular; 5% fine gravel to 15mm; subrounded; no odor. Poorly graded SAND with Gravel (SP); pale red (2.5YR 7/2); dry; dense; 85% medium to coarse sand; subangular to | SP | | • | Sand/gravel discharge preceeded by heavy dust. |
| 345 | | | | | medium to coarse sand; subangular to subrounded; 15% fine gravel to 12mm; subrounded to subangular; no odor. 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. Same as above (340 ft); fine gravel to 15mm; subrounded; 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. |
| 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 | | • | Kelly down @ 1529 End |
| 360 | | | | •`• ` • ••••• ••••• | | | | • | Kelly down @ 1538. End of 2/17/11. |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5337.2

Project Number: 140705

Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

X Coordinate: 1540432.85

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

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

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

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| ~ ~ ~ | 500 | una | IC. I. | J404 | | Dy. 1 | | - |
|-------------------|-------------|--------|------------------|-------------------|---|-----------|-------------------------------------|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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 |
| | | | | | 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. | sw | | hands. |
| 370 | - | | | | Same as above (365 ft); less coarse fraction; no odor; apppears hydrocarbon stained. | | | |
| 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 | |
| <u>380</u> 385 | - | | | | 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. |
| 390 | | | | | 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 | | |



Date Started: 2/15/2011

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

Y Coordinate: 1474038.62

Ground Elevation AMSL (ft): 5337.2

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106101

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

Groundwater Levels BGS (ft): \searrow At Time of Drilling: 485.00 \checkmark At End of Drilling: 480.45 TAfter Drilling: 482.40

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

| | | rdinate: 14/4038.62 Drilling Method: Air Rotary Casing Hammer rdinate: 1540432.85 Logged By: Brian Lucero Page 14 of 18 | | | | | | | | |
|---------------------|-------------|--|--------------------------------|--|---------------------|--|-------------------------------------|---|--|--|
| 66 06 Depth (ft) | Sample Type | Number | Headspace PID Lithologic | Material Description | ທ່ ບັ ທ່ ⊃ | | ell Diagram | Remarks | | |
| 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. | | | | 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 | | | |
| <u>410</u> 415 | - | | | 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 | | | | | |
| 420 | _ | | | 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 | | | | | |



Borehole ID: KAFB-106101

Client:US Army Corps of EngineersHole DiaProject Location:KAFB, Albuquerque, NMHole DiaProject Name:KAFB BFF SWMU ST-106 and SS-111SurfaceProject 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): \square At Time of Drilling: 485.00 \blacksquare At End of Drilling: 480.45 \blacksquare After Drilling: 482.40

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

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| | | Tuinat | | | | | | |
|--------------|-------------|--------|------------------|-------------------|---|----------|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | |
| 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 | | | | | | | | |



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

Borehole ID: KAFB-106101

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

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

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

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| ~ ~ ~ | 500 | unia | .0. 1 | 04043 | | Dy. | | |
|---|-------------|--------|------------------|-------------------|---|----------|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | - | | | | 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. Same as above (450 ft); no odor. | | High Solids Bentonite Grout Top of Bentonite Seal | |
| - - - - - - - - - - - - - - - - - - - | | | | | Same as above (450 ft); slight decrease in medium to coarse sand; no odor. | SW | | Kelly down @ 1358. New connection @ 1404. Resumed drilling @ 1405. |
| <u>465</u> | - | | | | 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 | | | | | | | | |

| Shav | | |
|------|---------|--|
| | US Army | |

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

Borehole ID: KAFB-106101

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

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

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

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| | -00 | | .e. 15404 | -02.00 E09900 | <u> </u> | | |
|--------------|-------------|--------|--------------------------------|--|----------|---|---|
| 8 Depth (ft) | Sample Type | Number | Headspace PID Lithologic | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | ✓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 | CL | - 5" Schedule 80 PVC Riser | Water encountered |
| | - | | | fine to fine sand; no odor. 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 | | during drilling = 485.0'. |
| 490 | - | | | Poorly graded SAND (SP); pale red (2.5YR 6/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor. | | - Top of 20/40 Sand - Top of 10/20 Sand | |
| 495 | - | | | 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 |
| 500 | - | | | 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 | | 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 | | | | 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 | | |



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

Borehole ID: KAFB-106101

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

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

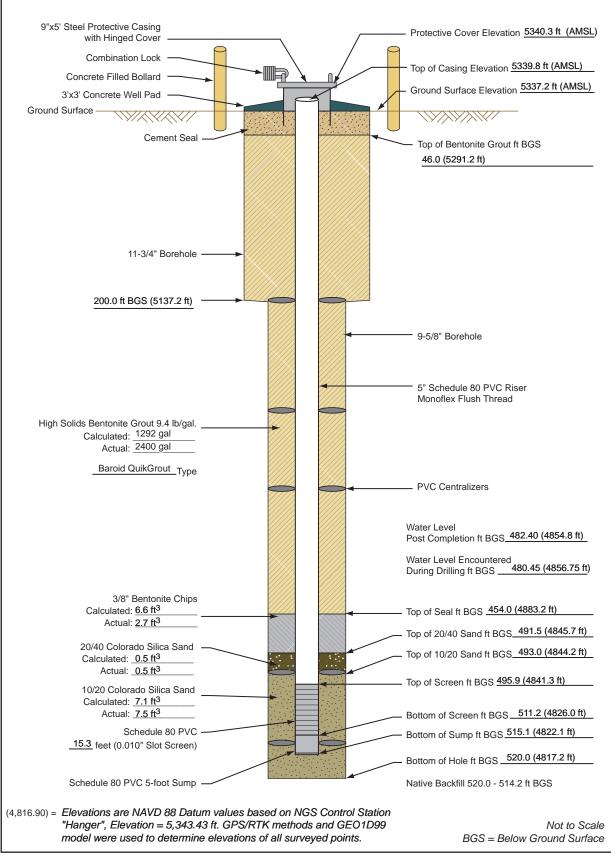
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero

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| (t) t (t) t | | inate. 154043 | 209904 | <u> </u> | | |
|---|---|---|--|----------|---|---|
| | a L | Number Headspace PID Lithologic Log | Material Description | | Well Diagram | Remarks |
| 510 odor. - - - - 515 - - Well graded SAND (SW); reddish brown (2.5YR 6/3); moist to wet; dense; 100% fine to coarse sand; trace very fine sand; SW | 510 - - 515 - 520 - 520 - - - - - - - - - - - - - - - - - - - | | 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. 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 | SW | Screen - Sump - Bottom of Sump | heavy fines. Kelly down @ 0942. New 5' connection @ 0954. Resumed drilling @ 0956. 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 |

Monitoring Well Completion Diagram KAFB-106101

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



140705.CB010040_MW_KAFB_106101



| Location: BFF | | Well/Piez. No.: 106101 | | | | | | | |
|--|---|---|--|--|--|--|--|--|--|
| Personnel: D. Flores, A. Trujillo | | Date Installed: 2/21/11 | | | | | | | |
| Date: 3/16/11 | | Csg. Diameter (I.D.): <u>5"</u> | | | | | | | |
| Samplers: D. Flores, A. Trujillo | | Total Depth (ft. BGL): <u>520.0</u> | | | | | | | |
| 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 Developi | ng Well (ft. BGL): <u>482.</u> | 19 | | | | | | | |
| Vol. (V) Purge Factor Volume to Purge Height of Water Column: <u>37.81 feet = 941.6 gal. * 1 = 941.6</u> $V=(B * r_c^2 * L_c * 7.48)+(B * (r_w-r_c)^2 * L_s * Ø_s * 7.48)+(H_2O added during drilling/installation) = 941.6 gallons$ | | | | | | | | | |
| V=(B * r _c ² * L _c * 7.48 | | | | | | | | | |
| V=(B * r _c ² * L _c * 7.48 Depth Purging From: <u>506 feet</u> |)+(B * (r _w -r _c)² * L _s * Ø _s * | | | | | | | | |
| |)+(B * (r _w -r _c)² * L _s * Ø _s * | 7.48)+(H ₂ O added during drilling/installation) = <u>941.6</u> gallons | | | | | | | |
| Depth Purging From: 506 feet |)+(B * (r _w -r _c) ² * L _s * Ø _s * | 7.48)+(H ₂ O added during drilling/installation) = <u>941.6</u> gallons Time Purging Begins: <u>1028, 3/17/11</u> | | | | | | | |
| Depth Purging From: <u>506 feet</u> Weather: <u>Sunny</u> |)+(B * (r _w -r _c) ² * L _s * Ø _s * / <u>SI 100258</u> | 7.48)+(H ₂ O added during drilling/installation) = <u>941.6 gallons</u> Time Purging Begins: <u>1028, 3/17/11</u> Screened Interval (ft BGL): <u>495.9-511.12</u> EC Meter: <u>YSI 100258</u> Turbidity Meter: <u>LVE 2818</u> | | | | | | | |
| Depth Purging From: 506 feet Weather: Sunny Equipment Nos.: pH Meter: |)+(B * (r _w -r _c) ² * L _s * Ø _s * / <u>SI 100258</u> | 7.48)+(H ₂ O added during drilling/installation) = <u>941.6 gallons</u> Time Purging Begins: <u>1028, 3/17/11</u> Screened Interval (ft BGL): <u>495.9-511.12</u> EC Meter: <u>YSI 100258</u> Turbidity Meter: <u>LVE 2818</u> | | | | | | | |
| Depth Purging From: 506 feet Weather: <u>Sunny</u> Equipment Nos.: pH Meter: Equipment Decontaminated Pric Describe: <u>Steam Cleaned</u> Collected Sample of Water Adde |)+(B * (r _w -r _c) ² * L _s * Ø _s * /SI 100258 pr to Development: Y _ | 7.48)+(H ₂ O added during drilling/installation) = <u>941.6 gallons</u> Time Purging Begins: <u>1028, 3/17/11</u> Screened Interval (ft BGL): <u>495.9-511.12</u> EC Meter: <u>YSI 100258</u> X N N X | | | | | | | |

Well Development Record

| | | Water Level (ft. Below | Volume Removed | | | | Turbidity | |
|-----------|------|------------------------------|-------------------|---------|------|------------|-----------|-------------------------------|
| Date | Time | TOC) | (gal.) | Temp.°C | рН | EC (ms/cm) | 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

 $\emptyset_{\rm s}$ = porosity of the sand pack

 $\omega_{\rm s}$ = porosity or the sana pack $r_{\rm c}$ = radius of the well casing and screen in feet $L_{\rm s}$ = length of water column inside the casing and screen in feet $r_{\rm w}$ = radius of the well bore in feet $L_{\rm s}$ = length of saturated portion of the sand pack in feet

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



Well Development Record

Project: KAFB BFF

Project Number: 140705

Date: 3/17/11

Time Start: 1508, 3/16/11

Well No: 106101

Samplers: D. Flores, A. Trujillo

Checked By: _____

Time Finish: 1327, 3/17/11

Field Chemistry (cont'd)

| | | Water Level (ft. Below | Volume Removed | | | | Turbidity | |
|-----------|------|------------------------------|-------------------|---------|------|------------|-----------|-------------------------|
| Date | Time | TOC) | (gal.) | Temp.°C | рН | EC (ms/cm) | 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

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APPENDIX D-1

KAFB-106102 Final Well Report

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| | 1 | |
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| S | na | W® |

Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106102

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

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

| YC | oordir | ate: 7 | n AMS 147403 15404(| 39. 8 5 | Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero Page 1 of 19 | | | | | |
|------------|-----------------------|-----------|---------------------------|---|--|----------|----|---------------|---|--|
| Oepth (ft) | Sample Type Number | Headspace | Lithologic Log | Material Description | | U.S.C.S. | We | ell Diagram | Remarks | |
| 5 | | | | Clayey SAND (SC); light reddish b (2.5YR 7/3); dry; medium dense to dense; 60% very fine to fine sand; clay; 15% silt; trace caliche nodule odor. Same as above (0 ft); light reddish brown (2.5YR 6/3); no odor. | o ; 25% es; no | SC | | | Hand augered. ***Note: no headspace requirement at this location*** Spud @ 1307 on 2/22/11. | |
| 15 | | | | Sandy lean CLAY (CL); red (2.5YF dry; medium stiff to stiff; medium plasticity; 70% clay with minor silt; very fine to fine sand; trace mediu coarse sand; subangular; no odor. | 30% m to | | | - Cement Seal | Driller began injecting potable water into | |
| | | | | Lean CLAY (CL); red (2.5YR 4/6); stiff; medium plasticity; 95% clay; very fine to fine sand; no odor. Same as above (16 ft); no odor. | | CL | | | kelly down @ 1323. New connection @ 1331. Resumed drilling @ 1332. | |
| 25 | | | | SILT (ML); red (2.5YR 5/6); dry to stiff; 90% silt with trace clay; 10% fine to fine sand; trace medium to sand; subangular; no odor. | very coarse | ML | | | | |
| 30 | | | | Lean CLAY (CL); red (2.5YR 5/6); moist; stiff; medium plasticity; 90% 10% very fine to fine sand; no odo | 6 clay; 📗 | CL | | | | |

| Shaw [®] |
|--|
| Client: US Army Corps of Engineers |
| Project Location: KAFB, Albuquerque, NM |
| Project Name: KAFB BFF SWMU ST-106 and SS-111 |
| Client: US Army Corps of Engineers |

Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Ground Elevation AMSL (ft): 5337.3

Borehole ID: KAFB-106102

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 $\bar{\Psi}$ After Drilling: 482.55

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

| Y Co | und Elev pordinat pordinat | e: 147 | 403 | 9.85 D | Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero Page 2 of 19 | | | | | |
|-----------------------------|----------------------------------|------------------|-----|---|--|----------|--|---|--|--|
| & Depth (ft) Somulo Tuno | Number | Headspace PID | | Material Description | | U.S.C.S. | | Well Diagram | Remarks | |
| - | | | | Sandy lean CLAY (CL); red (2.5YR 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 t (2.5YR 6/4); dry; stiff to very stiff; 85 silt; 15% very fine to fine sand; no c | 5% | ML | | • •< | | |
| 50 | | | | No cuttings returned. | | | | | Discharge clogged, attempted to clear @ 1420. Discharge cleared, | |
| 55 | | | | Sandy SILT (ML); light red (2.5YR 6 dry; stiff to very stiff; 70% silt; 30% v fine to coarse sand; subangular; no odor. SILT (ML); red (2.5YR 4/6); moist; v stiff; 70% silt; 30% clay; no odor. | very | ML | | | resumed advancing @ 1425. No cuttings returned without surging air. Regained returns at 52'. | |
| 60 | | | | Lean CLAY (CL); red (2.5YR 4/6); n very stiff; low plasticity; 70% clay; 3 silt; no odor. | noist; 0% | CL | | | | |



Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

Ground Elevation AMSL (ft): 5337.3

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 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

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

| | | | | 47403 54040 | | Logged By: Brian Lucero | | | | |
|--------------|-------------|--------|------------------|-------------------|---|-------------------------|---|---|---|--|
| 영 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks | |
| | _ | | | | 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. 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; | ML | • • • • • • • • • • • • • • • • • • | · · · · · · · · · · · · · · · · · · · | | |
| 70 | - | | | | Subangular; no odor. | | | · · · · · · · · · · · · · · · · · · · | | |
| 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 85 | - | | | | 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. | |
| 90 | - | | | | 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. 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. | |



Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

X Coordinate: 1540401.91

Ground Elevation AMSL (ft): 5337.3

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106102

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

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

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

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| ~ | | Juna | IC. IC | 54040 | Logged | <i>Б</i> у. 1 | Jhan | Lucero | _ |
|--------------|---|--------|------------------|-------------------|--|---------------|---|---|---|
| g Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| | _ | | | | 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. | | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | Discharge may be clogged. |
| 105 | - | | | | 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 |
| | - | | | | 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 | advancing. |
| 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 | 5 | | | | Same as above (109 ft); no odor. | | | | Likelyten of Ocate Fr |
| 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. |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5337.3

Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

X Coordinate: 1540401.91

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106102

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

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

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| | 500 | numat | | | | Dy. | | | _ |
|---|-------------|--------|------------------|-------------------|---|----------|---|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| - - - - - - - - - - - | - | | | | subrounded; 5% silt; no odor. 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. Same as above (120 ft); 95% very fine to fine sand; trace medium sand; subangular to subrounded; 5% silt; no odor. | SP | | • • • • • • • • • • • • • • • • • • • | Kelly down @ 1049. New connection @ 1058. Resumed drilling @ 1102. |
| 130 | | | | 777 | Clayey SAND (SC); reddish brown (5YR | SC | | • | |
| - | - | | | | 4/3); dry to moist; very dense; 75% very- fine to coarse sand; subangular; 25% clay with minor silt; no odor. SILT (ML); light reddish brown (2.5YR | ML | | • | |
| <u>135</u> | - | | | | 4/3); dry to moist; very stiff; 85% silt; 15% clay; no odor. 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. | | | • | |

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KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/21/11 15:00 - Z\XAFB BFFIGINTIKAFB_PROJECTIKAFB_BFF.GPJ

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): \Box At Time of Drilling: 480.30 \blacksquare At End of Drilling: Not Recorded \blacksquare After Drilling: 482.55

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

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| | 200 | ordinat | te: 18 | 54040 | .91 Logged By: Brian Lucero Page 6 of 19 | | | | | |
|---------------|------------------|---------|------------------|-------------------|--|----------|---|---|--|--|
| 10 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| | _ | | | | 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 | SP | | | | |
| <u>175</u> | | | | | to subrounded; higher abundance of pumice fragments than 155'; oxidized and abraded; no odor. 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 | $\left \right $ | | | | Poorly graded SAND (SP); pale red | SP | | | | |



Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

Ground Elevation AMSL (ft): 5337.3

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106102

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

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

| | | | | 47403 54040 | | | Lucero | Page 7 of 19 |
|-------------------|-------------|--------|------------------|-------------------|--|----------|-------------------------------------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | (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 | | |
| <u>190</u> | - | | | | Same as above (179 ft); no odor. | | | |
| <u>195</u> | - | | | | 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. |
| <u>205</u> 210 | - | | | | 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. Same as above (205 ft); medium plasticity; 95% clay; 5% silt; 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. |



Borehole ID: KAFB-106102

Client:US Army Corps of EngineersHolProject Location:KAFB, Albuquerque, NMHolProject Name:KAFB BFF SWMU ST-106 and SS-111SurProject Number:140705Creation

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): \Box At Time of Drilling: 480.30 \blacksquare At End of Drilling: Not Recorded \blacksquare After Drilling: 482.55

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

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|----------------------|-------------|--------|------------------|-------------------|--|-----------|-------------|-----------------------------------|--|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well | Diagram | Remarks |
| - | - | | | | 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. | | | | 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. | SM | | | |
| 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. |
| <u>225</u> - - | - | | | | 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 | •• • E | High Solids Bentonite Grout | Driller began injecting water into cyclone for |
| 230 | - | | | | Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; dense; 95% very fine to fine sand; 5% silt; no odor. | SP | | | 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 | | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5337.3

Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 3/1/2011

Date Completed: 3/3/2011

Project Location: KAFB, Albuquerque, NM

Borehole ID: KAFB-106102

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Stick-up

> Groundwater Levels BGS (ft): \square At Time of Drilling: 480.30 TAt End of Drilling: Not Recorded ✓ After Drilling: 482.55

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

Y Coordinate: 1474039.85 Page 9 of 19 X Coordinate: 1540401.91 Logged By: Brian Lucero Sample Type Headspace PID Lithologic Log Depth (ft) Number *i* Ö Material Description Remarks Well Diagram ю. ⊃. 240 Kelly down @ 0831. New SILT (ML); reddish brown (2.5YR 5/4); dry to moist; stiff to very stiff; 70% silt; connection @ 0837. ML 30% clay; trace very fine to fine sand; no Resumed drilling @ 0838. odor. Silty SAND (SM); light reddish brown (2.5YR 6/3); dry to moist; dense to very dense; 75% very fine to fine sand; 25% • 245 silt; no odor. Began driving casing • below 245'. SM • • 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. • 255 SW High Solids Same as above (250 ft); no odor. Bentonite Grout • 260 Poorly graded SAND (SP); reddish Kelly down @ 0901. New . brown (5YR 4/4); dry to moist; dense to connection @ 0913. • very dense; 100% fine to medium sand; Resumed drilling @ trace very fine sand; subrounded; no 0914. • odor. • • • • • • • 265 SP Same as above (260 ft); 95% sand; 5% fine gravel to 10mm; subrounded; no odor. • • • • . 270



Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

Ground Elevation AMSL (ft): 5337.3

Borehole ID: KAFB-106102

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 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

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

| | ordina ordina | | | | Logged By: Brian Lucero Page 10 of 19 | | | | | |
|--|------------------|------------------|-------------------|---|---------------------------------------|---|---|---|--|--|
| 02 Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | V | Vell Diagram | Remarks | | |
| 275 | | | | 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. Same as above (270 ft); no odor. | SP | | • •< | | | |
| 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 | ••• ••• ••• •• ••<td>- High Solids</td><td>Kelly down @ 0927. New connection @ 0933. Resumed drilling @ 0934.</td> | - High Solids | Kelly down @ 0927. New connection @ 0933. Resumed drilling @ 0934. | | |
| - - - 290 - - - | | | | odor. 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 | | Bentonite Grout | | | |
| <u>295</u> - - - 300 | | | | 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 | | - 7 - 7 - 7 - 7 - 7 - 7 - 7 - 7 | | | |



Borehole ID: KAFB-106102

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

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

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

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| ~ (| -00 | ordinat | le: I | 54040 | Logged By: Brian Lucero | | | | |
|---------------|-------------|---------|------------------|-------------------|--|----------|-------------------|--|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| 305 | _ | | | | 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. |
| 310 | - | | | | 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 | | · · · · · · · · · · · · · · · · · · · | |
| | - | | | | 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 | sw | | - High Solids Bentonite Grout | |
| 325 | - | | | | Same as above (315 ft); no odor. 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. | 500 | | | Kelly down @ 1021. New connection and resumed drilling. |
| 330 | | | | | | | • • • • • • | • • • • • • | |

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011 Ground Elevation AMSL (ft): 5337.3 Y Coordinate: 1474039 85

Project Number: 140705

Date Started: 2/22/2011

Y Coordinate: 1474039.85 X Coordinate: 1540401.91

Project Name: KAFB BFF SWMU ST-106 and SS-111

| S | Shaw Borehole ID: KAFB-106102 | | | | | | | | | | |
|---|-------------------------------|----------------------------|------------------|-------------------|---|--|------------------|---|---|-------------------------------------|---|
| Pro Pro | ojec ojec | t Loca | ation: ne: K | : KAI AFB | s of Engineers ^F B, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Stick-up | | | | | |
| Da Da | te S te T | Started | d: 2/2 acheo | 22/20 d: 3/~ | 11 1/2011 | | Time o End of | f Dril Drilli | ling: ng: | 480.30 Not Recorded | |
| YC | Cool | d Elev rdinat rdinat | e: 14 | 17403 | | | Metho | d: A | ir Ro | DC Drilling tary Casing H ero | ammer Page 12 of 19 |
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | | Well | Diagram | Remarks |
| 335 | - | | | | Well graded GRAVEL with Sand pale red (2.5YR 7/2); dry; dense dense; 80% fine to coarse grave 2.5cm; subangular to subrounder very fine to coarse sand; subang subrounded; 5% silt with clay as on gravel; no odor. | to very to d; 15% ular to | GW | | | | |
| 340 | - | | | | Well graded SAND (SW); pale re (2.5YR 7/2); dry; dense to very de 95% very fine to coarse sand; subangular to subrounded; 5% s odor. Note: brief discharge of gravel at interval. | ense; ilt; no | sw | · | | | |
| - | - | | | | Poorly graded SAND (SP); pale r (2.5YR 7/2); dry; dense to very d 95% very fine to fine sand; 5% si odor. | ense; | | | | | Kelly down @ 1053. New connection @ 1102. Resumed drilling @ 1102. |
| 345 | - | | | | Same as above (340 ft); 95% ver fine sand; trace medium to coars subrounded; 5% silt; no odor. | | SP | | | High Solids Bentonite Grout | Stopped drilling to reconnect air hose to casing hammer @1118. Resumed drilling @ 1152. |
| 350 | | | | | Well graded SAND (SW); pale re (2.5YR 7/2); dry to moist; dense i dense; 90% very fine to coarse s subangular to subrounded; 5% fi gravel to 15mm; subrounded; 5% odor. | to very and; ne | L | | | | |
| 355 - - - - - - - - - - - - - - - - - - | - | | | | Same as above (350 ft); no odor | | SW | • • • • | • •< | | |



Borehole ID: KAFB-106102

Client:US Army Corps of EngineersHoProject Location:KAFB, Albuquerque, NMHoProject Name:KAFB BFF SWMU ST-106 and SS-111SuProject Number:140705Cr

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): \Box At Time of Drilling: 480.30 \blacksquare At End of Drilling: Not Recorded \blacksquare After Drilling: 482.55

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

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|---------------|------------------|--------|------------------|-------------------|---|----------|---|--|
| 00 Depth (ft) | Sample Type | Numt | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 365 | - | | | | 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. |
| 370 | | | | | 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 | | |
| | - | | | | 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 | |
| <u>380</u> |) - - | | | | Same as above (370 ft); no odor. | | • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • | Kelly down @ 1232. New connection @ 1239. Resumed drilling @ 1242. |
| 385 | 5 | | | | Same as above (370 ft); increasing abundance of medium to coarse sand; / | | | |
| 390 | - - -) | | | | no odor. 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): \Box At Time of Drilling: 480.30 \blacksquare At End of Drilling: Not Recorded \blacksquare After Drilling: 482.55

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

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|--------------|--|------|-------------------|----------------------|--|-------|-------------------------------------|---|
| ଞ Depth (ft) | Sample Type Number Headspace PID Lithologic Log | | Lithologic Log | Material Description | ທີ່ ວິ ທີ່ Well Diagram ລິ | | Remarks | |
| 395 | - | | | | 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 | | |
| | - | | | | 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. | | | |
| <u>400</u> | - | | | | Same as above (395 ft); no odor. | SW | | 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. | | | |
| 415 | - | | | | Same as above (410 ft); no odor. Silty SAND (SM); pale red (2.5YR 7/2); | | | |
| 420 | | | | | moist; very dense; 80% very fine to fine sand; 20% silt; no odor. | SM | | |



Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

Ground Elevation AMSL (ft): 5337.3

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 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

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

| | | rdinat | ammer Page 15 of 19 | | | | | | |
|--------------------|-------------|--------|------------------------|-------------------|---|--|--|-------------------------------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | ທີ່ O. ທີ່ D. Well Diagram | | | Remarks |
| 425 | | | | | 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. |
| 430 | | | | | 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. Same as above (425 ft); dry; 95% very fine to medium sand; subangular to | | | | |
| 435 | | | | | subrounded; 5% silt; no odor. 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. | SP | | - 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. |
| - - - 450 | | | | | Poorly graded SAND (SP); pale red (2.5YR 7/2); dry; very dense; 95% very fine to fine sand; 5% silt; 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): \Box At Time of Drilling: 480.30 \blacksquare At End of Drilling: Not Recorded \blacksquare After Drilling: 482.55

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

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|--------------|-----|-----|-------------------|----------------------------------|---|--------------|--------------------|---|
| 5 Depth (ft) | | | Lithologic Log | Material Description | | Well Diagram | Remarks | |
| 455 | - | | | | 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. | | | |
| 460 | - | | | | Same as above (450 ft); no odor. | SP | | Kelly down @ 1516 on |
| 465 | - | | | | Same as above (450 ft); 100% fine to medium sand; trace coarse sand; subangular to subrounded; no odor. | | - High Solids | 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. |
| 470 | - | | | | Same as above (450 ft); trace fine gravel to 5mm; subrounded; no odor. Well graded GRAVEL with Sand (GW); pale red (2.5YR 7/2); moist; very dense; 70% fine to coarse gravel to 7.5cm; | GW | Bentonite Grout | |
| | | | | SU SU PC (2 95 sa | subrounded; 30% fine to coarse sand; subangular to subrounded; no odor. 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 | SP | | Resumed drilling @ 0833 on 3/1/11. Driller began injecting water into cyclone for dust |
| 475 | - | | | | odor. 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 | | |

| 9 | C Sha | | | | | Bore | eho | le ID: KAFB- | 106102 |
|--------------|----------------------------|------------------------------|------------------|-------------------|--|--|------------------|--|---|
| Pr Pr | ojec ojec | t Loca | ation: ne: K | : KÁI (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Dia | amete | r Upper (in.): 11-3/4 r Lower (in.): 9-5/8 bletion Type: Stick-up | |
| Da Da | ate S ate T | tartec | d: 2/2 acheo | 22/20 d: 3/ | 11 1/2011 | ⊥ At T I At E | Time o End of | Levels BGS (ft): f Drilling: 480.30 Drilling: Not Recorded ng: 482.55 | |
| Y | Cooi | d Elev rdinate rdinate | e: 14 | 47403 | | Drillling Drilling | Contra Metho | actor: WDC Drilling d: Air Rotary Casing H Brian Lucero | ammer Page 17 of 19 |
| B Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks |
| -00 | - | | | | ✓Well graded SAND (SW); pale re (2.5YR 7/2); dry; dense to very d 95% very fine to coarse sand; ▼subangular to subrounded; 5% fi | ense; | SW | | Kelly down @ 0902. New connection @ 0911. Resumed drilling @ 0912. |
| 485 | - | | | | coarse gravel to 3cm; subangula subrounded; no odor. Poorly graded SAND (SP); pale (2.5YR 7/2); moist; very dense; 1 | red | SP | | |
| | - | | | | very fine to fine sand; no odor. N sandy clay; dark brown (7.5YR 3 clay nodules at 484'. Well graded SAND (SW); pale re (2.5YR 7/2); dry to moist; very de | lote: / /4) wirh / ed | SW | | Dusty dry discharge from 480-497'. Kelly down. |
| 490 | | | | | 95% very fine to coarse sand; $\sqrt{35\%}$ subangular to subrounded; 5% fi | ne to / | ML | | |
| 495 | - | | | | coarse gravel to 5cm; subrounde odor. SILT with Sand (ML); light reddis (5YR 6/4); dry to moist; very den silt; 20% very fine to fine sand; n Silty SAND (SM); light reddish br (5YR 6/4); dry to moist; very den very fine to fine sand; trace medi | h brown se; 80% o odor. rown se; 70% | SM | | |
| 500 | - - - -) - | | | | coarse sand; subangular to subro 10% fine to coarse gravel to 7.50 subrounded; 20% silt; no odor. Poorly graded SAND (SP); pale ((2.5YR 7/2); dry to moist; very de 90% very fine to medium sand; to coarse sand; subangular to subro 5% fine to coarse gravel to 5cm; subrounded; 5% silt; no odor. Same as above (495 ft); wet; no | cm; red ense; race ounded; | SP | | Kelly down @ 0941. New connection @ 1107. Resumed drilling @ |
| 505 | | | | | | | | | 1146. |
| 505 | | | | | Well graded SAND (SW); weak r (2.5YR 5/2); moist; very dense; 9 very fine to coarse sand; subang fine gravel to 18mm; subangular subrounded; no odor. | 95% ular; 5% | sw | | |
| 510 |) | | | | | | | | |

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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

Borehole ID: KAFB-106102

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

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

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

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| | X Coordinate: 1540401.91 Logg | | | | | | ged By: Brian Lucero | | | |
|--------------|-------------------------------|--------|------------------|-------------------|---|-----------------------------------|---|---|--|--|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | scription ທີ່ ເດີ ທີ່ ວັ | | | | |
| 515 | - | | | | 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 | | | |
| 520 | - | | | | 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 | | | |
| 525 | - | | | | 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. Same as above (520 ft); moist; 100% very fine to fine sand; no odor. | SP | - Top of 5" Schedule 80 PVC 0.010" Slot Screen | Kelly down @ 1214. New connection @ 1246. Resumed drilling @ 1252. | | |
| 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 | | | | | | | | | | |

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Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5337.3

Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 3/1/2011 Date Completed: 3/3/2011

Y Coordinate: 1474039.85

X Coordinate: 1540401.91

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106102

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

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

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

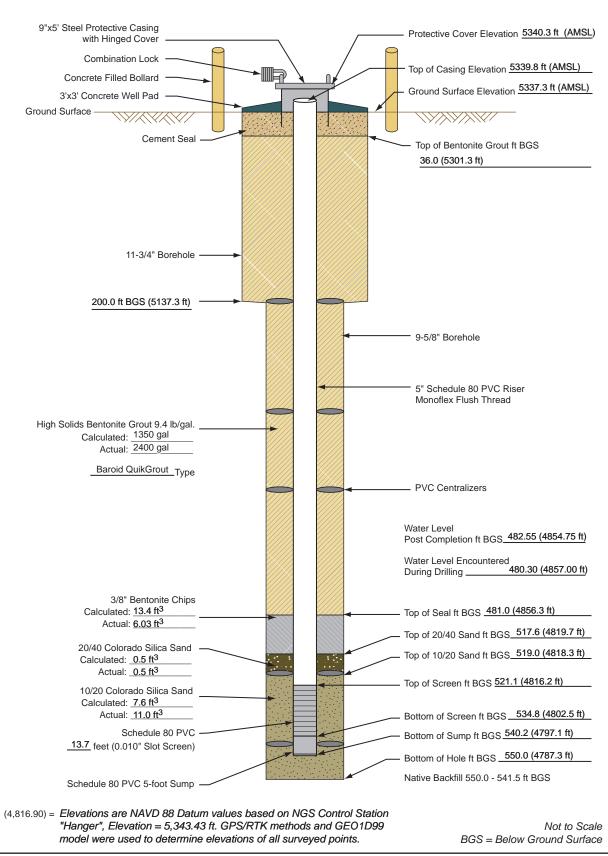
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| | 000 | unat | C. I | | | <i>р</i> у. с | | - |
|------------------------------|-------------|--------|------------------|-------------------|---|---------------|---|--|
| G Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - - 545 - - - | | | | | 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. 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 Sump Bottom of Filter Pack | 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'. |
| 550 | | | | | | | 60262 | Total Depth = 550 ft. Reached @ 1418 on 3/1/11. |
| 555 | | | | | | | | Water added during drilling (gallons) = 0 |
| - | | | | | | | | Water added after drilling (gallons) = 1,000 |
| | | | | | | | | Water added during construction (gallons) = Not Recorded |
| - | | | | | | | | Spud: started drilling from surface. |
| <u>565</u> | | | | | | | | Kelly down: TD the joint and ready to make new connection. |
| 570 | | | | | | | | |

Monitoring Well Completion Diagram KAFB-106102

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

 Installation End Date/Time:
 3/3/2011 @ 17:20



140705.CB010040_MW_KAFB_106102



| Well/Piez. No.: 106102 | | | | | | | |
|---|--|--|--|--|--|--|--|
| Date Installed: 3/3/11 | | | | | | | |
| Csg. Diameter (I.D.): <u>5"</u> | | | | | | | |
| Total Depth (ft. BGL): <u>541.50</u> | | | | | | | |
| X Pumping | | | | | | | |
| Other | | | | | | | |
| | | | | | | | |
| 482.52 | | | | | | | |
| Vol. (V) Purge Factor Volume to Purge | | | | | | | |
| 1064.95 gal. * 1 = 1064.95 * Ø _s * 7.48)+(H ₂ O added during drilling/installation) = <u>1064.95</u> gallons | | | | | | | |
| Time Purging Begins: <u>1027, 3/19/11</u> | | | | | | | |
| Screened Interval (ft BGL): 521.08-534.84 | | | | | | | |
| EC Meter: <u>YSI 100258</u> Turbidity Meter: <u>LVE 2818</u> | | | | | | | |
| | | | | | | | |
| t: Y <u>X N</u> | | | | | | | |
| | | | | | | | |
| <u>N X</u> | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Well Development Record

| | | Water Level (ft. Below | Volume Removed | | | | Turbidity | |
|-----------|------|------------------------------|-------------------|---------|------|------------|-----------|-------------------------|
| Date | Time | TOC) | (gal.) | Temp.°C | рН | EC (ms/cm) | 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

 $\emptyset_{\rm s}$ = porosity of the sand pack

 $\omega_a = \text{porcestly of the send pack}$ $r_c = \text{radius of the well casing and screen in feet}$ $L_c = \text{length of water column inside the casing and screen in feet}$ $r_w = \text{radius of the well bore in feet}$ $L_a = \text{length of saturated portion of the sand pack in feet}$

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



Well Development Record

Project: KAFB BFF

Project Number: 140705

Date: 3/19/11

Well No: 106102

Samplers: D. Flores, A. Trujillo

Checked By: _____

Time Start: 1000, 3/16/11

Time Finish: 1415, 3/19/11

Field Chemistry (cont'd)

| | | Water Level (ft. Below | Volume Removed | | | | Turbidity | |
|-----------|------|------------------------------|-------------------|---------|------|------------|-----------|------------------|
| Date | Time | TOC) | (gal.) | Temp.°C | рН | EC (ms/cm) | 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

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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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| ~ | | | | | 209900 | , , , , , , , , , , , , , , , , , , , | | |
|------------|-------------|---|------------------|-------------------|---|--|---|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | - | | | | No description recorded; disturbed; dirt road. | | - Concrete Seal | Hand augered. |
| | - | | | | 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. | | - 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. | ML | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 20 | | SB0002 SB0002- MS SB0002- MSD | 0.0 | | Silty SAND (SM); red (2.5YR 5/6); dry; dense; 60% very fine to fine sand; 40% silt. | | | Blow counts (18-19.5'): 26/50. Blow counts (19.5-21'): 50/Not Recorded. Blow counts (21-22.5'): Not Recorded. |
| 25 | - | | | | Same as above (18 ft). | SM | - Bottom of Screen | Added 10' of casing @ 1045. |
| 30 | | 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. |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | | | | | 209900 | | | |
|--------------|-------------|----------------------------|------------------|-------------------|--|----------|---|---|
| ର Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 35 | - | | | | Silty SAND (SM); yellowish red (5YR 5/6); moist; dense; 60% very fine to fine sand; 20% silt; 20% clay; low plasticity. Silty SAND (SM); red (2.5YR 4/6); moist; loose; 80% fine to medum sand; 5% gravel to 4mm; 15% silt. | SM | - Bentonite Seal | Added 10' of casing @ 1110. Resumed drilling @ 1115. |
| 40 | | SB0004 SB0004 SB0004 | | | 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. |
| 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 | 7/ \I | SB0005 SB0006 | 0.0 | | Poorly graded SAND (SP); yellowish red (5YR 4/6); 95% very fine to fine sand; 5% silt. | SP | - Bottom of Screen | Blow counts (48-49.5'): 38/40/43. Added 10' of casing @ 1230. |
| 55 | - | | | | Same as above (48 ft). | | - 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 | | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | 00 | man | J. IC | 54108 | | <u> </u> | Patrick Ostrye | |
|--------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| 0 Danth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 6 | 5 | | | | composed of granite. | | | Added 20' of casing @ 1245. Resumed drilling @ 1250. |
| 7 | - | | | | Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; loose; 95% very fine to fine sand; 5% silt. | | | |
| | 5 | | | | Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; loose; 95% very fine sand; 5% silt. | | | |
| | | | | | Same as above (70 ft). | SP | - Bentonite Seal | |
| 8 | | | | | 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. |
| 8 | | | | | 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. | | | |
| 9 | 0 | | | | | | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|------------------|------------------|-------------------|--|---------------|-----------------------|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | |
| <u>100</u> | | SB0007 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. |
| 105 | - | | | | Silty SAND (SM); brown (7.5YR 4/4); moist; loose; 60% very fine to fine sand; 40% silt. | | - - Bentonite Seal | |
| <u>110</u> | - | | | | Same as above (103 ft). | SM | | |
| 115 | | | | | Same as above (103 ft). | | | |
| 120 | - | | | | | | | |

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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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|---------|------------------|-------------------|---|----------|-------|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | /ell Diagram | Remarks |
| | _ | | | | 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. |
| 125 | - | | | | 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. | | | | Resumed drilling @ 0755 on 02/16/2011. |
| 125 | | | | | Same as above (122 ft). | | | | |
| | | | | | | | | | |
| 130 | - | | | | Same as above (122 ft). | | | - Bentonite Seal | |
| | - | | | | | | | | |
| 135 | - | | | | Same as above (122 ft). | SP | | | |
| | - | | | | | | | □ - Top of Filter | |
| 140 | - | | | | Poorly graded SAND with Gravel (SP); light gray (5YR 7/1); dry; very loose; 80% | | | Pack - Top of 3/4" Schedule 80 PVC 0.050 | Added 10' of casing @ 0805. Resumed drilling |
| | | | | | medium to coarse sand; 20% gravel to 30mm; angular to subrounded. | | | Slot Screen | @ 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. | | | | |
| 150 | 1/ \ | 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 |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------------|-----------------------|--------|---|-------------------|---|---------------|-----------------------|---|
| 15 Depth (ft) | Sample Type | Numt | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 15 | | SB0008 | | | gravel to 15mm; angular to subrounded. Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% fine to medium sand; 5% gravel to 10mm; angular to subrounded. | | - Bottom of Screen | Recorded. Added 10' of casing @ 0850. Resumed drilling @ 0855. |
| <u>16</u> | - _ _ _ _ | | - - - - - - - - - - - - - - - - - - - | | 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. | | | |
| 16 | - | | - | | 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. | | | |
| 17 | - | | | | Same as above (170 ft). | | | |
| 18 | <u>ן</u> | | | | | | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|------------------|------------------|-------------------|--|----------|------------------|--|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| <u>185</u> | - | | | | Poorly graded SAND with Gravel (SP); 55% meduim to very coarse sand; 45% gravel to 12mm; subangular to subrounded. Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to coarse sand. Same as above (182 ft). Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand. | | | |
| <u>195</u> 200 | | SB0009 SB0009 | 0.5 | | Same as above (189 ft). 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 | SP | - Bentonite Seal | Blow counts (198-199.5'): 38/50. Blow counts (199.5-201'): 40/50. Blow counts (201-202.5'): |
| <u>205</u> | | SB0009 | | | dominantly rounded. | | | 38/50. |
| 210 | - | | | | | | | |

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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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------------|-------------|--------|------------------|-------------------|--|---------------|-------------------------|---------|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. | | | |
| - | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% fine to medium sand. | | - Bentonite Seal | |
| - 230 - - - | | | | | Same as above (223 ft). | SP | | |
| - 235 - - - | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 100% medium to coarse sand. | | | |
| _ 240 | | | | | | | - Top of Filter Pack | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------------------------|-------------|------------------|------------------|-------------------|--|-----------|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. |
| <u>245</u> - - | - | | | | 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 | | |
| <u>250</u> | X | SB0010 SB0010 | 4.0 | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% medium to coarse sand. | | - Bottom of Screen | Blow counts (248-249.5'): 38/50. Blow counts (249.5-251'): Not Recorded. Added 10' of casing @ 1130. Resumed drilling |
| 255 | - | | | | Poorly graded SAND with Silt (SP-SM); reddish brown (5YR 5/4); moist; loose; 90% fine to medium sand; 10% silt. Same as above (252 ft). | | | @ 1135. |
| - - 260 - - - | - | | | | Same as above (252 ft); finer. | SP- SM | - Bentonite Seal | Added 20' of casing @ 1140. Resumed drilling @ 1145. |
| <u>265</u> - | - | | | | 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 | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|------------------------------------|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Silty SAND (SM); reddish brown (5YR 4/4); moist; medium dense; 60% fine sand; 20% silt; 20% clay. Silty SAND (SM); moist; medium dense; 60% very fine to fine sand; 30% silt; 10% clay. | SM | | |
| - | - | | | | Poorly graded SAND with Silt (SP-SM); reddish brown (2.5YR 5/3); moist; loose; 90% fine to medium sand; 10% silt. | | | |
| <u>280</u> - - | - | | | | Same as above (275 ft). | SP- SM | | Added 20' of casing @ 1155. |
| - <u>285</u> - - | - | | | | Same as above (275 ft). | | - Bentonite Seal | |
| <u>290</u> - - | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; loose; 90% medium to coarse sand; 10% gravel to 7mm; subangular to rounded. | | | |
| <u>295</u> - | - | | | | Same as above (290 ft). | SP | | |
| 300 | X | 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. |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|-----------------------------------|
| S Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 000 | | | | | 25mm; subangular to subrounded. | SP | | Added 20' of casing @ |
| <u>305</u> | - | | | | 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 | | 1230. Resumed drilling @ 1235. |
| <u>310</u> | _ | | | | 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 | | |
| <u>325</u> 330 | - | | | | Poorly graded GRAVEL with Sand (GP); dry; loose; 70% gravel to 12mm; subrounded to rounded; 30% fine to coarse sand; well graded. | GP | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| CE Depth (ft) Sample Type Number Headspace | PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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 | |
| | | Poorly graded SAND (SP); reddish brown (5YR 5/3); moist; loose; 95% medium to coarse sand; 5% gravel to 12mm; rounded. | | r - Top of Filter Pack | |
| <u>340</u> - - 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 | | 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 | | 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 | - Bentonite Seal | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | 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. | | | |
| 370 - - - | - | | | | Well graded SAND with Gravel (SW); brown (7.5YR 4/4); moist; loose; 60% sand; 40% gravel to 10mm; subangular to rounded. | SW | | |
| 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. | | - Bentonite Seal | |
| 380 | | | | | Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 100% fine sand. | SP | | |
| - <u>385</u> - - | | | | | Well graded SAND (SW); light brown (7.5YR 6/3); dry; loose; 95% sand; 5% gravel to 4mm; subrounded to rounded. | sw | | |
| 390 | | | | | | | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| 06 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/3); dry; loose; 95% fine to medium sand; 5% gravel to 3mm; subrounded. | | | | |
| <u>395</u> - - | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 100% fine to coarse sand. | | | | |
| - _ 400 | | SB0013 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. |
| - - <u>405</u> - - | - | | | | Same as above (398 ft). | SP | | - Bentonite Seal | |
| - <u>+10</u> - - | | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106108

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|--------|------------------|-------------------|--|----------|----|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | _ | | | | 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. | | | - 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). | SM | | | |
| 435 | - | | | | Poorly graded SAND (SP); reddish brown (5YR 4/3); moist; loose; 100% very fine to medium sand. | | | - Top of Filter Pack | |
| 440 | - | | | | Same as above (435 ft). | SP | | - 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 | 7/ \I | 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 |



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

Borehole ID: KAFB-106108

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

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

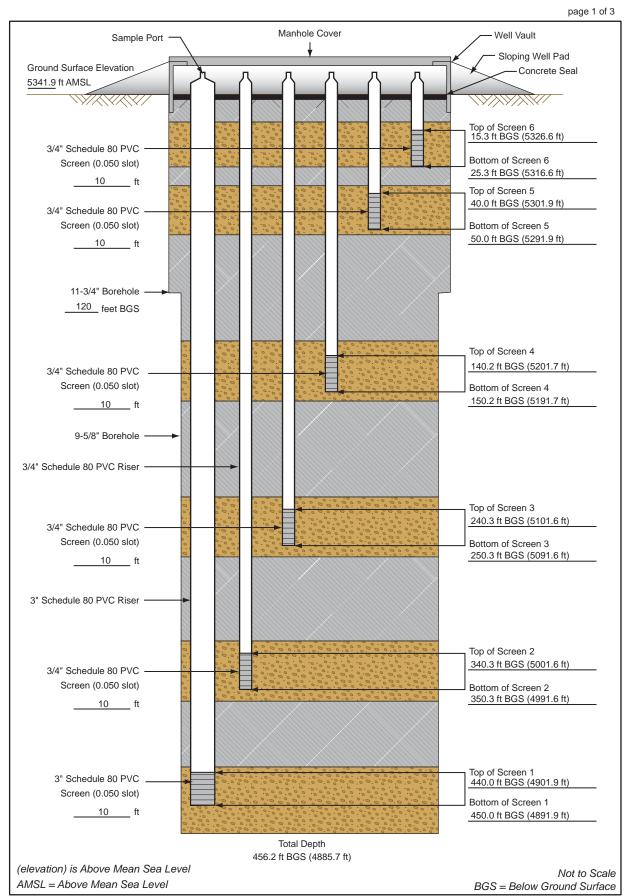
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | A Coordinate: 1541083.91 Logged By. Patrick Ostrye | | | | | | | | | |
|--------------|--|--------|---|-------------------|--|----------|---------------------|--|--|--|
| 5 Depth (ft) | Sample Type | Number | _ | Lithologic Log | | U.S.C.S. | Well Diagram | Remarks | | |
| | X | 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 | - | | | <u>• • • •</u> | | | | Total depth = 458 ft. Reached @ 1600 on 02/16/11. | | |
| | - | | | | | | | Water added during drilling (gallons) = 0 | | |
| 465 | - | | | | | | | Water added during construction (gallons) = Not Recorded | | |
| 470 | - | | | | | | | | | |
| | - | | | | | | | | | |
| 475 | - | | | | | | | | | |
| 480 | - | | | | | | | | | |

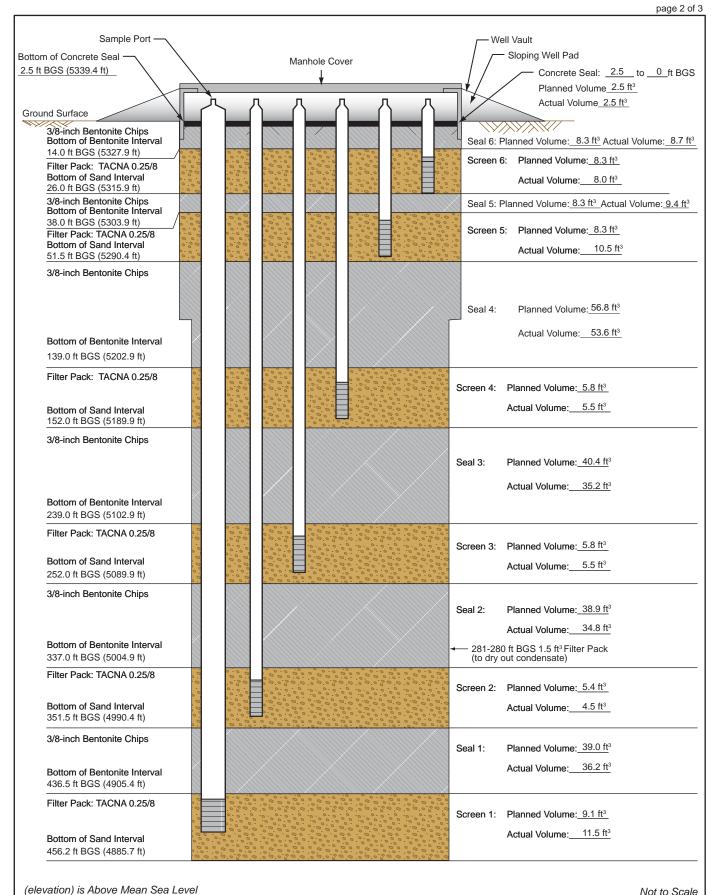
Nested Soil Vapor Well Completion Diagram for KAFB-106108

Installation Start Date/Time: 2/17/2011 @ 10:40 Installation End Date/Time: 2/18/2011 @ 17:15



140705_CA010020_SV_KAFB.106108 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106108

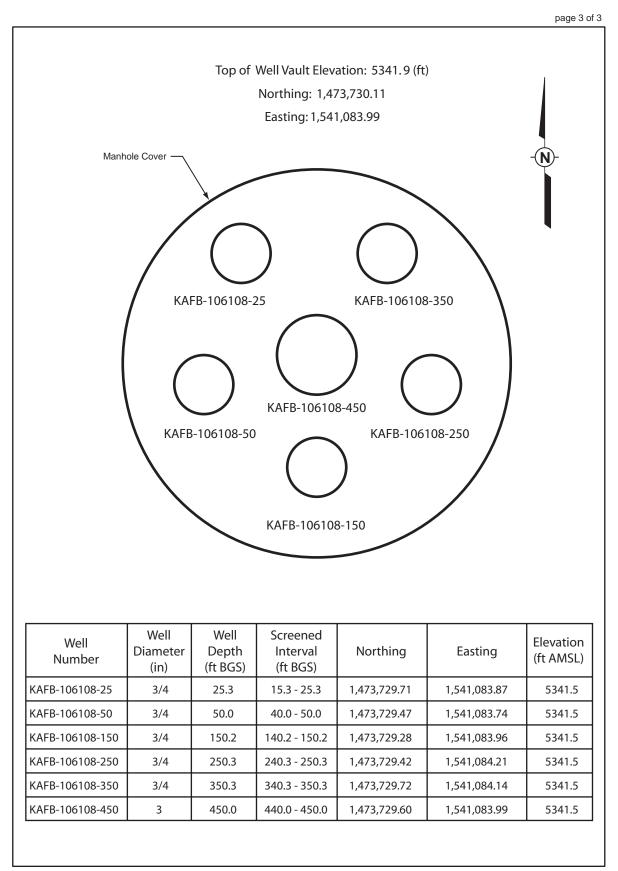


140705_CA010020_SV_KAFB.106108 (b)

All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106108



140705_CA010020_SV_Map View_106108

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APPENDIX D-1

KAFB-106109 Final Well Report

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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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------|------------------|-------------------|---|----------|---|---|
| o Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | | SB0015 | 9.4 | | No description recorded; disturbed | | - Bentonite Seal | Hand augered. Began drilling @ 1255 on 1/21/11. 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. 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 Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Blow counts (18.5-20'): |
| 20 25 | | SB0016 | 5.3 | | 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. | | - Bottom of | 7/12/38. |
| 30 | | SB0017 | 6.8 | | 5/4); moist; loose; 80% fine to medium sand; 20% clay; low to medium plasticity. | SC | - Bentonite Seal | Blow counts (27-28.5'): Not Recorded. |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| ల్ల Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 3: | - | SB0018 | 12.9 | | 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. 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. | | - Bentonite Seal | Sand line stuck. Stopped @ 37'. Cut and repaired line. Resumed drilling @ 0915 on 01/22/11. Blow counts (37-38.5'): 12/15/30. |
| 4(|) - - | | | | Same as above (35 ft). | SM | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | 12/10/00. |
| 4 | | SB0019 | 2.0 | | 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'. | | | Blow counts (47-48.5'): 12/15/36. |
| 5 | <u>)</u> - - | | | | 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 | |
| 5 | _ | | | | 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 | |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| 65 | - | | | | 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. Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 80% fine to medium sand; 5% gravel to 40mm; subrounded; 15% silt; low plasticity. | SM | | | |
| 70 | - | | | | Clayey SAND (SC); reddish brown (5YR 4/4); moist; loose; 60% fine to medium sand; 40% clay; low to medium plasticity. Silty SAND (SM); light reddish brown (5YR 6/4); moist; loose; 60% very fine to | SC | | | |
| 75 | | | | | fine sand; 5% gravel; 35% silt; low plasticity. 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 90 | - | | | | Same as above (82 ft). | SP | | | |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines. Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 60% fine to medium sand; 10% gravel; 30% silt; low | SP | | |
| 95 | | SB0020 | 1.0 | | plasticity. Same as above (92 ft); 70% fine to medium sand; 30% silt. | SM | | Blow counts (97-98.5'): 12/12/31. |
| <u>100</u> | - | | | | 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. |
| <u>105</u> | - | | | | No cuttings returned. | | - Bentonite S | No soil classification due to large chunks of silt |
| <u>110</u> | - | | | | No cuttings returned. | | | |
| 115 | - | | | | Lean CLAY with Sand (CL); brown | | | Visually clean soil from cyclone. |
| | - | | | | (7.5YR 5/4); moist; loose; medium plasticity; 85% clay; 15% very fine sand. Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines. | CL SP | | |
| 120 | | | | | | | | |

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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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| 15 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Wel | l Diagram | Remarks |
| 125 | - | | | | Poorly graded SAND (SP); brown (7.5YR 5/4); moist; very loose; 95% fine to medium sand; 5% fines. 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. | | | - Bentonite Seal | Resumed drilling @ 0845 on 1/23/11. |
| 130 | - | | | | Same as above (122 ft). | | | | |
| 135 | - | | | | Same as above (122 ft); 15% gravel to 10mm; subangular to subrounded. | SP | | | |
| <u>140</u> | - | | | | 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 Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 145 | - | | | | Same as above (138 ft); 70% sand; 30% gravel. | | | | |
| 150 | | 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 SP | | | Blow counts (147-148.5'): 12/12/31. |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - - - - - - - | - | | | | Volume of the second se | | Bottom of Screen | |
| - 160 - - | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; very loose; 95% fine to medium sand; 5% fines. | SP | | |
| - <u>165</u> - - | - | | | | 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 | | | | | | | | |

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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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | orumat | | | | | | | |
|-----------------------------|--------|------------------|-------------------|--|----------|------------------|--|--|
| 8 Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| - | | | | 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 | | | |
| 185 | | | | Poorly graded SAND (SP); reddish brown (5YR 5/3); 95% medium to coarse sand; 5% gravel to 5mm; 5% fines. | SP | | | |
| - - - 190 | | | | 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 | | | |
| - | | | | 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. | | | | |
| 95 | | | | Poorly graded SAND (SP); light brown (2.5YR 6/4); moist; very loose; 95% medium to coarse sand; 5% fines. | SP | - Bentonite Seal | | |
| -2 | SB0022 | 6.1 | - | | | | Blow counts (197-198.5 5/30/refusal. | |
| 200 | SB0023 | 6.1 | | Silty SAND (SM); brown (7.5YR 5/4); moist; very loose; 85% very fine to | | | Blow counts (198.5-200 Not Recorded. Blow | |
| -2 | SB0023 | | | medium sand; 15% silt; low to medium plasticity. | SM | | counts (200-201.5'): No Recorded. | |
| 205 | | | | Clayey SAND (SC); reddish brown (5YR 5/4); moist; loose; 75% very fine to fine sand; 25% clay; low plasticity. | sc | | | |
| | | | | Silty SAND (SM); reddish brown (5YR 5/3); 80% sand; 20% silt. | SM | | | |



Borehole ID: KAFB-106109

Client:US Army Corps of EngineersHole Diameter Upper (in.):11-3/4Project Location:KAFB, Albuquerque, NMHole Diameter Lower (in.):9-5/8Project Name:KAFB BFF SWMU ST-106 and SS-111Surface Completion Type:Flush mount

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| X Coordina | te: 154080 | 03.52 Logged | Logged By: Patrick Ostrye | | | |
|---|---------------------------------------|--|---------------------------|------------------|---------|--|
| 017 Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| - | | 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 | | | |
| - | | 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 | - Bentonite Seal | | |
| 225 | | Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; very loose; 90% medium to coarse sand; 10% gravel to 11mm. | SP | Dentonite Sea | | |
| 230 | | Well graded SAND (SW); pinkish gray (5YR 6/2); moist; very loose; 95% sand; 5% gravel. | sw | | | |
| | | Same as above (230 ft). | | | | |
| 240 | | (5YR 6/3); moist; loose; 50% very fine to fine sand; 50% clay; medium plasticity. | SC | Pack | | |

Y Coordinate: 1473479.95 X Coordinate: 1540803.52

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



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| 7.00 | pordinat | e. 104 | 1000 | | ed By: Patrick Ostrye | | | | |
|------------------------------|-----------------------|------------------|------|---|-----------------------|----|--|---|--|
| 00 Depth (ft) | Sample Type Number | Headspace PID | Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks | |
| - | | | | 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 | X SB0024 | 2.4 | | Same as above (240 ft); medium to coarse sand. Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; very | SW | | | Blow counts (247-248.5') 7/23/42. Description from | |
| 250 - - - | | | | 13mm; subrounded to rounded; 10% fines. Silty SAND (SM); reddish brown (5YR 5/3); moist; firm; 75% very fine to fine sand; 25% silt; low plasticity. Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; very loose; 95% fine to medium sand; 5% fines. | SM | | - Bottom of Screen | split spoon sample. | |
| 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 | | - Dentonite Sea | | |
| _ 265 _ _ _ _ | | | | Same as above (258 ft). | | | - Native Backfill | | |

| Sh | aw |
|----|----|

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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| ^ | Logged By: Patrick Ostrye | | | | | | | | |
|---------------|----------------------------|------------------|------------------|-------------------|--|----------|--|---|--|
| 22 Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| 27 | - | | | | 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 | | | |
| | - | | | | 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 | A Contraction of the sector of | | |
| 280 | 0 | | | | Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 13mm. | SW | - Filter Pack | | |
| 28 | 5 | | | | Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to coarse sand; 5% gravel. | SP | | | |
| <u>29(</u> | - - - - 0 - | | | | Well graded SAND with Gravel (SW); reddish brown (5YR 5/4); dry; very loose; 70% sand; 30% gravel to 25mm. | sw | - - Bentonite Seal | | |
| 29 | 5 | | | | Poorly graded SAND (SP); light brown (5YR 6/3); moist; very loose; 90% fine to coarse sand; 10% gravel to 25mm. | SP | | | |
| 300 | | SB0025 SB0025 | | | 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. | |



Project Number: 140705

Date Started: 1/21/2011

Date TD Reached: 2/4/2011 Date Completed: 2/9/2011

Y Coordinate: 1473479.95

Ground Elevation AMSL (ft): 5338.7

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrve

| | | rdinat | | 54080 | | ed By: Patrick Ostrye Page 11 | | |
|-------------------------|-------------|--------|------------------|-------------------|--|-------------------------------|------------------|---------|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. | | | |
| <u>305</u> - | - | | | | 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. Same as above (317 ft). | | | |
| 325 | | | | | 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. | | | |

| S | l | | | | | Borehole ID: KAFB-106109 | | | | |
|---------------|--------------|------------------|----------------|-----------------|--|---|-------------------|--|---|---|
| Pro Pro | ojeo ojeo | t Loca | ition: e: K | KA AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 705 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount | | | | |
| Da Da | te S te T | Started | : 1/2 acheo | 21/20 d: 2/- | 11 4/2011 | ∑ At⊺ ▼ At E | Time of End of | Levels E f Drilling Drilling: ng: N/A | N/A | |
| YO | Coo | ordinate | e: 14 | 17347 | | | Metho | d: Air F | VDC Drilling Rotary Casing H Ostrye | ammer Page 12 of 16 |
| 65 Depth (ft) | | | | | | | U.S.C.S. | We | ell Diagram | Remarks |
| 335 | - | | | | Poorly graded SAND with Gravel reddish brown (5YR 5/4); moist; v loose; 60% medium to coarse sa 40% gravel to 10mm; subrounde rounded. Poorly graded SAND with Gravel reddish brown (5YR 5/4); dry; ver 60% medium to very coarse sand gravel to 30mm; subangular to subrounded. Poorly graded SAND with Gravel reddish brown (5YR 4/3); 80% m to very coarse sand; 20% gravel 8mm; subrounded to rounded. No cuttings returned. | very nd; d to (SP); ry loose; d; 40% (SP); edium ₂ - | SP | | - Bentonite Seal - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | No recovery. Blockage in drill system. |
| 350 | \mathbb{H} | SB0026 SB0026 | 0.0 | | Well graded SAND with Gravel (light reddish brown (5YR 6/3); dr loose; 80% sand; 20% gravel to Well graded GRAVEL with Sand dry; very loose; 70% gravel to 15 angular to subrounded; 30% med very coarse sand. | y; very 9mm. (GW); mm; | SW | | - Bottom of Screen | Blow counts (347-348.5'): 7/12/23. Blow counts (348.5-350'): Not Recorded. |
| 360 | - | | | | Poorly graded SAND (SP); pinkis (7.5YR 6/2); dry; very loose; 95% medium sand; 5% fines. | | SP | | | |



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

Borehole ID: KAFB-106109

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| 95 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | _ | | | | 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. |
| <u>365</u> | | | | | Poorly graded SAND (SP); moist; loose; no gravel. | | | "Stop Work" called by Shaw and WDC @ 0945 |
| <u>370</u> | - | | | | Same as above (365 ft). | SP | | |
| <u>375</u> | - | | | | 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. |
| <u>380</u> | - | | | | 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 @ 094 on 02/04/11. |
| <u>385</u> | | | | | 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 | | | | 200 | | | | |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|--------|------------------|-------------------|---|-----------|------------------|--|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | - | SB0027 | NR | | Poorly graded SAND (SP); reddish brown (5YR 5/4); dry; very loose; 95% medium sand. | | | Could not obtain accurate |
| 400 | - | SB0027 | | | Same as above (395 ft). | SP | | blow counts from 397-400'. Insufficient volume for headspace measurement. |
| 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. | | | |
| 415 | - | | | | Same as above (410 ft). | SW | | |
| 420 | - | | | | 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 | | |



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

Borehole ID: KAFB-106109

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|----------------------|--------------------|---------|------------------|-------------------|---|----------|----|--|--|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | II Diagram | Remarks | |
| 425 | | | | | Well graded SAND (SW); reddish brown (5YR 5/4); dry; very loose; 95% sand; 5% fines. | sw | | | | |
| - | | | | | Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 95% fine to medium sand. | | | - Bentonite Seal | | |
| <u>430</u> - - | | | | | Same as above (425 ft); very fine to fine sand. | | | | | |
| <u>435</u> - - | | | | | 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 - - | $\left\{ \right\}$ | SB0028 | | | 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 | | | Blow counts (447- 448.5'): could not obtain accurate count. Blow counts (448.5-450'): Not | |

| Sł | aw | E |
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Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5338.7

Project Number: 140705

Date Started: 1/21/2011

Date TD Reached: 2/4/2011 Date Completed: 2/9/2011

Y Coordinate: 1473479.95

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106109

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

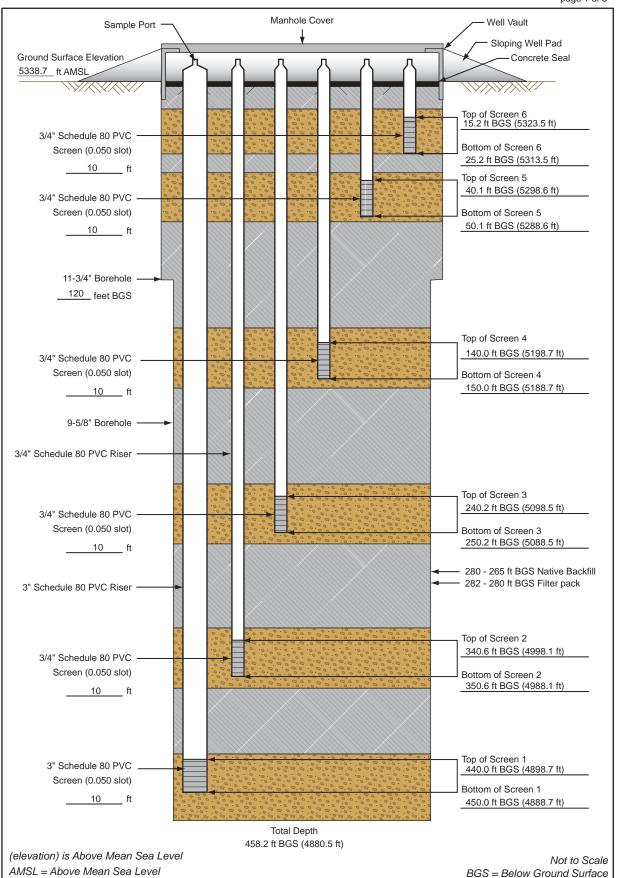
Groundwater Levels BGS (ft): ▼ After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

| | | | | 47347 54080 | | Logged By: Patrick Ostrye Page 16 of 1 | | | | |
|--------------|-------------|--------|------------------|-------------------|--|--|---------------------|---|--|--|
| 05 Depth (ft | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| | | | | | 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 | | | | <u></u> | | | | 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

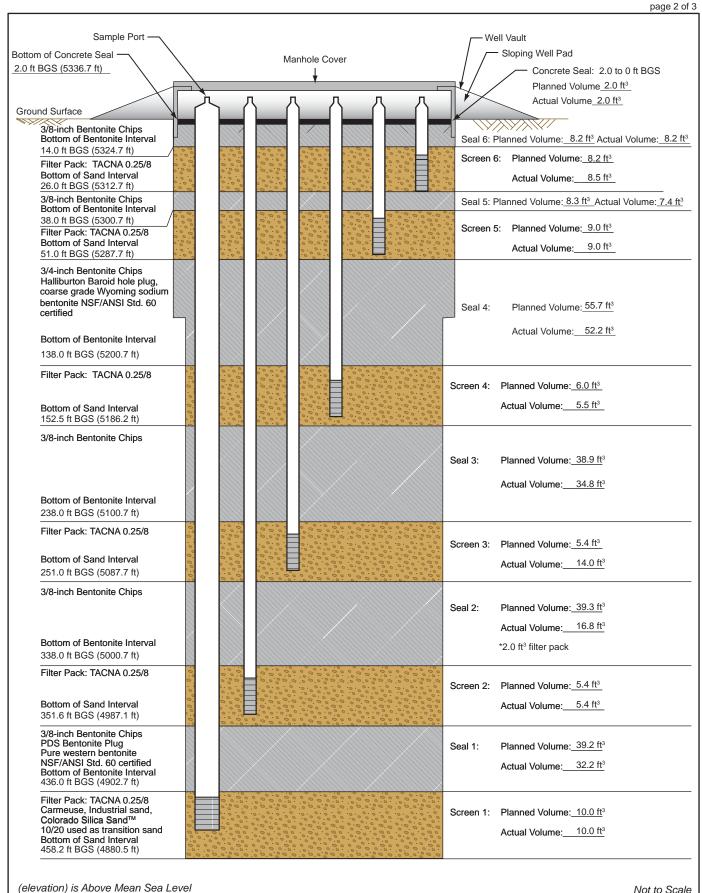
Installation Start Date/Time: <u>2/7/2011 @ 08:05</u> Installation End Date/Time: <u>2/9/2011 @ 15:00</u>



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140705_CA010020_SV_KAFB.106109 (a)

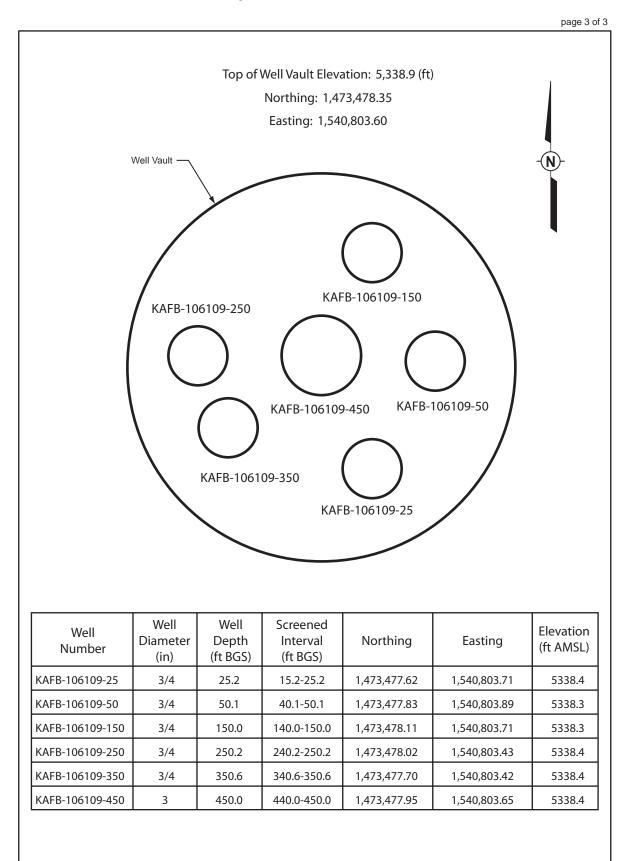
Nested Soil Vapor Well Completion Diagram for KAFB-106109



All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106109



140705_CA010020_SV_Map View_106109

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APPENDIX D-1

KAFB-106110 Final Well Report

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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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------|-------------|--------|------------------|-------------------|---|----------|---|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | - | | | | No description recorded; disturbed. | | Concrete Seal | Hand augered. |
| | - | | | | 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 |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|------|------------------|------------------|-------------------|---|----------|-----------------|---|---|--|
| S Depth (ft) | 1.72 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well | Diagram | Remarks | |
| | | SB0031 SB0032 | 0.0 | | 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. | |
| 35 | 5 | | | | 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. | | | | | |
| 40 | | SB0033 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. | |
| 45 | | SB0033 | | | 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. | | | | | |
| 50 | | SB0034 SB0034 | 0.0 | | Same as above (42 ft). Silty SAND (SM); reddish brown (5YR 5/4); dry; very dense; 55% very fine to fine sand; 45% silt. | SM | 1 IF IF IF IF I | 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. | |
| 55 | - | | | | Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt. | | - F | Bentonite Seal | e 0020. | |
| 60 |) | | | | | | | | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|--------------------|--------|------------------|-------------------|--|----------|------------------|---|
| @ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. |
| 6 | 5 | | | | 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 | <u>)</u> - - | | | | Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 55% very fine to fine sand; 45% silt. | | | |
| 7! | 5 | | | | 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. |
| 8 | 5 | | | | Silty SAND (SM); reddish brown (5YR 5/4); dry; loose; 60% very fine to fine sand; 40% silt. | | | |
| 9(| ו | | | | | | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------------------------|-------------|---|------|------|--|----------|------------------|--|
| ଞ Depth (ft) | Sample Type | Number Number Headspace PID Lithologic | | | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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- | | |
| - 100 - | | SB0035, SB0035- <u>MS</u> / SB0035- MSD | | | 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. | SM | | Blow counts (98-99.5'): 38/49/50. Blow counts (99.5-101'): 40/50. New 20' connection @ 1110. Resumed drilling @ 1120. |
| - 105 - | | | | | Silty SAND (SM); reddish brown (5YR 5/4); moist; loose; 55% very fine sand; 45% silt. Same as above (102 ft). | | - Bentonite Seal | |
| - - 110 - - - | | | | | Same as above (102 ft). | SM | | |
| <u>115</u> - - | | | | | Silty SAND (SM); reddish brown (5YR 4/4); moist; loose; 70% fine to medium sand; 30% silt. | | | |
| 120 | | | | | | | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-----------------------------|-------------|--------|------------------|-------------------|--|-----------|---|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| - | - | | | | 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. |
| - | - | | | | | | | - Bentonite Seal | |
| <u>130</u> - - 135 | - | | | | 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 | | | |
| - | - | | | | No cuttings returned. | | | | 9 5/8" casing fell through strata too fast. |
| - | | | | | | | | - Top of Filter Pack | |
| 140 | | | | | Silty SAND (SM); yellowish red (5YR 4/6); moist; loose; 70% fine to medium sand; 30% silt. | SM | | - 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. |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------------|-----|---------|------------------|-------------------|--|-----------------|---------------------|---|
| 15 Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | subangular to subrounded; 20% silt. | SM | Bottom of Screen | New 10' connection @ 1625. Resumed drilling @ 1635. |
| 15 | 5 | | | | Poorly graded SAND (SP); dry; loose; 100% medium to very coarse sand. | SP | | |
| 1.64 | | | | | Poorly graded SAND with Silt (SP-SM); dry; loose; 90% fine to medium sand; 10% silt. | · | | |
| 160 | - | | | | Same as above (156 ft). | SP- SM | | New 20' connection @ 1635. Resumed drilling @ 1655. |
| 16 | 5 | | | | Same as above (156 ft). | | - Bentonite Seal | |
| 17(|) | | | | 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 | | |
| <u>17</u> ! | 5 | | | | Poorly graded SAND (SP); yellowish red (5YR 5/6); 95% fine to medium sand; 5% silt. | SP | | |
| 180 | 5 | | | | | | | End of 2/20/11. |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | | Ś | | |
|---------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---|
| - | | ŀ | He | Litho | Material Description | U.S.C. | Well Diagram | Remarks |
| 185 | | | | | 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. |
| | | | | | 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 | | |
| - | | | | | 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. | | | |
| 195 | X SB | 30037 | 0.3 | | 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. Poorly graded SAND with Silt (SP-SM); light reddish brown (5YR 6/3); moist; | SP- SM | - Bentonite Seal | Blow counts (198-199.5'): 35/50. |
| 200 | | | | | dense; 90% very fine to fine sand; 10% silt; trace 2-3mm pumice. | | | 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 | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5340.4

Project Number: 140705

Date Started: 2/19/2011

Date TD Reached: 2/22/2011 Date Completed: 2/24/2011

Y Coordinate: 1473285.26

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|--------|------------------|-------------------|--|----|---|-------------------------|--------------|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | | Vell Diagram | Remarks |
| | - | | | | 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 reddis brown (5YR 6/4); moist; very loose; 100% medium to fine sand. | sh | | | |
| 220 | - | | | | Poorly graded SAND (SP); light reddis brown (5YR 6/4); moist; very loose; 100% fine to very coarse sand. | sh | | - Bentonite Seal | |
| 225 | - | | | | Same as above (220 ft). | SI | þ | | |
| 230 | - | | | | Same as above (220 ft); fine to coarse sand. | 9 | | | |
| <u>235</u> 240 | | | | | 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 | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|----------|------------------|-------------------|---|----------|----|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand. | | | Schedule 80 PVC 0.050 Slot Screen | New 10' connection @ 0905. Resumed drilling @ 0915. |
| 245 | - | | | | Same as above (240 ft). | | | | |
| <u>250</u> | | 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. |
| <u>255</u> | | | | | 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. |
| <u>265</u> 270 | - | | | | Clayey SAND (SC); brown (7.5YR 5/4); moist; loose; 50% fine to medium sand; 30% clay; 20% silt; nonplastic. | sc | | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------------------|-------------|--------|------------------|-------------------|---|----------|------------------|--|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Silty SAND (SM); strong brown (7.5YR 4/6); moist; loose; 80% fine to medium sand; 20% silt. | SM | | |
| - | - | | | | 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. | | | |
| <u>280</u> - - | - | | | | 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. | SP | | |
| <u>285</u> - - - | - | | | | Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subangular to subrounded; 30% fine to coarse sand. | GP | - Bentonite Seal | |
| <u>290</u> - - - | - | | | | 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 | | |
| <u>295</u> - - | - | | | | 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 | X | 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. |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|-------------------------------|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 305 | | SB0039 | | | rounded. | SP | | New 20' connection @ 0945. |
| 310 | - | | | | 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 | | |
| 315 | - | | | | 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 | | |
| 320 | - | | | | 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 | |
| - | - | | | | 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 | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------------|-------------|------------------|------------------|-------------------|---|---------------|----|--|--|
| 65 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 335 | - | | | | Silty SAND (SM); brown (7.5YR 5/4); moist; medium dense; 60% medium to coarse sand; 30% silt; 10% clay; nonplastic. | SM | | - Bentonite Seal | |
| | - | | | | 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 | |
| - | - | | | | 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 SB0040 | | | Poorly graded GRAVEL with Sand (GP); dry; medium dense; 85% gravel to 40mm; subrounded to rounded; 15% coarse to very coarse sand. | | | - Bottom of Screen | Blow counts (348-349.5'): 15/30/50. Blow counts (349.5-351'): Not Recorded. New 10' connection @ 1115. |
| - 355 - - - | - | | | | Poorly graded GRAVEL with Sand (GP); dry; loose; 60% gravel to 20mm; angular to rounded; 40% medium to very coarse sand. | GP | | - Bentonite Seal | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|--------------------|-----|--------|------------------|-------------------|---|----------|------------------|---|
| 0 Denth (ft) | Sample Type | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | | 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. |
| <u>36</u> | 5 | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; loose; 95% medium to coarse sand; 5% gravel to 5mm; subangular to rounded. | | | |
| <u>37</u> | 0 | | | | | 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. | | | |
| <u>37</u> | 5 | | | | | 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 | |
| <u>38</u> | <u>0</u> - - | | | | | 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. |
| <u>38</u> | 5 | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/3); moist; loose; 95% fine to coarse sand; 5% gravel to 12mm; subrounded to rounded. | | | |
| 39 | 0 | | | | | | | | |



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

Borehole ID: KAFB-106110

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | | Junate | C . I | 54112 | Logged | Dy. 1 | | Jourye | - |
|----------------------|-------------|--------|------------------|-------------------|--|----------|----|------------------|--|
| 06 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | Well graded SAND (SW); reddish brown (5YR 3/3); moist; loose; 100% sand. | | | | |
| <u>395</u> - - | - | | | | Same as above (390 ft); increase in coarse fraction. | SW | | | |
| - | X | 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 |
| 400 | X | 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 | W 1240. |
| - | - | | | | Well graded SAND (SW); reddish brown (5YR 5/3); dry; loose; 100% sand. | | | | |
| <u>410</u> - | - | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106110

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| X Coord | linat | e. 1 | 04112 | LUgged | р у. г | | suye | |
|------------------------------|--------|------------------|-------------------|---|---------------|----|--|---|
| 65 Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | 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 | | | | 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 | 30042 | 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. |



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

Borehole ID: KAFB-106110

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

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

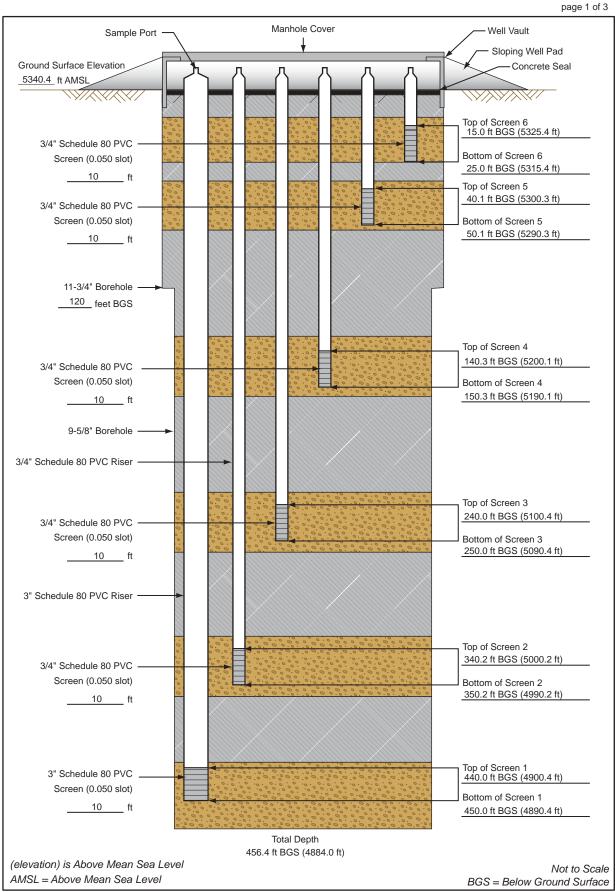
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | | | e: 1 | 54112 | 1.79 Logged | IBy: I | Patrick Ostrye | Page 16 of 16 |
|--------------|-------------|--------|------------------|-------------------|---|----------|---------------------|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | - | | | | to 10mm; rounded. Poorly graded SAND (SP); reddish brown (5YR 4/4); moist; medium dense; 100% fine to coarse sand. | SP | Bottom of Screen | |
| 460 | - | | | <u></u> | | | | Total Depth = 456.4 ft. Reached @ 1355 on 2/22/11. Water added during drilling (gallons) = 0 |
| 465 | - | | | | | | | Water added during construction (gallons) = Not Recorded |
| 470 | - | | | | | | | |
| 475 | | | | | | | | |
| 480 | | | | | | | | |

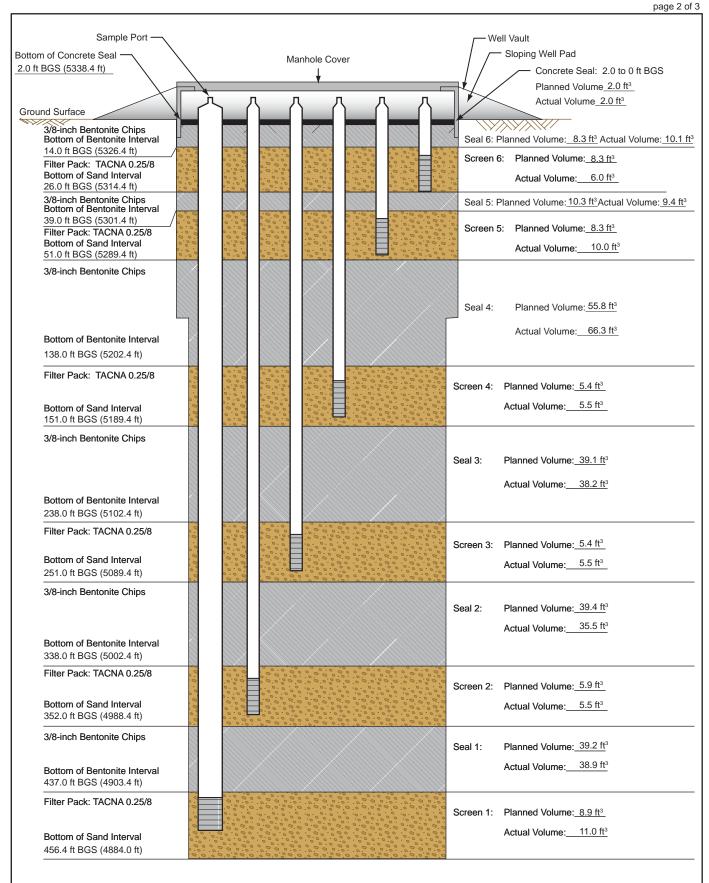
Nested Soil Vapor Well Completion Diagram for KAFB-106110

Installation Start Date/Time: 2/23/2011 @ 08:25 Installation End Date/Time: 2/24/2011 @ 14:50



140705_CA010020_SV_KAFB.106110 (a)

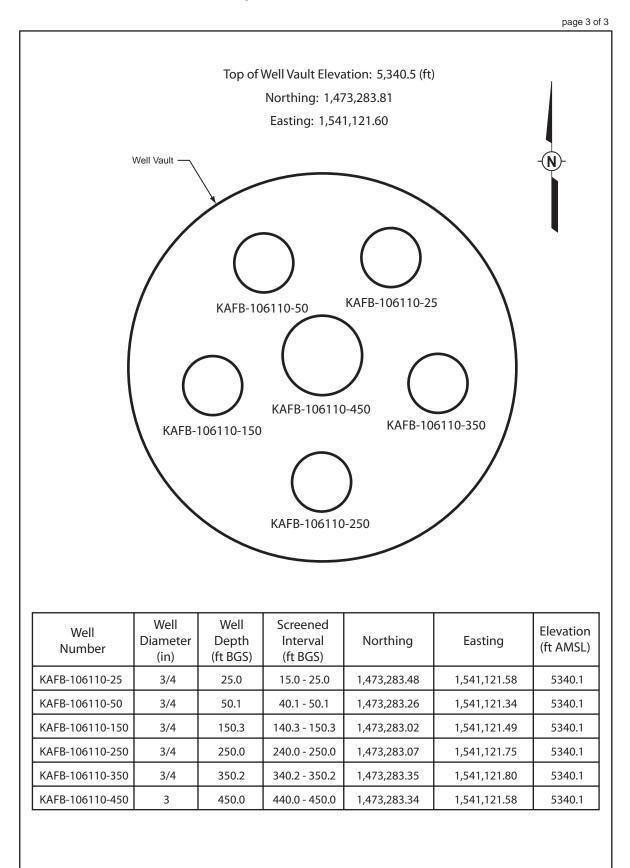
Nested Soil Vapor Well Completion Diagram for KAFB-106110



(elevation) is Above Mean Sea Level All Materials Placed with Tremie Pipe Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106110 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106110



140705_CA010020_SV_Map View_106110

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APPENDIX D-1

KAFB-106111 Final Well Report

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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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------------------------------------|------------------|-------------------|---|----------|--|
| _ Denth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram Remarks |
| | - | | | | No description recorded; disturbed. | | Hand augered. |
| 1 | | SB0043 SB0044 SB0044 | | | 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. 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. | | Began drilling @ 1220 o 3/1/11. Blow counts (7-8.5'): 75/Not Recorded. Blow counts (8.5-10'): 100/No Recorded. Blow counts (10-11.5'): Not Recorded |
| 2 | | SB0045 | 0.0 | | Silty SAND (SM); reddish brown (2.5YR 4/4); dry; medium dense; 50% very fine to fine sand; 5% coarse sand; 45% silt. 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. | SM | Top of Filter Pack Top of 3/4" Schedule 80 PVC 0.050 Slot Screen Blow counts (17-18.5'): 100/Not Recorded. Blow counts (18.5-20'): 100/Not Recorded. Petroleum odor @ 18'. |
| 2: | | SB0046 SB0046- MS / SB0046- | | | Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt. | | -Bentonite Seal Blow counts (27-28.5'): 50/35/20. Blow counts (28.5-30'): 50/25/15. |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------|------------------|-------------------|--|---------------------|---|---|---|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| | _ | | | | Silty SAND (SM); reddish brown (2.5YR 4/3); moist; medium dense; 55% very fine to fine sand; 45% silt. | | | - Bentonite Seal | New 10' connection @ 1440. Resumed drilling @ 1448. |
| 35 | | SB0047 | 0.0 | | 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. Silty SAND (SM); reddish brown (2.5YR | | | | Blow counts (37-38.5'): 20/30/50. |
| 40 | | | | | 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 | | SB0048 | 0.0 | | 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. Silty SAND (SM); reddish brown (2.5YR 4/4); moist; medium dense; 70% very | SM | | | Blow counts (47-48.5'): 20/30/50. |
| 50 | _ | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------|------------------|-------------------|---|---------------|------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | | | | | | | |

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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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|----------|------------------|-------------------|---|----------|------------------|--|
| © Depth (ft) | Sample Type | Num | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 95 | | SB0049 | 0.9 | | Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; loose; 97% fine to medium sand; 3% gravel to 15mm; subrounded to rounded. Poorly graded SAND (SP); pinkish gray (5YR 7/2); dry; loose; 100% very fine to medium sand. 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. | | | Blow counts (97-98.5'): 30/50. Resumed drilling @ 1645. |
| <u>10</u> 5 | - | | | | 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 |) | | | | | | | |



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

Borehole ID: KAFB-106111

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|--------------------|------------------|------------------|-------------------|---|----------|----|--|---|
| 55 Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | 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 | 5 | | | | Silty SAND (SM); reddish brown (5YR 5/3); moist; loose; 55% very fine to fine sand; 35% silt; 10% clay; nonplastic. | 3111 | | | |
| <u>130</u> |) | | | | Poorly graded SAND (SP); reddish brown (5YR 5/4); moist; very loose; 100% medium to coarse sand. | | | - Bentonite Seal | |
| 135 | | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% medium to very coarse sand. | SP | | - Top of Filter Pack | |
| 140 | <u>)</u> - - | | | | 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 | 5 | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); moist; very loose; 100% fine to coarse sand. | | | | |
| 150 | | SB0050 SB0050 | | | Poorly graded SAND with Gravel (SP); pinkish gray (5YR 6/2); moist; dense; 85% medium to very coarse sand; 15% | | | | Blow counts (147-148.5'): 50/30/20. Blow counts (148.5-150'): Not Recorded. |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|--------|------------------|-------------------|--|------------------|---------------------|----------------------------|
| 15 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | gravel to 10mm; angular to rounded. Note: split spoon contained cemented fragments to 45mm. | SP | Bottom of Screen | |
| 155 | - | | | | Poorly graded GRAVEL with Sand (GP); moist; very loose; 70% gravel to 35mm; subrounded to rounded; 30% medium to very coarse sand. | GP | | |
| | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 185 | _ | | | | 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. Poorly graded SAND with Gravel (SP); reddish brown (5YR 5/4); moist; very | SP | | New 20' connection @ 1120. Resumed drilling @ 1125. |
| 190 | - | | | | loose; 80% medium to very coarse sand; 20% gravel to 10mm; subangular to rounded. No cuttings returned; casing fell too fast to collect sample. | | | |
| 195 | | 000054 | | | 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 | SP | - Bentonite Seal | Blow counts (197-198.5'): |
| 200 | | SB0051 | 0.0 | | Poorly graded GRAVEL with Sand (GP); moist; very dense; 60% gravel to 30mm; subrounded to rounded; 40% medium to coarse sand. | GP | | 50/50. New 20' connection @ 1140. Resumed drilling @ 1220. |
| <u>205</u> 210 | - | | | | Clayey SAND (SC); light yellowish brown (2.5YR 6/3); moist; medium dense; 80% fine to medium sand; 15% clay; 5% silt. | SC | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| Number | Headspace | Lithologic Log | Material Description 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. Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 70% sand; 30% gravel to 15mm; subangular. | U.S.C.S. | Well Diagram | Remarks |
|--------|-----------|-------------------|--|--|--|---|
| | | | yellowish brown (10YR 5/4); moist; very loose; 85% fine to coarse sand; 15% gravel to 20mm; subrounded to rounded. Poorly graded SAND with Gravel (SP); light brownish gray (10YR 6/2); moist; very loose; 70% sand; 30% gravel to | | | |
| | | | light brownish gray (10YR 6/2); moist; very loose; 70% sand; 30% gravel to | | | |
| | | | | | | |
| | | | 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 Se | New 20' connection @ 1225. Resumed drilling @ 1235. |
| | | | 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. | | | |
| | | | Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded. | | | |
| | | | 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 | |
| | | | | light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 15mm; angular to subrounded; gravel is pumice. Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded. Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); moist; very loose; 60% sand; 40% gravel to | light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 15mm; angular to subrounded; gravel is pumice. Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded. Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); moist; very loose; 60% sand; 40% gravel to | light brownish gray (10YR 6/2); moist; very loose; 85% fine to coarse sand; 15% gravel to 15mm; angular to subrounded; gravel is pumice. Well graded SAND with Gravel (SW); light gray (7.5YR 7/1); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to subrounded. Well graded SAND with Gravel (SW); light brownish gray (10YR 6/2); moist; very loose; 60% sand; 40% gravel to 20mm; subangular to rounded. |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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| | 500 | Junat | J. IX | 54100 | 10.25 Logged | <u> </u> | | , ou ye | |
|--------------|-------------|--------|------------------|-------------------|--|----------|----|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | _ | | | | 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 | | SB0052 | 0.7 | | 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. | | | | Blow counts (247-248.5'): 50/Not Recorded. Blow |
| 250 | | SB0052 | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very dense; 100% very fine to medium sand; trace gravel. | | | - Bottom of Screen | counts (248.5-250'): 60/Not Recorded. 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. | SP | | | |
| <u>260</u> | - | | | | Silty SAND (SM); reddish brown (5YR 5/4); moist; medium dense; 60% very fine to medium sand; 40% silt. | | | - Bentonite Seal | New 20' connection @ 1335. Resumed drilling @ 1340. |
| <u>265</u> | - | | | | Same as above (258 ft). | SM | | | |
| 270 | - | | | | | | | | |



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

Borehole ID: KAFB-106111

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|--------------|--------|------------------|-------------------|---|----------|------------------|---|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | _ | | | | 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. |
| - | - | | | | Poorly graded GRAVEL with Sand (GP); dry; medium dense; 60% gravel to 15mm; subangular to subrounded; 40% medium to very coarse sand. | | - Bentonite Seal | |
| <u>290</u> | - | | | | Poorly graded GRAVEL with Sand (GP); dry; medium dense; 50% gravel to 15mm; subangular to subrounded; 45% fine to very coarse sand; 5% silt. | GP | | |
| 295 | | SB0053 | 0.0 | | Well graded SAND with Gravel (SW); moist; medium dense; 60% sand; 40% gravel to 35mm; subrounded to rounded. | sw | | Blow counts (297-298.5') |
| 300 | \mathbb{H} | SB0053 | | | Poorly graded GRAVEL (GP); dry; very dense; 90% gravel to 25mm; angular to rounded; 10% medium to very coarse | GP | | 60/Not Recorded. Blow counts (298.5-300'): 67/Not Recorded. |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|-------------------|-------------|--------|------------------|-------------------|--|------------|------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| <u>305</u> 310 | - | | | | sand. Poorly graded GRAVEL with Sand (GP); dry; medium dense; 55% gravel to 25mm; subangular to rounded; 45% coarse to very coarse sand. | GP | | New 20' connection @ 1430. Resumed drilling @ 1435. |
| 315 | - | | | | 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 | | |
| 320 | - | | | | 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 | |
| 325 | - | | | | 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. |
| 330 | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; loose; 95% medium to coarse sand; 5% gravel to 4mm; subangular to subrounded. | SP | | |

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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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------------------|-------------|---------|------------------|-------------------|---|-----------|-----------|--|---|
| 65 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well | Diagram | Remarks |
| - - - 335 | | | | | 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 | |
| | | | | | 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 | |
| - | | | | • • ř•⁄ • | Poorly graded SAND (SP); brown (7.5YR 5/3); moist; loose; 95% fine to medium sand; 5% gravel to 10mm; | SP | | Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | New 10' connection @ 1455. Resumed drilling @ 1505. |
| - - <u>345</u> - | | | | | Subangular to rounded. 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 | | | Diaw counto (247.249.5) |
| - | <u> </u> | SB0054 | 0.0 | | Poorly graded SAND with Gravel (SP); dry; dense; 85% medium to coarse sand; | | | | Blow counts (347-348.5' 50/Not Recorded. |
| <u>350</u> - - | | | | | 15% gravel to 20mm; angular to rounded. | SP | | Bottom of Screen | New 10' connection @ 1525. |
| - <u>355</u> - - | | | | | Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); moist; loose; 85% sand; 15% gravel to 30mm; angular to rounded. | | | Bentonite Seal | |
| - _ <u>360</u> | | | | | | 300 | | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|------------------|-------------------------|--------|------------------|-------------------|--|---------------|------------------|---|
| 96 Depth (ft) | 1.0 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. |
| <u>365</u> | _ | | | | 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. | | | |
| <u>375</u> | _ | | | | Well graded SAND (SW); pinkish gray (5YR 6/2); moist; loose; 95% sand; 5% gravel to 15mm; subangular to rounded. | SW | - Bentonite Seal | |
| 380 | <u>)</u> - - - | | | | 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. |
| <u>385</u> | _ | | | | Well graded SAND with Gravel (SW); dry; dense; 85% sand; 15% gravel to 10mm; angular to rounded. | | | |
| 390 |) | | | | | | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------------------------|-------------|------------------|------------------|-------------------|--|----------|------------------|--|
| ର Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 100% medium sand. | SP | | |
| 395 | | | | | 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 | | |
| - | | | | | Clayey SAND (SC); light gray (10YR 7/1); moist; dense; 55% very fine to fine sand; 35% clay; 10% silt; low plasticity. | SC | | Blow counts (397-398.5'): |
| 400 | X | SB0055 SB0056 | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; dense; 100% fine to coarse sand. | | | 50/40. Blow counts (398.5-400'): 50/40. Resumed drilling @ |
| - - <u>405</u> - - | | | | | Same as above (398 ft). | | - Bentonite Seal | 1650. |
| _ 410 _ - | | | | | Same as above (398 ft). | SP | | |
| - 415 - - | | | | | Same as above (398 ft). | | | |
| 420 | | | | | | | | |



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

Borehole ID: KAFB-106111

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|--------------|-------------|--------|------------------|-------------------|--|----------------|----|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | _ | | | | 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. Blow count (447-448.5'): |
| 450 | | SB0057 | 0.0 | | Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand. | | | | 50/45. |



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

Borehole ID: KAFB-106111

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

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

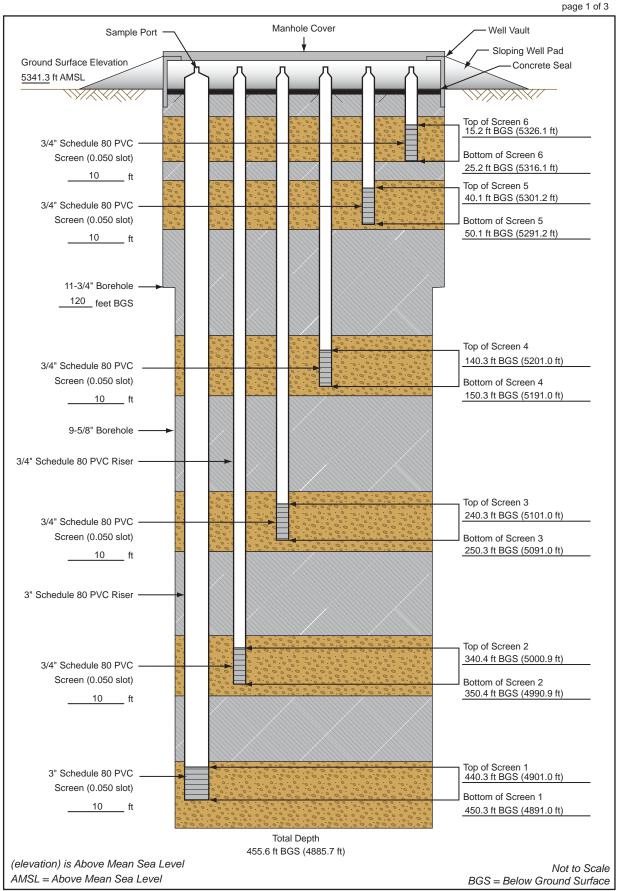
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Patrick Ostrye

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|---------------|-------------|----------|------------------|-------------------|--|----------|----------------------------|---|
| 05 Depth (ft) | | Number | Headspace PID | Lithologic Loa | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); pinkish gray (7.5YR 6/2); moist; dense; 100% fine to medium sand. | | - Bottom of Screen | New 10' connection @ 0810. Resumed drilling @ 0815. |
| 455 | | | | | Same as above (450 ft). | SP | - Bottom of Filter Pack | |
| | | | | | Well graded SAND (SW); brown (7.5YF 4/3); moist; medium dense; 100% sand | SW | | |
| 460 |) - - | | | | 1 | | | Total depth = 460 ft. Reached @ 0820 on 3/3/11. |
| 465 | - | | | | | | | Water added during drilling (gallons) = 0 |
| | - | | | | | | | Water added during construction (gallons) = 320 |
| <u>470</u> | | | | | | | | |
| 475 | - | | | | | | | |
| 480 | | | | | | | | |

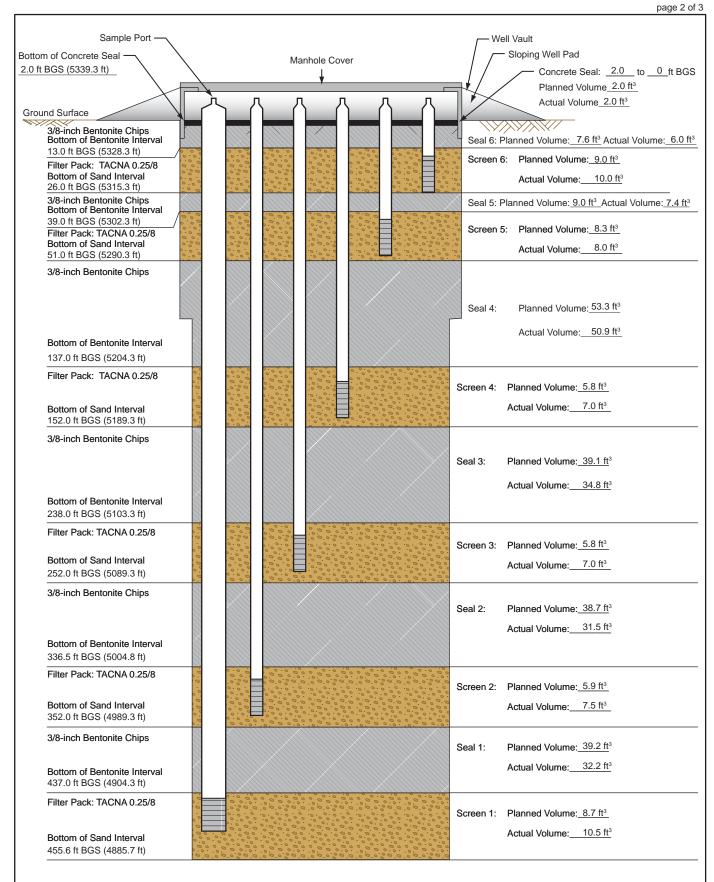
Nested Soil Vapor Well Completion Diagram for KAFB-106111

Installation Start Date/Time: <u>3/3/2011 @ 10:35</u> Installation End Date/Time: <u>3/4/2011 @ 16:25</u>



140705_CA010020_SV_KAFB.106111 (a)

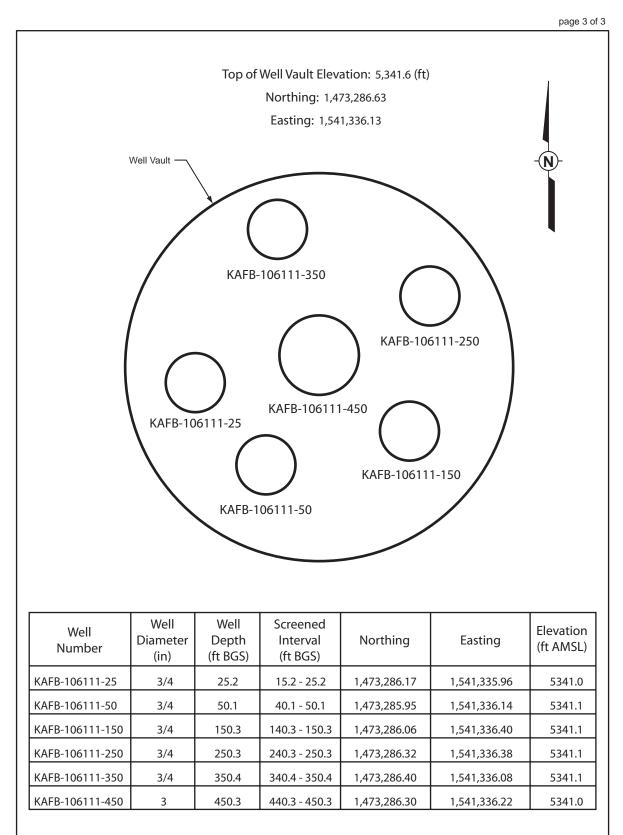
Nested Soil Vapor Well Completion Diagram for KAFB-106111



(elevation) is Above Mean Sea Level All Materials Placed with Tremie Pipe Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106111 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106111



140705_CA010020_SV_Map View_106111.ai

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APPENDIX D-1

KAFB-106112 Final Well Report

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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

Borehole ID: KAFB-106112

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

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

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

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|------------|-------------|----------|------------------|-------------------|---|---------------|--|--|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | 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 | - Bentonite Seal | 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. | | Pack - 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. | | - Bottom of Screen | |
| 30 | | SB0060 | 0.0 | | | | - Bentonite Seal | Blow counts (28.5-30'): 9/12. |



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

Borehole ID: KAFB-106112

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

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

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

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|--------------|-----------------------|------------------|------------------|-------------------|---|----------|----|--|---|
| S Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 35 | - | | | | 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. Same as above (30 ft); 85% silt; 15% very fine to coarse sand; trace fine | | | - Bentonite Seal | Resumed drilling @ 1615. |
| 4(| | SB0061 | 0.0 | | gravel to 6mm. Sandy SILT (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 60% silt; | | | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 | Blow counts (38.5-40'): 8/15. Kelly down @ 1622. Resumed drilling @ |
| 45 | - | | | | 40% very fine to very coarse sand; trace fine gravel to 7mm. Same as above (40 ft); trace clay | ML | | Slot Screen | 1633. |
| 50 | | SB0062 SB0063 | | | nodules. Same as above (40 ft); very stiff. | | | - Bottom of Screen | Blow counts (48.5-50'): 12/22. Blow counts (50-51.5'): 12/23. Kelly down @ 1638. |
| 55 | | 360003 | 0.0 | | Same as above (40 ft). | | | - Bentonite Seal | Resumed drilling @ 1655. |
| 60 | - - - -) | | | | | | | | |

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Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 2/24/2011 Date Completed: 3/2/2011

Y Coordinate: 1473505.07

Ground Elevation AMSL (ft): 5347.6

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106112

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

| | | e: 1473 e: 1541 | | | a: Air Rotary Casing F lason Tarbert | Page 3 of 16 |
|-----------------------------|--------|--------------------------------|--|----------|---|--|
| 9 Depth (ft) Sample Type | Number | Headspace PID Lithologic | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | SILT with Sand (ML); brown (7.5YR 5 dry; very stiff; low plasticity; 80% silt; 20% very fine to medium sand; trace gravel to 1.5cm. | 5/4); | | 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. | 5 | | 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 gravito 5mm. | vel | | |
| 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|--------------|-------------|--------|------------------|-------------------|--|----------------|-----|-------------------|---|
| © Denth (ft) | Sample Type | Numt | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Wel | l Diagram | Remarks |
| | _ | | | | SILT with Sand (ML); strong brown (7.5YR 5/6); dry; hard; nonplastic; 85% silt; 15% very fine to coarse sand to 3mm. | | | | |
| 9 | 5 | | | | Same as above (90 ft). | ML | | | |
| <u>10</u> | | 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. |
| 10 | 5 | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; loose; 90% medium sand; 5% coarse sand; trace gravel to 6mm; rounded; 5% silt. | SP | - | | |
| 11 | <u> </u> | | | | 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 | | | |
| <u>11</u> | 5 | | | | 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 | |
| 12 | | | | | | | | -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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|-------------------|------------------|--------|------------------|-------------------|--|-----------|----|--|---|
| 12 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | 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). | | | - Bentonite Seal | |
| <u>130</u> | - | | | | 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. | ML | | | |
| 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). | | - | - Top of Filter | |
| | $\left \right $ | | | | | CL | | 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. |
| <u>145</u> 150 | | SB0065 | 0.0 | | 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 | | | Blow counts (147-148.5'): 11/15. |



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

Borehole ID: KAFB-106112

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

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

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

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|-------------------|-------------|-------------------------|------------------|-------------------|---|-----------|------------------|---|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| | - | | | | 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 | Screen | Kelly down @ 1250. Resumed drilling @ 1302. | | |
| 155 | - | | | | SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; nonplastic; 80% silt; 20% very fine to medium sand to 2mm. | | | | | |
| <u>160</u> 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 | - | | | <u>• • • • Þ</u> | 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 | | | |
| | - | | | | 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. | | | | | |
| 175 | - | | | | Same as above (170 ft); 90% very fine to very coarse sand; trace fine gravel; 10% silt. | SW- SM | | | | |
| 180 | | | | | | | | | | |



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

Borehole ID: KAFB-106112

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

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

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

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| ~ ~ ~ | Coordinate: 1541550.70 Logged by: Sason Taibert | | | | | | | | |
|--------------|---|--------|------------------|-------------------|--|----------|------------------|---|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| | _ | | | | 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. | | | | |
| <u>190</u> | - | | | | 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 | | | |



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

Borehole ID: KAFB-106112

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

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

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

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|-------------------|-------------|--------|------------------|-------------------|---|----------|-------------------------|---|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | - | | | | rounded; 5% silt. | SW | | |
| 220 | - | | | | 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. | | - Bentonite Seal | Kelly down @ 1349. Resumed drilling @ 1357. |
| <u>225</u> 230 | - | | | | Same as above (220 ft); coarser gravel to 3cm. | SM | | |
| | - | | | | 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. | | | |
| 235 | | | | | Same as above (230 ft); grayish brown (10YR 5/2); predominantly pumice. | SW | - Top of Filter Pack | |
| 240 | | | | | | | | |



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

Borehole ID: KAFB-106112

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

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

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

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|-----------------------------|--------|------------------|-------------------|---|----------|----|---|---|
| B Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | 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. | | | Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1401. |
| 245 | SB0067 | 3.4 | | Same as above (240 ft); loose; predominantly lithics. | SW | | | Blow counts (247-248.5') 12/43. |
| 2 <u>50</u> | | | | Lean CLAY (CL); brown (7.5YR 5/3); dry; hard; low plasticity; 100% clay. | CL | | -Bottom of Screen | Kelly down @ 1410. |
| 2 <u>255</u> | | | | SILT (ML); brown (7.5YR 5/3); moist; hard; low plasticity; 60% silt; 40% clay. Same as above (252 ft). | | | | |
| - 260 - - - | | | | Same as above (252 ft); 90% silt; 10% very fine to medium sand. | ML | | - 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 | | | |

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Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 2/24/2011 Date Completed: 3/2/2011

Y Coordinate: 1473505.07

Ground Elevation AMSL (ft): 5347.6

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Borehole ID: KAFB-106112

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Flush mount

> Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|---------|------------------|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown (10Y 5/3); dry; very loose; 90% fine to mediu sand; 10% coarse sand to 2mm; subrounded; trace fines. | R im | | | |
| 275 | - | | | | Same as above (270 ft); 90% fine sand 10% medium sand. | I; 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 | |
| <u>290</u> | - | | | | Well graded SAND (SW); brown (7.5Y) 5/2); dry; loose; 95% very fine to very coarse sand; 5% fine gravel to 8mm; subrounded. | ج sw | - | | |
| 295 | | SB0068 | 0.5 | | Poorly graded SAND (SP); brown (10Y 5/3); dry; very loose; 85% medium san to 2mm; 15% very fine to fine sand; rounded. | | - | | Blow counts (297-298.5'): 3/Not recorded (for 18"). |
| 300 | | | | | | | | | |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 60 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| <u>305</u> | - | | | | Same as above (300 ft). | | | |
| <u>310</u> | - | | | | 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 | |
| <u>320</u> | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106112

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

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

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

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|------------------------------|---------|------------------|-------------------|--|-----------|----|--|--|
| 00 Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | 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 | |
| <u>340</u> | | | | 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. Well graded SAND (SW); yellowish brown (10YR 5/4); dry; loose; 100% very | CL | | | |
| 345 | | | | fine to coarse sand to 4mm; rounded. | sw | | | Blow counts (347-348.5' |
| -/_ 350 | SB0069 | 0.5 | | | | | - Bottom of Screen | 26/50. |
| - | | | | 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. |
| <u>355</u> - - - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106112

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

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

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

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|--------------|-------------|--------|------------------|-------------------|--|----------|----|------------------|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 365 | - | | | | 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. |
| | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; very dense; 90% medium sand; 5% coarse sand to 2.5mm; rounded; 5% fines. | | | | Bit packed off @ 1708. Resumed drilling @ |
| <u>370</u> | - | | | | Same as above (365 ft); trace fine gravel to 6mm. | SP | | | 1709. End of day @ 1714 on 2/23/11. Resumed drilling @ 0738 on 2/24/11. |
| <u>375</u> | - | | | | 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 | |
| <u>380</u> | - | | | | Same as above (375 ft); coarser. | SW | | | Kelly down @ 0746. Resumed drilling @ 0752. |
| <u>385</u> | - | | | | Same as above (375 ft). | | | | |
| 390 | | | | | | | | | |



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

Borehole ID: KAFB-106112

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

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

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

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| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | 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. | | | | |
| - | | | | | Same as above (390 ft); trace gravel to 1.1cm. | | | | Blow counts (397-398.5'): |
| 400 | \mathbb{H} | SB0070 SB1742 | | | Same as above (390 ft); no gravel. | | | | 6/Not Recorded. Blow counts (398.5-400'): 2/35. 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 | | | | | | | | | |

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Project Number: 140705

Date Started: 2/22/2011

Date TD Reached: 2/24/2011 Date Completed: 3/2/2011

Y Coordinate: 1473505.07

X Coordinate: 1541936.76

Ground Elevation AMSL (ft): 5347.6

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106112

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

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

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

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|--------------|-------------|---------|------------------|-------------------|--|---------------|--------------|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | 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. | | | - Bentonite Seal | |
| 430 | - | | | | Same as above (420 ft); 95% very fine to very coarse sand; 5% fine gravel to 2cm. | SW | | | |
| 435 | - | | | | Same as above (420 ft); grading finer; very fine to coarse sand to 3mm; no gravel. | | in incluse i | - Top of Filter | |
| 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. | | | Pack Top of 3" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1103. Resumed drilling @ 1108. |
| 445 | | SB0071 | 25.3 | | 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 | | - Bottom of | Blow counts (447-478.5') 33/50. |

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| 5 | a | W |

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

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106112

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

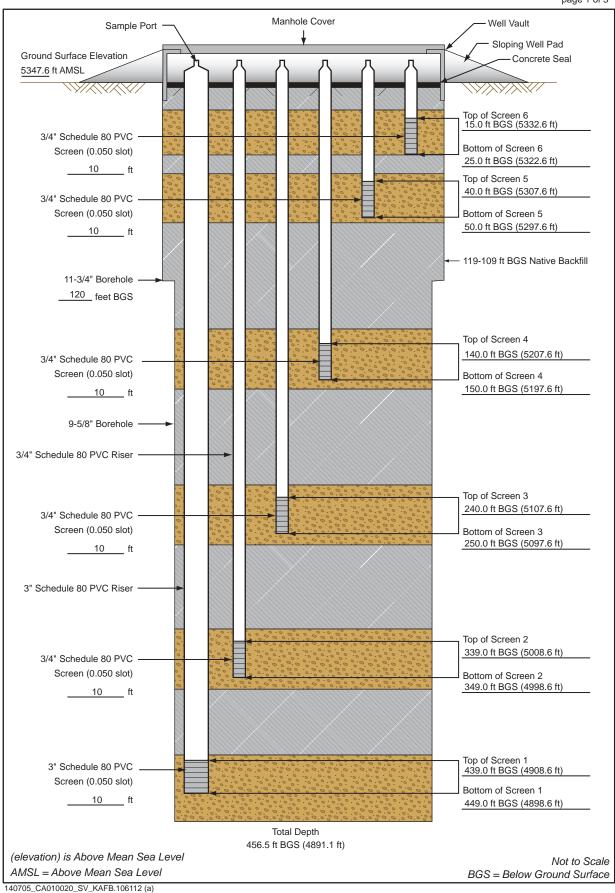
Groundwater Levels BGS (ft): \bigtriangledown At Time of Drilling: N/A At End of Drilling: N/A ▼ After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

| Y Coor X Coor | dinate | e: 14 | 7350 | 5.ÒŹ Drilli | ng Meth | od: | tor: WDC Drilling Air Rotary Casing H son Tarbert | ammer Page 16 of 16 |
|-----------------------------|--------|------------------|-------------------|---|----------|-----|---|---|
| B Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| 455 | | | | Silty SAND (SM); brown (7.5YR 4/4); moist; very dense; 80% medium sand 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 (10) 5/3); dry; very dense; 100% very fine to medium sand to 1mm; subrounded. | o SP | žQ. | - Bottom of | |
| | | | | Well graded SAND (SW); brown (10YI 5/3); dry; very dense; 100% very fine to very coarse sand to 4mm; rounded. | o SW | | A Native Backfill | |
| 460 | | | | | | | | Total depth @ 460 ft. Reached @ 1200 on 2/24/11. |
| 465 | | | | | | | | Water added during drilling (gallons) = 0 |
| | | | | | | | | Water added during construction (gallons) = 230 |
| 470 | | | | | | | | Kelly down: TD the joint and ready to make new connection. |
| 475 | | | | | | | | |
| 480 | | | | | | | | |

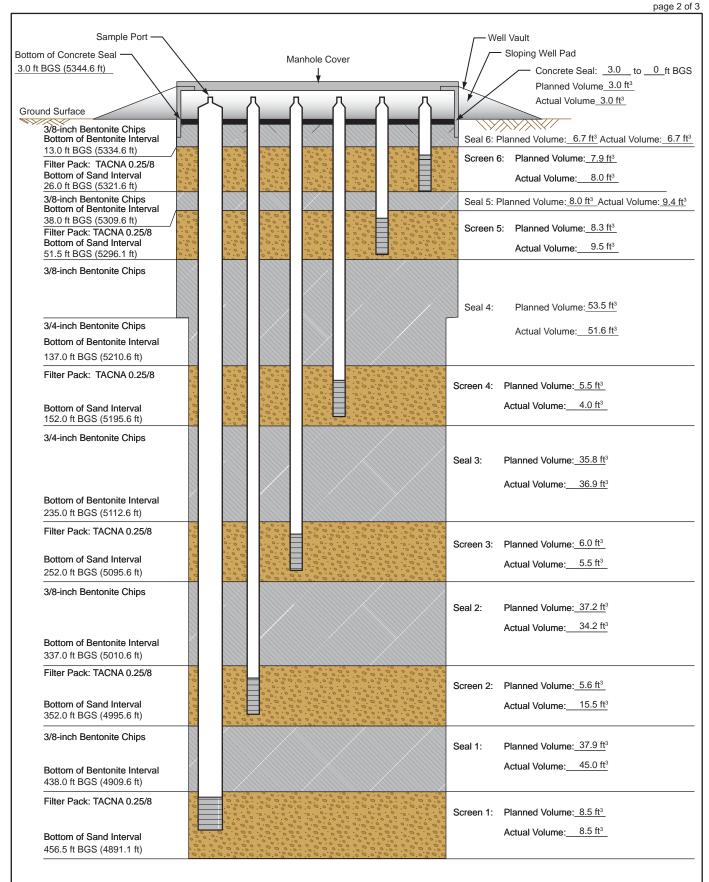
Nested Soil Vapor Well Completion Diagram for KAFB-106112

Installation Start Date/Time: 3/1/2011 @ 8:00 Installation End Date/Time: 3/2/2011 @ 16:45



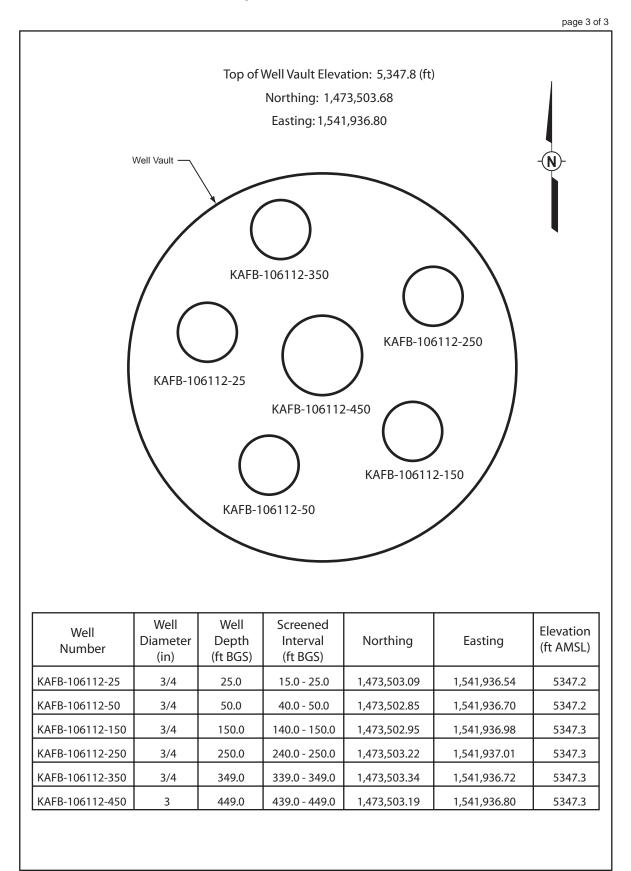
page 1 of 3

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



140705_CA010020_SV_Map View_106112.ai

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APPENDIX D-1

KAFB-106113 Final Well Report

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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

Borehole ID: KAFB-106113

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

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

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

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| | 500 | ordinat | с. I. | J4200 | 14.59 Logged | Б у. Ц | shan Lucero | 5 |
|------------|-------------|------------------|------------------|-------------------|--|---------------|--|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | _ | | | | 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. Same as above (0 ft); no odor. | SC | - Bentonite Seal | Hand augered. Spud @ 1454 on 01/18/11. |
| 10 | | SB0072 SB0080 | | | 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. Same as above (10 ft); no odor. | SP- SM | Pack - 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. Hard to drive casing ~14-15 ft. |
| 20 | | SB0073 SB0073 | | | Clayey SAND (SC); reddish brown (5YR 4/4); moist; very dense; 60% fine sand; 40% clay with minor silt; no odor. | | - Bottom of Screen | Kelly down @ 1551. New connection @ 1628 Resumed drilling @1634 Blow counts (20-21.5'): 50/Not Recorded. Blow counts (21.5-23'): 50 Not Recorded. |
| 25 30 | _ | | | | Same as above (20 ft); no odor. | SC | - Bentonite Seal | Kelly down @ 1640. New connection @ 1716. End of 01/18/11. |



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

Borehole ID: KAFB-106113

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

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

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

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| | coordinate | e: 1 | 54200 | 4.39 Logged | srian Lucero | | |
|---------------------|-----------------------|------------------|-------------------|---|--------------|---|---|
| ଝ Depth (ft) | Sample Type Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagrar | m Remarks |
| 35 | 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 | Resumed drilling @ 0747 on 01/19/11. Blow counts (30-31.5'): 48/50. |
| | | | | 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 Fil Pack | 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 PVC 0.05 Slot Scre | Resumed drilling @ |
| - | | | | Same as above (40 ft); no odor. | SC | | Hard to drive casing ~45'-47'. Kelly down @ 0840. |
| 50 | SB0076 | | | Sandy lean CLAY (CL); reddish brown (5YR 4/4); moist; hard; low to medium plasticity; 70% clay with silt; 30% fine sand; no odor. | CL | Bottom of Screen | |
| <u>55</u> - - | | | | Clayey SAND (SC); reddish brown (5YR 4/4); moist; dense; 70% fine to medium sand; 30% clay with minor silt; no odor. | sc | - Bentonite | e Seal |
| 60 | | | | | | | Kelly down @ 0922. |



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

Borehole ID: KAFB-106113

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

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

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

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| | 500 | aniai | <u>.</u> | 54200 | | | | |
|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| 영 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| 65 | - | | | | SILT with Sand (ML); reddish brown (2.5YR 5/4); moist; very dense; 75% silt with minor clay; 25% fine sand; no odor. | | | |
| 70 | | | | | Same as above (65 ft); 25% fine to coarse sand; subrounded; no odor. | ML | | |
| 75 | - | | | | Same as above (65 ft); with trace gravel to 1cm; no odor. | | - Bentonite Seal | |
| 80 | - | | | | 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 | | Kelly down @ 1006. New connection @ 1021. Resumed drilling @ 1023. |
| 85 | | | | | SILT with Sand (ML); red (2.5YR 4/6); moist; stiff; 75% silt with minor clay; 25% fine sand; no odor. | | | |
| 90 | 1 | | | | | | | |



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

Borehole ID: KAFB-106113

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

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

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

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| ~ ~ ~ | 500 | | C. I. | J=200 | | | | |
|--------------|-------------|------------------|------------------|-------------------|--|----------|------------------|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 95 | - | | | | SILT with Sand (ML); red (2.5YR 4/6); moist; stiff; 80% silt with minor clay; 20% fine sand; no odor. Same as above (90 ft); slight increase in clay; no odor. | ML | | |
| 100 | | SB0077 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 | | Blow counts (98.5-100'): 14/50. Blow counts (100-101.5'): 17/50. Kelly down @ 1031 on 01/19/11. New connection @ 1108 |
| 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 | on 01/20/11. Resumed drilling @ 1111. |
| 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|---------------|-------------|----------|------------------|-------------------|--|----------|---|--|--|
| 12 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| | - | | | | 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 | | | |
| 140 | - | | | | Same as above (133 ft); no odor. | | | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 | Kelly down @ 1211. New connection @ 1218. |
| 145 | - | | | | Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; 95% fine sand; 5% silt; no odor. | | | Slot Screen | Resumed drilling @ 1220. Likely top of Santa Fe Group. |
| | | | | | Same as above (141 ft); no odor. | SP | | | Blow counts (148.5-150'): |
| 150 | | SB0078 | 0.0 | | Well graded SAND (SW); light reddish | SW | | | 9/24. Kelly down @1232. End |



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

Borehole ID: KAFB-106113

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

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

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|---------------------------|------------------|--------------------------|------------------|-------------------|---|-----------|------------------|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | $\left(\right)$ | SB0078- MS SB0078- | | | gray (2.5YR 7/1); dry; loose; 95% fine to coarse sand; subrounded; trace fine gravel to 1cm; subrounded; 5% silt; no odor. | CL | Screen | of 01/20/11. New connection @ 0819 on 01/21/11. Resumed drilling @ 0820. Blow |
| - 155 - - - | | MSD | | | Sandy lean CLAY (CL); reddish brown (5YR 5/4); moist; stiff; low plasticity; 60% clay with minor silt; 40% fine sand; no odor. SILT with Sand (ML); red (2.5YR 4/6); dry to moist; stiff; 85% silt; 15% fine sand; no odor. | ML | | counts (150-151.5'): 13/50. Blow counts (151.5-153'): 18/50. |
| - 160 - | - | | | | Poorly graded SAND with Silt (SP-SM); light reddish gray (2.5YR 7/1); dry to | | | Kelly down @ 0827. New connection @ 0841. Resumed drilling @ |
| - | - | | | | moist; loose; 90% fine sand; 10% silt; no odor. | | | 0842. |
| 165 | | | | | Same as above (160 ft); minor gravel from discharge at 167 ft; no odor. | | - Bentonite Seal | |
| - <u>170</u> - | | | | | Same as above (160 ft); no odor. | SP- SM | | |
| - <u>175</u> - - | | | | | Same as above (160 ft); reddish brown (2.5YR 5/4); no odor. | | | |
| 180 | - | | | | | | | Kelly down @ 0853. |



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

Borehole ID: KAFB-106113

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

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

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

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| | Coordinate. 1942004.59 Logged By. Dhan Eddero | | | | | | | | | |
|--------------|---|--------|------------------|-------------------|---|----------|-------------|--|--|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagra | am Remarks | | |
| | - | | | | 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 | | | | |
| <u>190</u> | - | | | | 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. | | | | | |
| <u>195</u> | - | | | | Same as above (190 ft); no odor. | | - Bentoni | te Seal | | |
| | | 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 | | | | | | | | | | |

| S | L | | | | | Bore | eho | le IC |): KAFB- | 106113 |
|---|--------------|----------------------------|------------------|-------------------|---|---|-------------------|----------|--|--|
| Pro Pro | ojec Djec | t Loca | ation ne: k | : KÁI (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount | | | | |
| Da [:] Da | te S te T | Started | d: 1/ ache | 18/20 d: 2/ | 11 5/2011 | ∑ At⊺ ▼ At I | Time of End of | | | |
| YC | Cool | d Elev rdinat rdinat | e: 14 | 47306 | | | Metho | d: Air I | WDC Drilling Rotary Casing H ucero | ammer Page 8 of 16 |
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | W | 'ell Diagram | Remarks |
| | - | | | | Well graded SAND (SW); light re brown (2.5YR 6/3); dry to moist; 90% fine to coarse sand; subrou subangular; 10% fine gravel to 1 subrounded; no odor. Pumice | loose; nded to | SW | | | |
| - 215 - - - 220 - - - - - - - - - - - - - - - | | | | | Clasts/fragments at ~211 ft. Well graded GRAVEL with Sand light reddish brown (2.5YR 6/3); moist; loose; 85% fine to coarse to 4cm; subrounded; 15% fine to sand; subrounded; no odor. Same as above (213 ft); no odor | dry to gravel coarse | GW | | - Bentonite Seal | Color change may be HC staining. Kelly down @ 1127. New connection @ 1219. Resumed drilling @ 1220. |
| 230 | | | | | Well graded SAND (SW); light re gray (2.5YR 7/1); dry to moist; lo 100% fine to coarse sand; subro to subangular; trace fine gravel to no odor. Pumice noted. Same as above (225 ft); no odor Same as above (225 ft); no odor | ose; unded o 1cm; | SW | | - Top of Filter Pack | |
| | | | | | | | | | | Kelly down @ 1241. |

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/25/11 15:48 - Z\KAFB BFF\GINT\KAFB_PROJECT\KAFB_BFF.GPJ



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

Borehole ID: KAFB-106113

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

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

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

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|--------------------------------|-------------|--------|------------------|-------------------|--|---------------|----|---|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - - - 245 - | | | | | 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. Well graded SAND with Gravel (SW); light reddish gray (2.5YR 7/1); dry; loose; | SW | | Schedule 80 PVC 0.050 Slot Screen | New connection @1250. Resumed drilling @ 1251. |
| - - <u>250</u> - - | X | SB0081 | 214.0 | | 80% fine to coarse sand; subrounded to subangular; 20% fine to coarse gravel to 4cm; subrounded; no odor. Same as above (245 ft); no odor. SILT (ML); reddish brown (5YR 4/3); dry to moist; stiff; 100% silt; no odor. | | | - Bottom of Screen | Blow counts (248.5-250'): 27/50. Kelly down @1304 on 01/21/11. 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 | ML | | | unning @1144. |
| - <u>260</u> - | | | | | to moist; stiff; 80% silt; 20% clay; no odor. Same as above (257 ft); no odor. | | | - Bentonite Seal | Kelly down @ 1155. 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 | | | |



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

Borehole ID: KAFB-106113

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

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

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

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| | 200 | rdinat | e: 1 | 54200 | 04.39 Logged | Brian Lucero | Page 10 of 16 | |
|---------------|------------------|--------|------------------|-------------------|--|--------------|---------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | n Remarks |
| 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 | | |
| | - | | | | 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. |
| 280 | $\left \right $ | | | | Poorly graded SAND (SP); light reddish | SP | | New connection @ 1247. |
| | - | | | | 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 | SW | | Resumed drilling @ 1251. |
| 285 | | | | | gray (2.5YR 7/1); dry; loose; 95% fine to coarse sand; angular to subrounded; 5% silt; no odor. | GM | - Bentonite S | Casing won't drive below Seal 285 ft. |
| 290 | - | | | | 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. Lean CLAY (CL); light reddish brown (5YR 6/3); dry; very stiff; 90% clay (as nodules); 10% silt; no odor. | CL | | Below 285 ft, clay discharged as large, abraded nodules. |
| 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. |



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

Borehole ID: KAFB-106113

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

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

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

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| ~ ~ ~ | 500 | Juliat | . . | J-200 | | <i>су.</i> с | | |
|---------------|-------------|------------------|------------------|-------------------|---|--------------|------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 305 | | SB0082 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); | 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 (201.5, 2021): 27/50. |
| - | - | | | | blowing fines out during slow drilling. 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. | | | (301.5-303'): 27/50. New connection @ 1049 Resumed drilling @1058 |
| <u>310</u> | | | | | Same as above (305 ft); no odor. | SW | | |
| <u>315</u> | - | | | | 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 | | - Bentonite Seal | |
| <u>320</u> | - | | | | mineral clasts (granite, dacite, feldspar, quartzite). Same as above (315 ft); sand is fine to coarse; no odor. Well graded SAND (SW); reddish brown (5YR 5/4); dry to moist; loose; 95% fine | | | Kelly down @ 1116. New connection @ 1126 Resumed drilling @1127 |
| 325 | - | | | | to coarse sand; subangular; 5% silt; no odor. Same as above (322 ft); trace gravel to 3cm; no odor. | SW | | |
| 330 | | | | | | | | |



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

Borehole ID: KAFB-106113

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

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

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

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| | | annac | 0 | 5120 | Logged | | | 0 | |
|--------------------------------|------------------|------------------|------------------|-------------------|--|-----------|----------------------|---|--|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Loa | Material Description | U.S.C.S. | Well [| Diagram | Remarks |
| - | | | | | 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. | | - В | Bentonite Seal | |
| 335 - - | | | | | Same as above (330 ft); no odor. | SW | | op of Filter Pack | |
| - <u>340</u> - - - | | | | | Same as above (330 ft); 95% sand; 5% gravel; no odor; higher percentage of fine to medium sand. | | S | op of 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1147. New connection @ 1157. Resumed drilling @ 1158. |
| <u>345</u> - - | | | | | 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 | | | Blow counts (348.5-350'): |
| <u>350</u> - - | $\left(\right)$ | SB0083 SB0083 | 0.1 | | 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. | | Fig. 19 and the HILL | Bottom of Screen | 21/50. Blow counts: (350-351.5'): 27/50. Kelly down @ 1216. New connection @ 1242. Resumed drilling @1243. |
| 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 | - В | Bentonite Seal | Hammer stopped firing @ 1301, stopped advancing. Resumed advancing @ 1325. Stopped at ~357 ft @ 1335. Resumed |
| 360 | | | | | - - - - | | | | attempting to advance @ |



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

Borehole ID: KAFB-106113

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

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

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

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| ~ | 000 | iuiiai | | J-200 | | Dy. 1 | | |
|-------------------|-------------|--------|------------------|-------------------|---|----------|------------------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 365 | - | | | | Poorly graded SAND (SP); light reddish gray (2.5YR 7/1); dry; loose; 95% very fine to fine sand; 5% silt; no odor. Same as above (360 ft); trace medium to coarse sand; subangular; no odor. | SP | | 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. |
| <u>370</u> | - | | | | 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. | | | |
| <u>375</u> 380 | - | | | | Same as above (370 ft); no odor; gravel from discharge below 375 ft; chert gravel noted. | SW | - Bentonite Seal | Kelly down @ 0930. |
| 385 | - | | | | 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. | | | New connection @ 0943. Resumed drilling @ 0944. |
| 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 | | |



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

Borehole ID: KAFB-106113

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

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

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

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| ΧC | X Coordinate: 1542004.39 Logged By. Bhan Lucero | | | | | | | | |
|---------------------------|---|------------------|--|--|--|--------------------------------------|------------------|--|--|
| 66 Depth (ft) | Sample Type | Number | Headspace PID Lithologic Log Material Descript | | Material Description | ທ່ O. ທ່ D. Well Diagram | | Remarks | |
| - - - 395 | | | | | 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 | | | |
| - - - | | | | | 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. | | | Blow counts (398.5-400'): | |
| <u>400</u> - - | | SB0084 SB0084 | 9.9 | | Same as above (395 ft); no odor. | SW | | 6/NR. Blow counts: (400-401.5'): 9/50. Kelly down @ 1002. New connection @ 1327. Resumed drilling @ 1335. | |
| - 405 - - | | | | | Same as above (395 ft); no odor. | | - Bentonite Seal | | |
| - <u>+10</u> - - | | | | | 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. | | | | |
| 4 <u>15</u> - - | | | | | Same as above (410 ft); 95% very fine to fine sand; trace medium to coarse sand; subangular to subrounded; 5% silt; no odor. | SP | | | |
| - 420 | | | | | | | | Kelly down @ 1356. | |



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

Borehole ID: KAFB-106113

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

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

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

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| | Coordinate: 1542004.39 Logged By. Bhan Lucero | | | | | | | | |
|---------------------------|---|---|-----|-------------------|---|-----------|--------------|--|---|
| 5 Depth (ft) | Sample Type | Sample Type Number Headspace PID | | Lithologic Log | Material Description | | Well Diagram | | Remarks |
| 425 | | | | | 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. |
| 430 | | | | | 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 | | - Bentonite Seal | The interval from 425 ft to 435 ft consists of interbedded fine to coarse sands and fine to coarse gravels. |
| - | | | | | 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. | | | | |
| <u>435</u> - - | - | | | | Same as above (430 ft); no odor. | | | - Top of Filter Pack | |
| <u>440</u> - - | | | | | 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. |
| - <u>445</u> - - | | | | | Same as above (430 ft); no odor; gravel lense at 447 ft. | | | | |
| 450 | X | 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): \Box At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

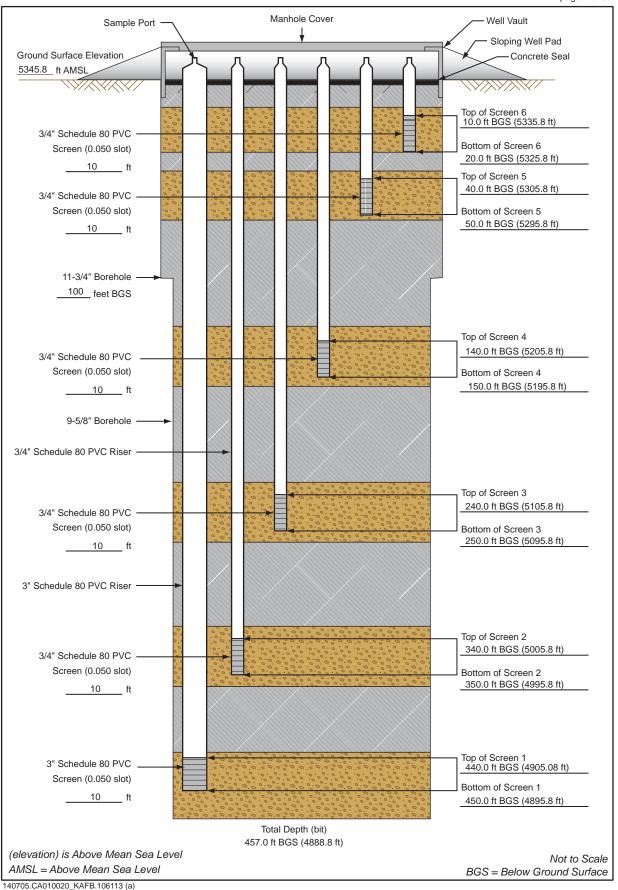
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| ~ ~ ~ | Coordinate: 1542004.39 Logged By. Bhan Lucero | | | | | | | |
|--------------|---|--------|------------------|-------------------|--|----------|--------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | ΝΛ | 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 | Screen | Blow counts (450-451.5): 48/50. |
| 460 | - | | | <u>.**.1</u> | | | | Total depth = 457 ft. Reached @ 1540 on 2/8/11. Water added during drilling = 0 |
| 465 | - | | | | | | | Water added during construction = Not Recorded Spud: started drilling from surface. |
| 470 | - | | | | | | | Kelly down: TD the joint and ready to make new connection. |
| 475 | - | | | | | | | |
| 480 | - | | | | | | | |

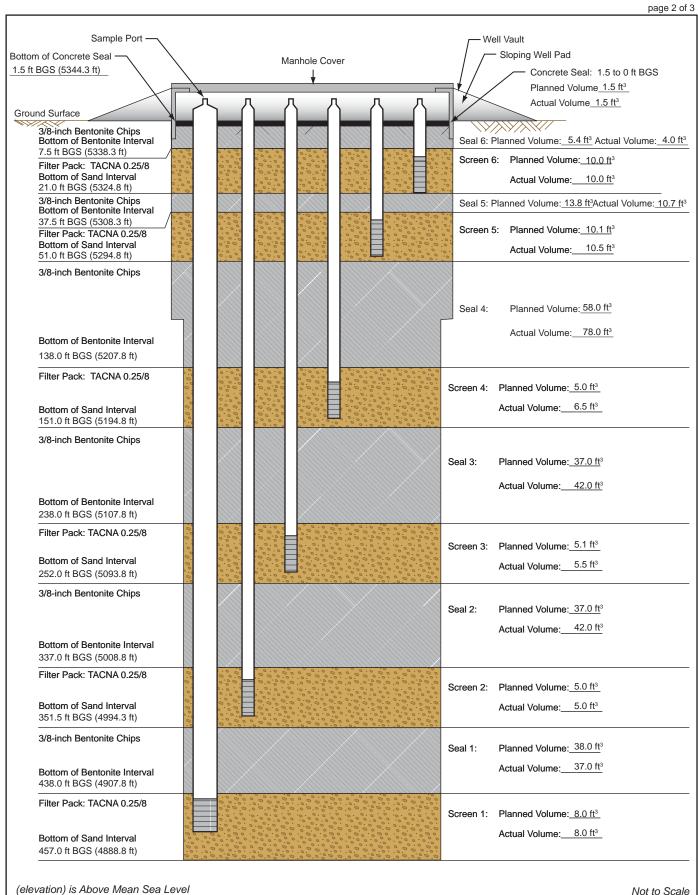
Nested Soil Vapor Well Completion Diagram for KAFB-106113

Installation Start Date/Time: 2/5/2011 @ 08:08 Installation End Date/Time: 2/8/2011 @ 10:51





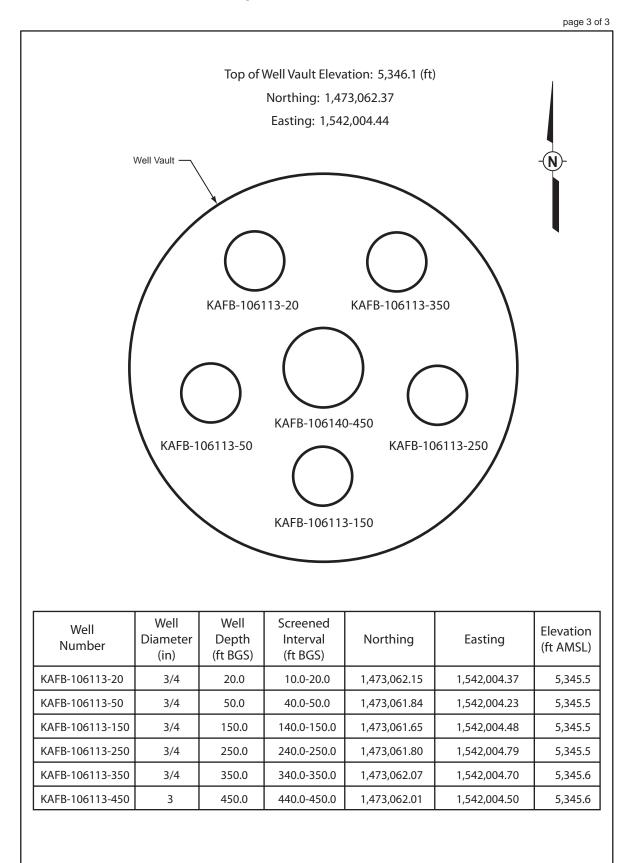
Nested Soil Vapor Well Completion Diagram for KAFB-106113



All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106113



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APPENDIX D-1

KAFB-106114 Final Well Report

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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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | Junat | C. IV | | Logged | - Dy. 7 | | |
|-------------------|-------------|--------|------------------|-------------------|--|----------|---|--|
| ⊖ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. | | Derterite Geel | Began drilling @ 1415 on 2/20/11. |
| | 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 | |
| | | 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. |
| | | | | | Same as above (20 ft); less clay; more silt; no odor. | CL | - Bottom of Screen | |
| 30 | | SB0088 | 0.2 | | | | - Bentonite Seal | Blow counts (29-30.5'): |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | Sooruma | | | Logged | , | - | | |
|---------------|-----------------------|------------------|-------------------|--|-----------|----|--|---|
| ଟି Depth (ft) | Sample Type Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | 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 | |
| 40 | SB0090 | 0.3 | | Sandy Lean CLAY (CL); red (2.5YR 4/6); dry; stiff; 65% clay; 30% sand; 5% gravel. | | | Pack - 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 | |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | | | | | Solution Cogged By. Aller Willindle | | | | | |
|--------------|-----------------------------------|--------|--|------------------|-------------------|---|----------|------------------|--|--|--|
| 0 Denth (ft) | Sample Type | Number | | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| 6 | <u>5</u> <u>0</u> <u>55</u> | | | | | SILT (ML); red (2.5YR 4/8); moist; soft; 70% silt; 30% clay. Same as above (60 ft). Same as above (60 ft); gravel fragments at 72'. | ML | - Bentonite Seal | New 10' connection @ 1625. New 20' connection @ 1645. | | |
| 8 | 5 | | | | | Lean CLAY (CL); yellowish red (5YR 5/6); dry; stiff; non to low plasticity; 55% clay; 40% silt; 5% sand; no odor. Same as above (75 ft). Same as above (75 ft); reddish brown (5YR 4/3); hard. | CL | | | | |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | 500 | ordinate | J. I. | 54173 | 16.70 Logged | | | |
|--------------|-------------|----------|------------------|-------------------|--|----------|------------------|---|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 95 | | | | | Sandy lean CLAY (CL); yellowish brown (10YR 5/4); dry; stiff; medium plasticity; no odor. | CL | | New 10' connection. |
| | | | | | Silty SAND (SM); pale brown (10YR 6/3); moist; medium dense to dense; 80% fine sand; 20% silt. | | | Blow counts (99-100.5'): |
| 100 | | SB0092 | 0.0 | | Same as above (95 ft); some gravel fragments. | SM | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | ordinat | | 94178 | 6.70 Logged By: Allen Willmore | | | | |
|---------------|-------------|---------|------------------|-------------------|---|-----------|--|-------------------------------|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| | - | | | | 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 | | | |
| <u>130</u> | - | | | | 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'): | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | 000 | ordina | | J4 17 8 | Loggeu | Dy. 7 | Allen will | more | c c |
|---------------|-------------------------|--------|------------------|-------------------|--|-----------|------------|---------------------|---|
| 15 Denth (ft) | Sample Type | Numk | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| | - | | | | 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. |
| 15 | 5 | | | | 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. | | | | |
| 16 | - - - - 0 | | | | | | | | |
| | - | | | | Same as above (153 ft); no gravel; more fine grained; moderately sorted. | | | | New 10' connection @ 0900. |
| 16 | 5 | | | | Same as above (153 ft); becomes poorly graded. | SW | | - Bentonite Seal | |
| 17 | <u>-</u> - - - | | | | Same as above (153 ft). | | | | New 10' connection @ 0915. |
| <u>17</u> | 5 | | | | Same as above (153 ft); small gravel. | | | | |
| 18 | 5 | | | | | | | | |
| | | | | | | | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | | | | | - j · · · | | |
|---------------|--------------|--|------------------|-------------------|--|------------------|------------------|---|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| <u>190</u> | - | | | | Same as above (185 ft). | SW | | |
| 195 | - | | | | Same as above (185 ft). | | - Bentonite Seal | |
| 200 | \mathbb{H} | SB0094 SB0094- <u>MS</u> / SB0094- MSD | | | 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. |
| 205 | - | | | | Same as above (200 ft). | SP | | |
| 210 | - | | | | | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| ~ ` | -00 | nuina | IE. 1 | 54179 | Logged | Бу. 7 | Allen Willmore | |
|---------------|-------------|--------|------------------|-------------------|---|----------|--|-------------------------------|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | - | | | | Poorly graded SAND with Gravel (SP); light brown (7.5YR 6/3); moist; 60% sand; 40% gravel to 1.5cm. | SP | | |
| 213 | - | | | | Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); dry; loose; gravel to 2cm; subangular to subrounded; no odor. | | | |
| 220 | - | | | | Well graded SAND (SW); light brown (7.5YR 6/4); moist; medium dense; 90% sand; 10% coarse gravel; subangular to subrounded; no odor. | SW | - Bentonite Seal | New 20' connection @ 1025. |
| 225 | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 95% fine sand; 5% fines; no odor. | | | |
| 230 | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense to medium dense; 95% sand; 5% gravel and fines. | SP | Top of Filter Pack | |
| 235 | | | | | Same as above (230 ft). | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 240 | 1 | | | | | | | |

| S | L | | | | | Borehole ID: KAFB-106114 | | | | |
|---------------|--------------|--------------------------------|------------------|-------------------|---|---|-------------------|--|---|---|
| Pro Pro | ojec ojec | t Loca | tion e: K | : KÁI (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 705 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount | | | | |
| Da Da | te S te T | Started | l: 2/2 ache | 20/20 d: 2/2 | 11 23/2011 | ∑ At T ▼ At E | Time of End of | Levels E f Drilling Drilling: ng: N// | N/A | |
| YO | Coo | d Elev ordinate ordinate | e: 14 | 47306 | | | Metho | d: Air F | NDC Drilling Rotary Casing H Ilmore | ammer Page 9 of 16 |
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | W | ell Diagram | Remarks |
| 245 | - | | | | Well graded GRAVEL with Sand pinkish gray (7.5YR 4/2); dry; loo gravel; 40% coarse sand; subang angular; no odor. | se; 60% | GW | | | New 10' connection @ 1100. |
| 2-10 | - | | | | Lean CLAY (CL); reddish brown 5/3); dry to moist; soft to firm; no plasticity; no odor. | | | | Screen | |
| 250 | - | SB0095 | 0.7 | | Same as above (245 ft); stiff. | | CL | | | Blow counts (249-250.5'): 27/36/50. New 10' connection @ 1155. |
| 255 | - | | | | Same as above (245 ft). | | | | - Bentonite Seal | |
| 260 | | | | | Well graded SAND with Clay and (SW-SC); brown (7.5YR 4/4); mc medium dense to dense; 60% sa 30% coarse gravel; 10% clay and odor. | oist; ind; | SW- SC | | | New 20' connection @ 1205. |
| 265 270 | | | | | Poorly graded SAND with Clay (light brown (7.5YR 6/4); moist; de 90% coarse sand; 10% clay and odor. | ense; | SP- SC | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | -00 | rainat | e: it | 94179 | 16.70 Logged | Allen Willmore | | |
|----------------------|-------------|---|-------|-------|--|----------------|------------------|----------------------------|
| 02 Depth (ft) | Sample Type | Number Number Headspace PID Lithologic Logic | | | Material Description | | | Remarks |
| | | | | | Poorly graded SAND with Clay (SP-SC); light brown (7.5YR 6/4); moist; dense; 90% coarse sand; 10% clay and silt; no odor. | | | |
| | | | | | Same as above (270); slight odor. | SP- SC | | |
| - | | | | | Same as above (270 ft); slight odor. Lean CLAY (CL); light brown (7.5YR | | | New 20' connection @ 1315. |
| - | | | | | 6/3); dry; hard; nonplastic; 90% clay with silt; 10% sand; no odor. | | | |
| 285 | | | | | Same as above (281 ft). | CL | - Bentonite Seal | |
| <u>290</u> - - | | | | | 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. | | | |
| <u>295</u> - - | | | | | Same as above (290 ft); more gravel. | SP | | |
| 300 | | SB0096 | 1.1 | | | | | Blow counts (299-300.5'): |

| Shaw | |
|---|----|
| Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, | NM |

Project Number: 140705

Date Started: 2/20/2011

Date TD Reached: 2/23/2011 Date Completed: 3/1/2011

Y Coordinate: 1473064.09

X Coordinate: 1541796.70

Ground Elevation AMSL (ft): 5344.8

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | | | 54170 | | | | |
|----------------------|------------------|--------|------------------|-------------------|--|----------|------------------|--|
| 00 Depth (ft) | 10 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | \mathbb{A}^{-} | 31743 | 1.1 | | 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. |
| <u>305</u> - - | | | | | 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 | |
| <u>320</u> | | | | | Same as above (310 ft). | SW | | New connection @ 0800 on 2/23/11. |
| <u>325</u> | | | | | Same as above (310 ft); finer. | | | |
| 330 | - | | | | | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| (ft) Type ber | υ | | | | |
|--|---|--|----------|--|---|
| 05 Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | Well graded SAND with Gravel (SW); light brown (7.5YR 6/4); dry; loose; 85% sand; 15% fine gravel to 0.5cm; no odor. | | Destacite Occi | |
| 335 | | Same as above (330 ft). | SW | - Bentonite Seal | New 10' connection @ 0910. |
| 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 | |
| 350 SB0097 | 0.3 | Well graded SAND (SW); light brown (7.5YR 6/3); dry; loose; 100% sand; no odor. | | | Blow counts (349-350.5'): |
| | | 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 | 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 | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 95 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
|---------------|-------------|--------|------------------|-------------------|---|----------|------------------|-------------------------------|
| | | | | | 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. | | | |
| 370 | - | | | | Same as above (367 ft). | SP | | |
| 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. | | - Bentonite Seal | |
| 380 | | | | | Same as above (375 ft). | SW | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106114

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | | | | 54179 | | <i></i> , , | lien wiimore | |
|---------------|-------------|--------|------------------|-------------------|---|-------------|------------------|---|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | Well graded SAND with Gravel (SW); pinkish gray (7.5YR 6/2); dry; loose to medium dense; 80% sand; 20% gravel; no odor. | | | |
| <u>395</u> | - | | | | Same as above (390 ft); brown (7.5YR 5/4); moist; finer. | SW | | |
| 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 | |
| <u>410</u> | - | | | | 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 | | |

| S | Cha | | | | | Bore | eho | le ID | : KAFB-′ | 106114 | |
|--------------|---|------------------------------|------------------|-------------------|---|---|------------------|--|---|--|--|
| Pro Pro | ojec ojec | t Loca Nam | ation: ie: K | KAF AFB | s of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount | | | | | |
| Da Da | Project Number: 140705 Date Started: 2/20/2011 Date TD Reached: 2/23/2011 Date Completed: 3/1/2011 | | | | | | Time o End of | Levels B f Drilling Drilling: ng: N/A | : N/À N/A | | |
| Y | Coo | d Elev rdinate rdinate | e: 14 | 17306 | | Drillling Drilling | Contra Metho | actor: V | VDC Drilling otary Casing H | ammer Page 15 of 16 | |
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | We | ll Diagram | Remarks | |
| 425 | _ | | | | Well graded GRAVEL with Sand pinkish gray (7.5YR 7/2); dry; loo gravel to 2.3cm; 20% fine sand; i to subrounded; no odor. | se; 80% | GW | | | New 20' connection @ 1440. | |
| 430 | - | | | | Well graded SAND with Gravel (brown (7.5YR 5/4); moist; loose; sand; 40% gravel to 1.2cm; subr to rounded. | 60% | SW | | - Bentonite Seal | | |
| 430 | - | | | | Poorly graded SAND (SP); pinkis (7.5YR 7/2); dry; loose; 100% co sand; angular to subangular. | | SP | | | | |
| | - | | | | Well graded SAND with Gravel (pinkish gray (7.5YR 7/2); dry; loo sand; 20% gravel; angular to subangular. | | sw | | - Top of Filter Pack - Top of 3" | | |
| 440 | - | | | | Same as above (435 ft); finer. | | | | Schedule 80 PVC 0.050 Slot Screen | New 10' and 5' connection @ 1520. | |
| 445 | - | | | | Poorly graded SAND with Gravel brown (7.5YR 5/4); moist; 70% s 30% gravel to 2cm; subangular t subrounded; petroleum odor. | and; | SP | | | | |
| 450 | | SB0099 | 2.1 | | Poorly graded SAND (SP); brown (7.5YR 5/4); moist; dense; 100% 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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

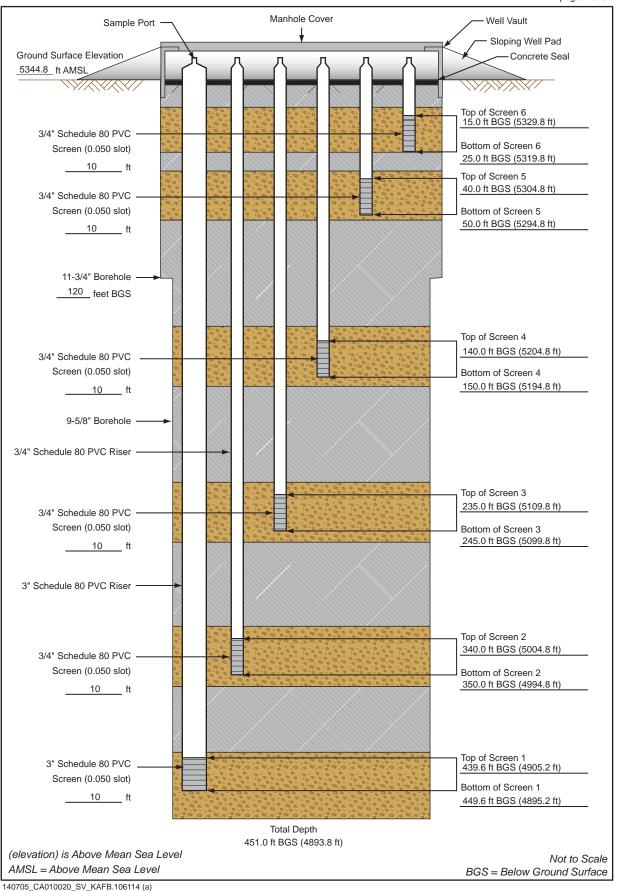
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| | | | | | 0.70 Eligide | | | |
|--------------|-------------|--------|------------------|-------------------|----------------------|----------|--------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | | SP | Screen | Total depth = 451 ft. Reached on 2/23/11. |
| 455 | - | | | | | | | Water added during drilling (gallons) = 0 |
| | - | | | | | | | Water added during construction (gallons) = 176 |
| 460 | - | | | | | | | |
| 465 | - | | | | | | | |
| | - | | | | | | | |
| 470 | | | | | | | | |
| 475 | - | | | | | | | |
| 480 | - | | | | | | | |

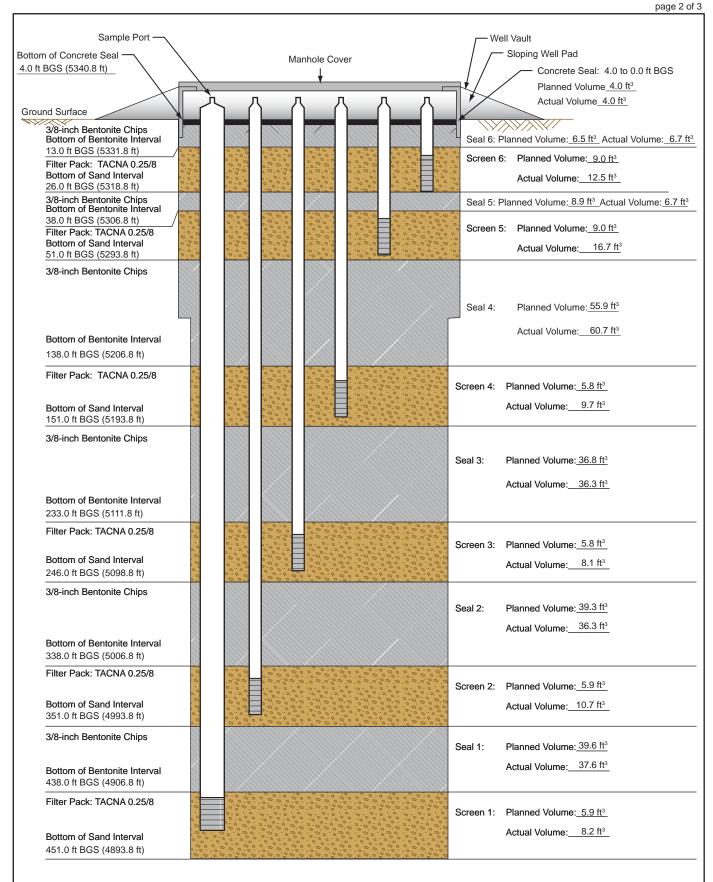
Nested Soil Vapor Well Completion Diagram for KAFB-106114

Installation Start Date/Time: 2/23/2011 @ 16:10 Installation End Date/Time: 3/1/2011 @ 17:00

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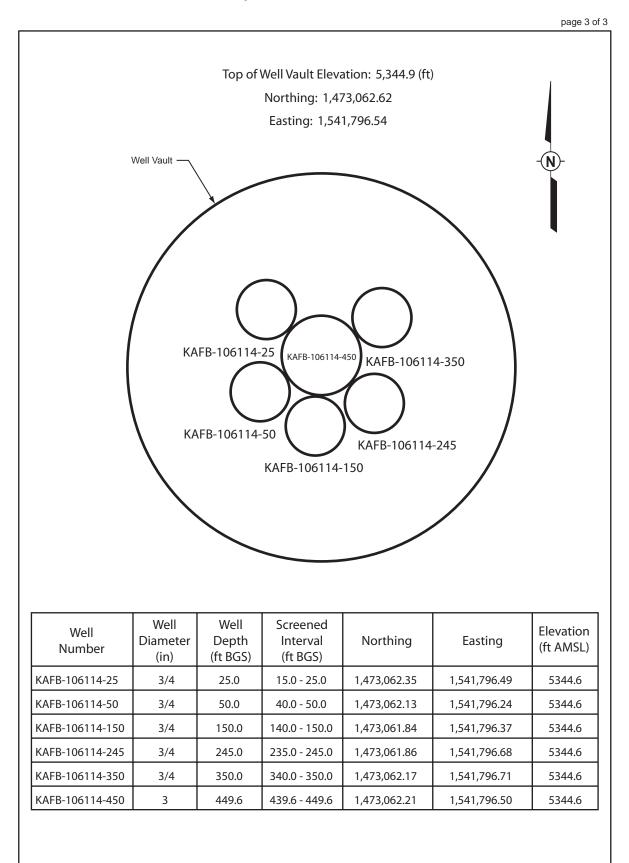


Nested Soil Vapor Well Completion Diagram for KAFB-106114



(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



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APPENDIX D-1

KAFB-106115 Final Well Report

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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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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| | | | | | | , | | |
|------------|------------------|------------------|------------------|-------------------|--|----------|--|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | - | | | | 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. Same as above (0 ft); no odor. | | - Concrete Seal | Hand augered. Began drilling @ 0744 on 2/9/11. |
| 10 | | SB0100 SB0101 | | | 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 | - Bentonite Seal | Kelly down @ 0752. Blow counts (9-10.5'): 12/16. Blow counts (10.5-12'): 17/39. New connection @ 0822. Resumed drilling @ 0823. |
| 15 | - | SB0102 | | | 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 | Kelly down @ 0830. Blow counts (19-20.5'): 19/31. |
| 20 | - - - - | SB0102 | 0.0 | | 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. Same as above (20 ft); no odor. | CL | - Bottom of Screen | New connection @ 0844. Resumed drilling @ 0845. |
| 30 | | SB0103 | 0.0 | | | | - Bentonite Seal | 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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| ~ ` | | ordinate | e. n | 54257 | 5.40 Loggeu | Бу. | Brian Lucero / Allen Will | more lage 2 of ite |
|---------------|-------------|----------------------------|------------------|-------------------|---|----------|--|--|
| ଟି Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 SB0104 SB0104 | 0.0 | | Sandy lean CLAY (CL); red (2.5YR 5/6); moist; hard; low plasticity; 70% clay with minor silt; 30% fine sand; no odor. | | Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | 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. |
| 45 | | SB0104 | | | Same as above (40 ft); no odor. | | | New connection @ 0950. Resumed drilling @ 0951. |
| 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. |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|--------------|--|--------|-----------|-------------|-----|---|----------|------------------|--|
| 0 Denth (ft) | | Number | Headspace | L ithologic | Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| _6 | 0 - - 5 - - - - - - - - - - - - - - - - | | | | | SILT (ML); red (2.5YR 4/8); moist; hard; 70% silt; 30% clay; trace very fine to fine sand; no odor. 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. SILT (ML); red (2.5YR 4/8); moist; hard; 90% silt with minor clay; 10% fine to coarse sand; subangular; no odor. | ML | - Bentonite Seal | New connection @ 1046. Resumed drilling @ 1054. |
| 8 | - - - 0 | | | | | 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. | | | Casing advanced without hammer last ~5ft. Kelly down @ 1058. |
| | - | | | | | 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. | | | New connection @ 1112. Resumed drilling @ 1114. |
| 8 | - | | | | | Same as above (80 ft); 95% clay with minor silt; 5% fine sand; no odor. | CL | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|-------------------|-------------|--------|------------------|-------------------|---|-----------|------------------|---|
| ଟ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Loa | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | 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. | | | Kelly down @ 1118. Blow |
| <u>100</u> | | 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. | ML | | counts (99-100.5'): 36/50. New connection @ 1211. Resumed drilling @ 1212. |
| <u>105</u> | - | | | | 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. | | - Bentonite Seal | No hammer, entire joint. |
| <u>110</u> | - | | | | Same as above (105 ft); 85% fine to coarse sand; subangular to subrounded; 15% silt with trace clay; no odor. | SM | | |
| <u>115</u> 120 | - | | | | 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'. |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|---------------|-------------|--------|------------------|-------------------|--|----------|----------|---|--|
| 15 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | _ | | | | 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. | | | | |
| 140 | - | | | | Same as above (135 ft); no odor. | CL | | | Kelly down @ 1557. 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. |

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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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|-----------------------------|---------------------------------|------------------|-------------------|--|----------|---|------------------|--|
| 05 Depth (ft) | Sample Type Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| 155 | SB0107- MS SB0107- MSD | | | 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 | | - Bottom of | 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 diasberge Decumed |
| 160 | | | | 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 | | Screen | discharge. Resumed drilling @ 1015. Kelly down @ 1022. |
| - | | | | 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. |
| <u>165</u> - - 170 | | | | 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. | | | - Bentonite Seal | |
| - | | | | Same as above (165 ft); 100% sand; trace fine gravel to 1.5cm; subrounded; no odor. | SW | | | |
| 175 | | | | Same as above (165 ft). | | | | |
| 180 | | | | 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. |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|--------------|-------------|--------|------------------|-------------------|---|---------------|------------------|---|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. | 00 | | |
| 190 | - | | | | Poorly graded SAND (SP); pale red | SP | | Kelly down @ 1104. New connection @ 1138. |
| | | | | | (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. | | | Resumed drilling @ 1138. |
| 195 | | | | | 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, | SP- | - Bentonite Seal | |
| 200 | | SB0108 | 0.0 | | rounded, vitric pumice clasts with quartz phenocrysts; altered and unaltered. Poorly graded SAND with Silt (SP-SM); pale red (2.5YR 7/2); dry to moist; very | SM | | Kelly down @ 1145. Blow counts (199-200.5'): 37/50. New connection @ 1205. Resumed drilling @ |
| | | | | | 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; | CL | | 1206. |
| 205 | | | | | Moist; black carbonaceous material. Lean CLAY (CL); light brown (7.5YR 6/3); moist; hard; high plasticity; 100% clay; black, carbonaceous dendritic material; no odor. Poorly graded SAND with Silt (SP-SM); | SP- SM | | |
| 210 | | | | | light brown (7.5YR 6/3); moist; very dense; 90% very fine to fine sand; 10% silt with clay; no odor. | | | |

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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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|---------------|-----|---------|------------------|-------------------|---|-----------|--|--|
| 15 Denth (ft) | 1.0 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| 21 | 5 | | | | 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. | SP- SM | | Kelly down @ 1225. |
| 22 | 0 | | | | 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; | | | New connection @ 1250. Resumed drilling @ 1251. |
| 22 | 5 | | | | No odor. Note: very small pumice clasts. Well graded SAND (SW); light reddish gray (2.5YR 7/1); dry; very dense; 100% | | - Bentonite Seal | |
| | - | | | | very fine to coarse sand; subangular; trace silt; no odor. | SW | | |
| 23 | 0 | | | | 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 | SP | | |
| 23 | 5 | | | | 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% | SM | | Silt and minor clay at 233' likely represent a perched layer - sample has high moisture content, but is not "wet". |
| 24 | 0 | | | | silt with minor clay; no odor. | | - Top of Filter Pack - Top of 3/4" | Kelly down @ 1330. |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|-----------------------|-------------|--------|------------------|-------------------|---|----------|--|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| | - | | | | 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. |
| <u>245</u> | - | | | | 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. | | | | |
| <u>250</u> | | 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 | на н | - Bottom of Screen | Kelly down @ 1007. Blov counts (249-250.5'): 48/50. |
| <u>255</u> - - | - | | | | Same as above (250 ft); finer than above; no odor. | | | | Kelly down @ 1056. |
| 2 <u>60</u> - - | _ | | | | 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. |
| 2 <u>65</u> - | | | | | 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. | | | | |
| 270 | | | | | | | | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|---------------|-------------|--------|------------------|-------------------|---|----------|------------------|--|
| 27 Danth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. Added water to cyclone |
| 27 | 5 | | | | | | | for dust supression. |
| 28 | | | | | 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 | | Kelly down @ 1159. |
| | - | | | | 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. |
| 28 | 5 | | | | 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. |
| <u>29</u> | 0 - - | | | | CLAY (CL); reddish brown (5YR 5/4); dry; soft; medium plasticity; 80% clay; 20% silt; no odor. | | | |
| <u>29</u> | 5 | | | | Same as above (290 ft); pinkish gray (5YR 6/2). | CL | | |
| 30 | o X | SB0110 | 0.8 | | | | | Blow counts (299-300.5'): |

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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): \Box At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
|-------------------------------------|-------------|---------|------------------|-------------------|--|----------|------------------|---|
| - | X | \$B0110 | | | 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. |
| <u>305</u> - - - - - | - | | | | 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 | | |
| 315 | - | | | | Poorly graded SAND (SP); very pale brown (10YR 7/3); dry; loose; 95% sand; 5% fine gravel; no odor. | SP | | |
| - | - | | | | 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. |
| <u>325</u> - - | | | | | Same as above (315 ft). | | | New connection @ 1415. |
| 330 | | | | | | | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|---------------|-------------|--------|------------------|-------------------|---|----------------------|----|---|--|
| 85 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| - - | - | | | | 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 |
| <u>340</u> | - | | | | Same as above (330 ft) | sw | | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| <u>345</u> | - | | | | Same as above (330 ft); 55% sand; 45% gravel. | | | | Began tripping out to attach spilt spoon sampler @ 1510. |
| 350 | | SB0111 | 0.8 | • | Well graded GRAVEL with Sand (GW); | | | -Bottom of Screen | Blow counts (349-350.5' 14/39/50. |
| - | | | | | reddish gray (5YR 5/2); dry; loose; 65% gravel; 35% coarse sand; subangular to to subrounded; no odor. | GW | | | New 10' connection @ 1615. |
| 355 - - | - | | | | 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 | | - Bentonite Seal | |
| 360 | | | | | | | | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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| | 000 | nunut | 0. 10 | 04231 | D.+0 Logged | <i>су.</i> с | shari Lucero / Alleri Will | more |
|------------------|-------------------------|--------|------------------|-------------------|--|--------------|----------------------------|--------------------------------------|
| 96 Depth (ft) | 1.0 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 365 | - | | | | 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. |
| 370 | | | | | 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 | | |
| 375 | | | | | Well graded GRAVEL (GW); reddish gray (5YR 5/2); dry; loose; 90% gravel; 10% coarse sand; angular to subrounded; no odor. | GW | | |
| | | | | | Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; loose; 60% sand; 40% coarse gravel; angular to subrounded; no odor. | | - Bentonite Seal | |
| 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 |) | | | | L | | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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| ~ (| X Coordinate: 1542375.40 Logged By: E | | | | | | | ay: Brian Lucero / Allen Willmore | | | | |
|--------------------|---------------------------------------|--------|------------------|-------------------|---|----------|----|-----------------------------------|--|--|---|--|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks | | | |
| | - | | | | Well graded SAND with Gravel (SW); reddish gray (5YR 5/2); dry; loose; 60% sand; 40% gravel; angular to subrounded; no odor. | SW | | | | | | |
| - - - 400 | | SB0112 | 0.3 | | Same as above (390 ft). | | | 300 | | | Began tripping out to collect spilt spoon samples @ 0835. Blow counts (399-400.5'): 11/16/12. Blow counts (400.5, 402'): | |
| - - 405 | | 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 | | | samples @ 0835. Blow counts (399-400.5'): | | | |
| 410 | - | | | | Well graded SAND (SW); pinkish gray (5YR 6/2); moist; loose; 90% sand; 10% coarse gravel; angular to subrounded; no odor. | | | - Bentonite Seal | | | | |
| - | - | | | | 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 | | | | | | | | | | | | |



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

Borehole ID: KAFB-106115

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

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|--------------|-------------|--------|------------------|-------------------|--|----------|-----|---|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Wel | ll Diagram | Remarks |
| 425 | - | | | | 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. |
| 430 | - | | | | Same as above (420 ft); coarse sand; less gravel. | SW | | -Bentonite Seal | |
| 435 | - | | | | 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. |
| 440 | - | | | | 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 - Top of 3" | |
| | - | | | | Well graded SAND with Gravel (SW); pinkish gray (5YR 6/2); dry; loose; 60% sand; 40% coarse gravel; subangular to subrounded; no odor. | | | Schedule 80 PVC 0.050 Slot Screen | Hammer locked @ 1320. New 10' connection @ 1320. Resumed drilling @ 1340. |
| 445 | - | SB0114 | 0.6 | | Same as above (440 ft); finer sand; less gravel. | SW | | - 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero / Allen Willmore

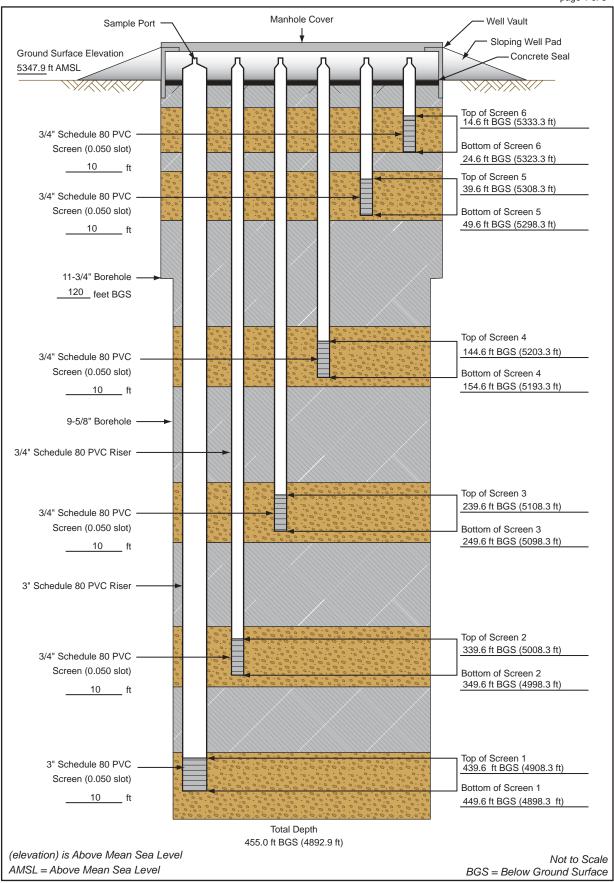
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| | | | | | 5.40 | Logged Dy. 1 | Shan Lucero / Allen Will | |
|--------------|---|--------|------------------|-------------------|--------------------------|--------------|--------------------------|--|
| 5 Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | _ | | | | No description recorded. | | Screen | Total Dopth = 455 ft |
| | - | | | | | | | Total Depth = 455 ft. Reached @ 1510 on 2/17/11. Water added during drilling (gallons) = 0 |
| 460 | - | | | | | | | Water added during |
| <u>465</u> | - | | | | | | | construction (gallons) = Not Recorded Kelly down: TD the joint and ready to make new connection |
| <u>470</u> | - | | | | | | | |
| <u>475</u> | - | | | | | | | |
| 480 | - | | | | | | | |

Nested Soil Vapor Well Completion Diagram for KAFB-106115

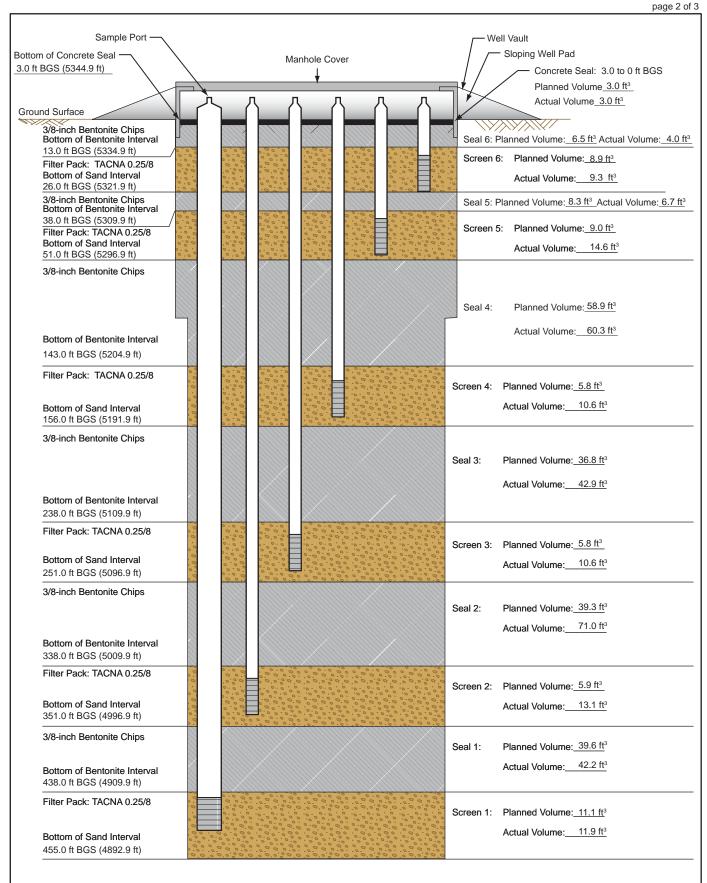
Installation Start Date/Time: 2/18/2011 @ 08:15 Installation End Date/Time: 2/20/2011 @ 9:20

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¹⁴⁰⁷⁰⁵_CA010020_SV_KAFB.106115 (a)

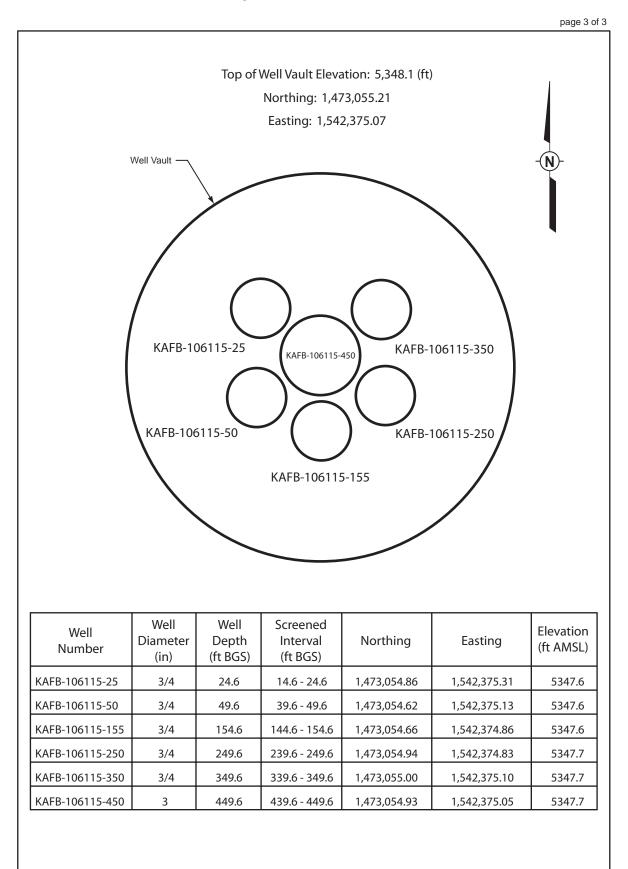
Nested Soil Vapor Well Completion Diagram for KAFB-106115



(elevation) is Above Mean Sea Level All Materials Placed with Tremie Pipe Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106115 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106115



140705_CA010020_SV_Map View_106115

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APPENDIX D-1

KAFB-106118 Final Well Report

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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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|------------|---------------------------|------------------|------------------|-------------------|--|----------|---|--|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | SILT (ML); brown (7.5YR 5/2); dry; stiff; nonplastic; 95% silt; 5% fine gravel; rounded; no odor. | | - Concrete Seal | Hand augered. |
| 5 | | SB0143 | 0.4 | | Same as above (0 ft). | | | Began drilling @ 1127 on 2/24/11. Blow counts (7-8.5'): 7/8. |
| 10 | - <u>/</u> - - - | SBU 143 | 0.4 | | Same as above (0 ft); 90% silt; 10% fine to coarse sand; subrounded. | | - Bentonite Seal | |
| 15 | | SB0144 | 0.0 | | Same as above (0 ft); non to low plasticity. | ML | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1150. New connection @ 1254. Resumed drilling @ 1256. |
| 20 | | SB0144 | | | Same as above (0 ft). | | | Blow counts (17-18.5'): 16/15. Bow counts (18.5-20'): 16/15. |
| 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 | | - Bottom of Screen | Kelly down @ 1304. |
| 30 | | SB0145 SB0146 | | | odor. | | - Bentonite Seal | Blow counts (27-28.5'): 6/12. Blow counts (28.5-30'): 14/20. New connection @ 1325. |



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

Borehole ID: KAFB-106118

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | Sample Type | | | Material Description | S.C.S. | ell Diagram | Remarks |
|----------|-------------|------------------|-----|--|--------|---|---|
| صّ 30 | San | Z | He | SILT (ML); brown (7.5YR 5/2); dry; firm; non to low plasticity; 100% silt with clay | | | Resumed drilling @ 1325. |
| 35 | - | | | nodules to 1cm; no odor. Same as above (30 ft); 90% silt; 10% clay nodules. | | - Bentonite Seal | Kelly down @ 1335. |
| 40 | | SB0147 | 0.0 | Same as above (30 ft). | ML | - Top of Filter Pack | Blow counts (37-38.5'): 7/11. New connection @ 1347. Resumed drilling @ 1347. |
| 45 | - | | | | | Schedule 80 PVC 0.050 Slot Screen | |
| - | | SB0148 | 0.0 | Same as above (30 ft); very stiff. | | | Kelly down @ 1353. Blow counts (47-48.5'): 23/27. Blow counts (48.5 50): 47/50. Blow |
| 50 | | SB0148 SB0148 | | Silty SAND (SM); brown (7.5YR 5/4); dry; dense; 75% fine to coarse sand; rounded; 10% gravel; rounded; 15% silt; | | - Bottom of Screen | (48.5-50'): 47/50. Blow counts (50-51.5'): 42/50 New connection @ 141' Resumed drilling @ 1418. |
| 55 | - | | | no odor. Same as above (50 ft); 80% fine to coarse sand; 5% gravel; 15% silt. | SM | - Bentonite Seal | Kelly down @ 1420. Ne connection @ 1430. Resumed drilling @ 1431. |
| 60 | - | | | | | | 1401. |



bs of Engineers Hole Diameter Upper (in.): 11-3/4

Client: US 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): \Box At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|---|-----------------|------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 | | |
| | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------------------|-------------|---------|------------------|-------------------|--|--------------|------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | SILT with Sand (ML); brown (7.5YR 4/4); dry; stiff to firm; nonplastic; 75% silt; 25% fine sand; rounded; no odor. | ML | | |
| 95 | | SB0149 | 0.0 | | 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. Blow counts (97-98.5'): 16/28. New connection @ 1516. Resumed drilling @ 1517. |
| 100 | - | | | | Same as above (95 ft). SILT (ML); brown (7.5YR 5/3); dry; stiff; nonplastic; 95% silt; 5% fine to coarse sand; no odor. | | | |
| - | - | | | | | | - Bentonite Seal | |
| <u>110</u> - - - | - | | | | 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. |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|-----------------|-------------|--------|------------------|-------------------|--|---------------|-------------------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Lean CLAY (CL); brown (7.5YR 4/3); dry; stiff to very stiff; medium plasticity; 100% clay; no odor. | | | |
| <u>125</u> | - | | | | Same as above (120 ft); brown (7.5YR 5/3). | CL | | |
| <u>130</u> | - | | | | Same as above (120 ft); low to medium plasticity. | | - Bentonite Seal | |
| <u>135</u> - | - | | | | 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. |
| <u>140</u> - | - | | | | 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. |
| - - 150 | | SB0150 | 0.4 | | | ML | - Top of Filter Pack | Blow counts (147-148.5'): 12/50. New connection @ 1040. Resumed drilling @ 1042. |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------------------------|-------------|--------|------------------|-------------------|--|---------------|----------|--|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | 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. |
| <u>155</u> | - | | | | 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. |
| <u>160</u> - - | - | | | | 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 | | | |
| - <u>170</u> - - | - | | | | Same as above (160 ft). | | | - Bentonite Seal | |
| 175 - - - - 180 | | | | | 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. |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|----------------------|-------------|--------|------------------|-------------------|--|------------------------------|------------------|---|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% fine to medium sand; rounded; no odor. | SP | | |
| <u>185</u> - - | - | | | | Well graded SAND (SW); brown (10YR 5/3); 95% fine to coarse sand; evenly distributed; rounded; 5% gravel to 1cm; rounded; no odor. | | | |
| 190 | - | | | | Same as above (185 ft); 35% of coarse fraction of sand is lapilli tuff. | SW | | |
| <u>195</u> | | SB0151 | 0.1 | | 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. Blow counts (197-198.5'): 9/50. New connection @ |
| _ 200 _ | - | | | | Same as above (195 ft); 100% fine sand. | SP | | 1322. Resumed drilling @ 1327. |
| 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 | - | | | | | | | |

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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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|------------------------------|--------|------------------|-------------------|--|----------|------------------|---|
| 01 Depth (ft) Sample Tvpe | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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. | 300 | | 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 | | |
| 235 | | | 00 | 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. |

| S | L | | | | | | Borehole ID: KAFB-106118 | | | | |
|--------------------|--------------|---------------------------------|------------------|------------|-------------------------|--|--------------------------|------------------|---|--|---|
| Pro Pro | ojec ojec | ct Loca | tion: e: K | : ł (Af | ≺AF =B I | s of Engineers ⁻ B, Albuquerque, NM 3FF SWMU ST-106 and SS-111 ⁷ 05 | Hole Dia Surface | amete Comp | r Lower pletion 7 | (in.): 11-3/4 (in.): 9-5/8 Type: Flush mo | unt |
| Da Da | te S te T | Started TD Rea Comple | : 2/2 ache | 24/ d: | /20 [/] 3/3 | 11 3/2011 | ∑ At 1 ▼ At E | Time o End of | Levels I f Drilling Drilling ng: N// | N/A | |
| YC | Coo | nd Elev ordinate ordinate | e: 14 | 473 | 374 | | | Metho | d: Air F | NDC Drilling Rotary Casing H acock | ammer Page 9 of 16 |
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic | Log | Material Description | | U.S.C.S. | w | ell Diagram | Remarks |
| - | - | | | | | Poorly graded GRAVEL with Sar dark grayish brown (10YR 4/2); o dense; 65% gravel to 2cm; round 35% fine to coarse sand; rounde odor. | lry; led; | GP | | | |
| 245 | - | | | | | SILT (ML); brown (10YR 4/3); dr nonplastic; 100% silt; no odor. | y; stiff; | | | - Bentonite Seal | Kelly down @ 1358. |
| 250 | | SB0152 | 2.9 | | | Same as above (243 ft). | | ML | | - Top of Filter Pack | Blow counts (247-248.5'): 26/50. New connection @ 1415. Resumed drilling @ 1416. |
| 255 - - - | - | | | | | Poorly graded SAND (SP); light yellowish brown (10YR 6/4); dry; 95% very fine to fine sand; round fines; no odor. | dense; led; 5% | SP | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1420. New connection @ 1428. Resumed drilling @ 1429. |
| <u>260</u> | | | | | | Well graded SAND (SW); brown 4/3); dry; dense; 100% fine to co sand; rounded; trace gravel to 1. rounded. | arse | | | | |
| 265 | - | | | | | Same as above (260 ft). | | SW | | - Bottom of Screen - Bentonite Seal | |
| 270 | | | | | | | | | | | |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------------|-------------|---------|------------------|-------------------|--|----------|------------------|---|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel to 1.5cm; rounded. | sw | | |
| <u>275</u> | - | | | | 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. |
| <u>280</u> | - | | | | 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 | |
| <u>290</u> | - | | | | 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. |
| 300 | | SB0153 | 0.0 | | | | | Blow counts (297-298.5') 9/11. New connection @ 1510. Resumed drilling @ 1510. |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 320 (10YŘ 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; subrounded; no odor. GP 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. GP | × C001 | | . 15 | - 17 C | | <i>р</i> у. С | Sley Feacuck | |
|---|-------------|--------|---|-------------------|--|---------------|------------------|--|
| 305 Well graded SAND (SW); brown (TOYR 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. 310 Same as above (305 ft). 315 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; no odor. 320 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; no odor. 320 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; no odor. 320 Poorly graded SAND (SP); gravish brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace medium sand; no odor. | Sample Type | Number | Headspace | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 310 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). SW 315 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; subrounded; no odor. Bentonite Seal 320 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; no odor. GP 320 Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace medium sand; no odor. GP | - | | 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | | 4/3); dry; dense; 95% fine to coarse sand; rounded; 5% gravel to 1.5cm; rounded; no odor. | | | |
| 315 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; subrounded; no odor. Bentonite Seal Kelly down @ 1520; connection @ 1527; Resumed drilling @ 1528. 320 Poorly graded SAND (SP); gravish brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace medium sand; no odor. GP | 310 | | | | brown (10YR 4/3); dry; dense; 65% fine to coarse sand; rounded; 35% gravel to 1.5cm; rounded; no odor. | SW | | |
| 320 Poorly graded GRAVEL (GP); brown (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; subrounded; no odor. GP 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. GP | 315 | | | | | | - Roptonito Soci | |
| Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace medium sand; no odor. | 320 | | - () | | (10YR 4/3); dry; dense; 90% gravel to 2cm; rounded; 10% fine to coarse sand; | GP | Bentonite Sear | Kelly down @ 1520. Ne connection @ 1527. Resumed drilling @ 1528. |
| | - | | | | brown (10YR 5/2); dry; dense to medium dense; 100% fine sand; rounded; trace | | | |
| Same as above (320 ft); 100% fine to medium sand; rounded. | - | | | | Same as above (320 ft); 100% fine to medium sand; rounded. | SP | | |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|--|----------|---------------------------------------|---|----|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagi | ram Remarks | |
| 335 | | | | | Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 95% fine to medium sand; 5% coarse sand; rounded; no odor. | SP | - Bentor | nite 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 Pack | Filter Kelly down @ 1539. N connection @ 1610. Resumed drilling @ 1611. | ew |
| - | | | | | Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 100% very fine to fine sand; rounded; no odor. | SP | - Top of Sched PVC 0 Slot Sc | lule 80).050 | |
| 345 | | 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. Blow counts (347-348. 5/11. Blow counts (348.5-350'): 9/17. New | ŕ |
| 350 | | SB0154 | | | Same as above (345 ft). | SW | - Bottom Screer | n of Resumed drilling @ | |
| <u>355</u> | | | | | 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 | - Bentor | nite Seal of 3/1/11. New connection @ 0828 on 3/2/11. Resumed drillir @ 0834. | ı |
| 360 | | | | | Well graded SAND (SW); brown (10YR 4/3); dry; medium dense; 100% fine to coarse sand; subrounded to rounded; no | sw | | | |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---|---------------------------------------|--|----------|------------------|--|
| 90 Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 365 370 370 375 380 385 385 | | odor. Same as above (358 ft); trace gravel; rounded. Same as above (358 ft); subangular to subrounded. 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. Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% fine to coarse sand; rounded; trace gravel; rounded; no odor. Same as above (380 ft); dominantly fine sand. | 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. |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); dry; loose; 100% fine to medium sand; dominantly fine sand; rounded; abundant mica flakes; no odor. | | | |
| <u>395</u> | - | | | | Same as above (390 ft); trace coarse sand. | SP | | Kelly down @ 1204. |
| - | X | 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 |
| <u>400</u> - - - - - - - - - - - - - - - - - - | | 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. Same as above (400 ft). | SW | - Bentonite Seal | connection @ 1310. Resumed drilling @ 1313. |
| - | - | | | | 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 | | |
| <u>415</u> - - - | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106118

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|------------------------|---------|---|-------------------|---|---------------|-----------|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | II Diagram | Remarks |
| 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 | |
| 440 | | 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. Blow counts (447-448.5'): 12/11. Blow counts |
| 450 | $\left \right\rangle$ | SB0156 | | | Poorly graded SAND (SP); brown (10YR | SP | | | (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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

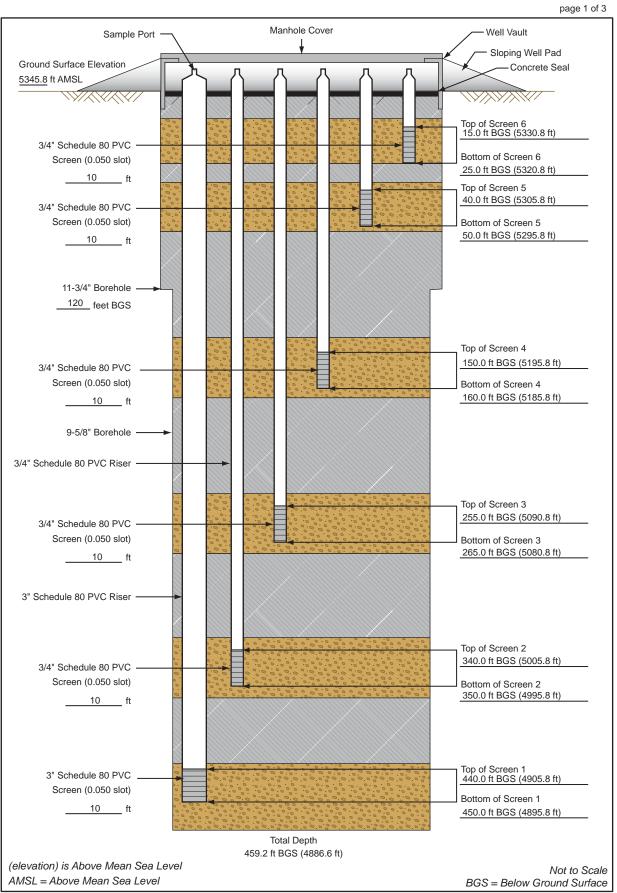
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|--|----------|--------------|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | 4/3); dry; medium dense; 95% fine to medium sand; rounded; 5% coarse sand; rounded; no odor. | SP | Screen | Resumed drilling @ 1606. |
| <u>45</u> 8 | 5 | | | | 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. |
| 4.01 | - | | | | | | | Water added during drilling (gallons): 0 |
| 46 | <u>></u> | | | | | | | Water added during construction (gallons): 423.3 |
| 47(| - -) | | | | | | | Kelly down: TD the joint and ready to make new connection. |
| | - | | | | | | | |
| 47 | 5 | | | | | | | |
| | - | | | | | | | |
| 480 |) | | | | | | | |

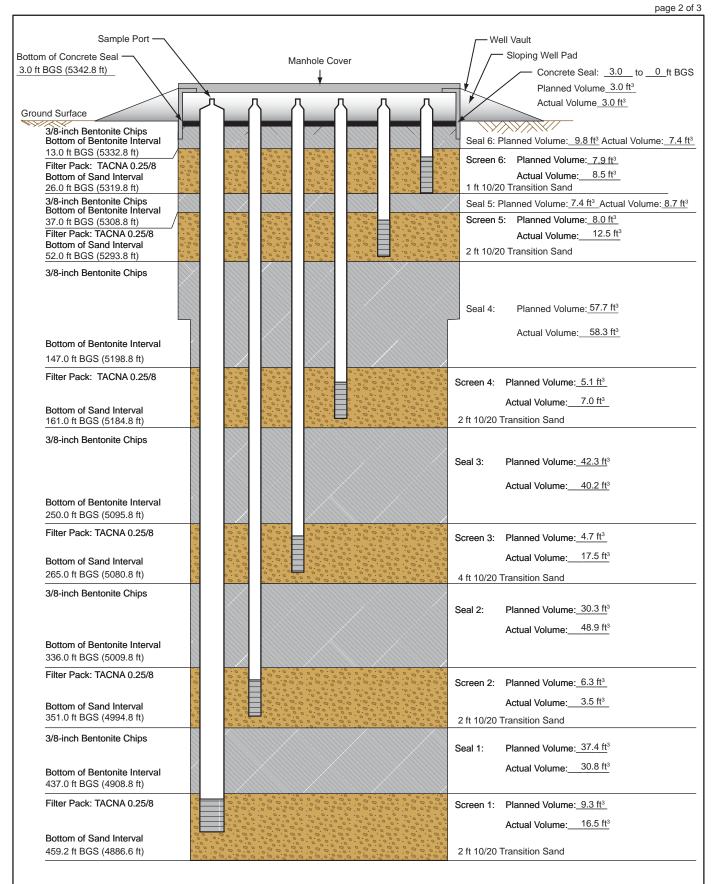
Nested Soil Vapor Well Completion Diagram for KAFB-106118

Installation Start Date/Time: <u>3/4/2011 @ 09:20</u> Installation End Date/Time: <u>3/7/2011 @ 10:25</u>



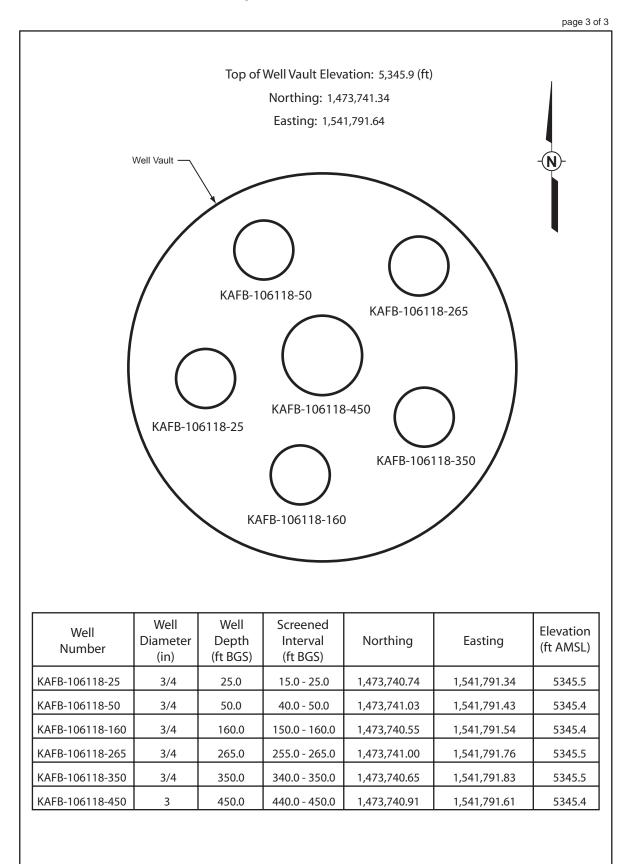
¹⁴⁰⁷⁰⁵_CA010020_SV_KAFB.106118 (a)

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



140705_CA010020_SV_Map View_106118.ai

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APPENDIX D-1

KAFB-106119 Final Well Report

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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

Borehole ID: KAFB-106119

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

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

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

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|--------------------------------|-------------|--|------------------|-------------------|--|---------------|--|--|
| Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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 or 3/3/11. Blow counts (7-8.5'): |
| 10 | -X | SB0157 SB0158 | 0.1 | - | Same as above (0 ft); reddish brown | | - Bentonite Seal | 14/15. Resumed drilling @ |
| | - | | | | (5YR 5/4); very stiff; 60% silt; 5% clay; 35% very fine to meduim sand. | | Top of Filter Pack | 1504. |
| 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. Blow counts (17-18.5'): |
| 20 | -X | SB0159 | 0.0 | - | Sandy SILT (ML); brown (7.5YR 5/4); | | | 14/23. Resumed drilling @ 1521. |
| | - | | | | 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. |
| 30 | | SB0160 SB0160- MS SB0160- SB0160- MSD | | | | | - Bentonite Seal | Blow counts (27-28.5'): 8/13. Blow counts (28.5-30'): Not Recorded Resumed drilling @ |



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

Borehole ID: KAFB-106119

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

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

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

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|--------------|-----------------------|--------|------------------|-------------------|--|----------|--|---|
| S Depth (ft) | 1.72 | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 35 | - | | | | 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. Same as above (30 ft); hard; 70% silt; | ML | - Bentonite Seal | 1541. |
| 40 | | SB0161 | 0.0 | | 30% very fine to coarse sand to 4.5mm; no clay. 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. No cuttings returned. | | - Top of Filter Pack - Top of 3/4" | Blow counts (37-38.5'): 11/23. Bottom of casing @ |
| 45 | - | | | | Sandy SILT (ML); brown (7.5YR 5/4); | | Schedule 80 PVC 0.050 Slot Screen | 1546. Resumed drilling @ 1554. |
| 50 | | SB0162 | 0.0 | | dry; hard; low plasticity; 70% silt; 30% very fine to coarse sand; trace fine gravel to 9mm. 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. | ML | - Bottom of | Blow counts (47-48.5'): 16/32. Bottom of casing @ |
| 55 | - | | | | | SM | Screen | 1559. Resumed drilling @ 1616. |
| 60 | - - - -) | | | | 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 | |



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

Borehole ID: KAFB-106119

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

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

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

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| | | | | | <u> </u> | 0.14 209900 | | | - | |
|--------------|-------------|--------|------------------|--|----------|---|-----------|--------------|--------------|-----------------------------|
| @ Denth (ft) | Sample Type | Number | Headspace PID | Lithologic | Log | Material Description | U.S.C.S. | Well Diagram | | Remarks |
| | - | | | | | 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. |
| 6 | 5 | | | | | Same as above (60 ft); 60% silt; 40% very fine to coarse sand. | ML | | | |
| 7 | <u> </u> | | | | | Same as above (60 ft); 50% silt; 20% clay; 30% very fine to fine sand. | | | | |
| 7 | - | | | <td></td><td>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.</td><td>SW- SM</td><td>- Be</td><td>ntonite Seal</td><td>Bottom of casing @ 1635.</td> | | 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 | - Be | ntonite Seal | Bottom of casing @ 1635. |
| 8 | 2 | | | | | SILT with Sand (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 80% silt; 20% very fine to medium sand to 1mm. | | | | |
| 8 | 5 | | | | | Same as above (80 ft). | ML | | | |
| 9 | 2 D | | | | | | | | | |



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

Borehole ID: KAFB-106119

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

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

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

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|--|-------------|--------|------------------|-------------------|--|----------------|------------------|---|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| <u>95</u> 100 | | SB0163 | 4.9 | | No cuttings returned. 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. Lean CLAY (CL); lense. Poorly graded SAND (SP); brown (10YR 5/3); damp; loose; 100% medium sand to 0.5mm; rounded; trace clay nodules. Same as above (99 ft); 95% medium sand; 5% silt. | ML CL SP | - Bentonite Seal | Blow counts (97-98.5'): 5/23. Bottom of casing @ 1652. Resumed drilling @ 1704. |
| <u>110</u> <u>115</u> <u>120</u> | | | | | Lean CLAY (CL); brown (10YR 5/3); damp; hard; medium plasticity; 100% lean clay; trace silt (likely from cyclone). SILT (ML); brown (7.5YR 5/4); moist; hard; low plasticity; 85% silt; 5% clay; 10% very fine sand. Same as above (112 ft). | 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \square After Drilling: N/A

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

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Sample Type Headspace PID Lithologic Log Depth (ft) Number Ś Ö Material Description Remarks Well Diagram ю. 5 120 No cuttings returned. Bottom of casing @ 1709 on 3/3/11. Resumed drilling @ 1105 on 3/4/11. 125 No cuttings returned. Bentonite Seal 130 No cuttings returned. Poorly graded SAND (SP); brown (10YR 135 5/3); moist; very dense; 100% medium sand to 0.5mm; rounded. SP Top of Filter Bottom of casing @ Pack 1117. Resumed drilling @ 1124. 140 Top of 3/4" Well graded SAND (SW); brown (10YR Schedule 80 4/3); damp; medium dense; 100% fine to PVC 0.050 coarse sand to 3mm; rounded. Slot Screen 145 SW Same as above (140 ft); very dense. Blow counts (147-148.5'): SB0164 0.0 23/50. Bottom of casing @ 1128. 150



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

Borehole ID: KAFB-106119

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|-----------------------------------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Well graded SAND (SW); brown (10YR 4/3); damp; medium dense; 100% fine to coarse sand to 3mm; rounded. | | Screen | Resumed drilling @ 1142. |
| 155 | - | | | | Same as above (150 ft); 95% very fine to very coarse sand; 5% fine gravel to 1.1cm. | | | Bottom of casing @ |
| 160 | - | | | | Same as above (150 ft); 95% very fine to very coarse sand; 5% fine gravel to 1.1cm. | | | 1145. Resumed drilling @ 1151. |
| 165 | - | | | | Same as above (150 ft); grading finer; no gravel. | SW | - Bentonite Seal | |
| <u>170</u> | - | | | | Same as above (150 ft); grading finer; some pumice. | | | |
| 175 | | | | | Same as above (150 ft). | | | Bottom of casing @ |
| 180 | | | | | | | | 1156. |



Project Number: 140705

Date TD Reached: 3/4/2011 Date Completed: 3/6/2011

Y Coordinate: 1473521.57

Ground Elevation AMSL (ft): 5343.5

Date Started: 3/3/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106119

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

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|--|-------------|------|------------------|-------------------|--|----------|----------------------|---------------------------|--|
| 08 Depth (ft) | Sample Type | | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - - - - - - - - - - | - | | | | 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. Same as above (180 ft). | | | | Resumed drilling @ 1237. |
| - <u>190</u> - | | | | | Same as above (180 ft). | | | | |
| <u>195</u> | - - - | 0165 | 0.0 | | Same as above (180 ft). | SW | | - Bentonite Seal | Blow counts (197-198.5'): |
| <u>200</u> | | | | | Same as above (180 ft); fine gravel to 2cm. | | | | 4/4. Bottom of casing @ 1242. Resumed drilling @ 1255. |
| 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 | | | |

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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

Borehole ID: KAFB-106119

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

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

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

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|---------------|-------------|--------|------------------|-------------------|---|-----------|---------|-------------------------|---|
| 10 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| | - | | | | 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). | | | | Resumed drilling @ 1308. |
| 225 | - | | | | Same as above (217 ft); predominantly | | | - Bentonite Seal | |
| <u>230</u> | - | | | | pumice. Same as above (217 ft); pumice and lithics. | SW | | | |
| <u>235</u> | - | | | | Same as above (217 ft); trace fine gravel to 2.7cm. | | | | |
| 240 | - | | | | | | | - Top of Filter Pack | Bottom of casing @ 1312. Resumed drilling @ 1319. |

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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

Borehole ID: KAFB-106119

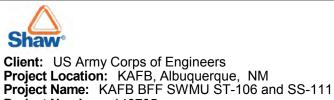
Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

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

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

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|----------------------------------|-------------|--------|------------------|-------------------|---|---------------|---|---|------------------------------------|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| - | - | | | | 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 | | 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. | | | | Plant counts (247, 248, 5') |
| - 250 - - | | SB0166 | 2.7 | | Same as above (244 ft); dense; 85% coarse sand; 15% fine to medium sand. | SP | | - Bottom of Screen | Blow counts (247-248.5') 14/23. |
| - 255_ - - | - | | | | Same as above (244 ft); 85% coarse sand; 15% fine to medium sand. | | | | |
| 260 | | | | | | | | -Bentonite Seal | 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 | | Demonite Seal | |
| <u>265</u> - - - 270 | | | | | 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 | | | |



Project Number: 140705

Date TD Reached: 3/4/2011 Date Completed: 3/6/2011

Y Coordinate: 1473521.57

Ground Elevation AMSL (ft): 5343.5

Date Started: 3/3/2011

Borehole ID: KAFB-106119

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

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

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

| | | rdinat | | | | Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert Page 10 of 16 | | | | | |
|---------------|------------------------------------|--------|------------------|-------------------|---|---|---|------------------|--|--|--|
| 05 Depth (ft) | Sample Type Number Headspace | | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks | | |
| - | - | | | | Well graded SAND (SW); brown (10YR 4/3); dry; dense; 100% very fine to very coarse sand; trace fine gravel to 6mm; subrounded. | | | | | | |
| <u>275</u> | - | | | | 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 yellowisi brown (10YR 4/4); dry; dense; 100% very fine to very coarse sand; trace fine gravel to 1.3cm; rounded. | | | | | | |
| 295 | | SB0167 | 5.5 | | Well graded SAND with Gravel (SW); dry; dense; 80% very fine to very coarse sand; 20% fine gravel to 3cm. | SW | | | Blow counts (297-298.5'): 12/27. Bottom of casing | | |
| 300 | | | | | | | | | @ 1408. Resumed drilling @ 1424. | | |



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 Hole Diameter U Hole Diameter U Surface Completer Completer States of the s

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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|---------------|-------------|--------|------------------|-------------------|---|----------|------------------|-----------------------------|--|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| 305 | - | | | | Silty SAND (SM); dark yellowish brown (10YR 4/4); moist; dense; 80% very fine to very coarse sand to 4mm; rounded; 20% silt. | SM | | | |
| | - | | | | 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. | | | | |
| 310 | - | | | | Same as above (305 ft). | SW | | | |
| 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. | | | | |
| 325 | | | | | Same as above (320 ft); no gravel. | SP | | | |
| 330 | | | | | | | | | |



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

Borehole ID: KAFB-106119

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

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

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

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|---------------------------|-------------|--------|------------------|-------------------|--|----------|----|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); dry; loose; 100% fine to medium sand. | | | | |
| - <u>335</u> - | | | | | Same as above (330 ft); 100% medium sand. | SP | | - Bentonite Seal | |
| - _ 340 | - | | | | | | | - Top of Filter Pack | Resumed drilling @ 1452. |
| - | | | | | 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. | <u> </u> | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| <u>345</u> - | | | | | Same as above (340 ft); grading coarser. | | | | |
| - | X | SB0168 | 2.9 | | | | | | Blow counts (347-348.5'): 5/10. Resumed drilling @ 1509. |
| <u>350</u> - - | | | | | Same as above (340 ft); medium dense; coarser. | SW | | - Bottom of Screen | |
| _ <u>355</u> _ _ | | | | | Same as above (340 ft); grading finer. | | | - Bentonite Seal | |
| - _ 360 | - | | | | | | | | Bottom of casing @ 1513. |



ShawHole DiClient: US Army Corps of EngineersHole DiProject Location: KAFB, Albuquerque, NMHole DiProject Name: KAFB BFF SWMU ST-106 and SS-111Surface

Date Started: 3/3/2011 Date TD Reached: 3/4/2011 Date Completed: 3/6/2011

Project Number: 140705

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

Borehole ID: KAFB-106119

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

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

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|---------------------------|-------------|--------|------------------|-------------------|--|----------|----------|-------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| - | | | | | 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. |
| <u>365</u> | | | | | Same as above (360 ft). | | | | |
| - 370 - | | | | | Same as above (360 ft); grading finer. | SW | | - Bentonite Seal | |
| <u>375</u> | | | | | 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. |
| <u>380</u> - - | | | | | Same as above (375 ft); trace fine gravel to 3cm. | SP | | | |
| - <u>385</u> - - | | | | | Same as above (375 ft). | | | - Native Backfill | |
| 390 | | | | | | | | | |



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

Borehole ID: KAFB-106119

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

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

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

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|----------------------|-------------|------------------|------------------|-------------------|--|----------|------------------|---|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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 | | |
| <u>395</u> | - | | | | Same as above (390 ft); 90% medium sand; 10% coarse sand. | | | |
| - - 400 | | SB0169 SB0170 | | | 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 |
| - | - | | | | Same as above (397 ft). | | | (398.5-400'): Not Recorded. Resumed drilling @ 1556. |
| 405 | - | | | | Same as above (397 ft); grading finer. | SW | - Bentonite Seal | |
| <u>410</u> - - | - | | | | Same as above (397 ft); grading finer. | | | |
| 415 | - | | | | Same as above (397 ft); grading coarser. | | | Bottom of casing @ 1602. |
| 420 | - | | | | | | | |



Project Number: 140705

Date TD Reached: 3/4/2011 Date Completed: 3/6/2011

Y Coordinate: 1473521.57

Ground Elevation AMSL (ft): 5343.5

Date Started: 3/3/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106119

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

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|--------------------|-------------|----------|------------------|-------------------|--|------------|----------|----|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | | We | II Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown 5/3); dry; dense; 100% medium to coarse sand to 2mm; rounded. | (10YR | | | | |
| 425 | - | | | | Same as above (420 ft). | SF | D | | | |
| - 430 - - | - | | | | Same as above (420 ft). | J. | | | - Bentonite Seal | |
| 435 | - | | | | Well graded SAND (SW); dark ye brown (10YR 4/4); moist; dense; S very fine to very coarse sand; trac vgravel to 1.5cm; rounded; 5% silt. | 95% / | | | | Resumed drilling @ |
| - 440 - | - | | | | Lean CLAY (CL); lense. Poorly graded SAND (SP); brown 5/3); moist; dense; 100% fine san 0.2mm; rounded. Note: strong odor from cuttings. | | | | - Top of Filter Pack - Top of 3" Schedule 80 PVC 0.050 Slot Screen | 1626. |
| 445 | - | | | | Same as above (437 ft); 100% me sand. | edium |) | | | |
| 450 | | SB0171 | 0.3 | | | | | | | Bottom of casing @ 1631. Blow counts (447-448.5'): 10/15. Resumed drilling @ |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

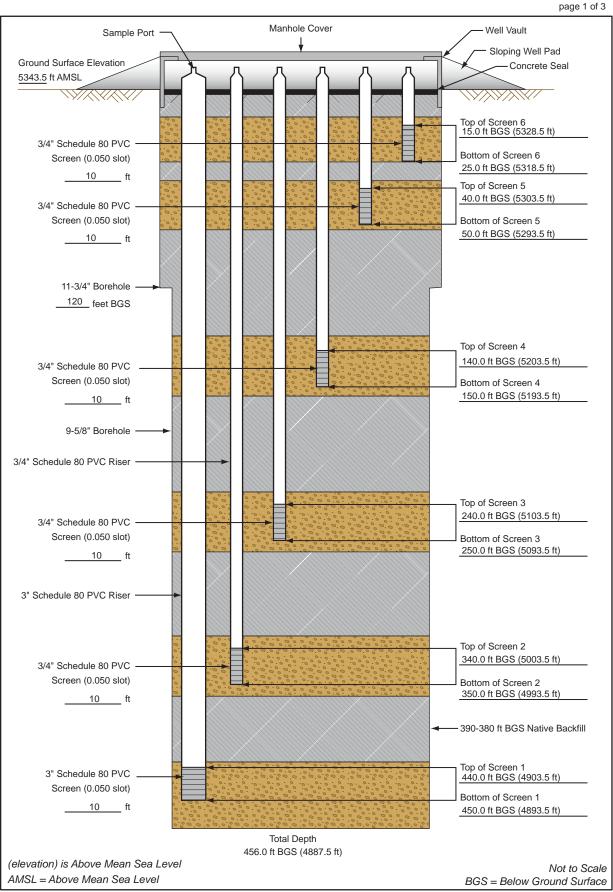
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| | | ordinat | e: 1 | 54161 | Logged | ву: с | lason larbert | Fage 16 01 16 |
|--------------|------------------|---------|------------------|-------------------|--|----------|----------------------------|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); moist; dense; 100% fine sand to 0.2mm; rounded. | | Screen | 1646. |
| 45 | 5 | | | | Same as above (450 ft). | SP | - Bottom of Filter Pack | |
| 460 | - -) - | | | | | | - Native Backfill | Total depth = 460 ft. Reached @ 1650 on |
| 46 | - | | | | | | | 3/4/11. Water added during drilling (gallons) = 0 |
| | - | | | | | | | Water added during construction (gallons) = 320 |
| 47(| -) - | | | | | | | Bottom of casing: TD the joint and ready to make new connection. |
| 47 | 5 | | | | | | | |
| | - | | | | | | | |
| 480 | וו | | 1 | | | | | |

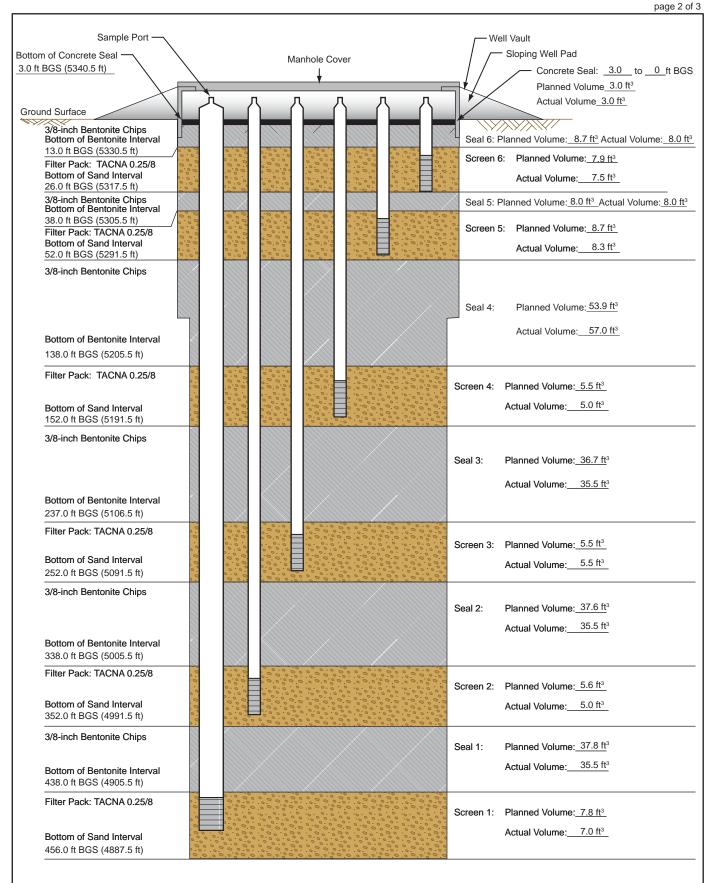
Nested Soil Vapor Well Completion Diagram for KAFB-106119

Installation Start Date/Time: 3/5/2011 @ 8:00 Installation End Date/Time: 3/6/2011 @ 15:00



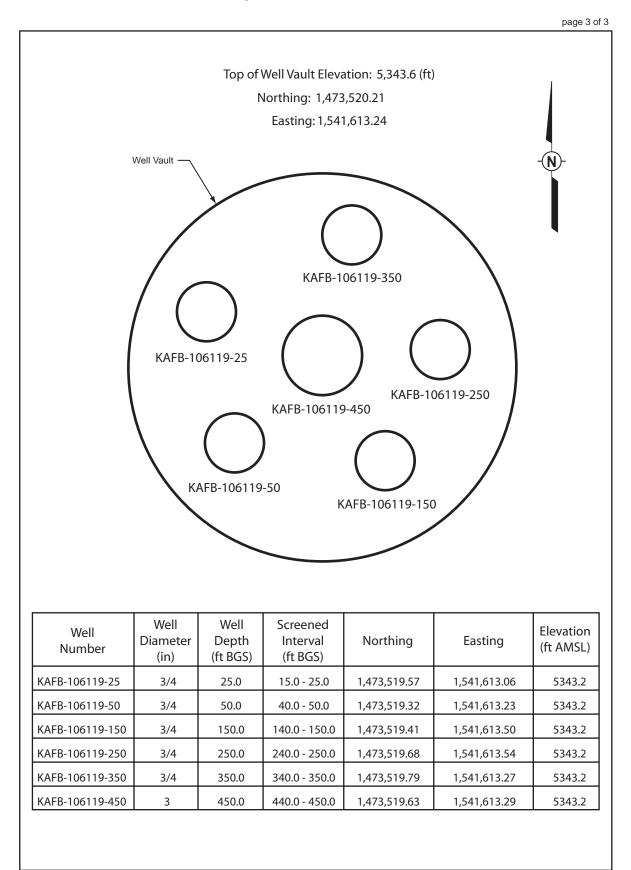
140705_CA010020_SV_KAFB.106119 (a)

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



140705_CA010020_SV_Map View_106119

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APPENDIX D-1

KAFB-106129 Final Well Report

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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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|------------|---|--------|------------------|-------------------|---|-----------|--|--|
| Oepth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | - | | | | No description recorded; disturbed. | | 222222 - Concrete Seal | Hand augered. |
| | | SB0300 | 0.0 | | Silty SAND (SM); light reddish brown (5YR 6/3); dry; loose; 60% very fine to fine sand; 10% fine gravel; 30% silt; trace clay. | | - Bentonite Seal | Began drilling @ 1145 on 3/1/11. Blow counts (7-8.5'): 9/11. |
| 10 | | | | | Same as above (5 ft). | SM | Top of Filter Pack | Stopped drilling @ 1200. Resumed drilling @ 1315. |
| 15 | | SB0301 | 0.0 | | 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. 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. | | | |
| 25 | | | | | Same as above (20 ft). | SC | - Bottom of Screen | |
| 30 | | 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 | - Bentonite Seal | Blow counts (28-29.5'): 11/22. Kelly down @ 1409. Resumed drilling |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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| | | aniat | J. I. | 7210 | 50.45 Logged | | | | | |
|---|--------------|------------------|------------------|---|---|-----------------------------|--|---|--|--|
| ଝ Depth (ft) | Sample Type | Number | Headspace PID | Material Description O. O. Well Diagram | | | | Remarks | | |
| | - | | | | 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. Same as above (31 ft); trace clay; mica flakes. | | | - Bentonite Seal | @ 1420. | |
| - - - - - - | | SB0303 | 0.0 | | Same as above (31 ft); dry; trace caliche. Same as above (31 ft); 5% coarse sand. | SP- SM | | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Blow counts (38-39.5'): 17/24. Kelly down @ 1435. Resumed drilling @ 1450. | |
| <u>45</u> - - 50 | \mathbb{H} | SB0304 SB0304 | 0.0 | | 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. Same as above (45 ft). | | | - Bottom of Screen | Blow counts (48-49.5'): 50/Not Recorded. Blow counts (49.5-51'): Not Recorded. Kelly down @ 1503. Resumed drilling | |
| - - - - - - - - - - - - - - - - - - - | - | | | | 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. Silty SAND (SM); yellowish red (5YR 5/6); dry; medium dense; 75% very fine to fine sand; subangular to subrounded; | ¯G₩- ∖ <u>G</u> M∠ SM | | - Bentonite Seal | @ 1526. | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|---------|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|------------------|-------------|--------|------------------|-------------------|---|----------|--------------|---|--|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagrar | m Remarks | |
| <u>95</u> 100 | | SB0305 | 0.0 | | 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. Same as above (90 ft); loose; trace fine gravel. Poorly graded SAND (SP); pale brown (10YR 6/3); dry; medium dense; 100% fine to medium sand; subangular to subrounded; primarily quartz. | SP | | Blow counts (98-99.5'): 14/23. Kelly down @ 1620. End of 3/1/11. Resumed drilling @ 0856 on 3/2/11. | |
| 110 | - | | | | 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. Same as above (105 ft); yellowish brown (10YR 5/4). | | - Bentonite | Seal | |
| <u>115</u> | - | | | | Same as above (105 ft); light yellowish brown (10YR 6/4). | SW | | | |

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Project Number: 140705

Y Coordinate: 1473262.72

Date Started: 3/1/2011 Date TD Reached: 3/3/2011 Date Completed: 3/6/2011

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Ground Elevation AMSL (ft): 5348.4

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|----------------------|-------------|--------|------------------|-------------------|---|-----------|---------|--|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | ell Diagram | Remarks |
| 125 | | | | | 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. |
| 130 | | | | | 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 | | - Bentonite Seal | |
| - | | | | | 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 | | | |
| 135 | | | | | Sandy lean CLAY (CL); brown (7.5YR 5/4); moist; firm; low plasticity; 60% clay; 40% fine sand; subrounded. | | | - Top of Filter Pack | |
| <u>140</u> - - | | | | | Same as above (135 ft); light brown (7.5YR 6/3); dry. | CL | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| <u>145</u> - | | | | | 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 | X | SB0306 | 2.0 | | GRAVEL (GP); lense. | GP | | | Blow counts (148-149.5'): 13/23. Kelly down @ 1420. Resumed drilling |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | Poorly graded SAND (SP); very pale brown (10YR 7/4); dry; medium dense; 80% fine sand; 15% medium sand; 5% coarse sand; subrounded. | SP | Screen | @ 1434. |
| 155 | - | | | | Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 80% fine sand; subrounded; 20% clay. | SC | | |
| 165 | - | | | | 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. |
| 170 | | | | | Clayey SAND (SC); brown (7.5YR 5/4); slightly moist; medium dense; 80% fine sand; subrounded; 20% clay. | SC | - Bentonite Seal | |
| | - | | | | 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. | | | |
| 175 | | | | | Same as above (170 ft); finer sand. | SP | | |
| 180 | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|---------------------------|-------------|--------|------------------|-------------------|--|-----------------|------------------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | Well graded SAND (SW); yellowish brown (10YR 5/4); moist; loose; 100% fine to coarse sand; subrounded; trace coarse gravel. | | | Kelly down @ 1505. |
| <u>185</u> - - | | | | | Same as above (180 ft); more fine and medium sand. | sw | | |
| - <u>190</u> - - | | | | | 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 | X | SB0307 | 1.5 | | Sanu. | | | Blow counts (198-199.5' 21/32. Blow counts (199.5-201'): 35/40. Kell |
| | | 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. | | | down @ 1525. Resumed drilling @ 1545. |
| 205 | | | | | Same as above (200 ft). | SP | | |
| - - 210 | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|------------|-------------|--------|------------------|-------------------|--|---------------|-------------------------|---|
| Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | | | | | Well graded SAND with Gravel (SW). | SW | | |
| | | | | | Poorly graded SAND (SP); light brownish gray (10YR 6/2); 95% medium to coarse sand; 5% coarse gravel. | SP | | |
| | | | | | 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. | | - Bentonite Seal | Kelly down @ 1600. Resumed drilling @ 1608. |
| - | | | | | 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. | SW | | |
| 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 | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|--------------|-------------|---------|------------------|-------------------|--|----------|-----------|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Di | iagram | Remarks |
| | _ | | | | 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 | Sci PV | p of 3/4" hedule 80 ′C 0.050 ot Screen | Kelly down @ 1620. Resumed drilling @ 1630. |
| 245 | | SB0309 | 0.7 | | Well graded SAND with Gravel (SW); grayish brown (10YR 5/2); 70% fine to medium sand; subangular; 30% coarse gravel to 60mm. | sw | | | Blow counts (248.5-250'): 27/35. Kelly down @ |
| | - | | | | Poorly graded SAND with Gravel (SW); grayish brown (10YR 5/2); 70% fine to medium sand; subangular; 30% coarse gravel to 60mm. | | | ttom of reen | 1635. |
| 255 | | | | | Same as above (250 ft). | SP | | | |
| <u>260</u> | | | | | Clayey SAND (SC); light brownish gray (10YR 6/2); dry; dense; 70% fine sand; 30% clay. | | Be | ntonite Seal | End of 3/2/11. Resumed drilling @ 0750 on 3/3/11. |
| 265 | | | | | Same as above (260 ft). | sc | | | |
| 270 | | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|---------------------------------|-------------|---|-------|-------|--|----------|------------------|--|
| 05 Depth (ft) | Sample Type | Sample Lype Number Headspace PID Lithologic | | | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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 | | |
| - <u>280</u> - - | | | | | Same as above (270 ft). | | | |
| - 2 <u>85</u> - | | | | | Sandy SILT (ML); brown (10YR 5/3); slightly moist; firm; 70% silt; 30% fine sand. | | - Bentonite Seal | |
| - - 2 <u>90</u> - - | | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; medium dense; 90% fine sand; 5% medium sand; 5% coarse sand; | | | |
| - 295 - | | | | | subangular to subrounded. Same as above (290 ft). | SP | | Blow counts (297-298.5 |
| - - 300 | | SB0310 | 0.0 | | | | | 18/27. Kelly down @ 0820. Resumed drilling @ 0843. |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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|-------------------|-------------|--------|------------------|-------------------|--|----------|------------------|--------------------|
| 60 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 305 | - | | | | 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. 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; | | | |
| 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. |
| <u>325</u> 330 | | | | | Same as above (320 ft). | SW | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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| | ,00 | rumat | C. I. | | | Dy. 1 | | Verner | - |
|--------------------------------|-------------|--------|------------------|-------------------|---|----------|----|--|---|
| S Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - - 335 | | | | | 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. Same as above (330 ft); 5% gravel to 50mm. | | | - Bentonite Seal - Top of Filter Pack | |
| - - <u>340</u> - - | | | | | Same as above (330 ft); 40% coarse sand; 25% medium sand; 25% fine sand; rounded to subrounded; 10% gravel to 40mm. | SW | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 0920. Resumed drilling @ 0928. |
| - 345 - - | | SB0311 | 17.3 | | 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 | 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 | | Scieen | Kelly down @ 0937. Resumed drilling @ 0956. |
| - <u>355</u> - - - | | | | | 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 | | - Bentonite Seal | |
| 360 | | | | | | | | | |



Corps of Engineers Hole Diameter Upper (in.): 11-3/4

Client: US 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
|---------------------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|--|
| - | - | | | | 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. | |
| <u>365</u> - - | - | | | | 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. | | | | |
| <u>375</u> - - - | - | | | | 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 | | |
| <u>380</u> - - | - | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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| ~ ~ ~ | | Junat | J. 1. | 04210 | LUYYEU | Dy. v | viniani v | Verner | - |
|----------------------------------|-------------|--------|---|-------|---|-------|-----------------------------|------------------|---|
| 66 Depth (ft) | Sample Type | Number | Number Headspace PID Lithologic Log | | Material Description | | ທີ່ O. ທີ່ Diagram | | Remarks |
| | - | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); slightly moist; medium dense; 80% medium sand; 10% coarse sand; 10% fine sand. | SP | | | |
| <u>395</u> - - - 400 | | SB0312 | 1.7 | | Well graded SAND (SW); yellowish brown (10YR 5/4); slightly moist; medium dense; 100% fine to coarse sand. | sw | | | Blow counts (397-398.5'): 21/29. Kelly down @ 1055. Resumed drilling @ 1115. |
| | - | | | | 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. | | | | |
| <u>405</u> - - | - | | | | Same as above (400 ft); trace coarse sand. | SP | | - Bentonite Seal | |
| 410 | - | | | | Same as above (400 ft). | | | | |
| <u>415</u> - - | - | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); slightly moist; medium dense; 100% fine to coarse sand. | sw | | | |
| 420 | | | | | | | | | |



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

Borehole ID: KAFB-106129

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner

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| ~ ~ ~ | 500 | iunau | J. I. | 04213 | 0.45 LOgged | Dy. | villiam v | Verner | |
|---------------|-------------|--------|------------------|-------------------|---|----------|-----------|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); slightly moist; medium dense; 100% fine to coarse sand; trace fine gravel. | | | | Kelly down @ 1130. |
| 425 - - | - | | | | Same as above (420 ft); 50% fine sand; 25% medium sand; 25% coarse sand; no gravel. | SW | | - 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. |
| <u>435</u> | - | | | | 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 | |
| 445 | - | | | | 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. |
| 450 | | SB0313 | 1.1 | | 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 | | | Blow counts (447-448.5'): 17/24. |

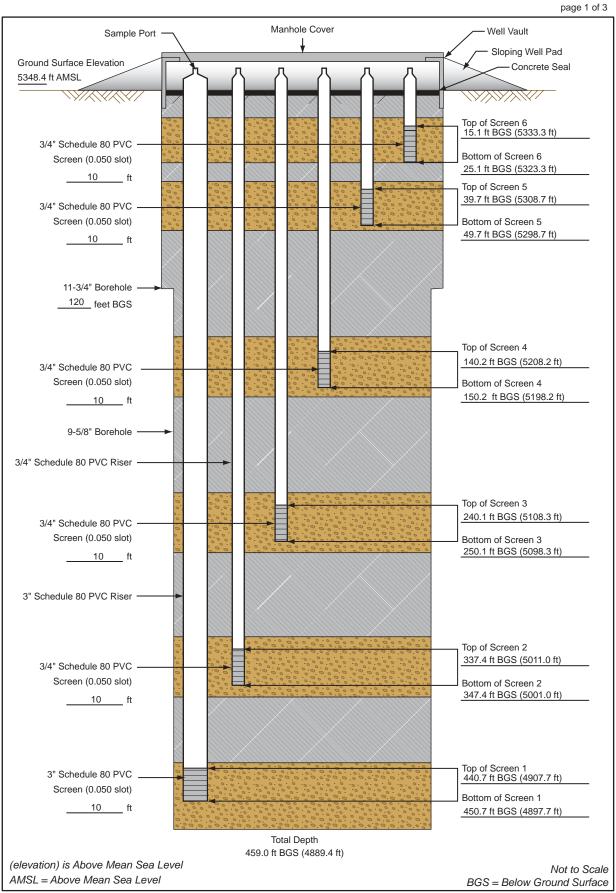
| Shaw | | | | | | | | | | | |
|------------------------------|---------------|------------------|-------------------|---|---|----------|-----------------------|--|--|--|--|
| Projec | t Loca Nam | ation ie: K | : KA (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 705 | Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount | | | | | | |
| Date S | Started | l: 3/ ache | 1/201 d: 3/ | 1 3/2011 | Groundwater Levels BGS (ft): | | | | | | |
| Groun Y Coo X Coo | rdinate | e: 14 | 17326 | | Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: William Werner Page 16 of 16 | | | | | | |
| 65 Depth (ft) Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks | | | |
| - | | | | Poorly graded SAND (SP); brow 5/3); moist; medium dense; 80% sand; 10% medium sand; 10% c sand; trace coarse gravel to 30m | fine oarse | SP | - Bottom of Screen | | | | |
| 455 | | | | Lean CLAY with Sand (CL); gray brown (10YR 5/2); moist; firm; 7(15% silt; 15% fine sand; trace cc sand and gravel. | 0% clay; barse | CL | | | | | |
| 460 | | | | Poorly graded SAND (SP); brow 5/3); moist; medium dense; 80% sand; 10% medium sand; 10% c sand; trace coarse gravel to 30m slight petroleum odor. | fine coarse nm; | SP SW | - Native Backfill | Total depth = 460 ft. Reached @ 1348 on | | | |
| - | | | | Well graded SAND (SW); yellow brown (10YR 5/4); moist; mediur 40% fine sand; 30% medium sar coarse sand; 5% fine to coarse g 25mm. | n dense; nd; 25% | | | 3/3/11. Water added druing 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 | | | | | | | | | | | |

Borehole ID: KAFB-106129

KAFB_BOREHOLE_LOG - SHAW_DRILLING.GDT - 4/26/11 13:08 - Z:\KAFB BFFIGINTIKAFB_PROJECTIKAFB_BFF.GPJ

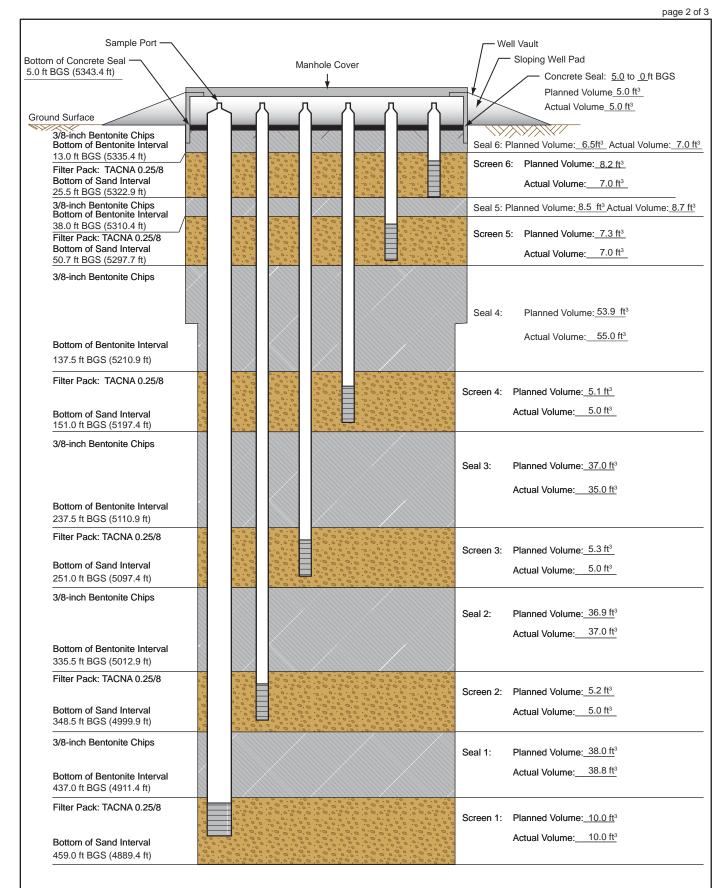
Nested Soil Vapor Well Completion Diagram for KAFB-106129

Installation Start Date/Time: <u>3/3/2011 @ 16:40</u> Installation End Date/Time: <u>3/6/2011 @ 14:30</u>



140705_CA010020_SV_KAFB.106129 (a)

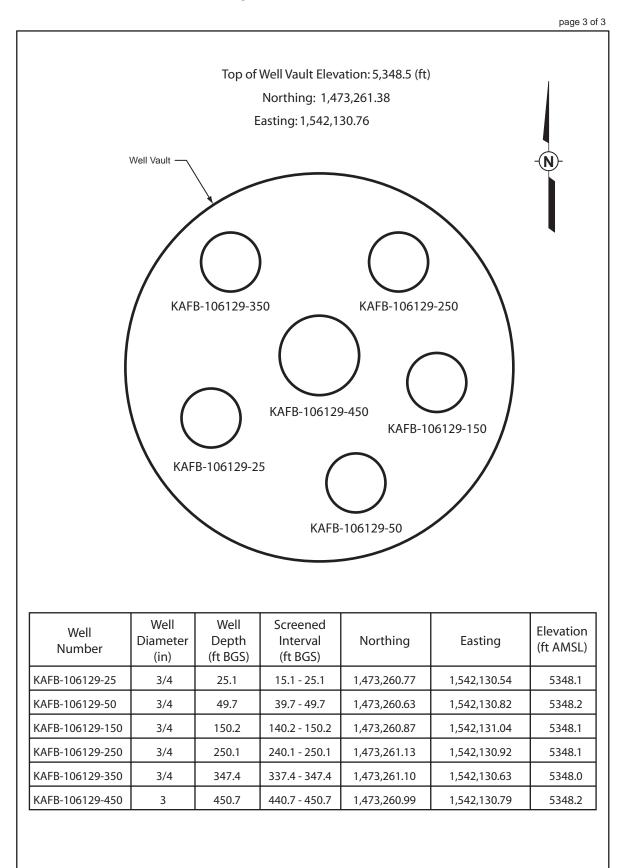
Nested Soil Vapor Well Completion Diagram for KAFB-106129



(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



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APPENDIX D-1

KAFB-106130 Final Well Report

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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

Borehole ID: KAFB-106130

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

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

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

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| Logged By. Jason Tarbert | | | | | | | | |
|--------------------------|-------------|--------------------|------------------|-------------------|---|----------|--|--------------------------------------|
| ⊖ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 or 2/17/11. |
| 10 | - | SB0314 | 0.0 | | Sandy SILT (ML); brown (7.5YR 5/4); dry; very stiff; low plasticity; 70% silt; | | - Bentonite Seal | Blow counts (8.5-10'): 8/15. |
| - | - | | | | 25% fine sand; 5% fine gravel to 8mm. | | - Top of Filter Pack | |
| <u>15</u> | - | | | | Same as above (10 ft). | ML | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 20 | | SB0315 | 0.0 | | | | | Blow counts (18.5-20'): 10/15. |
| | - | | | | 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. | | | Resumed drilling @ 1556. |
| 25 | | | | | SILT with Sand (ML); reddish brown (5YR 4/4); dry; nonplastic; 85% silt; 15% very fine sand. | | - Bottom of Screen | |
| 30 | | SB0316, SB0316- | | | | | - Bentonite Seal | Blow counts (28.5-30'): 13/37. |



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

Borehole ID: KAFB-106130

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

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

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

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| | | | | | Dy. 0 | | |
|-------------------------------|-----------------------|-----------|------------|--|----------|--|--|
| සි Depth (ft) | Sample Type Number | Headspace | Lithologic | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | SB03 MS | 16- 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 | | |
| 40 | SB03 | 17 0.0 | - | Same as above (30 ft). | | Pack - 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. |
| | SB03 | 18 0.8 | | Lean CLAY (CL); brown (7.5YR 5/4); dry; hard; low plasticity; 60% clay; 40% silt; trace coarse sand to 4mm; subangular. | CL | | Blow counts (48.5-50'): 17/50. Kelly down @ |
| - | | | | SILT (ML); light reddish brown (5YR 6/4); dry; hard; low plasticity; 90% silt; 10% fine sand; trace fine gravel to 8cm; rounded. | | • Pottom of Screen | 1709. End of 02/17/11. Resume drilling @ 0815 on 02/18/11. |
| <u>55</u> - - - - | | | | 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 | |



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

Borehole ID: KAFB-106130

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

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

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

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| | | | | | | , | | |
|--------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | |
| | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| 100 | | SB0319 | 0.7 | | Same as above (90 ft); dry; very stiff; trace clay nodules. | ML | | 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 |
| <u>105</u> | - | | | | 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 | @ 1134. Resumed drilling @ 1143. |
| <u>110</u> | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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| 7.0 | .00 | aniat | C. I | | | <u> </u> | | | |
|----------------------|-------------|--------|------------------|-------------------|--|----------|----|------------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | 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. |
| <u>125</u> - - | | | | | SILT (ML); brown (7.5YR 5/4); moist; hard; low plasticity; 80% silt; 10% clay; 10% very fine sand to 0.1mm. | | | | |
| <u>130</u> | | | | | Same as above (125 ft); trace coarse sand to 3mm; rounded. | | | | |
| - - 135 | | | | | Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; low plasticity; 80% clay; 20% silt. | CL | | - Bentonite Seal | |
| - | | | | | SILT with Sand (ML); brown (7.5YR 5/4); dry; hard; low plasticity; 85% silt; 15% very fine to coarse sand to 4mm. | | | | |
| - | | | | | | ML | | | |
| <u>140</u> | | | | | Same as above (135); 75% silt; 10% clay; 15% very fine sand. | | | | Resumed drilling @ 1619. |
| - - - | | | | | Lean CLAY (CL); brown (7.5YR 5/3); moist; hard; low plasticity; 90% clay; 10% silt. | | | | |
| <u>145</u> - | | | | | Same as above (142 ft). | CL | | - Top of Filter | |
| - - 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 | | Pack | Blow counts (148.5-150') 29/50. |



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

Borehole ID: KAFB-106130

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

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

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

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| 05 Depth (ft) Sample Type | | Number | Headspace PID | Lithologic Log | | Ś | | | |
|------------------------------|---|--------|------------------|-------------------|---|-----------|----|--|-----------------------------|
| | _ | | He | Litho | Material Description | U.S.C. | We | ll Diagram | Remarks |
| 155 | | | | | subrounded. | SW | | Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Resumed drilling @ 1640. |
| 160 | | | | | 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. | | | | |
| - | | | | | 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 | | | |
| <u>170</u> - - - | | | | | Sandy SILT (ML); brown (10YR 5/3); moist; hard; nonplastic; 70% silt; 30% very fine to very coarse sand to 4mm. | | | - Bentonite Seal | |
| 175 | | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 100% fine to medium sand to 0.5mm; subrounded. | SP | | | |



Project Number: 140705

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

Y Coordinate: 1473567.70

Ground Elevation AMSL (ft): 5349.0

Date Started: 2/17/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106130

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

| | | ordinat | | | | Iling Method: Air Rotary Casing Hammer gged By: Jason Tarbert Page 7 of 16 | | | | |
|---------------|-------------|---------|------------------|-------------------|--|---|----|-----------------|---|--|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks | |
| | - | | | | 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 | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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| | X Coordinate: 1542131.09 Logged By: Jason Tarbert Page o of 16 | | | | | | | |
|--------------|--|--------|------------------|-------------------|---|----------|-----------------------|--|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | _ | | | | Poorly graded SAND (SP); brown (10YR 5/3); damp; dense; 85% fine sand; 15% medium to coarse sand; rounded; trace fines. | SP | | |
| | - | | | | 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 @ |
| 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 | 0941. |
| 230 | - | | | | Well graded SAND (SW); grayish brown (10YR 5/2); damp; dense; 100% very fine to coarse sand to 4mm; subrounded. | | | |
| 235 | | | | | Same as above (228 ft); trace fine gravel to 1.2cm. | SW | Top of Filter Pack | |



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

Borehole ID: KAFB-106130

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

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

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

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|-----------------|-------------|--------|------------------|-------------------|--|---------------|---|--|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | _ | | | | 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. | | Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 0949. Resumed drilling @ 0957. Bit packed off. |
| <u>245</u> | _ | | | | 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. |
| | _ | | | | Same as above (245 ft); grading finer. | | | |
| <u>260</u> - | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 25 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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). Lean CLAY (CL); brown (7.5YR 4/4); moist; hard; low plasticity; 70% clay; | CL | - Bentonite Seal | |
| <u>290</u> | | | | | 30% silt. 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 | | Blow counts (298.5-300'): |
| 300 | 1// | SB0323 | 0.9 | | | | | 31/50. |



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

Borehole ID: KAFB-106130

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

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

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

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|--------------|-------------|--------|------------------|---|--|----------|------------------|--|
| S Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | N / | 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. | | | |
| <u>310</u> | - | | | | 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. |
| <u>325</u> | - | | | | 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 | | | | | | | | |

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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

Borehole ID: KAFB-106130

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

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

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

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|----------------------|-------------|---------|------------------|-------------------|--|----------|--|---|
| ଝ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. | | - Bentonite Seal | |
| 335 | - | | | | Same as above (330 ft); 85% very fine to very coarse sand; 15% fine gravel to 2.4cm. | SW | Top of Filter Pack | |
| <u>340</u> | - | | | | 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 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1140. Resumed drilling @ 1230. |
| - <u>345</u> - | - | | | | 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. | | | |
| 350 - - | | SB0325 | 0.6 | | Same as above (343 ft); medium dense; trace clay nodules. | SW | - Bottom of Screen | Blow counts (348.5-350') 10/12. Resumed drilling @ 1251. |
| 355 - - | | | | | 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 | |
| - 360 | - | | | | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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|--------------------------|-------------|--------|------------------|-------------------|---|----------|-----------------|---|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| <u>365</u> <u>370</u> | - | | | | 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. Well graded SAND with Gravel (SW); brown (10YR 5/3); dry; dense; 85% very fine to very coarse sand; 15% fine gravel | | | |
| <u>375</u> | | | | | 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 Sea | |
| <u>380</u> | - | | | | Same as above (375 ft); moist; trace clay nodules. | | | Kelly down @ 1306. Resumed drilling @ 1315. |
| <u>385</u> 390 | - | | | | Same as above (375 ft); trace clay nodules. | | | |



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

Borehole ID: KAFB-106130

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 | | |
| <u>395</u> | - | | | | 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. | | | Plaw counts (208 5 400') |
| <u>400</u> | | SB0326 | 0.6 | | 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. Kelly down @ 1321. Resumed drilling @ 1340. |
| 405 | - | | | | Same as above (398 ft); no gravel. | | - Bentonite Seal | |
| 410 | - | | | | Same as above (398 ft); grading finer. | SW | | |
| <u>415</u> | - | | | | Same as above (398 ft); finer. | | | |
| 420 | | | | | | | | |



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

Borehole ID: KAFB-106130

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

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

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

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|---------------|-------------|--------|------------------|-------------------|---|----------|----|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | _ | | | | 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 | | | |
| <u>435</u> | - | | | | 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. |



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

Borehole ID: KAFB-106130

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

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

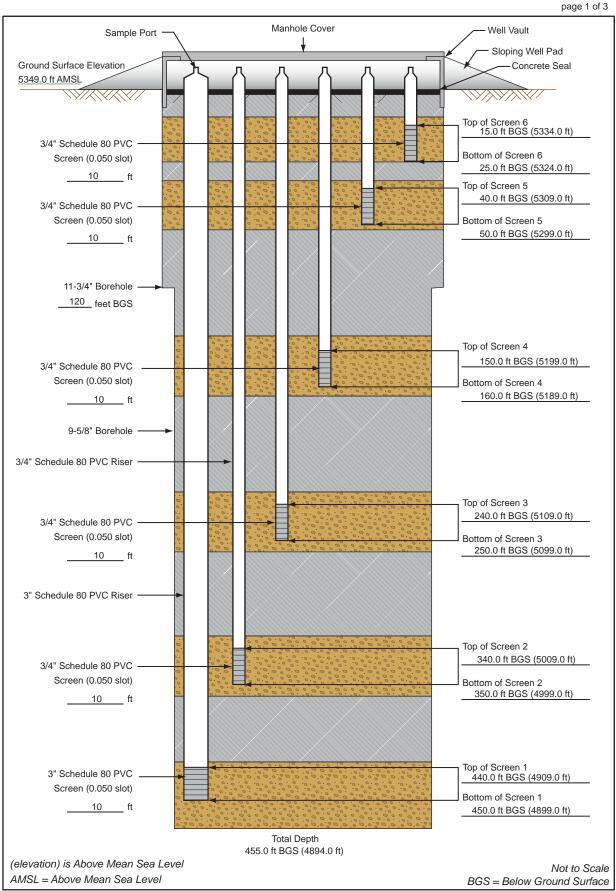
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|--------------|-------------|------------------|------------------|-------------------|--|---|--------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | | SB0327 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 | 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. |
| - | - | | | <u> </u> | | | | Total depth = 455 ft. Reached @ 1512 on 02/19/2011. |
| <u>460</u> | - | | | | | | | Water added during drilling (gallons) = 0 Water added during |
| 465 | - | | | | | | | construction (gallons) = Not Recorded Kelly down: TD the joint |
| | - | | | | | | | and ready to make new connection |
| 470 | - | | | | | | | |
| | - | | | | | | | |
| <u>475</u> | | | | | | | | |
| 480 | - | | | | | | | |

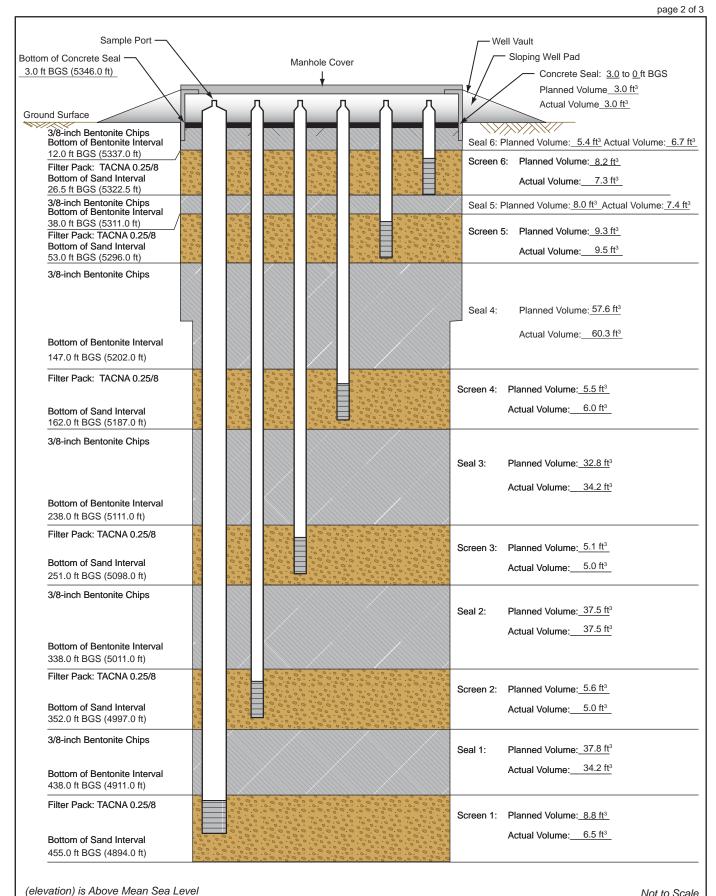
Nested Soil Vapor Well Completion Diagram for KAFB-106130

Installation Start Date/Time: <u>2/20/2011 @ 09:22</u> Installation End Date/Time: <u>2/21/2011 @ 16:45</u>



140705_CA010020_SV_KAFB.106130 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106130

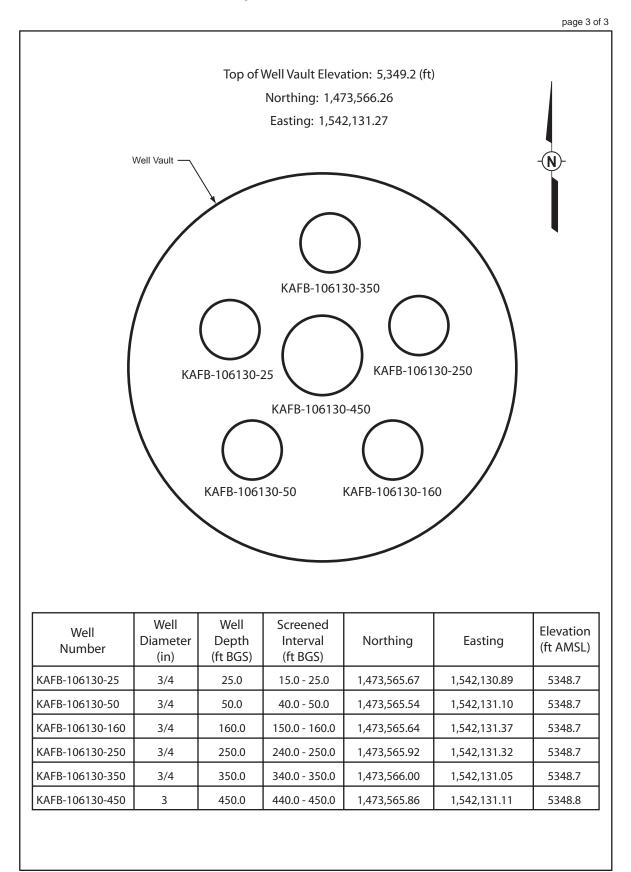


All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106130 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106130



140705_CA010020_SV_Map View_106130

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APPENDIX D-1

KAFB-106131 Final Well Report

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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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|------------|-------------|--------|------------------|-------------------|--|----------|--|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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 | | SB0328 | 0.1 | | Lean CLAY (CL); light reddish brown | | - Bentonite Seal | Blow counts (8.5-10'): 11/22/26. New 10' connection @ |
| | _ | | | | (5YR 6/4); moist; soft; low to medium plasticity; 95% clay; 5% sand; no odor. | | Pack | 1245. |
| 15 | - | | | | Same as above (10 ft). | CL | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 20 | | SB0329 | 0.0 | | Same as above (10 ft). | | | Blow counts (18.5-20'): 17/25/27. New 10' connection @ 1310. |
| 25 | - | | | | Silty GRAVEL (GM); reddish brown (5YR 5/4); moist; 70% gravel; angular to subrounded; 30% silt; no odor. | GM | | |
| | | | | | Lean CLAY (CL); yellowish red (5YR 4/6); moist; soft; low plasticity; 70% clay; 20% silt; 10% gravel; angular to subrounded; no odor. | CL | Bertavita Cool | |
| 30 | | SB0330 | 0.0 | | | | - Bentonite Seal | Blow counts (28.5-30'): 11/22/31. Blow counts |

| Shaw | | | Bore | eho | le ID | : KAFB- | 106131 |
|--|---------------------------------------|--|-----------|-------------------|--|--|---|
| Project Loc | ation: KA ne: KAFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 705 | Hole Dia | ametei | Lower | (in.): 11-3/4 (in.): 9-5/8 ype: Flush mo | unt |
| Date Starte Date TD Re Date Comp | d: 3/2/201 eached: 3/ | 1 5/2011 | 👤 At E | Time of End of | Levels E f Drilling Drilling: ng: N/A | : N/A N/A | |
| | vation AMS te: 147292 | GL (ft): 5344.4 29.18 | Drillling | Contra Metho | actor: V d: Air R | VDC Drilling Rotary Casing H | ammer Page 2 of 16 |
| ତ Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | | U.S.C.S. | We | ell Diagram | Remarks |
| SB0337 | 1 0.0 | Lean CLAY (CL); yellowish red (4/6); moist; hard; low plasticity; 7 clay; 20% silt; 10% gravel; angul subrounded; no odor. | '0% | CL | | | (30-31.5'): 12/26/50. New 10' connection @ 1345. |
| | | GRAVEL (GW); lense. | | GW | | | |
| 35 | | Lean CLAY with Gravel (CL); pir 7/4); moist; medium plasticity; 80 20% gravel to 0.75cm; no odor. | | | | - Bentonite Seal | |
| 40 SB0332 | 2 0.0 | Lean CLAY with Sand (CL); yello red (5YR 5/6); moist; firm; non to plasticity; 80% clay; 20% sand; r | low | CL | | - Top of Filter Pack | Blow counts (38.5-40'): 16/28/46. New 10' connection @ 1405. |
| 45 | | Same as above (40 ft). | | | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| | 3 0.0 | | | | | | Blow counts (48.5-50'): 9/15/46. Blow counts |
| 50 SB0333 | 3 | Well graded SAND with Gravel (pink (5YR 7/4); dry to moist; 70% 30% coarse gravel to 2cm; suba no odor. | sand; | SW | | | (50-51.5'): 11/42/50. New 10' connection @ 1435. |
| 60 | | Lean CLAY with Sand (CL); yello red (5YR 5/6); moist; firm; non to plasticity; 80% clay; 20% sand; r | low | CL | | - Bottom of Screen | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| A coordinate: 1341030.05 | | | | | | | | | |
|--------------------------|-----------------------|--------|---|------------------|-------------------|---|----------|------------------|-------------------------------|
| 0 Danth (#) | | Number | 5 | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | | Gravelly SILT (ML); reddish yellow (5YR 6/6); moist; soft; 55% silt; 45% gravel to 1cm; rounded; no odor. | | | New 20' connection @ 1445. |
| 6 | 5 | | | | | Same as above (60 ft); 70% silt; 30% gravel. | | | |
| 7 | 0 | | | | | Same as above (60 ft). | | | |
| 7 | 5 | | | | | SILT (ML); reddish yellow (5YR 6/6); moist; soft; 70% silt; 25% clay; 5% gravel to 2cm; rounded. | ML | - Bentonite Seal | |
| 8 | - 0 - - - | | | | | SILT (ML); reddish yellow (5YR 6/6); dry; soft; low plasticity; 65% silt; 30% clay; 5% gravel; no odor. | | | New 20' connection @ 1500. |
| 8 | 5 | | | | | Same as above (80 ft); 10% gravel. | | | |
| 9 | 0 | | | | | | | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| ଓ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; non to low plasticity; 85% clay; 15% silt; no odor. | CL | | |
| | | SB0334 | 0.0 | | Silty SAND (SM); light brown (7.5YR 6/4); moist; loose to dense; 75% sand; 25% silt with clay; no odor. | SM | | Blow counts (98.5-100'): 6/8/12. Blow counts |
| | | 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 | | (100-101.5'): 16/19/22. New 20' connection @ 1530. |
| | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% fine to coarse sand; no odor. | SP | - Bentonite Seal | |
| - | - | | | <u></u> | SILT (ML); reddish yellow (5YR 6/6); moist; hard; low plasticity; 65% silt; 30% clay; 5% gravel; no odor. | | | |
| <u>115</u> - - | - | | | | Same as above (110 ft). | ML | | |
| 120 | | | | | | | | End of 3/2/11. |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
|---------------|-------------|-------------------|------------------|-------------------|--|----------|---|---|---|
| - | - | | | | 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. |
| <u>125</u> | - | | | | 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 | |
| <u>135</u> | - | | | | Same as above (125 ft). | | | T (51) | |
| 140 - - | - | | | | Well graded SAND (SW); light brown (7.5YR 6/4); moist; dense to medium dense; 100% sand; subangular; no odor. | | | - Top of Filter Pack - 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 |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 05 Depth (ft) | Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | MSD | 5- 0.0 | SILT (ML): reddish yellow (5YR 6/6); moist; hard; non to low plasticity; 95% silt with clay; 5% sand; no odor. | ML | Screen | (150-151.5'): 15/26/42. New 10' connection @ 0955. |
| <u>155</u> - - | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense to medium dense; 95% sand; 5% fine gravel to 1cm; no odor. | | | |
| <u>160</u> | - | | Same as above (155 ft). | | | New 20' connection @ 1005. |
| <u>165</u> | | | Same as above (155 ft); 10% gravel to 0.5cm; coarsens downward. | SP | - Bentonite Seal | |
| <u>170</u> | - | | 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 | | | | | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 185 | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/4); moist; dense; 95% sand; 5% fine gravel; no odor. | SP | | New 20' connection @ 1025. |
| | - | | | | Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; 80% sand; 15% gravel; 5% silt and clay; no odor. | | | |
| <u>190</u> 195 | - | | | | Same as above (185 ft). | SW | Destacite Occi | |
| | - | | | | SILT (ML); brown (7.5YR 5/3); moist; soft; 90% silt with clay; 10% gravel to 2.5cm; subrounded; no odor. | ML | - Bentonite Seal | Blow counts (198.5-200'): |
| 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 | | 16/32/41. New 20' connection @ 1110. |
| <u>205</u> 210 | - | | | | Well graded SAND (SW); brown (7.5YR 5/3); dry; loose to medium dense; 100% sand; no odor. | sw | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - - 215 | | | | | 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. Same as above (210 ft). | CL | | |
| - | | | | | 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. Well graded SAND with Gravel (SW); light brown (7.5YR 6/3); moist; 85% sand; 15% coarse gravel to 0.5cm; no | SW | - - Bentonite Seal | |
| 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 | Top of Filler | |
| - 235 - - | - | | | | 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 Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 240 | | | | | | | | |

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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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|---------------------------|-------------|--------|------------------|-------------------|---|-----------|-----------------------|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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 | | New 10' connection @ 1235. |
| <u>245</u> - - | | | | | Lean CLAY (CL); light brown (7.5YR 6/4); dry; hard; medium to high plasticity; clay with silt; gravel; no odor. | | - Bottom of Screen | |
| <u>250</u> - - | | SB0337 | 0.0 | | Same as above (245 ft); nonplastic; no gravel. | CL | | Blow counts (248.5-250'): 19/46/50. New 10' connection @ 1310. |
| 255 | - | | | | 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 | - Bentonite Seal | |
| <u>260</u> - - - | - | | | | Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; medium plasticity; clay with silt; no odor. | | | New 20' connection @ 1505. |
| <u>265</u> - - - | | | | | 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. | CL | | |
| 270 | | | | | | | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|----------------------------|-------------|--------|------------------|-------------------|--|----------------|------------------|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | Lean CLAY (CL); brown (7.5YR 5/4); moist; hard; medium plasticity; 100% clay with silt; no odor. | | | |
| _ 275 _ - | | | | | Same as above (270 ft). | CL | | |
| - <u>280</u> - - | - | | | | Well graded SAND with Gravel (SW); pink (7.5YR 7/3); dry; loose; 85% sand; 15% coarse gravel; no odor. | | | New 20' connection @ 1550. |
| - _ _ _ _ _ | | | | | Same as above (278 ft); 40% gravel; angular to subrounded. | sw | - Bentonite Seal | |
| _ <u>290</u> _ _ | | | | | Poorly graded SAND (SP); very coarse; angular to subangular. | | | |
| - <u>295</u> - - | - | | | | Same as above (290 ft); fines downward. | SP | | |
| - _ 300 | X | SB0338 | 0.0 | 000 | GRAVEL (GP); lense; gravel to 2cm; | GP | | Blow counts (298.5-300'): 10/26/41. |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| <u>310</u> | - | | | | 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. Well graded SAND with Gravel (SW); | GW | | New 20' connection @ |
| | - | | | | pink (7.5YR 7/3); dry; loose; 60% sand; 40% gravel to 5cm; subangular to rounded; no odor. | | | 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 | - | | | | | | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|----------------------|-------------|--------|------------------|-------------------|---|----------|----|--|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | Poorly graded SAND (SP); pink (7.5YR 7/3); dry; 80% fine sand; 20% medium to coarse sand; no odor. | SP | | | |
| - 335 - | | | | | 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 | |
| - - 340 | - | | | | 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 | |
| - - - | | | | | Poorly graded SAND (SP); pink (7.5YR 7/3); dry; 80% fine sand; 20% medium to coarse sand; no odor. | | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | New 10' connection @ 1150. |
| <u>345</u> - - | | | | | Same as above (340 ft); light brown (7.5YR 6/4); moist; trace gravel to 2cm; rounded to subangular. | SP | | | |
| 350 | Д | SB0339 | 0.0 | | | | | • | Blow counts (348-349.5 9/35/50. Blow counts |
| - - - | | SB0339 | | | Well graded GRAVEL (GW); pink (7.5YR 7/3); dry; 90% gravel to 7cm; subangular to rounded; 10% coarse sand; no odor. | GW | | - Bottom of Screen | (349.5-351'): 49/50. New 10' connection @ 1255. |
| - 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 | | | | | | | | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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| | X Coordinate: 1541690.65 Logged By: Allen Willimore | | | | | | | | | |
|---------------|---|--------|------------------|-------------------|---|----------|------------------|-------------------------------|--|--|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| 365 | - | | | | 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. | | |
| | - | | | | 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. | 0.0 | - Bentonite Seal | | | |
| 380 | | | | | | SP | | New 20' connection @ 1615. | | |
| 205 | | | | | 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. | | | | | |
| 385 | - | | | | Same as above (381 ft); moist. Poorly graded SAND (SP); light brown (7.5YR 6/3); moist; loose; 100% fine | | | | | |
| 390 | | | | | sand; no odor. | | | End of 3/4/11. | | |



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

Borehole ID: KAFB-106131

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|-------------------------|-------------|------------------|------------------|-------------------|---|---------------|----|------------------|---------------------------------------|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | 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. | | | | |
| - | | SB0340 SB1749 | 0.0 | | Same as above (393 ft); dry. | SM | | | Blow counts (398-399.5') 16/37/43. |
| <u>400</u> | | | | | Same as above (393 ft); light brown (7.5YR 6/4). | | | | New 20' connection @ 1215 on 3/5/11. |
| - | | | | | Well graded SAND (SW); dry; lense. | SW | | | |
| 405 | - | | | | Silty SAND (SM); light brown (7.5YR 6/4); moist; dense; 60% sand; 10% gravel; 30% silt; no odor. | SM | | - Bentonite Seal | |
| - - - - 410 | | | | | 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 | | - Dentonite Sea | |
| - | | | | | Well graded SAND (SW); pinkish gray (7.5YR 7/2); damp; loose; 100% sand to 0.3cm; no odor. | sw | | | |
| <u>415</u> | | | | | 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

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|---------------|-------------|--------|------------------|-------------------|---|----------|----|---|--|
| 55 Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); light brown (7.5YR 6/3); dry; loose; 100% sand; no odor. | | | | New 20' connection @ 1400. |
| 42 | 5 | | | | Same as above (420 ft); coarser. | SP | | - Bentonite Seal | |
| 43(| - - - | | | | Same as above (420 ft); finer. | 54 | | - Top of Filter Pack - Top of 3" Schedule 80 | |
| 43 | | | | | | | | PVC 0.050 Slot Screen | |
| | - | | | | Well graded SAND (SW); pinkish gray (7.5YR 7/2); dry; loose; 100% very fine to coarse sand; no odor. | SW | | | |
| 44(| ן ר | | | , KĊ | Silty GRAVEL (GM); light brown (7.5YR | GM | | | |
| <u> </u> | | | | | 6/4); moist. SILT with Sand (ML); light brown (7.5YR | ML | [₿ | - Bottom of Screen | New 10' connection @ |
| | | | | | 6/4); moist; hard; 85% silt with clay; 15% sand; no odor. | CL | | | 1500. |
| 44 | 5 | | | | Lean CLAY (CL); brown (7.5YR 5/6); dry; hard to stiff; medium plasticity; 90% clay; 10% sand; no odor. SILT with Sand (ML); light brown (7.5YR | ML | | | |
| | | | | | 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 | s∜ | SB0341 | 0.0 | | | | | | Blow counts (448.5-450'): 15/34/43. |



Project Number: 140705

Date TD Reached: 3/5/2011 Date Completed: 3/7/2011

Y Coordinate: 1472929.18

Ground Elevation AMSL (ft): 5344.4

Date Started: 3/2/2011

Borehole ID: KAFB-106131

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Project Name: KAFB BFF SWMU ST-106 and SS-111 Surface Completion Type: Flush mount

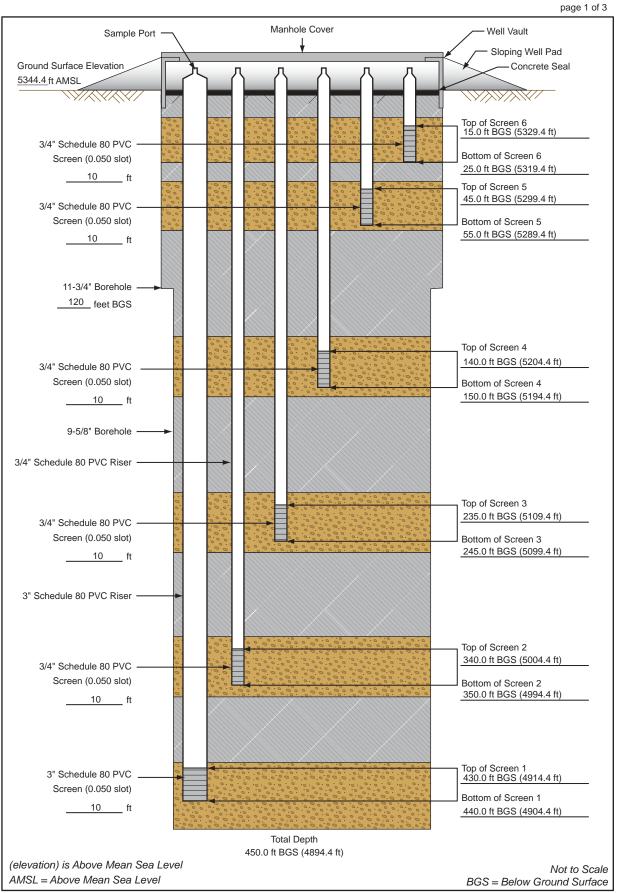
> Groundwater Levels BGS (ft): ▼ After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Allen Willmore

| | | | | 541690.65 | | Logged By: Allen Willmore Page 16 of 16 | | | | |
|-----------------|-------------|--------|------------------|-------------------|----------------------|---|----------|--------------|---|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | Well Diagram | Remarks | |
| - | - | | | | | | | | Total depth = 450 ft. Reached @ 1515 on 3/5/11. | |
| 455 | - | | | | | | | | Water added during drilling (gallons) = 0 | |
| - | - | | | | | | | | Water added during construction (gallons) = 187.5 | |
| 460 - | - | | | | | | | | | |
| - | - | | | | | | | | | |
| 465 | - | | | | | | | | | |
| - | - | | | | | | | | | |
| <u>470</u> - | - | | | | | | | | | |
| - - 475 | - | | | | | | | | | |
| | | | | | | | | | | |
| - - 480 | | | | | | | | | | |

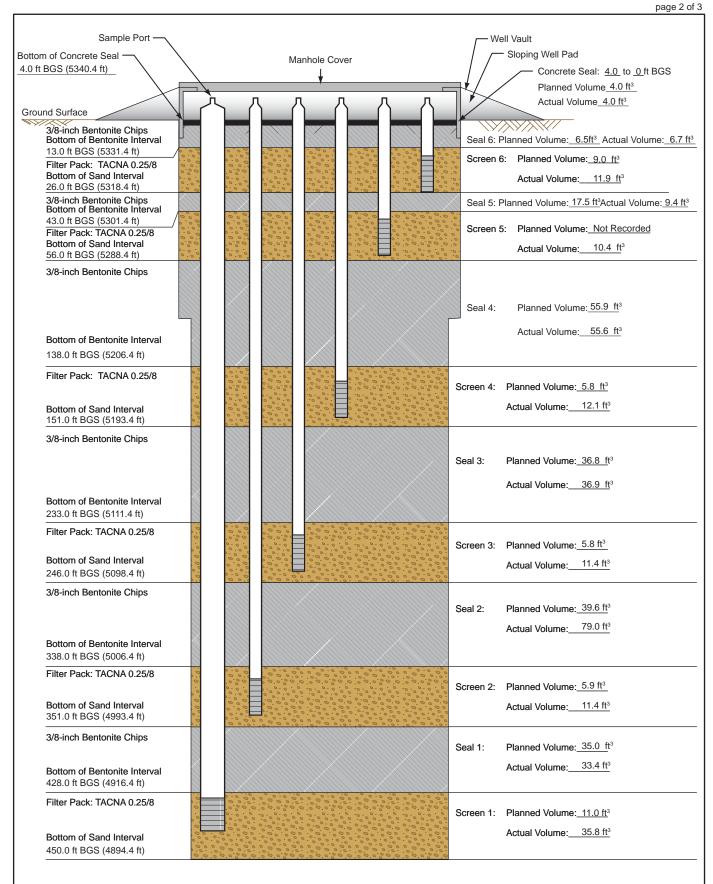
Nested Soil Vapor Well Completion Diagram for KAFB-106131

Installation Start Date/Time: <u>3/6/2011 @ 07:40</u> Installation End Date/Time: <u>3/7/2011 @ 16:00</u>



¹⁴⁰⁷⁰⁵_CA010020_SV_KAFB.106131 (a)

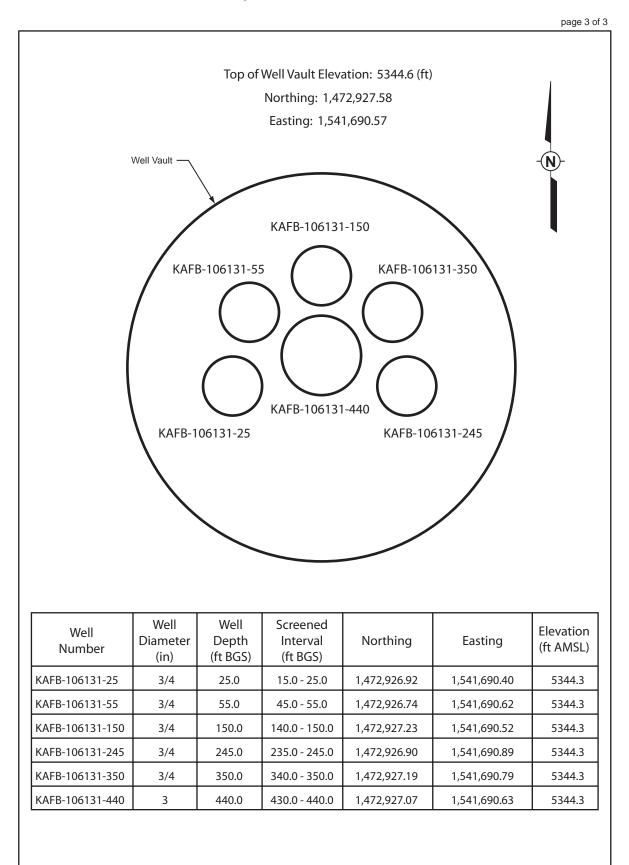
Nested Soil Vapor Well Completion Diagram for KAFB-106131



(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



140705_CA010020_SV_Map View_106131

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APPENDIX D-1

KAFB-106132 Final Well Report

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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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|------------------|------------------|-------------------|---|-------------|---|---|
| O Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. | | | Began drilling @ 1550 on 2/6/11. |
| 10 | | SB0342 | 0.0 | | Same as above (0 ft); 70% silt; 30% fine sand; trace gravel. | | - Bentonite Seal | 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 Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 20 | | 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 | | SB0344 | 0.0 | | Same as above (20 ft); reddish brown (2.5YR 4/4). | | - Bottom of Screen | Blow counts (25.5-27'): 17/50. |
| 30 | | SB0344 SB0344 | | | | | - Bentonite Seal | Blow counts (27-28.5'): 50/3. Blow counts (28.5-30'): 50/5. |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| <u> </u> | | aniat | 0. 1. | 5420 | Logged | eu by: Gley i eacock | | | | |
|-------------------------------------|------------------|------------------|------------------|-------------------|--|----------------------|---|--|--|--|
| පි Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagra | am Remarks | | |
| - | | | | | SILT (ML); reddish brown (5YR 4/4); dry; stiff; low plasticity; 90% silt; 5% fine sand; 5% coarse sand; low dry strength; no odor. | | - Bentoni | Kelly down @ 0833. New connection @ 0930. Resumed drilling @ 0940. te Seal | | |
| 35 | | | | | Same as above (30 ft); 90% silt; 5% gravel; 5% coarse sand. | ML | | | | |
| 40 | X | SB0345 | 0.0 | | | | Pack | Filter Kelly down @ 0945. Blow counts (37-38.5'): 12/23. | | |
| <u>+0</u> - - - - 45 | | | | | 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 Schedu PVC 0.1 Slot Sch | Resumed drilling @ | | |
| - | ∇ | | | | 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 | | | Kelly down @ 1015. Blow counts (47-48.5'): | | |
| - | $\left(\right)$ | SB0346 | | | subangular; no odor. | | | 18/32. Blow counts (48.5-50'): | | |
| 50 | $\left(\right)$ | SB0346 SB0347 | | | Same as above (45 ft); no odor. | | - Bottom Screen | of Blow counts (50-51.5'): | | |
| - | Δ | | | | | ML | | 27/32. New connection @ 1054 Resumed drilling @ 1058. | | |
| 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. | | - Bentoni | | | |
| 60 | | | | | | | | Kelly down @ 1103. | | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|---|-----------|------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | 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. | | | |
| 90 | | | | | | | | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|---------|------------------|-------------------|--|----------|------------------|---|
| 6 Depth (ft) | Sample Type | Numt | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | SILT (ML); red (2.5YR 4/6); dry to moist; medium stiff to stiff; 85% silt; 15% clay; no odor. | | | |
| 95 | | SB0348 | 0.0 | | 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. | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. |
| <u>125</u> - - | - | | | | 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 | |
| - - - - - | - | | | | 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. |
| <u>145</u> - | - | | | | Lean CLAY (CL); brown (7.5YR 4/4); dry to damp; very stiff; medium to high plasticity; 100% clay; no odor. | | | |
| 150 | | SB0349 | 0.0 | | | | | Blow counts (148.5-150'): 30/50. |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------|-------------|-------|------------------|-------------------|---|----------|-------|---|---|
| 10 Depth (ft) | Sample Type | Num | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| | - | | | | 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). | | | | 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. | ML | | - 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 | |
| 180 | - | | | | | | | | Kelly down @ 1124. |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|-------------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 185 | - | | | | 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. Same as above (180 ft). | SW | - Filter Pack | New connection @ 1137. Resumed drilling @ 1138. |
| <u>190</u> | - | | | | 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. Same as above (190 ft); trace fines. | | - Bentonite Seal | |
| 200 | | SB0350 | 0.0 | | Same as above (190 ft). | SP | | Kelly down @ 1145. Blow counts (198.5-200'): 28/50. New connection @ 1207. Resumed drilling @ 1207. |
| <u>205</u> 210 | - | | | | 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 | | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|--|--------------|-----------------------|---|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| | - | | | <u></u> | SILT (ML); olive brown (2.5Y 4/4); dry; stiff; nonplastic; 90% silt; 10% fine sand; no odor. | | - 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. | ML | | |
| 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. | | | |
| 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. | SW | Top of Filter Pack | Kelly down @ 1240. |
| 240 | | | | | | | | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | Coordinate. 1942804.10 Logged By. Greg Featock | | | | | | | | |
|----------------------|--|--------|------------------|-------------------|--|----------|----|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | 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 | | 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. | | | | Kelly down @ 1331. Blow |
| 250 - - - | | SB0351 | 0.1 | | Same as above (245 ft); 20% fine sand; 40% medium sand; 40% coarse sand; trace gravel; trace clay nodules. | SW | | - Bottom of Screen | counts (248.5-250'): 37/50. New connection @ 1353. Resumed drilling @ 1354. |
| <u>255</u> - - | - | | | | Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 70% fine sand; 30% medium sand; angular to subangular; no odor. | | | | Kelly down @ 1357. |
| <u>260</u> - - | - | | | | Same as above (255 ft); trace gravel. | SP | | - Bentonite Seal | New connection @ 1404. Resumed drilling @ 1404. |
| 265 | - | | | | Same as above (255 ft); mica flakes to 3mm. | | | | |
| 270 | | | | | | | | | |

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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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | -00 | rdinate | . К | 94200 | J4.16 Lügged | Breg Peacock | - 5 | |
|---------------------------|-----|---------|------------------|-------------------|--|--------------|------------------|---|
| 02 Depth (ft) | | | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 275 | _ | | | | 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 | | |
| - | - | | | | 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. |
| <u>280</u> - - | - | | | | Same as above (275 ft). | SP | | New connection @ 1435. Resumed drilling @ 1436. |
| <u>285</u> - - - | - | | | | 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 | |
| <u>290</u> - - | - | | | | 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. | | | |
| <u>295</u> | - | | | | Same as above (290 ft). | SP | | Kelly down @ 1446. |
| - 300 | | SB0352 | 0.4 | | | | | Blow counts (298.5-300') 27/50. |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | | annat | 0 | J4200 | | Logged By. Greg Feacock | | | | |
|----------------------------------|-------------|--------|------------------|-------------------|--|-------------------------|------------------|---|--|--|
| 60 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| - | - | | | | 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. | | |
| <u>305</u> - - - 310 | - | | | | Lean CLAY (CL); olive brown (2.5Y 4/4); dry to moist; stiff; medium to high plasticity; 100% clay; no odor. | CL | | | | |
| - | - | | | | 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. | | | | | |
| <u>315</u> - - | - | | | | 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. | | |
| <u>320</u> | - | | | | 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 | | | | | | | | | | |



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

Borehole ID: KAFB-106132

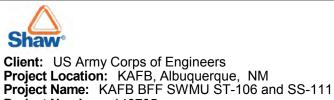
Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | .00 | unat | C. I. | 54200 | J4.16 Logged | Sieg Peacock | | |
|---------------------------|-------------|--------|------------------|-------------------|---|--------------|--|--|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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 - - - 345 | | | | | 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. |
| - | | | | | 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 | | Kelly down @ 1606. Blow |
| <u>350</u> - - - | | SB0353 | 0.0 | | 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 | count (348.5-350'): 7/28. New connection @ 1634. Resumed drilling @ 1635. |
| <u>355</u> - - | | | | | Poorly graded SAND (SP); olive brown (2.5Y 4/3); dry; dense; 100% fine sand; rounded; no odor. | SP | - Bentonite Seal | |
| 360 | | | | | | | | |



Project Number: 140705

Date TD Reached: 2/9/2011 Date Completed: 2/17/2011

Y Coordinate: 1473593.29

X Coordinate: 1542804.16

Ground Elevation AMSL (ft): 5353.0

Date Started: 2/6/2011

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| ~ ~ ~ | 500 | rdinat | .e. i. | J4200 | | эгед Реасоск | | |
|--------------|-------------|--------|------------------|-------------------|---|--------------|-------------------|---|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 | -Bentonite Seal | |
| 375 | - | | | | Same as above (360 ft). | | | |
| | | | | | | | | Kelly down @ 0805. |
| 380 | | | | | 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 | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| XC | Coc | ordinate | e: 1 | 54280 | 04.16 Logged | ged By: Greg Peacock | | | Page 14 of 16 | |
|--------------------|-------------|----------|------------------|-------------------|--|----------------------|---|-------------------|---|--|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks | |
| - | - | | | | 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. Blo counts (398.5-400'): 12/28. New connection @ 100 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 | | | | |
| <u>410</u> - | - | | | | 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. | |



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

Borehole ID: KAFB-106132

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | 500 | numate | J. IN | J4200 | 14.10 Logged | By. Greg Feacock | | | _ |
|--------------|-------------|--------|------------------|-------------------|---|------------------|----|--|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | 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 | | | |
| <u>435</u> | - | | | | Same as above (420 ft); trace gravel. | | | -Top of Filter Pack | |
| - | - | | | | | | | | Kelly down @ 1105. |
| 440 | - | | | | 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. |



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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

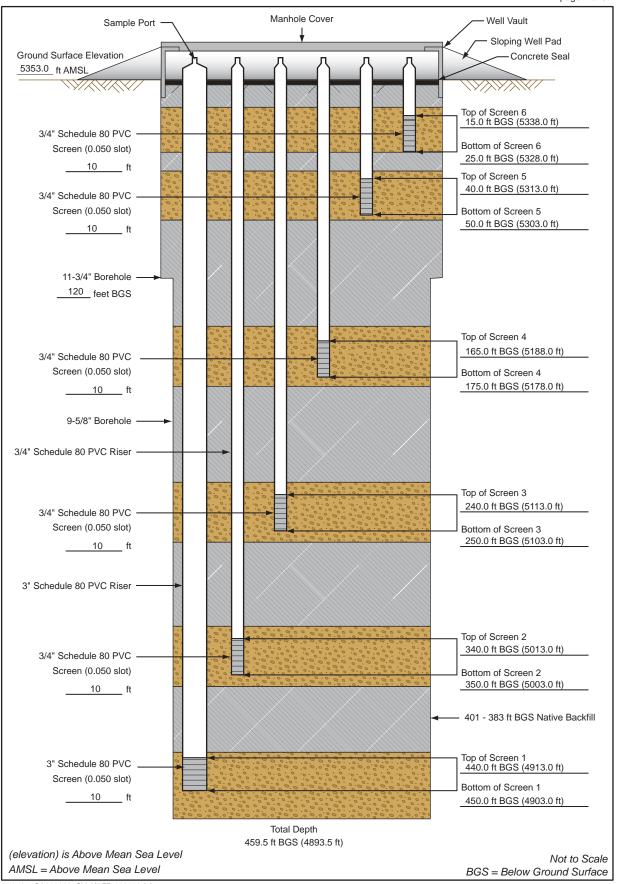
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| | | | e: I: | 54280 | Greg Peacock | Fage 10 01 10 | | |
|-----------------------|-------------|--------|------------------|-------------------|--|---------------|---------------------|---|
| (ft) 50 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | | | | | 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 | |
| 460 | - | | | <u></u> | | - | | Total Depth = 459.5 ft. Reached @ 1545 on 2/9/11. Water added during drilling (gallons) = 0 |
| 465 | - | | | | | | | Water added during construction (gallons) = Not Recorded Kelly down: TD the joint |
| 470 | - | | | | | | | and ready to make new connection. |
| 475 | - | | | | | | | |
| 480 | | | | | | | | |

Nested Soil Vapor Well Completion Diagram for KAFB-106132

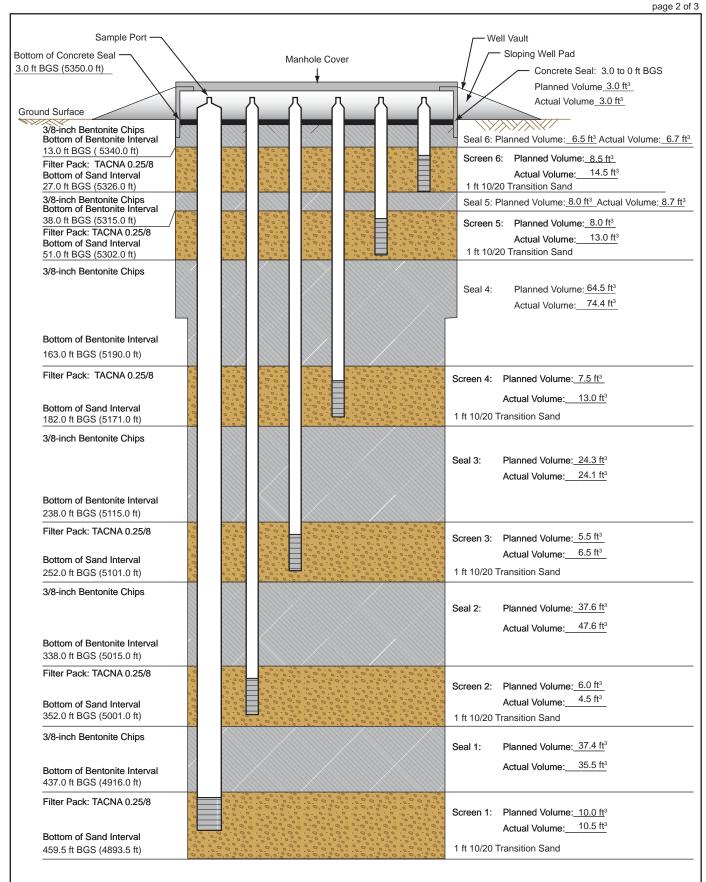
Installation Start Date/Time: 2/10/2011 @ 07:40 Installation End Date/Time: 2/17/2011 @ 08:25

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140705_CA010020_SV_KAFB.106132 (a)

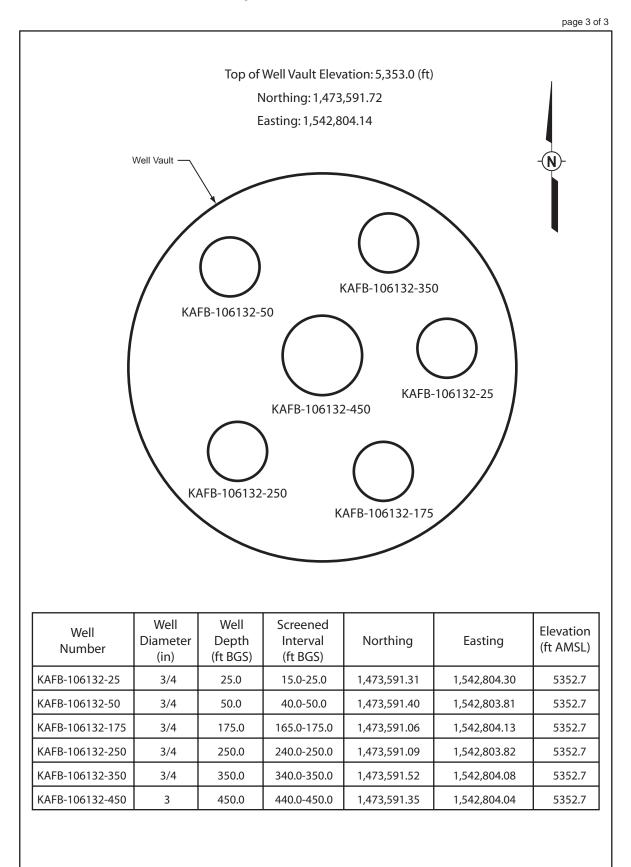
Nested Soil Vapor Well Completion Diagram for KAFB-106132



(elevation) is Above Mean Sea Level All Materials Placed with Tremie Pipe Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106132 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106132



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APPENDIX D-1

KAFB-106133 Final Well Report

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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

Borehole ID: KAFB-106133

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

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

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

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| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
|------------|-------------|--------|------------------|-------------------|---|----------|---|--|
| - | - | | | | 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. Began drilling @ 1021 on 2/7/11. Sediments stuck |
| 5 | - | | | | Same as above (0 ft); light brown (7.5YR 6/3). | ML | | 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 @ |
| - | X | SB0356 | | | Silty SAND (SM); brown (7.5YR 4/3); dry; very dense; 60% fine sand; 15% coarse sand to 3mm; subrounded; 25% silt. | SM | nnnnnnn - Top of Filter | 1335. Blow counts (8.5-10'): Not Recorded. Blow counts (10-11.5'): 32/50. |
| 15 | | | | | | | Pack | |
| - | - | | | | Sandy SILT (ML); brown (7.5YR 5/4); moist; hard; 55% silt; 40% very fine sand; 5% gravel to 1.5cm; trace clay nodules. | | Schedule 80 PVC 0.050 Slot Screen | |
| 20 | X | SB0357 | 0.1 | | | | | Blow counts (18.5-20'): 27/50. |
| - | X | SB0357 | | | Same as above (15 ft); hard. | | | Blow counts (20-21.5'): 27/50. |
| 25 | - | | | | Sandy SILT (ML); reddish brown (5YR 4/4); moist; hard; 60% silt; 10% clay | ML | - Bottom of Screen | 10' drill string won't fit through hammer @ 1357, need new one. Resumed drilling @ 1414. |
| 30 | | SB0358 | 0.6 | | nodules; 30% fine sand; trace fine gravel to 1cm. | | - Bentonite Seal | Blow counts (28-29.5'): 25/50. Blow counts (29.5-31'): Not Recorded. |



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

Borehole ID: KAFB-106133

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

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

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

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|---------------------|-----------------------|------------------|-------------------|--|---------------|----|--|---|
| සි Depth (ft) | Sample Type Number | Headspace PID | Lithologic Loa | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | 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 | | - Bentonite Seal | Blow counts (31-32.5'): Not Recorded. |
| <u>35</u> - - | | | | Lean Clay (CL); brown (7.5YR 4/4); moist; hard; medium plasticity; 60% clay; 40% silt. | CL | | - Top of Filter | |
| 40 | SB0359 | 0.0 | | SILT (ML); brown (7.5YR 4/4); moist; hard; 70% silt; 20% clay; 10% very fine sand to 0.08mm. | | | Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Blow counts (38.5-40'): 27/50. |
| <u>45</u> - | SB0360 | , 0.0 | - | SILT with Sand (ML); brown (7.5YR 4/4); moist; hard; 60% silt; 20% clay; 10% very fine sand; 10% fine gravel to 1cm. | ML | | | Blow counts (47-48.5'): 30/36. |
| 50 | MS 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. | | | | |
| - | | | | 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 | |
| 60 | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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| | | | | <u>)424</u> | 10.20 LOgged | Dy. J | | • |
|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|---------|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | |
| 65 | - | | | | Sandy SILT (ML); brown (7.5YR 4/3); dry; soft; low plasticity; 60% silt; 40% fine to coarse sand to 4mm. | | | |
| 70 | - | | | | Same as above (65 ft); trace fine gravel to 1cm. | ML | | |
| 75 | - | | | | SILT with SAND (ML); brown (7.5YR 5/4); dry; soft; low plasticity; 80% silt; 20% very fine sand; trace fine gravel to | | - Bentonite Seal | |
| 80 | - | | | | Poorly graded SAND (SP); brown (7.5YR 5/4); dry; very loose; 100% very fine sand to 0.1mm; rounded. | SP | | |
| | - | | | | Silty SAND (SM); brown (7.5YR 5/4); dry; very loose; 60% fine to coarse sand to 4mm; rounded; 40% silt. | SM | | |
| 85 | - | | | | SILT with Sand (ML); brown (7.5YR 5/4); dry; firm; 80% silt; 5% clay; 15% very fine sand to 0.08mm. | | | |
| 90 | - | | | | | | | |



Project Number: 140705

Date TD Reached: 2/10/2011 Date Completed: 2/16/2011

Y Coordinate: 1473504.01

Ground Elevation AMSL (ft): 5352.0

Date Started: 2/7/2011

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106133

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

| | | ordinate | | | | Logged By: Jason Tarbert Page 4 of 1 | | |
|--------------------|-------------|------------------|------------------|-------------------|---|--------------------------------------|------------------|---|
| ଓ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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). | | | Kelly down @ 1645. |
| - 100 - - | | SB0361 SB0361 | 0.0 | - | Same as above (90 ft); hard. | ML | | Blow counts (98.5-100'): 50/50. End of 2/7/11. Began sampling at 100' @ 0837 on 2/8/11. Blow counts (100-101.5'): 50/50. |
| <u>105</u> | - | | | | Lean CLAY (CL), brown (7.5YR 5/4); moist; hard; medium plasticity; 70% clay; 30% silt; trace gravel to 7mm. | CL | - Bentonite Seal | 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 | | |
| <u>115</u> | | | | | 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 |



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

Borehole ID: KAFB-106133

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

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

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

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| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| <u>125</u> | - | | | | SILT (ML); brown (7.5YR 5/4); moist; soft; medium plasticity; 60% silt; 40% clay. | ML | | New connection @ 1619 Resumed drilling @ 1620. |
| <u>130</u> | - | | | | 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 | |
| <u>140</u> | - | | | | SILT (ML); yellowish brown (10YR 5/4); moist; firm; low plasticity; 70% silt; 20% clay; 10% fine sand to 0.5mm. | | | Kelly down @ 1629. New 10' connection @ 1639. Resumed drilling @ 1640. Kelly down @ 1650. End of 2/8/11. |
| <u>145</u> | - | | | | 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 |

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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

Borehole ID: KAFB-106133

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

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

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

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| X | 200 | ordinate | e: 1 | 54241 | I6.28 Logged | ву: | Jason I | arbert | Page 6 01 16 |
|---------------|-------------|----------|------------------|-------------------|---|-----------|---------|--|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | /ell Diagram | Remarks |
| 155 | - | SB0362 | | | Lean CLAY (CL); yellowish brown (10YR 5/4); moist; hard; low plasticity; 60% clay; 40% silt; trace fine sand to 0.2mm. | CL | | - Bentonite Seal | (150-151.5'): 50/50. New 10' connection @ 0825. Resumed drilling @ 0826. |
| | | | | | SILT with Sand (ML); brown (7.5YR 5/4); moist; soft; nonplastic; 80% silt; 5% clay; 15% very fine sand to 0.08mm. | | | - Top of Filter Pack | Cuttings stuck in cyclone @ 0834. Cuttings unstuck @ 0843. Resumed drilling. |
| <u>160</u> | - | | | | 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. |
| 170 | - | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 80% fine sand; 20% medium sand to 1mm; subangular. | SP | | | |
| | - | | | | 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 | | Screen | |
| 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 | | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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|----------------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. |
| <u>185</u> | - | | | | Same as above (180 ft); trace fine gravel to 1.8cm. | SW | | |
| - 190 - | - | | | | Same as above (180 ft). | | | |
| - <u>195</u> - | | | | | 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. Blo 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 | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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|-------------------------|-------------|--------|------------------|-------------------|--|-----------|-----------------------|---|
| 0 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); moist; very loose; 95% medium sand; 5% coarse sand to 4mm; rounded. | | | |
| - 215 - - - | - | | | | Same as above (210 ft); 100% fine sand to 0.2mm. | SP | | |
| - 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. Lean CLAY (CL); lense. | _GP | | |
| - 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. | CL SW- | | |
| - - 235 | - | | | | | SM | | |
| - | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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|---------------|-------------|------------------|------------------|-------------------|--|----------|---|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | W | ell Diagram | Remarks |
| | _ | | | | Well graded SAND (SW); brown (10YR 5/3); moist; very loose; 100% very fine to coarse sand; trace fine gravel to 1.7cm; subrounded. | | | 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 SB0364 | 0.0 | | Same as above (240 ft); damp; very dense; 10% fine gravel to 3cm. | SW | | - Bottom of Screen | Kelly down @ 1228. Blow counts (248.5-250'): 47/50. 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. Lean CLAY (CL); light brown (7.5YR | | _ | - Bentonite Seal | Kelly down @ 1310. New 20' connection @ 1318. Resumed drilling @ 1318. |
| <u>265</u> | - | | | | 6/3); moist; firm; low plasticity; 60% clay; 40% silt. Same as above (262 ft); brown (10YR 5/3). | CL | | | |
| 270 | - | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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|----------------------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. | | | |
| 2 <u>80</u> - - - | | | | | Same as above (275 ft); slightly finer. | SP | | Kelly down @ 1329. Resumed drilling @ 1338. |
| 2 <u>85</u> - - - | | | | | Well graded SAND (SW); brown (10YR 5/3); moist; very loose; 100% very fine to coarse sand to 4.8mm; rounded. | sw | - Bentonite Seal | |
| 2 <u>90</u> | | | | | 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. Same as above (292 ft); 60% silt; 30% clay; 10% very fine sand. | ML | | |
| 300 | | SB0365 | 0.0 | | | | | Kelly down @ 1346. Blo 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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| 60 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | 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. | | | |
| 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. | sw | - Bentonite Seal | |
| <u>320</u> | - | | | | 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 | | | | ***** | | | | |

| S | l | | | | | Bore | eho | le ID | : KAFB- | 106133 |
|---------------|--------------|---------------------------------|------------------|---------------------------------------|---|-------------------|-------------------|--|--|---|
| Pro Pro | ojeo ojeo | ct Loca | ation e: K | : KÁI (AFB | os of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 705 | Hole Dia | ametei | Lower | (in.): 11-3/4 (in.): 9-5/8 ype: Flush mo | unt |
| Da Da | te S te T | Started | l: 2/ ache | 7/201 d: 2/* | 1 10/2011 | ∑ At 1 ▼ At E | Time of End of | Levels E f Drilling Drilling: ng: N/A | N/A | |
| YC | Coo | nd Elev ordinate ordinate | e: 14 | 47350 | | | Metho | d: Air F | VDC Drilling Rotary Casing H arbert | ammer Page 12 of 16 |
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | Well graded SAND with Gravel (dark yellowish brown (10YR 4/4) very loose; 85% fine to very coar sand; 15% fine gravel to 2.1cm; rounded. | ; dry; se / | SW | | | |
| 335 | - | | | · · · · · · · · · · · · · · · · · · · | Poorly graded SAND (SP); brown 5/3); dry; very loose; 100% fine s 0.02mm; subrounded; trace fines | and to | SP | | - Bentonite Seal | |
| - | - | | | | Well graded SAND (SW); dark ye brown (10YR 4/4); moist; very loo 95% very fine to very coarse san fine gravel to 8mm; rounded. | ose; | | | - Top of Filter Pack | |
| 340 | - | | | | Same as above (335 ft); trace gr | avel. | | | Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1445. Resumed drilling @ 1454. |
| <u>345</u> | - | | | | Same as above (335 ft); no grave | el. | SW | | | Drill bit is packed off @ 1500. Unstuck @ 1504. |
| 350 | | SB0366 | 0.1 | | Same as above (335 ft); dense; r gravel. | no | | | - Bottom of Screen | Blow counts (348.5-350'): 19/27. Kelly down @ 1507. Rig down to lengthen sand line. Completed sand line |
| 355 | | | | | Silty SAND (SM); brown (7.5YR dry; dense; 85% very fine to fine 0.1mm; rounded; 15% silt; low pl | sand to | | | | attachment @ 1550 and sampled at 350'. Compressor would not start @ 1620. End of 2/9/11. |
| 360 | - | | | | Same as above (352 ft). | | SM | | - Bentonite Seal | Resumed drilling @ 0824 on 2/10/11. |

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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

Borehole ID: KAFB-106133

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

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

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

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| | | | | | | - | | |
|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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). | | | |
| <u>375</u> | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106133

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

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

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

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| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| 395 | - | | | | 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. Same as above (390 ft); moist; finer. | | | | |
| <u>400</u> | | 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; | SW | | | Kelly down @ 0911. Blow counts (398.5-400'): 30/50. Resumed drilling @ 0943. |
| 405 | - | | | | trace clay nodules. 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 | |
| <u>410</u> | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; dense; 100% medium sand to 0.5mm; subrounded; trace fines. | SP | | | |
| <u>415</u> 420 | - | | | | Well graded SAND (SW); brown (10YR 5/3); moist; very dense; 95% very fine to very coarse sand to 3mm; subrounded; 5% silt. | sw | | | |



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

Borehole ID: KAFB-106133

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

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

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

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| ~ ~ ~ | | | - | | 10.20 Logged | , | | | |
|-----------------------------|-------------|--------|------------------|-------------------|--|-----------|----|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| 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 | | | Resumed drilling @ 1008. |
| - | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); dry; dense; 100% medium sand to 0.5mm; subrounded. | SP | | - Bentonite Seal | |
| <u>430</u> - | - | | | | Well graded SAND (SW); brown (10YR 4/3); dry; very dense; 95% very fine to very coarse sand to 4mm; subangular to | | | | |
| 4 <u>35</u> | | | | | Younded; 5% silt. 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" | |
| <u>440</u> - - | - | | | | 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 | | Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1020. Unwrapped and wrapped sand line. Resumed drilling @ 1036. |
| <u>445</u> - - 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. Blov counts (448.5-450'): 40/70. |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5352.0

Project Number: 140705

Date TD Reached: 2/10/2011

Date Completed: 2/16/2011

Y Coordinate: 1473504.01

Date Started: 2/7/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106133

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

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

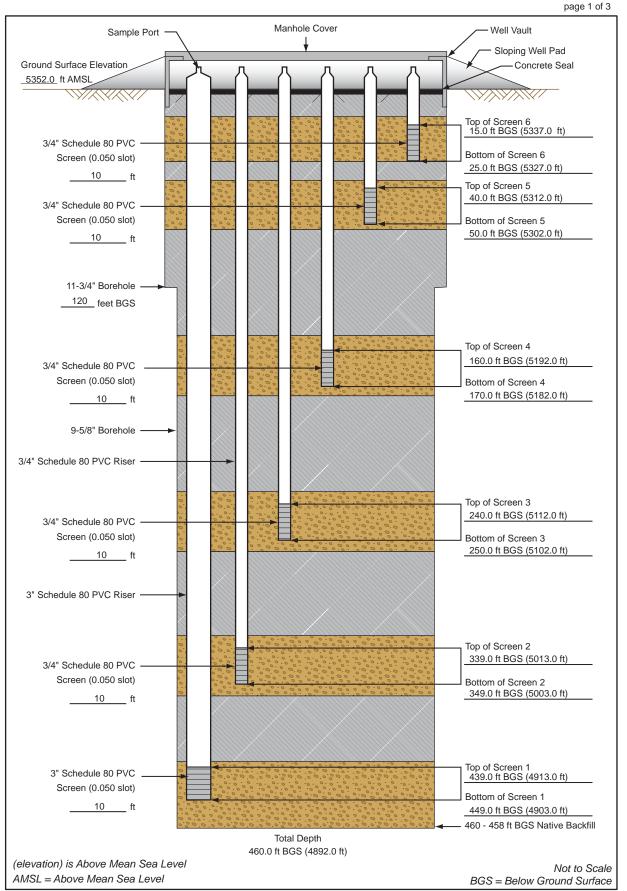
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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X Coordinate: 1542416.28 Sample Type Headspace PID Lithologic Log Depth (ft) Number Ś S.C. Material Description Remarks Well Diagram 5 450 Well graded SAND (SW); brown (10YR Resumed drilling @ 5/3); dry; 95% very fine to coarse sand 1130. to 3mm; subrounded; 5% silt. 455 SW Same as above (450 ft). Bottom of Filter Pack Native Backfill 460 Total Depth = 460 ft.Reached @ 1140 on 2/10/11. Water added during drilling (gallons) = $\tilde{0}$ 465 Water added during construction (gallons) = Not Recorded Kelly down: TD the joint 470 and ready to make new connection. 475 480

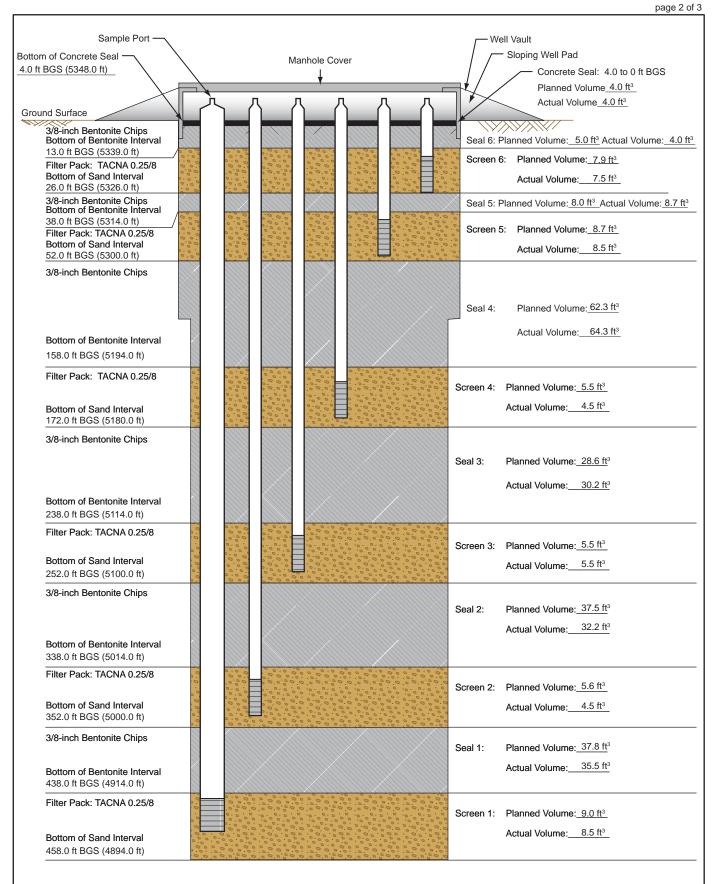
Nested Soil Vapor Well Completion Diagram for KAFB-106133

Installation Start Date/Time: <u>2/15/2011 @ 08:34</u> Installation End Date/Time: <u>2/16/2011 @ 16:29</u>



¹⁴⁰⁷⁰⁵_CA010020_SV_KAFB.106133 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106133

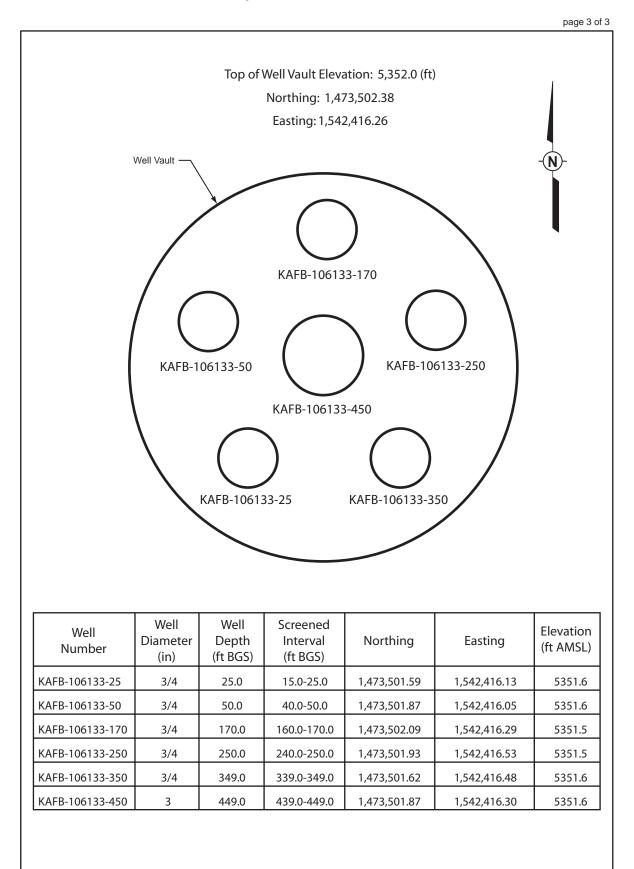


(elevation) is Above Mean Sea Level All Materials Placed with Tremie Pipe

140705_CA010020_SV_KAFB.106133 (b)

Not to Scale BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106133



140705_CA010020_SV_Map View_106133

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APPENDIX D-1

KAFB-106134 Final Well Report

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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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|------------------|---------|------------------|-------------------|---|----------|--|---|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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 | | | | - Bentonite Seal | Blow counts (7.5-9'): 15/7. |
| - | | | | | SILT (ML); strong brown (7.5YR 5/6); dry; firm; medium plasticity; 60% silt; 35% clay; 5% medium to coarse sand; no odor. | | Top of Filter | |
| | | SB0370 | 0.0 | - | 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 3/4" Schedule 80 PVC 0.050 Slot Screen | Kelly down @ 1250. Blow |
| 20 | $\left(\right)$ | SB0371 | | | SILT (ML); strong brown (7.5YR 5/6); dry; firm; medium plasticity; 100% silt; trace gravel to 1cm; rounded; no odor. | | | counts (17.5-19'): 8/10. Blow counts (19-20.5'): Not Recorded. New connection @ 1305. Resumed drilling @ 1306. |
| 25 | | 00070 | 0.0 | | SILT (ML); brown (7.5YR 5/4); dry; firm; nonplastic; 100% silt with weakly indurated clay nodules to 1cm; no odor. | | - Bottom of Screen | Kelly down @ 1308. Blow counts (27-28.5'): 22/50. New connection @ 1350. |
| 30 | \triangle | SB0372 | 0.0 | | | | - Bentonite Seal | Resumed drilling @ 1352. |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|-----------------|-------------|------------------|------------------|-------------------|---|----------|---|---|
| ଟ୍ଟ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 35 | | SB0373 SB0373 | 0.0 | | 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. SILT (ML); yellowish brown (10YR 5/4); dry; soft; non to low plasticity; 100% silt; no odor; caliche at 37'. Same as above (35 ft); reddish brown (5YR 5/4). | | - Bentonite Seal - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | 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. |
| <u>45</u> 50 | | SB0374 | 0.0 | | 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. 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. | ML | - Bottom of Screen | Kelly down @ 1439. Blow counts (47-48.5'): 12/25. New connection @ 1455. Resumed drilling @ 1456. |
| 60 | - | | | | SILT (ML); brown (10YR 4/3); dry; soft; nonplastic; 85% silt; 15% clay; no odor. | | - Bentonite Seal | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|---------|------------------|-------------------|--|--------------|------------------|---|
| @ Denth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. |
| 6 | 5 | | | | 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. | | | |
| 7 | <u>-</u> | | | | SILT (ML); yellowish brown (10YR 5/4); nonplastic; 100% silt; trace gravel; no odor. | | | |
| 7 | 5 | | | | Same as above (70 ft); nonplastic; 85% silt; 15% clay; no gravel. | ML | - Bentonite Seal | Kelly down @ 1518. New |
| 8 | - - - | | | | Same as above (70 ft); clay nodules to 2cm; slightly indurated. | | | connection @ 1525. Resumed drilling @ 1525. |
| 8 | 5 | | | | Same as above (70 ft); clay nodules to 1cm; trace sand. | | | |
| 9 | 2 0 | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|--------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| g Depth (ft) | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | SILT (ML); yellowish brown (10YR 5/4); dry; soft; non to low plasticity; 90% silt; 10% fine to medium sand; no odor. | | | |
| 95 | | SB0375 | 0.0 | | 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 | | Kelly down @ 1533. Blow counts (97-98.5'): 18/27. New connection @ 1550. Resumed drilling @ |
| 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 | | 1551. |
| | - | | | | SILT (ML); brown (10YR 4/3); dry; soft to stiff; low to medium plasticity; 70% silt; 30% clay; no odor. | | - Bentonite Seal | |
| <u>110</u> |) - - | | | | Same as above (105 ft). | ML | | |
| <u>115</u> | - | | | | 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------------------|-------------|--------|------------------|---------------------------------------|---|----------|------------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 |
| <u>125</u> | - | | | | Same as above (120 ft). | ML | | @ 1109 on 2/19/11. |
| - <u>130</u> - | - | | | | SILT (ML); brown (7.5YR 5/3); dry; firm; nonplastic; 95% silt; 5% fine to medium sand; subangular; no odor. | | | |
| - <u>135</u> - - | - | | | · · · · · · · · · · · · · · · · · · · | 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. |
| <u>140</u> - | - | | | | 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. | | | |
| <u>145</u> | - | | | | Same as above (140 ft). | ML | | |
| 150 | X | SB0376 | 0.4 | | | | | Kelly down @ 1131. Blow counts (147.5-149'): 15/28. New connection @ 1146. Resumed |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------------------|-------------|--------|------------------|-------------------|--|----------|-----------|--|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | II Diagram | Remarks |
| - | - | | | | SILT (ML); dark yellowish brown (10YR 4/4); dry; soft to firm; low plasticity; 80% silt; 20% clay; no odor. | | | - Bentonite Seal | drilling @ 1147. |
| <u>155</u> | - | | | | Same as above (150 ft); yellowish brown (10YR 5/4); 90% silt; 10% fine sand; rounded to subrounded. | ML | | - Top of Filter Pack | Kelly down @ 1150. New connection @ 1158. Resumed drilling @ 1203. |
| <u>160</u> | - | | | | 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 3/4" Schedule 80 PVC 0.050 Slot Screen | Approximate top of Santa Fe Group. |
| <u>165</u> - - - | - | | | | SILT (ML); dark yellowish brown (10YR 4/4); dry; soft; nonplastic; 95% silt; 5% fine sand; no odor. | ML | | | |
| <u>170</u> - - | - | | | | 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 | |
| <u>175</u> | - | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------------------|-------------|--------|------------------|-------------------|---|---------------|------------------|---|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; loose; 100% fine to coarse sand; rounded; no odor. | | | |
| - <u>185</u> - - | | | | | Same as above (180 ft); clay nodules. | | | |
| 190 - | - | | | | Same as above (180 ft). | SW | | |
| <u>195</u> - - | - | | | | Same as above (180 ft); dense; 90% fine to coarse sand; rounded; 10% gravel to 1.5cm; rounded. | | - Bentonite Seal | Kelly down @ 1253. Blow counts (197.5-199'): |
| _ 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. | | | 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 @ |
| _ 205 _ _ _ | | | | | Same as above (200 ft); 90% fine sand; 10% medium sand. | SP | | 1320. |
| _ 210 | | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| | 500 | ordinate | e. r | 04237 | Logged | Logged By: Greg Peacock | | | | |
|------------|-------------|----------|------------------|-------------------|---|-------------------------|-----------------------|---|--|--|
| Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| 215 | - | | 0.1 | | Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; coarse sand dominantly volcanic tuff. Same as above (210 ft); trace gravel; rounded; less volcanic tuff sand. | | | Kelly down @ 1327. Blow counts (217.5-219'): | | |
| 220 | - | SB0377 | 0.1 | | 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 | 12/15. New connection @ 1401. Resumed drilling. | | |
| 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. | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|----------------------|--------------|--|------------------|---------------------------------------|---|--------------|---|---|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagrar | m Remarks |
| - | - | | | | 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 PVC 0.05 Slot Scre | 80 |
| 245 | - | | | · · · · · · · · · · · · · · · · · · · | Same as above (240 ft). | SW | | Kelly down @ 1424. |
| 250 | \mathbb{H} | SB0378, SB0378- <u>MS</u> / SB0378- | | | | | - Bottom of | Blow counts (247.5-249'): 27/37. Blow counts (249-250.5'): 38/50. New connection @ 1445. |
| - - - 255 | - | MSD | | | 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 | Screen | Resumed drilling @ 1446. |
| - | - | | | | 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. |
| <u>260</u> - - | - | | | | 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 | - | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---|
| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. |
| - <u>280</u> - - | - | | | | 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; | | | Kelly down @ 0836. |
| - - 300 | | SB0379 | 0.0 | | dense; 90% fine sand; rounded; 10% silt; nonplastic; no odor. | SP- SM | | Blow counts (297-298.5') 17/38. New connection @ 0954. Resumed drilling @ 0954. |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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|---------------|-------------|--------|------------------|-------------------|--|------------|------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | <i>_</i> _ | | |
| <u>310</u> | - | | | | 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. |
| <u>320</u> | - | | | | Same as above (305 ft). | | | |
| <u>325</u> | - | | | | 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 | | | | '° 0° 200 | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 00 Depth (ft) | Sample Type | Number | Headspace PID | | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - - 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 | |
| | | | | | 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. |
| - | - | | | | 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 | |
| <u>345</u> - - | X | SB0380 | 0.0 | | Same as above (340 ft); 90% fine to coarse sand; 10% gravel to 2cm; rounded. | | | | Kelly down @ 1052. Blow counts (347-348.5'): 26/50. Blow counts |
| - 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 | (348.5-350'): 21/28. New connection @ 1120. Resumed drilling @ 1121. |
| 355 - - - | | | | | Same as above (350 ft). | | | - Bentonite Seal | Kelly down @ 1127. New connection @ 1133. Resumed drilling @ 1134. |
| 360 - | | | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. | | | |
| | | | | | Same as above (360 ft); 95% fine to coarse sand; 5% gravel. | | | |
| <u>370</u> - - - | | | | | 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. | | | |
| <u>385</u> - - - | | | | | 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 - | | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); dark grayish brown (10YR 4/2); dry; dense; 100% fine sand; rounded; trace medium sand; rounded; no odor. | | | |
| <u>395</u> | - | | | | Same as above (390 ft); 100% fine to medium sand; rounded to subrounded. | SP | | Kelly down @ 1158. Blow counts (397-398.5') 29/47. New connection @1220. Resumed drilling @ 1258. |
| - - 400 | | SB0381 | 0.1 | | | | | |
| - | - | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; rounded; trace gravel; no odor. | SW | | |
| <u>405</u> - - | | | | | 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 | |
| <u>410</u> - - | _ | | | | Same as above (405 ft); trace coarse sand; rounded. | SP | | |
| <u>415</u> | _ | | | | Same as above (405 ft). | | | Kelly down @ 1307. New connection @ 1319. Resumed drilling @ 1320. |
| 420 | | | | | | | | |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

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| 55 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 425 | - | | | | 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 | | | |
| 430 | - | | | | 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 | - | - Bentonite Seal | |
| <u>430</u> - - | - | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 100% fine to coarse sand; subrounded to subangular; no odor. | | - | | |
| <u>435</u> - - | - | | | | Same as above (430 ft); 90% fine to coarse sand; 10% gravel to 1cm; rounded. | | | - Top of Filter Pack | Kelly down @ 1332. New connection @ 1340. Resumed drilling @ 1341. |
| - - - - | - | | | | Same as above (430 ft); 95% fine to coarse sand; rounded; 5% gravel; rounded. | SW | | - Top of 3" Schedule 80 PVC 0.050 Slot Screen | |
| 445 - | | SB0382 | NR | | Same as above (430 ft); 100% fine to coarse sand; rounded to angular; evenly distributed. | | | | Kelly down @ 1347. Blow counts (447-448.5') |
| - 450 | | | | | | | | | 50/NA. Blow counts (448.5-450'): 50/NA. No recovery. Note: |



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

Borehole ID: KAFB-106134

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Greg Peacock

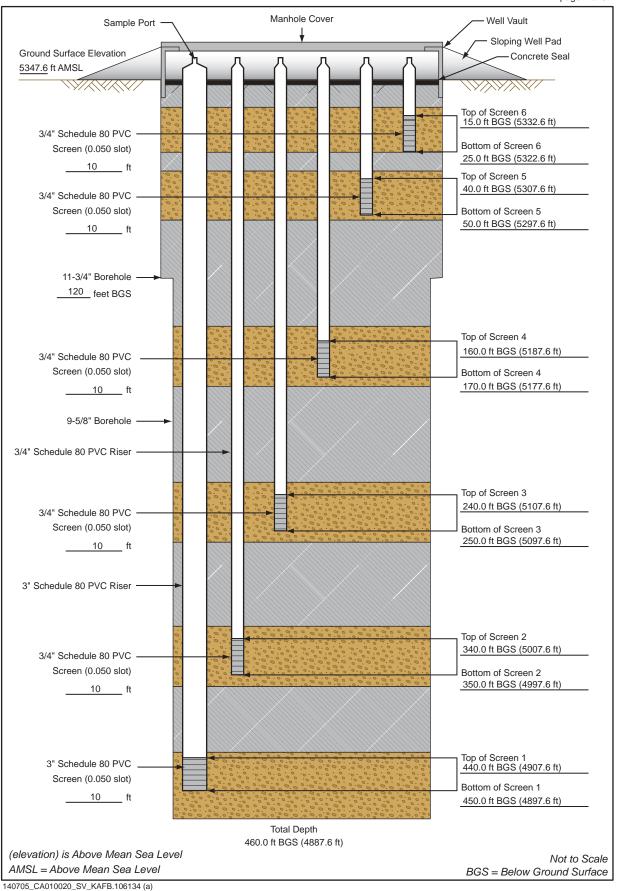
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| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | - | | | | Well graded SAND (SW); dark grayish brown (10YR 4/2); dry; dense; 95% fine to coarse sand; rounded; 5% fine gravel to 1.5cm; rounded; no odor. | | Screen | insufficient volume for headspace meausrement. New connection @ 1414. Resumed drilling @ 1415. |
| | - | | | | Same as above (450 ft); 95% fine to coarse sand; 5% clay nodules to 3mm. | SW | | Kelly down @ 1525. |
| 460 | - | | | | | | | Attempted to collect additional spilt spoon sample, but no recovery. Blow counts (457-458.5'): 50/Not Recorded. |
| - | - | | - | <u></u> | Poorly graded SAND (SP); grayish brown (10YR 5/2); dry; dense; 95% fine sand; rounded; 5% gravel to 2.5cm; rounded; no odor. | SP | | Total depth = 460 ft. Reached @ 1445 on 2/20/11. |
| 465 | - | | | | | | | Water added during drilling (gallons) = 0 |
| - | - | | | | | | | Water added during construction (gallons) = Not Recorded |
| <u>470</u> | - | | | | | | | Kelly down: TD the joint and ready to make new connection |
| 475 - | | | | | | | | |
| 480 | - | | | | | | | |

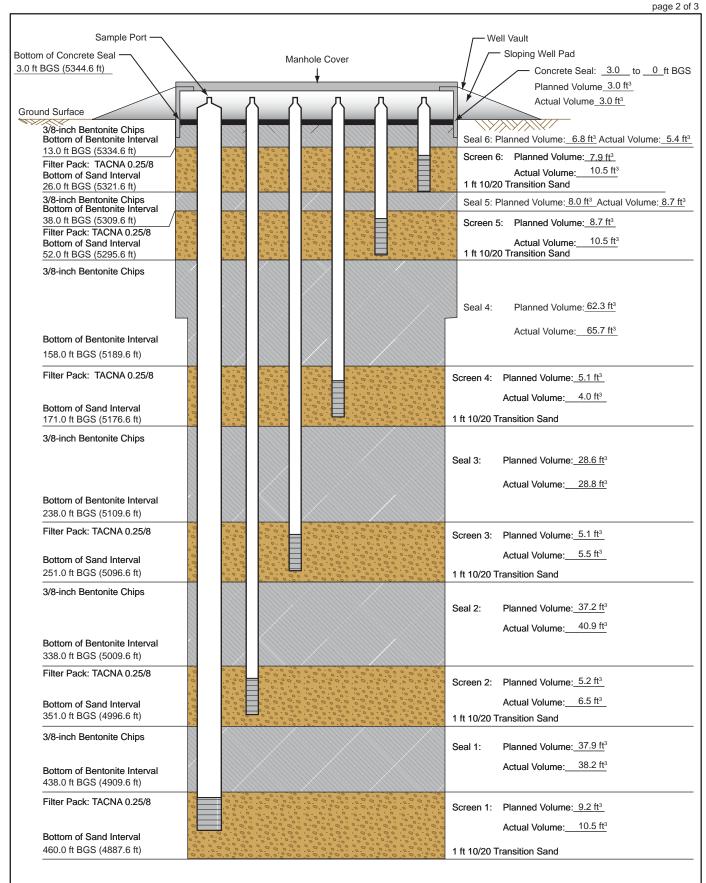
Nested Soil Vapor Well Completion Diagram for KAFB-106134

Installation Start Date/Time: 2/21/2011 @ 08:10 Installation End Date/Time: 2/23/2011 @ 12:00

page 1 of 3

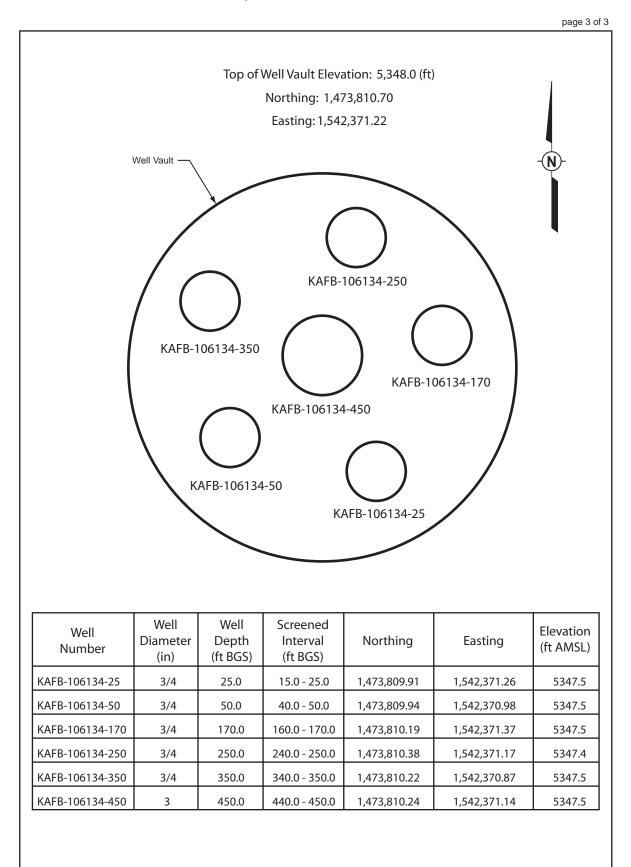


Nested Soil Vapor Well Completion Diagram for KAFB-106134



(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



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APPENDIX D-1

KAFB-106135 Final Well Report

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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

Borehole ID: KAFB-106135

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

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

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

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|------------|-------------|--------|-----------|-------------------|---|----------|--|--|
| Denth (ft) | Sample Type | Number | Headspace | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | No description recorded. | | - Concrete Seal | Hand augered. ***Note: no headspace requirement at this location*** |
| | 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. | | - - Bentonite Seal | Began drilling @ 0755 on 1/23/11. |
| 1 | 0 | | | | 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 | |
| 1 | 5 | | | | Same as above (10 ft); trace fine gravel to 7mm. | ML | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 2 | - 0 | | | | Same as above (10 ft); dry. | | | |
| 2 | 5 | | | | Same as above (10 ft); dry; no clay. | | - Bottom of Screen | |
| 3 | 0 | | | | | | - 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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| & Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| · · · · | - | | | | 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 | |
| 40 | - | | | | Same as above (30 ft); trace clay nodules. | | Pack - 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 | | | | | | | | |

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Project Number: 140705

Date Started: 1/23/2011 Date TD Reached: 1/23/2011 Date Completed: 2/5/2011

Y Coordinate: 1474070.68

Ground Elevation AMSL (ft): 5351.1

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

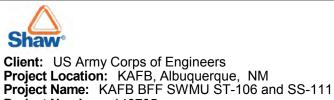
Borehole ID: KAFB-106135

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

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|-------------------|-------------|--------|------------------|-------------------|--|----------|------------------|--------------|
| පී Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. | , | | |
| | | | | | Same as above (60 ft). | | | |
| | - | | | | Same as above (60 ft); trace clay nodules. | | | |
| | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106135

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

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|---------------------------|-------------|--------|------------------|-------------------|--|-------------------|----------|----------|-----------------------|-----------------------|
| ଓ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | We | ell Diagram | Remarks |
| - | | | | | Sandy SILT (ML); brown (7.5YR a dry; soft; low plasticity; 60% silt; 4 fine sand to 0.1mm. | | | | | |
| 95 | | | | | Same as above (90 ft); 60% silt; very fine sand. | 40% | | | | |
| <u>100</u> - - | | | | | SILT with Sand (ML); brown (7.5' dry; soft; medium plasticity; 70% 15% clay; 15% very fine sand to 0.07mm. | YR 5/4); silt; | | | | |
| <u>105</u> - - | | | | | Same as above (100 ft); 70% silt clay; 15% very fine sand. | ; 10% | ML | | - Bentonite Seal | |
| <u>110</u> - - | | | | | Sandy SILT (ML); brown (7.5YR dry; soft; low plasticity; 70% silt; 3 very fine to medium sand to 0.4m trace clay nodules. | 30% | | | | |
| <u>115</u> - - - | | | | | Same as above (110 ft). | | | | | |
| 120 | | | | | | | | | | |



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

Borehole ID: KAFB-106135

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

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

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

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| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| - | - | | | | 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. |
| <u>130</u> | - | | | | 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. | | | | |
| - 140 - - | - | | | | Same as above (135 ft); trace medium sand. | SM | | - Top of Filter Pack - 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. | | | | |
| 150 | | | | | | | | | |



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): \Box At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|---------------|------------------|--------|------------------|-------------------|---|----------|------------------|---------|
| 15 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Sandy SILT (ML); brown (7.5YR 5/4); dry; very soft; 70% silt; 30% very fine to fine sand to 0.2mm. | | Screen | |
| 155 | - | | | | Same as above (150 ft); brown (7.5YR 4/3). | | | |
| <u>160</u> | - | | | | 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 | $\left \right $ | | | | | | | |



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

Borehole ID: KAFB-106135

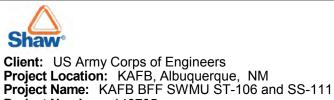
Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

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

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|---------------|-------------|--------|------------------|-------------------|---|-----------|------------|-----------------------------------|--------------|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well I | Diagram | Remarks |
| 185 | - | | | | 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 | | | |
| 195 | - | | | | 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 | E | 3entonite Seal | |
| 200 | - | | | | 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 | | | |
| - | - | | | | 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 | | | | | | | | | |



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

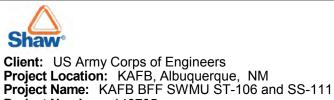
Borehole ID: KAFB-106135

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

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|-------------------------|-------------|--------|---------------------------------------|---|------------------|------|------------------------------------|-----------------------|
| 0 Depth (ft) | Sample Type | Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | | Well Diagram | Remarks |
| 215 | - | | | Well graded SAND (SW); brown (4/3); moist; loose; 95% very fine to coarse sand; trace gravel to 8mm; subangular; 5% silt. |) | / | | |
| - | - | | <u>* * * * * *</u> | Sandy SILT (ML); brown (10YR 5/3 moist; soft; low plasticity; 60% silt; very fine sand to 0.08mm. | 3); 40% ML | | | |
| <u>220</u> - - | | | | Well graded SAND (SW); brown (7 5/3); moist; loose; 90% very fine to coarse sand; 10% fine gravel to 10 subrounded. | very | | - Bentonite Seal | |
| <u>225</u> - - | - | | | Same as above (220 ft); 15% grav 3cm. | el to | | | |
| <u>230</u> - - | - | | | Same as above (220 ft). | SM | / | | |
| _ 235 _ _ _ | | | | Same as above (220 ft). | | | Top of Filter | |
| _ 240 | - | | | | | | Pack | |



Project Number: 140705

Date Started: 1/23/2011

Date TD Reached: 1/23/2011 Date Completed: 2/5/2011

Y Coordinate: 1474070.68

Ground Elevation AMSL (ft): 5351.1

Borehole ID: KAFB-106135

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

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

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

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| X Coordina | ite: 154290 | | d By: | lason Tarbert | Page 9 of 16 |
|--|---------------------------------------|---|----------|--|--------------|
| 05 Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | 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): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

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

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|---------------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---------|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 275 | - | | | | Lean Clay (CL); brown (10YR 5/3); moist; soft; low plasticity; 90% clay; 10% silt to 0.01mm. | CL | | |
| - - - | - | | | | 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. | | | |
| <u>280</u> - - - | - | | | | Same as above (275 ft). | SW- SM | | |
| <u>285</u> - - - | - | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% very fine sand to 0.04mm; rounded; 5% silt. | | - Bentonite Seal | |
| <u>290</u> - - - | - | | | | 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. | SP | | |
| <u>295</u> - - - | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106135

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

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

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

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|---------------------------|-------------|--------|------------------|-------------------|--|----------|------------------|---------|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Silty SAND (SM); brown (10YR 4/3); damp; loose; 70% fine sand to 0.08mm; subrounded; 20% silt; 10% clay. | SM | | |
| <u>305</u> - - | | | | | Lean CLAY (CL); brown (10YR 5/3); moist; soft; medium plasticity; 70% clay; 30% silt to 0.01mm. | CL | | |
| <u>310</u> - - | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 90% medium sand; 10% coarse sand to 3mm; subrounded. | | | |
| - 315 - | - | | | | Same as above (310 ft); trace clay nodules. | | - Bentonite Seal | |
| - <u>320</u> - - | - | | | | Same as above (310 ft); moist; 5% gravel to 6mm. | SP | | |
| - <u>325</u> - - | - | | | | Same as above (310 ft); 90% coarse sand; gravel to 1.4cm. | | | |
| - 330 | - | | | | | | | |

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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

Borehole ID: KAFB-106135

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

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

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

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|----------------------|-------------|--------|------------------|-------------------|---|--------------|--|-----------------------------------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); brown (10YR 4/3); dry; very loose; 90% medium sand; 10% coarse sand to 3mm; subrounded. | | - Bentonite Seal | |
| <u>335</u> - - | - | | | | 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 | |
| <u>340</u> - | - | | | | 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 | |
| - <u>345</u> - | - | | | | 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. Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; | GP SP | | Driller added ~10 gallons H2O. |
| - 350_ - | - | | | | loose; 100% coarse sand to 2mm; rounded; trace fines. No cuttings returned. | | - Bottom of Screen | |
| - 355_ - | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 100% coarse sand to 2mm; | | - - Bentonite Seal | |
| - - 360 | - | | | | rounded; trace gravel to 9mm; trace fines; | SP | | |

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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

Borehole ID: KAFB-106135

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

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

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

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|---------------|---------------------------------|--------|------------------|-------------------|---|----------|------------------|-----------------------------------|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 365 | - | | | | Poorly graded SAND (SP); dark yellowish brown (10YR 4/4); damp; loose; 100% coarse sand to 2mm; rounded; trace fines. Same as above (360 ft); 100% medium | SP | | |
| 370 | - - - - - - - | | | | Well graded SAND with Gravel (SW); dark yellowish brown (10YR 4/4); moist; | | | |
| 375 | - - 5 | | | | very loose; 85% very fine to coarse sand; 15% fine gravel to 5mm; well rounded. Well graded SAND (SW); dark yellowish brown (10YR 4/4); moist; very loose; 95% very fine to coarse sand; 5% fine | | - Bentonite Seal | |
| 380 | - - - - - - | | | | gravel to 5mm; well rounded. Same as above (375 ft). | SW | | Driller added ~10 gallons H2O. |
| 385 | - 5 - - | | | | 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 | 5 | | | | | | | |



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

Borehole ID: KAFB-106135

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

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

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

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|-------------------|-------------|--------|------------------|-------------------|---|----------|------------------|-----------------------------------|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | |
| <u>410</u> | - | | | | As above (390 ft); 95% medium sand; 5% coarse sand; no gravel. | | | |
| <u>415</u> 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 | | |

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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

Borehole ID: KAFB-106135

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

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

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

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|---------------|-------------|-----|--------|------------------|-------------------|---|----------|----------|--|-----------------------------------|
| 55 Depth (ft) | | | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 42 | - | | | | | 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 | | | |
| | - | | | | | 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. | | | | |
| <u>43</u> | 5 | | | | | Same as above (425 ft); 100% coarse sand; trace clay nodules. | SP | | - Top of Filter Pack | |
| 44(| 2 - - | | | | | Same as above (425 ft); no gravel. | | | - Top of 3" Schedule 80 PVC 0.050 Slot Screen | |
| 44 | 5 | | | | | Same as above (425 ft); no gravel. | | | | |
| 45 | _ _ 0 | | | | | | | | · · · | |



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

Borehole ID: KAFB-106135

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

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

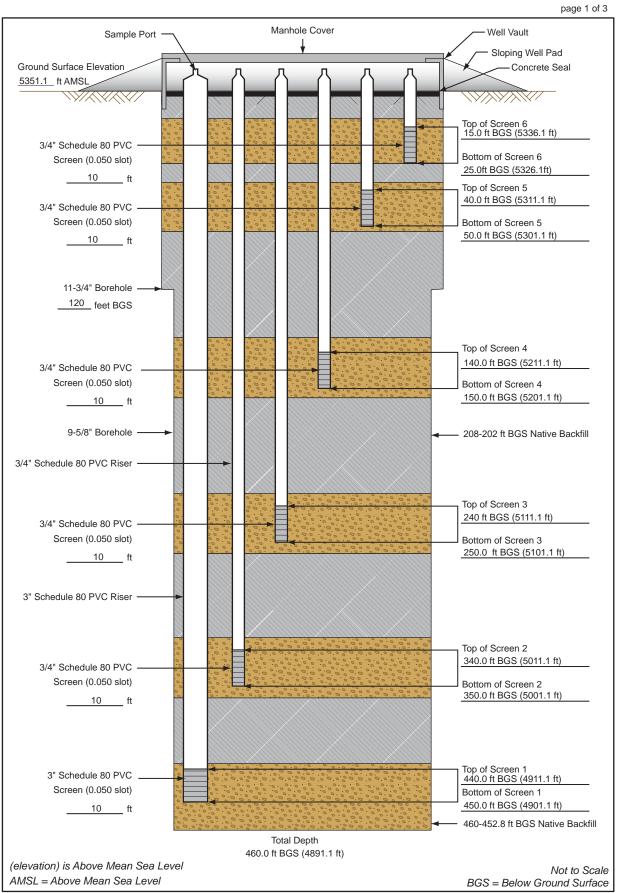
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|---------------|-------------|--------|------------------|---------------------------------------|---|----------|---------------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 455 | | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 100% medium sand; no gravel. Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; very loose; 85% medium sand; 10% coarse sand to 1.2mm; subrounded; 5% fines. | SP | Bottom of Screen | |
| 460 | - | | | * * * * * * * * * * * * * * * * * * * | very fine to very coarse sand; 5% fine gravel to 4mm; subangular. 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. |
| 465 | - | | | | | | | Water added during drilling (gallons) = 40 Water added during construction (gallons) = |
| 470 | - | | | | | | | Not Recorded |
| 475 | - | | | | | | | |
| 480 | | | | | | | | |

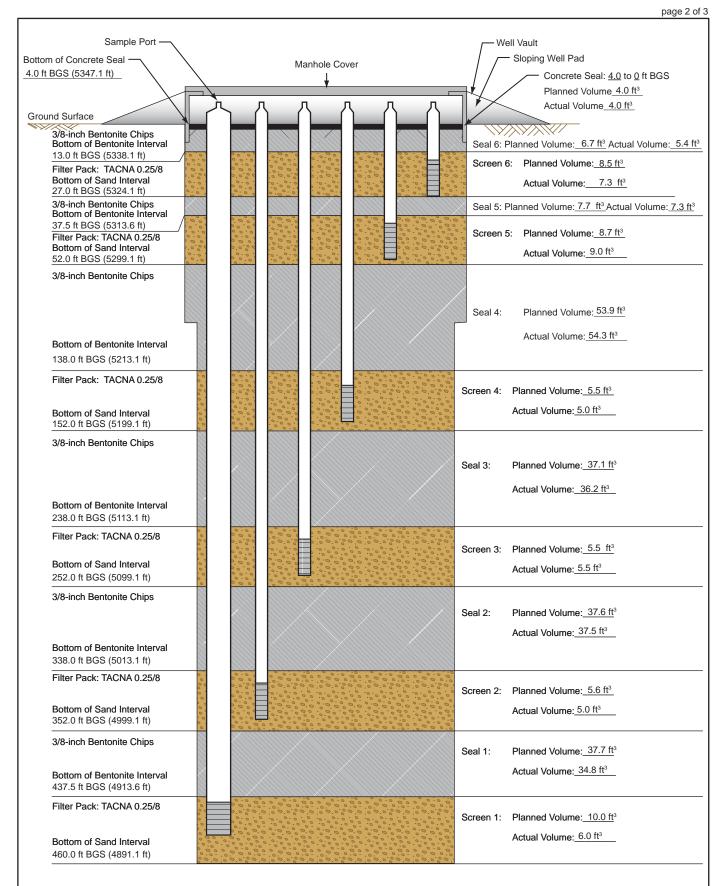
Nested Soil Vapor Well Completion Diagram for KAFB-106135

Installation Start Date/Time: 2/3/2011 @ 12:30 Installation End Date/Time: 2/5/2011 @ 16:45



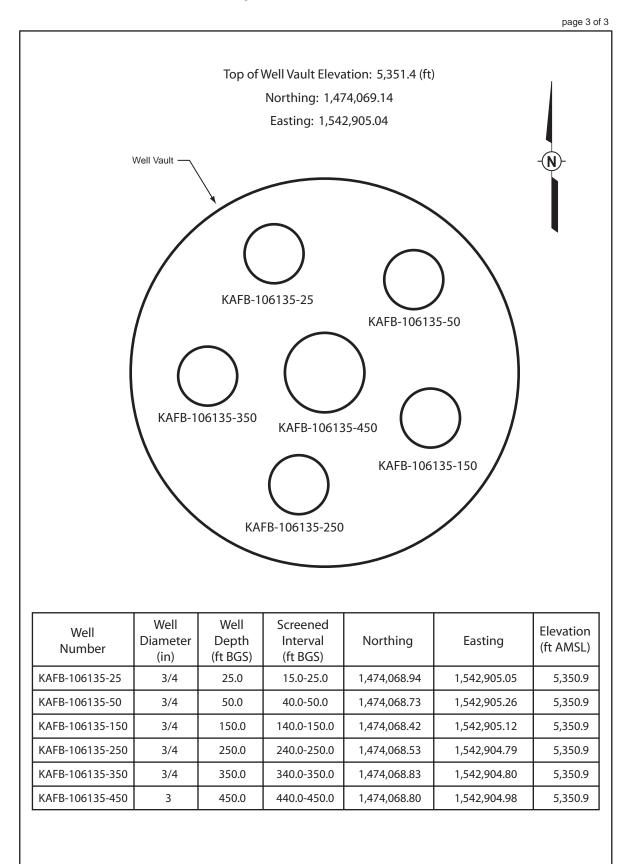
140705_CA010020_SV_KAFB.106135 (a)

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



140705_CA010020_SV_Map View_106135

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APPENDIX D-1

KAFB-106137 Final Well Report

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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

Borehole ID: KAFB-106137

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

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

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

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|--------------|-------------|--------|------------------|-------------------|---|------------------|--|--|
| o Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 5 | - | | | | No description recorded. | | - Concrete Seal | Hand augered. ***Note: no headspace requirement at this location*** |
| - | - | | | | 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. | | - Bentonite Seal | Began drilling @ 1212 on 1/18/11. |
| 10 | - | | | | Same as above (5 ft). | | Top of Filter Pack | |
| <u>15</u> | - | | | | Same as above (5 ft); 7% gravel. | ML | - 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 - Bentonite Seal | |
| 30 | | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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|--------------|-------------|--------|------------------|-------------------|---|----------|--|---------------|
| ତ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | - Bentonite Seal | |
| 35 | - | | | | Same as above (30 ft); no coarse sand; trace fine gravel to 1.5cm; trace clay nodules. | | Top of Filter | |
| 40 | - | | | | Same as above (30 ft). | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 45 | - | | | | Same as above (30 ft). | ML | | |
| 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 | - | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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|--------------|-------------|--------|------------------|-------------------|---|----------|------------------|---------|
| 9 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| 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. | ML | - 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 | | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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|--------------|-------------|--------|------------------|-------------------|---|---------------|------------------|---------|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | |
| <u>110</u> | - | | | | Same as above (105 ft); trace gravel to 1.7cm. | SP | | |
| <u>115</u> | - | | | | Sandy SILT (ML); brown (7.5YR 4/4); dry; very soft; low plasticity; 70% silt; 25% fine sand; 5% coarse sand to 5mm. | ML | - Bentonite Seal | |
| 120 | | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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| PID Lithologic Lithologic Log | Material Description 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. Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine sand to 0.04mm; rounded; 40% silt; trace clay nodules. 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 SM | | ell Diagram | Remarks Reached 120' with 11-3/4" casing @1346. Began drilling on 1/19/11 @ 1000. |
|--|--|--|--|---|--|
| | moist; soft; medium plasticity; 60% silt; 20% clay; 15% very fine sand; 5% coarse sand to 5mm. Silty SAND (SM); brown (7.5YR 5/4); moist; loose; 60% very fine sand to 0.04mm; rounded; 40% silt; trace clay nodules. Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 70% silt; 20% very fine sand; 10% medium sand; trace | | | - Bentonite Seal | 11-3/4" casing @1346. Began drilling on 1/19/11 |
| | moist; loose; 60% very fine sand to 0.04mm; rounded; 40% silt; trace clay nodules. Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; low plasticity; 70% silt; 20% very fine sand; 10% medium sand; trace | SM | | - Bentonite Seal | |
| | moist; soft; low plasticity; 70% silt; 20% very fine sand; 10% medium sand; trace | | | | |
| | | ML | | | |
| | 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 | |
| <u>******</u> . | 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 | |
| | 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 | | | |
| | | SILT (ML); pale brown (10YR 6/3); moist; firm; medium plasticity; 60% silt; 35% clay; 5% very fine sand to 0.04mm. SILT with Sand (ML); yellowish brown (10YR 5/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse | SILT (ML); pale brown (10YR 6/3); SW SILT (ML); pale brown (10YR 6/3); SW SILT (ML); pale brown (10YR 6/3); ML SILT with Sand (ML); yellowish brown ML (10YR 5/4); dry; very soft; low plasticity; ML 85% silt; 10% very fine sand; 5% coarse ML | SILT (ML); pale brown (10YR 6/3); moist; firm; medium plasticity; 60% silt; 35% clay; 5% very fine sand to 0.04mm. ML SILT with Sand (ML); yellowish brown (10YR 5/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse ML | coarse sand to 5mm; subangular. SW 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 SILT with Sand (ML); yellowish brown (10YR 5/4); dry; very soft; low plasticity; 85% silt; 10% very fine sand; 5% coarse ML |



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

Borehole ID: KAFB-106137

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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. | | 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 | | |
| <u>160</u> | - | | | | 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 | |
| <u>170</u> | - | | | | Well graded SAND (SW); yellowish brown (10YR 5/4); dry; very loose; 90% fine to medium sand; 10% coarse sand to 2mm; subrounded. | | | |
| <u>175</u> | | | | | Same as above (170 ft); moist. | sw | | |
| 180 | | | | | | | | |



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

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106137

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

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

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

| YC | Coord | dinate | ation / e: 147 e: 154 | 7407 | 9.39 | Drilling N | Netho | actor: WDC Drilling d: Air Rotary Casing H ason Tarbert | ammer Page 7 of 16 |
|--------------------|-------------|--------|-----------------------------|------|--|---------------|--------------|---|-----------------------|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Log | Material Description | | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | Well graded SAND (SW); yellowis brown (10YR 5/4); dry; very loose fine to medium sand; 10% coarse to 2mm; subrounded. | ; 90% | | | |
| - 185 - - | | | | | Well graded SAND (SW); brown (5/3); moist; loose; 90% fine to me sand; 10% coarse sand to 2mm; rounded. | (10YR dium | | | |
| <u>190</u> - | | | | | Same as above (185 ft); 15% coa sand; trace fine gravel to 1.1cm. | rse | SW | | |
| <u>195</u> | | | | | Same as above (185 ft). | | | - Bentonite Seal | |
| - 200 - | - | | | | Same as above (185 ft). | | | | |
| - 205 - - | | | | | Poorly graded SAND (SP); brown 4/3); moist; very loose; 70% medi sand; 20% fine sand; 10% coarse to 3mm; rounded. | um | SP | | |
| _ 210 | | | | | | | | | |

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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

Borehole ID: KAFB-106137

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

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

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

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|------------|-------------|--------|------------------|-------------------|--|----------|------------------|---------|
| Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | | |
| <u>220</u> | - | | | | 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 | | | |
| 230 | - | | | | 1.3cm; rounded. Same as above (225 ft); 10% fine gravel. | | | |
| 235 | - | | | | Same as above (225 ft). | SW | | |
| 240 | - | | | | | | Pack | |



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

Borehole ID: KAFB-106137

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

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

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

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Sample Type Headspace PID ithologic Log Depth (ft) Number *i* Ö Material Description Well Diagram Remarks ю. ⊃. 240 Top of 3/4" Well graded SAND (SW); grayish brown Schedule 80 (10YR 5/2); moist; loose; 95% very fine PVC 0.050 to very coarse sand; 5% fine gravel to Slot Screen 1.3cm; rounded; less coarse sand. 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 SW Bottom of Well graded SAND with Gravel (SW); Screen dark yellowish brown (10YR 4/4); moist; loose; 85% fine to very coarse sand; 15% fine gravel to 2.3cm; well rounded. 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 Bentonite Seal 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 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



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

Borehole ID: KAFB-106137

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

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

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|---------------------------|-------------|--------|------------------|------------|--|----------|------------------|---------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | SILT (ML); brown (10YR 4/3); dry to moist; soft; medium plasticity; 60% silt; 40% clay. | | | |
| <u>275</u> - - | - | | | | 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 | SM | | |
| - 285 - - - | - | | | | fine to very coarse sand to 4mm; subrounded; 15% silt; 5% clay nodules. Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% fin sand to 0.04mm; rounded; 5% silt. | | - Bentonite Seal | |
| - <u>290</u> - - | - | | | | Same as above (284 ft); slightly coarser | SP | | |
| - <u>295</u> - - | | | | | Same as above (284 ft); dry to moist. | | | |
| 300 | | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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|-----------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---------|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); yellowish brown (10YR 5/4); moist; loose; 95% medium sand to 0.04mm; rounded; 5% silt. | SP | | |
| <u>305</u> - - | - | | | | Well graded SAND (SW); brown (10YR 4/3); dry; very loose; 100% fine to very coarse sand; trace fine gravel to 7mm; subrounded. | | | |
| <u>310</u> | - | | | | Same as above (305 ft). | SW | | |
| 3 <u>15</u> - - | - | | | | 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 | |
| <u>320</u> | - | | | | 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. | | | |
| <u>325</u> | - | | | | Same as above (320 ft). | SW- SM | | |
| 330 | | | | | | | | |

| S | L Sha | | | | | Borehole ID: KAFB-106137 | | | | |
|-------------------|-----------------|-----------------|------------------|-------------------------|--|--------------------------|-------------------|--|--|---|
| Pro Pro | ojec ojec | t Loca t Nan | ation ne: k | : KÁF | s of Engineers FB, Albuquerque, NM BFF SWMU ST-106 and SS-111 | Hole Dia | amete | r Lower | (in.): 11-3/4 (in.): 9-5/8 ype: Flush mo | unt |
| Da Da | ite S ite T | Starteo D Re | d: 1/ ache | 18/20 d: 1/′ | | ∑ At T ▼ At E | Time of End of | Levels B f Drilling Drilling: ng: N/A | : N/À N/A | |
| Y | Coo | rdinat | e: 14 | n AMS 47407 54232 | | Drilling | Metho | | VDC Drilling otary Casing H rbert | ammer Page 12 of 16 |
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | We | Il Diagram | Remarks |
| 335 | - | | | | Poorly graded GRAVEL with San dark yellowish brown (10YR 4/4) very loose; 80% fine to medium of 4cm; 20% medium to coarse san rounded. | ; dry; gravel to | GP | | - Bentonite Seal | |
| | | | | 200 | No cuttings returned. | | | | - Top of Filter Pack | Driller added ~20 gallons of water. No cuttings returned @ 335 ft. |
| 340 | - | | | | Poorly graded SAND with Gravel dark yellow brown (10YR 4/4); dr loose; 70% medium to very coars 30% fine gravel to 8mm; rounded | y; very se sand; | 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 (SF brown (10YR 4/3); wet; loose; 90 medium sand to 0.4mm; rounded silt. | % | | | | |
| 350 | | | | | Same as above (345 ft); dry to m | oist. | SP- SM | | - Bottom of Screen | |
| <u>355</u> 360 | - | | | | Poorly graded SAND (SP); grayis brown (10YR 5/2); dry; very loose medium sand; 10% coarse sand 2mm; subrounded; trace fines. | e; 90% | SP | | - Bentonite Seal | |

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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

Borehole ID: KAFB-106137

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

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

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

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|----------------------|-------------|--------|------------------|-------------------|---|----------|------------------|---------|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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). | | | |
| 375 | | | | | Poorly graded SAND with Gravel (SP); | | - Bentonite Seal | |
| - | | | | | dark yellowish brown (10YR 4/4); moist; very loose; 80% medium sand; 5% fine sand; 15% fine gravel to 1.7cm; well rounded. | | | |
| <u>380</u> - - | | | | | 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 | | | |
| 390 | | | | | sand; 15% fine gravel to 1cm; subrounded. | SW | -Bentonite Seal | |



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

Borehole ID: KAFB-106137

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

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

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

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| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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. | 300 | | |
| - 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. | | - Native Backfill | |
| 410 | - | | | | Same as above (405 ft); dry. | 0.5 | | |
| - 415 - | - | | | | Same as above (405 ft); dry. | SP | - Bentonite Seal | |
| 420 | | | | | | | | |



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

Borehole ID: KAFB-106137

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

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

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

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| | X Coordinate: 1542321.46 Logged By. Jason Tarbert | | | | | | | |
|--------------|---|--------|------------------|-------------------|--|-----------|--|---------|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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 | | |
| | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% medium sand to 0.4mm; rounded; 5% fines. | | - Bentonite Seal | |
| 430 | - | | | | Same as above (425 ft). | SP | | |
| 435 | - | | | | Well graded SAND (SW); brown (10YR 5/3); dry; very loose; 95% fine to very coarse sand; 5% fine gravel to 1.1cm; subangular. | | - Top of Filter Pack | |
| 440 | - | | | | Same as above (435 ft). | SW | - Top of 3" Schedule 80 PVC 0.050 Slot Screen | |
| 445 | - | | | | Same as above (435 ft); slightly coarser. | | | |
| 450 | | | | | | | | |

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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

Borehole ID: KAFB-106137

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

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

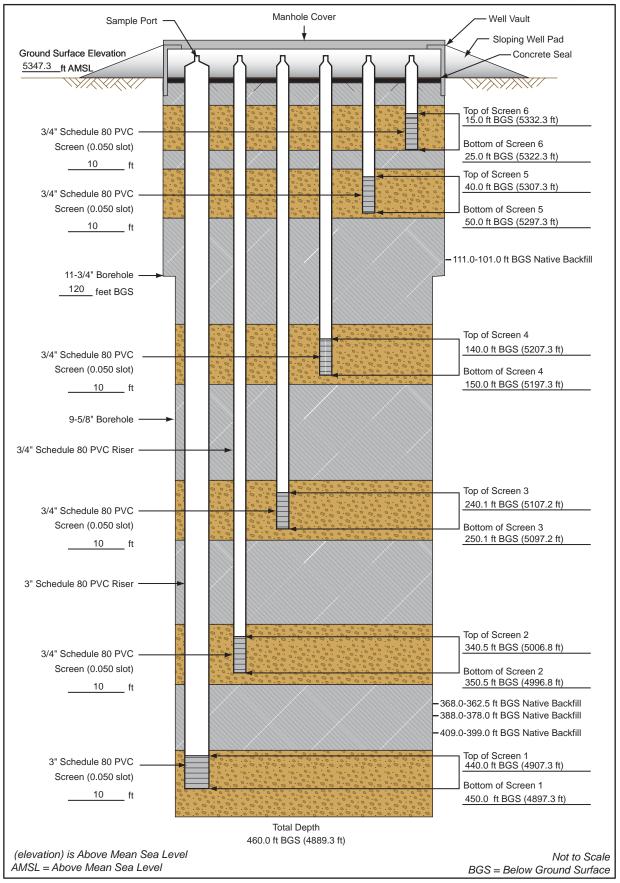
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|--------------------|-------------|--------|------------------|-------------------|---|-----------|---------------|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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 | 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 Water added during |
| - - 470 - | | | | | | | | construction (gallons) = Not Recorded |
| 475 | | | | | | | | |
| 480 | | | | | | | | |

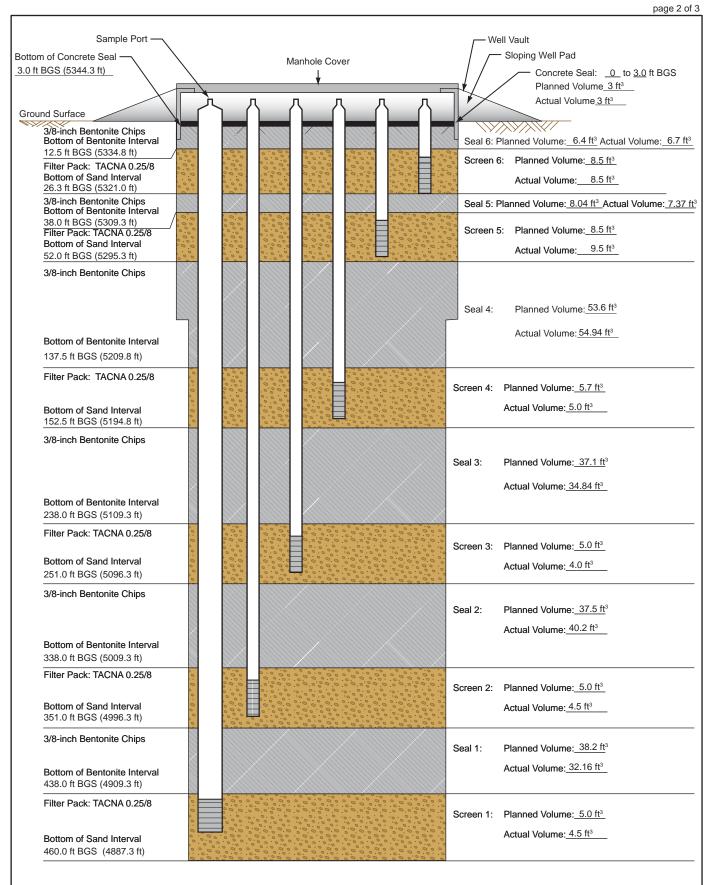
Installation Start Date/Time: <u>1/20/2011 @ 08:00</u> Installation End Date/Time: <u>1/22/2011 @ 11:37</u>

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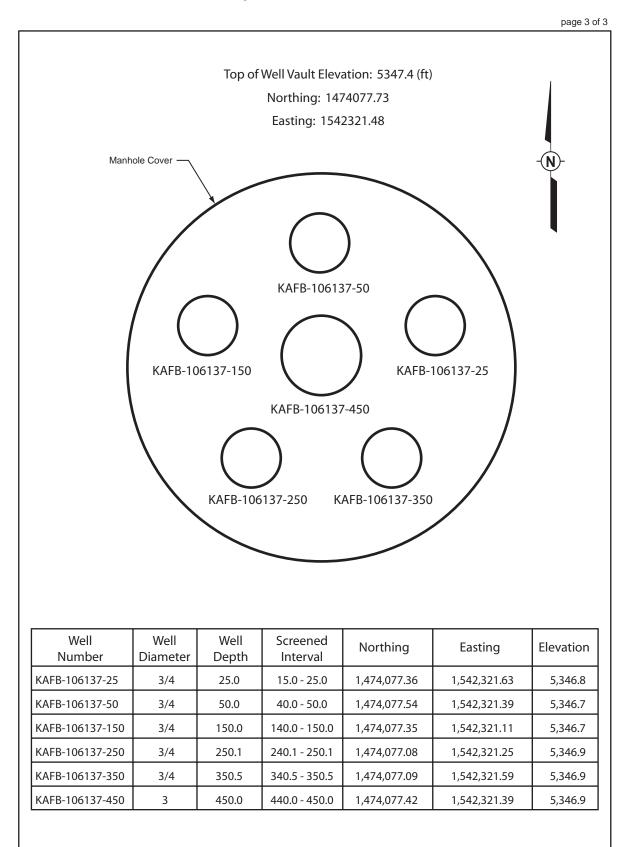
¹⁴⁰⁷⁰⁵_CA010020_SV_KAFB.106137 (a)

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



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APPENDIX D-1

KAFB-106139 Final Well Report

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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

Borehole ID: KAFB-106139

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

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

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

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|------------|-------------|--------|------------------|-------------------|---|----------|--|--|
| Oepth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | - | | | <u></u> | Sandy SILT (ML); yellowish red (5YR 5/6); dry; soft; 65% silt with clay; 35% fine sand. | | | Began drilling 11-3/4" borehole @ 1600 on 1/5/11. |
| 10 | - | | | | Same as above (5 ft); yellowish red (5YR 4/6). | | - Bentonite Seal | |
| 15 | - | | | | Same as above (5 ft). | | - Top of Filter Pack - Top of 3/4" Schedule 80 PVC 0.050 | |
| 20 | - | | | | SILT with Gravel (ML); light reddish brown (5YR 6/4); dry; soft; 75% silt with clay; 25% fine gravel to 1cm. | ML | Slot Screen | |
| 20 | - | | | | 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. |
| 25 | - | | | | Same as above (20 ft); reddish brown (2.5YR 4/4). | | - Bottom of Screen | |
| 30 | - | | | | | | -Bentonite Seal | |



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

Borehole ID: KAFB-106139

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

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

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

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|-------------|----------------------|---------|-----|------------------|------------|--|----------|---------------------------------------|------------------------|
| W Danth (#) | Sample Type | Niumbor | | Headspace PID | Lithologic | Material Description | U.S.C.S. | Well Diagram | n Remarks |
| | - | | | | | 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 |
| 3 | 5 | | | | | Same as above (30 ft). | ML | | |
| 4 | .0 | | | | | | | 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. | | Schedule 4 PVC 0.050 Slot Scree | 1/6/11. New connection |
| 4 | - - - | | | | | Silty SAND (SM); red (2.5YR 4/6); dry; loose; 60% fine sand; 10% fine gravel to 1cm; subangular; 30% silt and clay. | | | |
| _5 | 50 | | | | | Same as above (45 ft). | SM | - Bottom of Screen | |
| 5 | - 5 <u>5</u> - | | | | | Same as above (45 ft). | | - Bentonite s | Seal |
| 6 | 0 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|--------------|-------------|--------|------------------|--|--|----------|------------------|---|--|--|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | |
| | - | | | | 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 | 1 | | | | | | | | | |

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Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5341.3

Project Number: 140705

Date TD Reached: 1/8/2011 Date Completed: 1/8/2011

Y Coordinate: 1474051.40

Date Started: 1/5/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106139

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

Groundwater Levels BGS (ft): ▼ After Drilling: N/A

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

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|---|-------------|--------|------------------|-------------------|--|---------------------------|-----------|---|------------------|---|
| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | W | ell Diagram | Remarks |
| 95 - - - - - - - - - - - - - - - - - - - | | | | | Well graded SAND (SW); weak r (2.4YR 5/2); dry; loose; 95% fine coarse sand; subangular to subro 5% fine gravel to 1cm; subrounde gravel consists of lithic fragments (granite, some volcanics) and tra feldspars. Same as above (90 ft). | to ounded; ed; s | sw | | | |
| - | | | | | Poorly graded SAND (SP); weak (2.5YR 5/2); dry; loose; 100% find | | | | | New connection @ 0954. Resumed drilling @ 0959. |
| 105 | | | | | Same as above (100 ft). | | SP | | - Bentonite Seal | |
| 110 | | | | | Poorly graded SAND with Silt (SF weak red (2.5YR 5/2); dry; loose; fine sand; 10% silt. | 90% | SP- SM | | | |
| <u>115</u> - - - 120 | | | | | SILT (ML); reddish brown (2.5YR moist; soft; low plasticity; 90% sil clay; 10% fine sand. Same as above (113 ft). | | ML | | | |



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

Borehole ID: KAFB-106139

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

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

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

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| (tt) 125 130 | Number | Lithologic Log | Material Description Lean CLAY (CL); reddish brown (2.5YR 4/4); moist; firm; medium plasticity; 90% silty clay; 10% fine sand. Silty SAND (SM); weak red (2.5YR 5/2); dry; loose; 70% fine sand; 30% silt and clay nodules. | CL | We | ell Diagram | Remarks New connection @ 1103. Began driving to TD 11-3/4" @1105. Stopped drilling @ 120' at 1110. Bit packed off @ TD. Bit free @ 1131, began |
|---|--------|-------------------|---|-----------|----|--|--|
| - - - - - - - - - | | | 4/4); moist; firm; medium plasticity; 90% silty clay; 10% fine sand. Silty SAND (SM); weak red (2.5YR 5/2); dry; loose; 70% fine sand; 30% silt and | | | | Began driving to TD 11-3/4" @1105. Stopped drilling @ 120' at 1110. Bit packed off @ TD. |
| | | | dry; loose; 70% fine sand; 30% silt and | SM | | | Bit free @ 1131, began |
| 130 | | | | | | - Bentonite Seal | tripping out. 9-5/8" to TD, new connection made (140' |
| - | | | 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 | | | 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. | | | - Top of Filter Pack | |
| 140 | | | Same as above (135 ft); 5% fine gravel to 1.5cm; rounded. | SP- SM | | - Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | New connection @ 1658. Resumed drilling @ 1700. |
| <u>145</u> - - - | | | 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 | | | |



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

Borehole ID: KAFB-106139

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

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

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

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| 10 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 90% fine to medium sand; 10% fine gravel to 1cm; subangular. | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|---------------------------|-------------|--------|------------------|-------------------|---|--------------|------------------|--|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. |
| <u>185</u> - - - | | | | | 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. | | | Pumice clasts noted |
| <u>190</u> - - | | | | | Same as above (185 ft); 75% sand; 15% gravel; 10% silt. | | | |
| <u>195</u> | | | | | Same as above (185 ft); quartizite gravel. | SW- SM | - Bentonite Seal | 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 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

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

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|---------------|-------------|--------|------------------|-------------------|--|-----------|-------------------------|---|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 215 | _ | | | | 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 | | |
| 220 | - | | | | Silty SAND (SM); reddish gray (5YR 5/2); dry; loose; 80% fine sand; 20% silt. | SM | | |
| | - | | | | 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. | | - Bentonite Seal | New connection @ 1139. Resumed drilling @ 1141. |
| 225 | - | | | | Same as above (220 ft). | sw | | |
| 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 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|---------------|-------------|--------|------------------|-------------------|---|---------------|---|---|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | Poorly graded SAND (SP); reddish gray (5YR 5/2); dry; loose; 100% fine sand; some medium; trace silt. | SP | 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. | | | Rate of penetration slowed below 235' bgs. |
| 250 | - | | | | Same as above (245 ft). | SP- SM | - Bottom of Screen | |
| 255 | - | | | | Same as above (245 ft). | | | Stopped drillng @ 1238. End of 1/7/11. |
| <u>260</u> | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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| 02 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
|---------------|-------------|--------|------------------|-------------------|---|-----------|------------------|--|
| | _ | | | | 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. | | | |
| <u>295</u> | - | | | | Same as above (290 ft). | SP | | Stopped drilling @ 1036. |
| 300 | - | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|----------------------|-------------|--------|------------------|-------------------|--|--------------|------------------|---|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | | | | | 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. |
| 310 | | | | | 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 | | |
| - | | | | | Poorly graded SAND (SP); dark reddish gray (5YR 4/2); dry; loose; 95% fine sand; 5% silt. | | | Rate of penetration slowed down. |
| <u>315</u> - - | | | | | Same as above (310 ft). | SP | - Bentonite Seal | |
| <u>320</u> - - | | | | | 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. | | | Stopped drilling @ 1102. New connection @ 1155. Resumed drilling @ 1157. |
| <u>325</u> - - | | | | | Same as above (320 ft). | SW | | |
| 330 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|---------------|-------------|--------|------------------|-------------------|---|--------------|----|--|---|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ell Diagram | Remarks |
| 335 | - | | | | Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium to coarse sand; subrounded; 5% silt. Same as above (330 ft); 95% fine sand; | SP | | - Bentonite Seal | Rig chatter around 335'. |
| 340 | - | | | | 5% silt. | | | - Top of Filter Pack | |
| 345 | - | | | | 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 3/4" Schedule 80 PVC 0.050 Slot Screen | Stopped drilling @ 1208. New connection @ 1223. Resumed drilling @ 1225. |
| - | - | | | | 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 | |
| <u>355</u> | - | | | | Same as above (350 ft). | | | - Bentonite Seal | Stopped drilling @ 1238. |
| 360 | | | | | | | | | |



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

Borehole ID: KAFB-106139

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

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

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

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|---------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---|
| 90 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND with Silt (SP-SM); weak red (2.5YR 5/2); dry; loose; 90% fine sand; 10% silt. | | | 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?). | SP- SM | | |
| 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 | | |
| 380 | - | | | | 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 | |
| - | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106139

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

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero

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|---------------|-------------|--------|------------------|-------------------|---|----------|------------------|---|
| 66 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); weak red (2.5YR 5/2); dry; loose; 95% fine sand; minor medium sand; 5% silt. | | | |
| <u>395</u> | - | | | | 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. | | | |
| <u>415</u> | - | | | | Same as above (410 ft); 95% fine sand, 5% silt. | | | Stopped drilling @ 1407. |
| 420 | | | | | | | | |



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

Borehole ID: KAFB-106139

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero

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| Depth (ft) Sample Type Number | Headspace PID Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | Well graded SAND (SW); weak red (2.5YR 5/2); dry; loose; 95% fine to coarse sand; subangular to subrounded; 5% silt. | SW | | |
| 425 | | Sandy SILT (ML); brown (7.5YR 4/4); moist; soft; 60% silt with minor clay; 40% fine sand; trace medium to coarse sand. | | - Bentonite Seal | |
| <u>430</u> - - - | | Silty SAND (SM); brown (7.5YR 5/3); dry to moist; loose; 75% fine sand; 25% silt with trace clay. | | | |
| <u>435</u> - - 440 | | Same as above (430 ft); moist. | SM | - Top of Filter Pack | |
| - | | Sandy SILT (ML); brown (7.5YR 4/4); moist; soft to firm; 60% silt with minor clay; 40% fine sand. | | - 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. |
| <u>445</u> - - - | | 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 | | |



Client: US Army Corps of Engineers

Ground Elevation AMSL (ft): 5341.3

Project Number: 140705

Date TD Reached: 1/8/2011 Date Completed: 1/8/2011

Y Coordinate: 1474051.40

Date Started: 1/5/2011

Project Location: KAFB, Albuquerque, NM

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106139

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

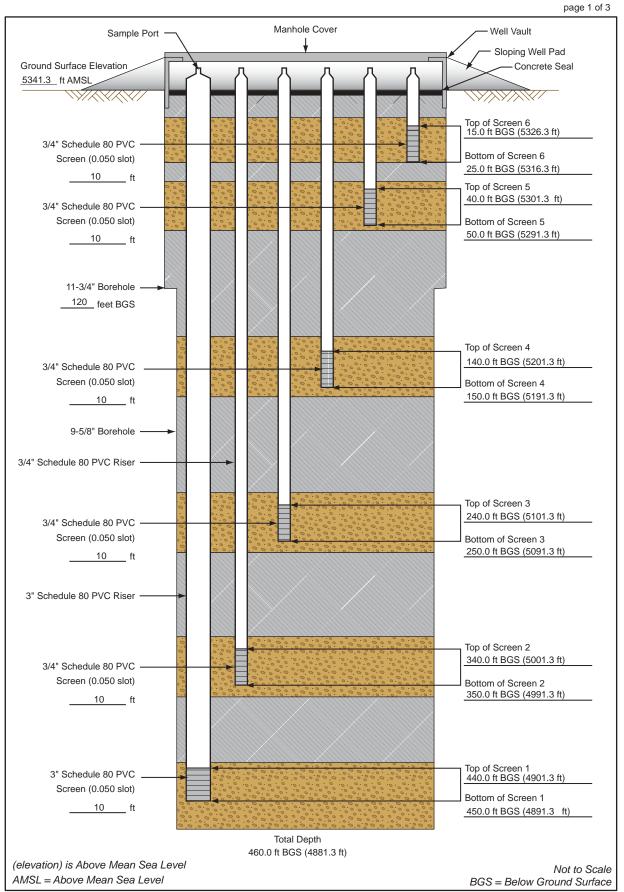
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Brian Lucero

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|--------------|-------------|--------|------------------|-------------------|--|-----------|--------------|--|
| 5 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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 | Screen | |
| <u>455</u> | _ | | | | Silty SAND (SM); weak red (2.5YR 5/2); dry; loose; 70% fine sand; 30% silt. | SM | | |
| <u>460</u> | - | | | <u> : 193</u> | | | | Total depth = 460 ft. Reached @1511 on 1/8/2011. |
| 465 | | | | | | | | Water added during drilling (gallons) = 0 |
| | | | | | | | | Water added during construction (gallons) = Not Recorded |
| <u>470</u> | - | | | | | | | |
| <u>475</u> | | | | | | | | |
| 480 | | | | | | | | |

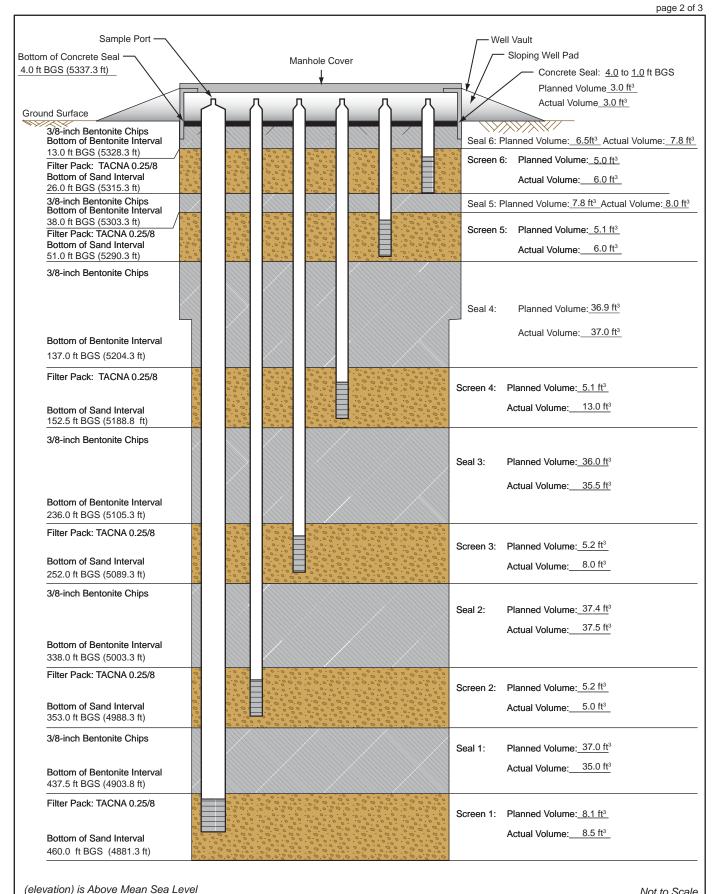
Nested Soil Vapor Well Completion Diagram for KAFB-106139

Installation Start Date/Time: <u>1/11/2011 @ 11:26</u> Installation End Date/Time: <u>1/14/2011 @ 15:00</u>



140705_CA010020_SV_KAFB.106139 (a)

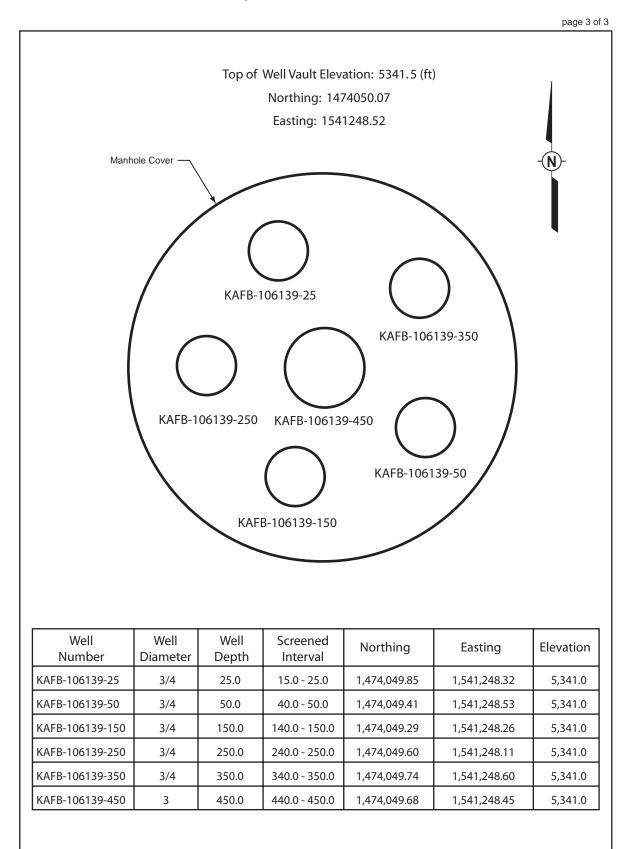
Nested Soil Vapor Well Completion Diagram for KAFB-106139



All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106139



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APPENDIX D-1

KAFB-106140 Final Well Report

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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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| Denth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | No description recorded. | | Concrete S | Hand augered. ***Note: no headspace requirement at this location*** |
| | - | | | | Sandy SILT (ML); light reddish brown (5YR 6/3); moist; soft; low plasticity; 70% silt; 30% fine sand; trace gravel to 7mm. | | - - Bentonite S | Began drilling @1600 on 1/10/11. Seal |
| 1 | - | | | | Same as above (5ft); reddish brown (5YR 3/4); increasing gravel to 1.5cm. | | Top of Filte Pack | er |
| 1 | 5 | | | | Same as above (10ft); trace clay nodules; less gravel. | ML | - Top of 3/4' Schedule & PVC 0.050 Slot Scree | 30 |
| 2 | <u>-</u> - - | | | | Same as above (10ft); increasing clay nodules. | | | |
| 2 | 5 | | | | 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 | |
| 3 | D | | | | | | - Bentonite s | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|---------------|-------------|--------|------------------|-------------------|---|----------|--|---------|
| සි Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | _ | | | | 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). | | | |
| | | | | | | | Pack | |
| 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 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 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \Box At Time of Drilling: N/A \mathbf{I} At End of Drilling: N/A \mathbf{I} After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|--------------|-------------|--------|------------------|-------------------|--|----------|------------------|--|
| 8 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | | | | | 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. | | | 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 | SW | | |
| - | | | | | to 6mm; angular to subangular. 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. |
| 85 | | | | | Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; very loose; 95% very fine to fine sand; 5% silt. | SP | | Resumed drilling @ 1320. |
| 90 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| ଞ Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); yellowish red (5YR 5/6); dry; very loose; 95% very fine to fine sand; 5% silt. | SP | | Resumed drilling @ 1320. |
| <u>95</u> 100 | - | | | | 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. | | | |
| 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. Lean CLAY with Sand (CL); reddish | CL | - Bentonite Seal | |
| <u>110</u> | - | | | | brown (5YR 4/3); dry; soft; high plasticity; 85% clay; 15% very fine sand. Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); dry; very loose; 95% medium to very fine sand; angular to subrounded; 5% fines. | | | Air hammer hose blew off @1410. End of 1/11/11. |
| 115 | - | | | | Same as above (110 ft). | SP | | Beginning of 1/12/11. |
| 120 | - | | | · · · · · · · · · · · · · · · · · · · | | SW | | |

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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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | w | /ell Diagram | Remarks |
| 125 | - | | | | 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. |
| | - | | | | Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% fine to very fine sand; 40% clay. | | | - Bentonite Seal | |
| - | - | | | | Clayey SAND (SC); strong brown (7.5YR 5/6); moist; loose; 60% medium to very fine sand; 40% clay. | SC | | | |
| <u>135</u> | - | | | | Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% fine to very fine sand; 40% clay. | | |] - Top of Filter | |
| | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); dry; very loose; 95% coarse to fine sands; 5% fines. | SP | | Pack | |
| 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 | | Slot Screen | |
| - 150 | - | | | | Clayey SAND (SC); brown (7.5YR 4/4); moist; loose; 60% medium to very fine sand; 40% clay. | SC | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|----------------------|-------------|--------|------------------|-------------------|--|-----------|-----------------------|---------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| 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 | | |
| - | - | | | | Well graded SAND with Gravel (SW); gray (5YR 6/1); dry; very loose; 60% sand; 40% gravel to 30mm; angular to subrounded. | | | |
| <u>165</u> - - | - | | | | Well graded SAND with Gravel (SW); gray (5YR 6/1); moist; very loose; 85% sand; 15% fine gravel to 9mm; subangular to subrounded. | SW | - Bentonite Seal | |
| <u>170</u> - - | - | | | | Silty SAND with Gravel (SM); reddish brown (5YR 4/4); moist; loose; 70% well graded sand; 15% gravel; some tuft clasts; 15% silt. | SM | | |
| <u>175</u> | - | | | | Well graded SAND with Gravel (SW); brown (7.5YR 4/4); 80% sand; 20% gravel to 7mm; rounded; tuft clasts. | sw | | |
| 180 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| | -00 | ordina | I.C. 13 | Jason Tarbert | | | | |
|---------------|-------------|--------|------------------|-------------------|--|----------|--|---------|
| 08 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | _ | | | | Poorly graded SAND (SP); pinkish gray (7.5YR 7/2); moist; very loose; 95% coarse to fine sand; 5% fines. | SP | - Bentonite Seal | |
| <u>185</u> | - | | | | Well graded SAND (SW); light gray (2.5YR 7/1); dry to moist; 90% sand; 5% gravel to 11mm; subangular to subrounded; 5% fines. Well graded SAND (SW); light brownish gray (2.5Y 6/2); moist; very loose; 90% sand; 10% gravel to 12mm; trace fines. | sw | - Native Backfill | |
| <u>195</u> | | | | | 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 | - A the second s | |
| 205 | - | | | | Poorly graded SAND (SP); light reddish brown (5YR 6/4); dry; very loose; 95% fine to very fine sand; 5% fines. | SP | | |

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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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|-----------------------------------|-------------|--------|------------------|-------------------|--|----------|---------------------------------------|--------------|--|
| 01 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | |
| - | | | | | Well graded SAND (SW); light gray (5YR 6/1); moist; very loose; 90% sand; 5% gravel to 17mm; subrounded to rounded; 5% fines. | | | | |
| 2 <u>15</u> - - - | | | | | Well graded SAND with Gravel (SW); gray (5YR 6/1); 85% sand; 15% gravel to 17mm; angular to subrounded; trace fines. | SW | A A A A A A A A A A A A A A A A A A A | | |
| 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 | | |
| 2 <u>25</u> - - - 230 | | | | | Well graded SAND (SW); gray (5YR 5/1); dry; very loose; 100% sand to 5mm. | SW | CONTRACTOR | | |
| - | | | | | Poorly graded SAND (SP); pink (5YR 7/3); damp; very loose; 95% coarse to fine sand; 5% fines. | SP | | | |
| 2 <u>35</u> | | | | | 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. Poorly graded SAND (SP); pink (5YR 7/3); 95% coarse to fine sand; 5% gravel | | - Bentonite Seal | | |
| - - 240 | | | | | to 5mm; subrounded. | SP | - Top of Filter Pack | | |

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| Sh | aw |

Project Number: 140705

Date Started: 1/10/2011 Date TD Reached: 1/12/2011 Date Completed: 1/20/2011

Client: US Army Corps of Engineers Project Location: KAFB, Albuquerque, NM

Ground Elevation AMSL (ft): 5345.3

Project Name: KAFB BFF SWMU ST-106 and SS-111

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A ▼ After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer

| YC | Coor | dinat | e: 14 e: 15 | 7263 | 4.47 Dr | Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert | | | | ammer Page 9 of 16 |
|---|-------------|--------|------------------|-------------------|---|---|----------|----|--|-----------------------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | | U.S.C.S. | We | ell Diagram | Remarks |
| <u>- 10</u> - 245 - - - 250 | | | | | Well graded SAND with Gravel (SW light gray (5YR 7/1); dry; very loose; sand; 15% gravel to 10mm; subang to subrounded. Well graded SAND with Gravel (SW light gray (5YR 7/1); dry; very loose; sand; 40% gravel to 15mm; angular rounded. | ; 85% ular /); ; 60% to | SW | | Top of 3/4" Schedule 80 PVC 0.050 Slot Screen | |
| 255 | | | | | Silty SAND (SM); light brown (7.5YR 6/4); moist; loose; 60% medium to v fine sand; 5% gravel to 40mm; subangular to subrounded; 35% silt. | very | | | - Bottom of Screen | |
| - - 260 | | | | | Silty SAND (SM); light brown (7.5YR 6/4); moist; loose; 70% medium to v fine sand; 30% silt. | very | SM | | | |
| - 265 | | | | | Same as above (255 ft); 80% mediu very fine sand; 20% silt. | um to | SIVI | | - Bentonite Seal | |
| | | | | | Poorly graded SAND with Silt (SP); brown (7.5YR 7/3); moist; loose; 909 medium to very coarse sand; trace gravel to 7mm; 10% silt. | % | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|------------------------------|-------------|--------|------------------|-------------------|--|-----------|------------------|---------|
| 05 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 | | |
| - <u>280</u> - - | - | | | | Poorly graded SAND (SP); pinkish gray (5YR 6/2); moist; very loose; 95% very coarse to medium sand; 5% fines. | | | |
| 2 <u>85</u> - - 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 | - Bentonite Seal | |
| - | - | | | | Poorly graded SAND with Silt (SP-SM); light brown (7.5YR 6/4); 90% coarse to fine sand; 10% silt. | SP- SM | | |
| <u>295</u> - - | | | | | Clayey SAND (SC); reddish brown (7.5YR 6/6); 80% fine sand; 20% clay. | sc | | |
| 300 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|---------------|-------------|--------|------------------|-------------------|--|----------|------------------|---------|
| 00 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| - | - | | | | 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 | | |
| <u>315</u> | - | | | | 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 | |
| <u>-</u> | - | | | | 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 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| | X Coordinate: 1542237.30 Log | | | | | | lason Ta | IDEIL | |
|----------------------|------------------------------|--|--|-------------------|--|----------|----------|--|---------------------------------------|
| 05 Depth (ft) | Sample Type | Sample Type Number Headspace PID Lithologic Log | | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| 335 | - | | | | 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 | |
| - | - | | | | 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 | |
| <u>340</u> - - | - | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|---------------------------|-------------|--------|------------------|-------------------|---|-----------|------------------|---------|
| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | Poorly graded SAND (SP); brown (10YR 5/3); dry; very loose; 95% coarse to medium sand; 5% fines. | | | |
| - <u>365</u> - - | | | | | 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 | | |
| <u>875</u> - - | | | | | Well graded SAND (SW); brown (7.5YR 5/3); dry; loose; 95% sand; 5% fines. | | - Bentonite Seal | |
| - <u>-</u> - - | | | | | 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 | | |
| <u>385</u> - - | | | | | Poorly graded SAND (SP); brown (7.5YR 5/3); dry to moist; very loose; 95% coarse to fine sand; 5% fines. | SP | | |
| 390 | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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| g Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks | | | |
|---------------------------|-------------|--------|------------------|-------------------|--|----------|------------------|---------|--|--|--|
| - | - | | | | 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. | | | | | | |
| - <u>395</u> - - | - | | | | 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 | | | | |
| <u>410</u> - - | - | | | | 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 | | | | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|-----------------------|-------------|--------|------------------|-------------------|--|----------|----------|--|---------|
| 55 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | We | ll Diagram | Remarks |
| - | - | | | | 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 | |
| <u>430</u> | - | | | | Poorly graded SAND (SP); pink (7.5YR 7/3); moist; very loose; 95% very coarse to fine sand; 5% fines. | | | | |
| 4 <u>35</u> - - | - | | | | 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 | | | | | | | | | |



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

Borehole ID: KAFB-106140

Hole Diameter Upper (in.): 11-3/4 Hole Diameter Lower (in.): 9-5/8 Surface Completion Type: Flush mount

Groundwater Levels BGS (ft): \square At Time of Drilling: N/A \blacksquare At End of Drilling: N/A \blacksquare After Drilling: N/A

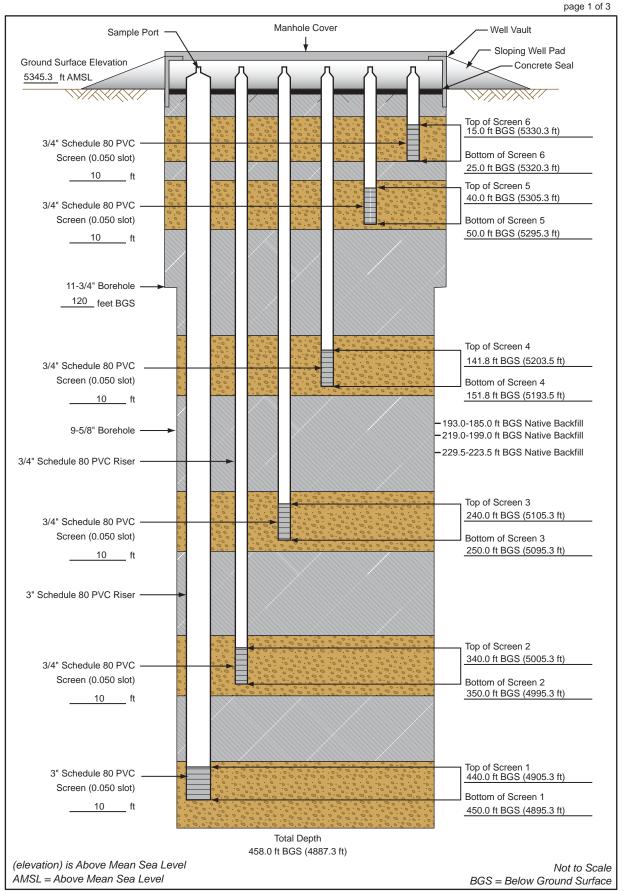
Drilling Contractor: WDC Drilling Drilling Method: Air Rotary Casing Hammer Logged By: Jason Tarbert

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|---------------|-------------|--------|------------------|-------------------|--|----------|---------------------|--|
| 65 Depth (ft) | Sample Type | Number | Headspace PID | Lithologic Log | Material Description | U.S.C.S. | Well Diagram | Remarks |
| | - | | | | 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. | | | |
| | - | | | | Poorly graded SAND (SP); dry, very loose; 95% medium to fine sand; 5% | SP | | Total depth = 458 ft. |
| 460 | - | | | | | | | Reached @1630 on 1/12/11. |
| | - | | | | | | | Water added during drilling (gallons) = 0 |
| 465 | - | | | | | | | Water added during construction (gallons) = Not Recorded |
| | - | | | | | | | |
| 470 | - | | | | | | | |
| | - | | | | | | | |
| 475 | - | | | | | | | |
| | - | | | | | | | |
| 480 | | | | | | | | |

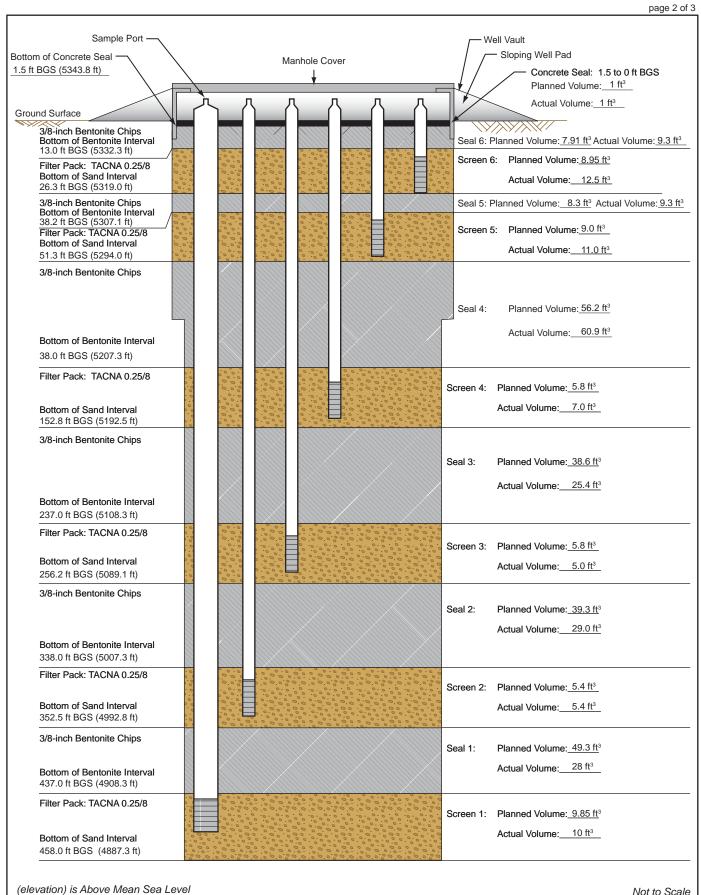
Nested Soil Vapor Well Completion Diagram for KAFB-106140

Installation Start Date/Time: <u>1/13/2011 @ 09:10</u> Installation End Date/Time: <u>1/20/2011 @ 13:05</u>



140705_CA010020_SV_KAFB.106140 (a)

Nested Soil Vapor Well Completion Diagram for KAFB-106140

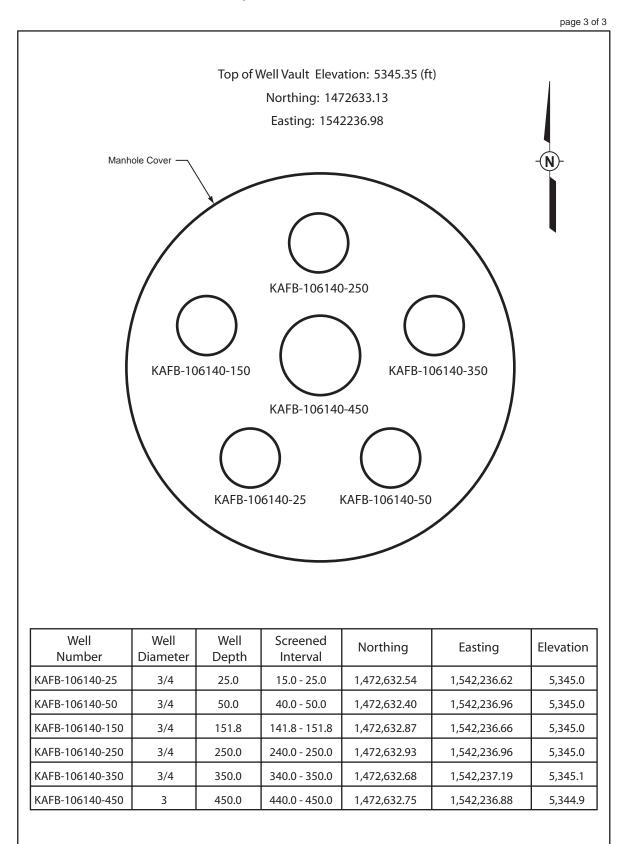


All Materials Placed with Tremie Pipe

Not to Scale BGS = Below Ground Surface

140705_CA010020_SV_KAFB.106140 (b)

Nested Soil Vapor Well Completion Diagram Map View for KAFB-106140



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APPENDIX C

Waste Disposal Documentation

C-1. IDW Soil Disposal

C-2. Off-Site Waste Disposal Manifest

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APPENDIX C-1

IDW Soil Disposal

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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.

VEN C. KITT

Solid Waste Program Manager Environmental Management 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 determination for 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



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

Dear Pam Moss:

Order No.: 1012939

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

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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 <u>BY CUSTOMER</u>

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 rolloffs, 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



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-106045 wells 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.

Mr. Steve Kitt

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

2



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

Dear Pamela Moss:

Order No.: 1101216

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

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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



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&l 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

Mr. Steve Kitt

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, \langle 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

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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



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&1 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-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

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NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

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SOVINK

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 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 – A20-081 and 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



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

Dear Pamela Moss:

Order No.: 1102163

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



4981 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

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KAFB, ALBUQUERQUE, NM

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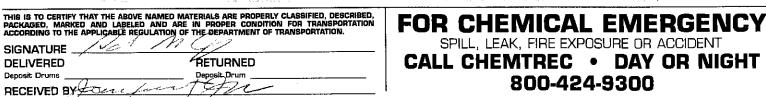
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NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE MANIFEST

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NON-HAZARDOUS WASTE

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.

Solid Waste Program Manager Environmental Management



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

Mr. Steve Kitt

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



COVER LETTER

Thursday, February 24, 2011

Pamela Moss Shaw Environmental, Inc. 7604 Technology Way, Suite 300 Deriver, CO 80237

TEL: (720) 554-8252 FAX

RE: KAFB BFF

Dear Pamela Moss:

Order No.: 1102257

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

Andy Freeman, Laboratory Manager

NM Lab # NM9425 NM0901 AZ license # AZ0682 ORELAP Lab # NM100001 Texas Lab# T104704424-08-TX



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 # Fax 505.345.4107 www.hallenvironmental.com

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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.

VEN C. KI

Solid Waste Program Manager Environmental Management

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.

Mr. Steve Kitt

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



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

Dear Pamela Moss:

Order No.: 1102293

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 = Fax 505.345.4107 www.hallenvironmental.com

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KAFB, ALBUQUERQUE, NM

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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



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 Kirtlaud Air Force Base (Kirtlaud 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-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,

Equew for Tom Cooper Que 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



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

Dear Pamela Moss:

Order No.: 1102584

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 Fax 505.345.4107 www.hallenvironmental.com



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

Dear Pamela Moss:

Order No.: 1102634

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



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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 rolloffs. 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

Mr. Steve Kitt

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,

per for Jon 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



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

Dear Pamela Moss:

Order No.: 1102662

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

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COMPANY, INC. 6133 EDITH BOULEVARD NE ALBUQUERQUE, N.M. 87107 PHONE (505) 345-3655

BOL#

RINCHEM COMPANY., INC

03/07 /2011

RHINO – KAFB / SHAW KAFB, ALBUQUERQUE, NM RINCHEM COMPANY, INC 6133 EDITH NE ALBUQUERQUE, NM 87107

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COMPANY, INC. 6133 EDITH BOULEVARD NE ALBUQUERQUE, N.M. 87107 PHONE (505) 345-3655

BOL#

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RINCHEM COMPANY., INC Carrier

RHINO - KAFB / SHAW

KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC 6133 EDITH NE ALBUQUERQUE, NM 87107

 $\left[X \right]$

LANDFILL TRANSPORTATION

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DELIVERY OF ROLL-OFF LINERS

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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 <u>OR</u> IF BOX IS MOVED TO ANOTHER LOCATION. ANY QUESTIONS REGARDING THIS FORM PLEASE CONTACT ROB GOFF AT 998-4140 OR 681-4984 (CEIL).

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COMPANY, INC. 6133 EDITH BOÚLEVARD NE ALBUQUERQUE, N.M. 87107 PHONE (505) 345-3655

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RINCHEM COMPANY., INC Cartier

RHINO ~ KAFB / SHAW EAFB, ALBUQUERQUE, NM RINCHEM COMPANY, INC 6133 EDITH NE

ALBUQUEROUE, NM 87107

| \mathbb{X} | DELIVERY OF EMPTY ROLL-OFF BIN | LANDFILL | IER (SEV BELOW) | |
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RETURN COMPLETED BOL TO ROB GOFF

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| 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 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.

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

Mr. Steve Kitt

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,

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



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

Dear Pamela Moss:

Order No.: 1102748

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

STRAIGHT BILL OF LADING

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Carrier No.

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COMPANY, INC. 6133 EDITH BOULEVARD NE ALBUQUERQUE, N.M. 87107 PHONE (505) 345-3655

BOL# 17 /2011

RINCHEM COMPANY., INC Cartier

RHINO - KAFB / SHAW

KAFB, ALBUQUERQUE, NM

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RINCHEM COMPANY, INC 6133 EDITH NE ALBUQUERQUE, NM 87107

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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 Jothn 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



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

Dear Pamela Moss:

Order No.: 1103060

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



4901 Hawkins NE = Suite D = Albuquerque, NM 87109 505.345.3975 = Fax 505.345.4107 www.hallenvironmental.com



COMPANY, INC. 6133 EDITH BOULEVARD NE ALBUQUERQUE, N.M. B7107 PHONE (505) 345-3655

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RHINO - KAFB / SHAW

KAFB, ALBUQUERQUE, NM

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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



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

Mr. Steve Kitt

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.

2

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Agnew for Tim 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



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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505,345,3975 ■ Fax 505,345,4107 www.hallenvironmental.com



COMPANY, INC. 6133 EDITH BOULEVARD NE ALBUQUERQUE, N.M. 87107 PHONE (505) 345-3655

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KAFB, ALBUQUERQUE, NM

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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/ shave Kitt. well Leications: KAFB-106128 KAFB-106131 weaker Left aff Letter but. Roll-offs 2013-27 + 1420-088 + 22023 wave included. Straig will maker internal annections. USweed O

STEVEN C. KITT Solid Waste Program Manager Environmental Management



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. Mr. Steve Kitt

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.

2

If you have any questions regarding this request, please contact me at (720) 554-8163. Thank you for your assistance.

Sincerely,

Thomas Cooper

new for Tom 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

Waste Disposal Letter 106118, March 24, 2011



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

Dear Pamela Moss:

Order No.: 1103222

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.41D7 www.hallenvironmental.com

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KAFB, ALBUQUERQUE, NM

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RINCHEM COMPANY., INC

RHINO – KAFB / SHAW

KAFB, ALBUQUERQUE, NM

RINCHEM COMPANY, INC 6133 EDITH NE

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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

Mr. Steve Kitt

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,

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



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

Dear Pamela Moss:

Order No.: 1103421

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



4901 Hawkins NE ■ Suite D ■ Albuquerque, NM 87109 505.345.3975 ■ Fax 505.345.4107 www.hallenvironmental.com

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APPENDIX C-2

Off-Site Disposal Waste Manifest

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| UNIFORM HAZARDOUS 1. WASTE MANIFEST | ed for use on elite (12-pitch) typewriter. | | | | | Form | hourses a | OMB No. 2 | 0000 0000 |
|---|---|---|--|----------------|---------------------|-----------------|----------------|--|-------------------------------|
| | Generator ID Number | 2. Page 1 of 1 of 1 | 3. Emergency Response | | 4. Manifec | 17 setting M | | | .050-005: |
| 5. Generator's Name and Mailing / | NM9570024423 | | 505-846-2 Generator's Sile Address | 2803 | | <u>134</u> | 1379 | 18 F | <u>LE</u> |
| | Kirtland Airford | e Dase | | | ant month School | 53) | | | |
| Generator's Pt 505 846-2 | 2050 Wyoming | | | | | | | | |
| Generator's Ptilles 846-2 6. Transporter 1 Company Name | 803 Albuquerque, N | M 8/11/ | · · · · · · · · · · · · · · · · · · · | | | | | | |
| RINC | HEM CO INC | | | | U.S. EPA ID | | | | |
| 7. Transporter 2 Company Name | | | | | U.S. EPAID | M DOO: | 22086. | 21 | |
| 8. Designated Facility Name and S | | | | | 1 | | | | |
| C. Designation recting realing and S | | ompany, Inc. | | | U.S. EPA ID | Number | | | |
| | 6133 Edith | | | | | | | | |
| Facility's Phone: (505) | 345-3855 Albuquerqu | ie, NM 87107 | | | 1 . N | MD00: | 30000 | 77 | |
| 9a. 9b. U.S. DOT Description HM and Packing Group (if any | (including Proper Shipping Name, Hazard Cl | ass, ID Number, | 10. Conta | iners | 11. Total | 12. Unit | 42000 | <u> </u> | |
| | | | No. | Туре | Quantity | VL/Vol. | 13. 1 | Waste Codes | |
| benzene, wat | WASTE FLAMMABLE LI ter), 3, PG II (D001) | QUIDS, N.O.S. | A | DM | | P | DOUT | D018 | |
| | | | | | Ø | | | | |
| | WASTE FLAMMABLE LI | QUIDS, N.O.S. | | DF | <u> </u> | P | D001 | D018 | - |
| | er), 3, PG II (D001) | | 3 | | 1500 | P | | 6010 | |
| 3. | | | | <u> </u> | // | | | | |
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| 4. | | | | | | | | | |
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| 14. Special Magiling lastructions a | nd Additional Information | | | | | | | | |
| 2) RC8578 | nd Additional Information 24 hour e | nergency conta | ct: Terry Ru | uion (3 | 03)887-4 | 8464 | -1)1 | RG# 1 | 28- ~~ |
| | | | • | ~ - | / | | 2) E | RG# 1 | 28 |
| | · · · | | | | | | | | |
| 15. GENERATOR'S/OFFEROR'S marked and labeled/blacarde | S CERTIFICATION: I hereby declare that th d, and are in all respects in proper condition itents of this consionment conform to the terr | e contents of this consignment ar | e fully and accurately de | escribed above | e by the proper s | ipping name | , and are clas | silied, packa | ged, |
| Exporter, I cartify that the con | tonia of this sension and and a state | in equipor according to applica | | ionei governn | nemal regulations | . If export shi | pment and I | am the Prima | - |
| | inclusion of this consignment compilm to the ten | ns of the attached EPA Acknowle | dgment of Consent. | | | | | | y . |
| Generator's/Offeror's Printed/Typed | zation statement identified in 40 CFR 262.27 | (a) (if I am a large quantity gener | allor) or (b) (if I am a sm | ali quantitugo | flerator) is tose. | | | | 9 |
| | zation statement identified in 40 CFR 262.27 Name | (a) (if I am a large quantity gener | dgment of Consent. allor) or (b) (if I am a sm allure | | flereikor) is tose. | | Mor | ith Day | Year |
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| EPA Form 8700-22 (Rev. 3-05) | Previous editions are obsolete. |
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| Piea | se print or type. (Form designed for u | se on elite (12-pitch) typewriter.) | | 4 | Sila | • | | | | |
| | WASTE MANIFEST | ator ID Number | 2. Page 1 of 1 of 1 | 3. Emergency Respon | The Phone | 2 4. Manifes | it Tracking | Number | | 0. 2050-0039 |
| | 5. Generator's Name and Mailing Address | Kirtland Airforce Base | | 505-846-2 Generator's Site Addres | | | <u>J34</u> | 037 | 32 | FLE |
| | | 2050 Wyoming Blvd S | | | | | 635/ | | | |
| ╽╽┝ | Generator's 505 846-2803 5. Transporter 1 Company Name | Albuquerque, NM 871 | 17 | | | | | | | |
| | RINCHEN | I CO INC | ······································ | ************************************** | | U.S. EPA ID | | | | |
| | Transporter 2 Company Name | | | | | U.S. EPA ID | | 22086 | 27 | |
| | Designated Facility Name and Site Addr | | | | | | | | | |
| | aciiity's Phone: (505)345-36 | Rinchem Company 6133 Edith Blvd NI | Ε | | | U.S. EPA ID | Number | | | |
| 5 | 9b. U.S. DOT Description (inclusion | Proper Shipping Name, Hazard Class, ID Numbe | 5/10/ | | | NM | D002 | 22086 | 27 | |
| | 5p (| E FLAMMABLE LIQUIDS, N | | 10. Conta No. | Type | 11. Totai Quantity | 12. Unit WL/Vol. | 13 | . Waste Code | s |
| GENERATOR | (benzene, water), 3, | PG-II (D001) | 1.0.S. | - | DMC | 1,000 | P | D001 | D018 | |
| | RQ, UN1993, WAST | E FLAMMABLE LIQUIDS, N | 0.9 | 2 | | ', | | | | |
| ĨL | (benzene, water), 3, | PG II (D001) | | 2 | DF | 1,000 | Ρ | DOUT | D018 | |
| | 3. | | | | | | | | | |
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| | 4. | | | | | | | | | |
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| 14 | PRC8578 | A HR EMERGEN | CY CON | | | | \$ | - 1) E | 564 450 | |
| | | 24 HR EMERGENI 20164 RHING | ENV. | SVS 1 | 20 0- | | 3-00/ | 2) EF | RG# 128 | 3 |
| 15. | GENERATOR'S/OFFFROP'S CERTICIC | | | 1. | ••• | 144 | 7-0 | 541 | | |
| | marked and labeled/placarded, and are in Exporter, i certify that the contents of this | ATION: I hereby declare that the contents of this r all respects in proper condition for transport accor consignment conform to the terms of the attacher ment identified in 40 CER 262 27(a) (1) are a | consignment are for | ully and accurately desc international and nation | ribed above b | y the proper shipp tal regulations. If | ing name, | and are class | sified, packag | ed, |
| Gen | I certify that the waste minimization states arator's/Offeror's Printed/Typed Name | consignment contorm to the terms of the attached nent Identified in 40 CFR 262.27(a) (if I am a large | e quantity generato | r) or (b) (if I am a small | quantity gener | zelor) is true. | colour sish | unenit and i a | in ne Primary | ' |
| 16 | . W, Brider | | | A | \overline{n} |) | | Mont | h Day | Year |
| 1 | ternational Shipments | port to U.S. | Export from U.S. | Port of entry | devit- | | | 0. | z 09 | 11 |
| 17. T | ansporter Acknowledgment of Receipt of M | laterials | | Date leaving | | ······································ | | | | |
| | DEN HEYMAN | / | Signature | 1 | | | | Month | Day | Year |
| Trans | porter 2 Printed/Typed Name | | Signature | 2 m | | 1 | | 00 | . I [′] I | 11 |
| 18. D | screpancy | | | | | | | Month | Day | Year |
| 18a. (| iscrepancy Indication Space | Jantity Time | | | | | | l | <u> </u> | |
| | | antity Type | | Residue | L | Partial Rejectio | n | | Full Rejectio | n |
| 18b. A | ternate Facility (or Generator) | | | Manifest Reference Nu | | 10 500 00 00 | | _ | | |
| Facility | 's Phone: | | | | Ľ | I.S. EPA ID Numb | er | | | |
| 18c. S | gnature of Alternate Facility (or Generator) | | | | | | | · | | |
| 9. Ha | ardous Waste Report Management Metho | d Codes (i.e., codes for hazardous waste treatme | | | | | | Month | Day | Year |
| | | 2. | nt, disposal, and re 3. | cycling systems) | | ····· | | <u></u> | | |
| 0. Des | gnated Facility Owner or Onerator Conte | stim of marity of t | | | | 4. | | | | |
| rinted | Typed Name | ation of receipt of hazardous materials covered b | y the manifest exce Signature | ept as noted in Hern 18a | | | | | | |
| orm 8 | 700-22 (Rev. 3-05) Previous editions | an obsiste | | | | | | Month | Day Y | /ear |
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| | | | | ^{Ki} | rtland Airforce Base | € | Generator's Site Addre | ess (if different t | nan mailing addre | SS) | 2014 | | |
| | | | | 20 | 50 Wyoming Blvd | SE | | | | | | | |
| | Ger | 505 herator's Phone: | 846-90 | 05 Al | buquerque, NM 871 | 117 | 1 | | | | | | , |
| 6. Transporter 1 Company Name RINCHEM CO INC | | | | | | | | | | | | | |
| | 7. Ť | ransporter 2 Cor | | | ······ | | | 20862 | 7 | | | | |
| | L | | | | | | | | U.S. EPA ID I | lumber | | | |
| 11 | 8. 0 | esignated Facilit | y Name and S | ite Address | Rinchem Compa | ov Inc | | | U.S. EPA ID N | lumber | | | _ |
| | | | | | 6133 Edith Blvd | | | | | | | | |
| | Fac | ility's Phone: | (505)34 | 45-3655 | | | | | | | 20962 | 7 | |
| | 9a. HM | 9b. U.S. DO | T Description (i Group (if any)) | including Prope | er Shipping Name, Hazard Class, ID Nun | | 10. Con | 10. Containers 11. Total | | | MD002208627 | | |
| | X | | | | LAMMABLE LIQUIDS, | NOS | No. | Туре | Quantity | Wt./Vol. | | aste Codes | |
| GENERATOR | | (Benzer | ne, Wate | er), 3, PC | G II (D001) | N.O.S. | 1 | DF | | Ρ | D001 C | 018 | ٦ |
| ER | | | | | | | 4 | | 1500 | | | | |
| E S | | 2. | | | | | | | | | | | ┥ |
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| | | 3. | | | | | | + | | | | | |
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| | | 4. | | · | | | | | | | | _ | |
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| | 1/10 | | | | · · · · · · · · · · · · · · · · · · · | | | | | 1 | | | - |
| | 1444 | | mstructions an | io Additional (n) | ^{formatio} ²⁴ hour emergen | cy contac | t: RHINO E | NV SVC | S 1-800 | -762- | T) ER | G# 128 | - |
| | | | | | 0241 | | | | | | | | |
| | | | | | | | | | | | | | |
| | 15. | GENERATOR'S marked and labe | OFFEROR'S (| CERTIFICATION and are in all i | ON: I hereby declare that the contents o respects in proper condition for transport signment conform to the terms of the att | f this consignment | are fully and accurately d | escribed above | by the proper ship | ping name, | and are classif | ied, packaged, | ┥ |
| | | Exporter I certify | that the conte | ents of this con- | signment conform to the terms of the atta lidentified in 40 CFR 262.27(a) (if I am a | sahad CDA Astron | | ioonal governme | ntal regulations. I | f export ship | ment and I am | the Primary | |
| | Gene | rator's/Offeror's I | rinted/Typed I | Name | | Sig | nature | nall quantity gen | erator) is true. | | Month | Day Year | |
| + | 16 10 | CHN Iternational Shipn | <u>S</u> | Til | e | | | | | - | 103 | | |
| INT | | sporter signature | | | to U.S. | Export from (| J.S. Port of e | otry/exit: | | | | | - |
| ER | 17. Tr | ansporter Acknow | vledgment of R | eceipt of Mater | rials | | Date lear | ving U.S.: | | | | | |
| TR ANSPORTER INT | Trans | porter 1 Printed/ | yped Name | P | ······································ | Sigi | nature | | | | Month | Day Year | 4 |
| NSP | Trans | porter 2 Printed/ | Funed Name | P | ······································ | | KON | STAR | -Ks | | | 10411 | |
| RA | | | ypeu name | | | Sig | nature | | | | Month | Day Year | - |
| ₽ | 18. Di | screpancy | | | | | | • <u> </u> | | | | | |
| | 18a. C | Discrepancy Indic | ation Space | Quan | tity Type | · · · · · · · · · · · · · · · · · · · | | | <u> </u> | | | | 4 |
| | | | | www. | , сшире | | Residue | | Partial Reject | tion | | Full Rejection | |
| ا∠ | 18b. A | Ntemate Facility (| or Generator | | | | Manifest Reference | e Number: | | | | | |
| 5 | | | | | | | | | U.S. EPA ID Nu | mber | | | 1 |
| Ř | | y's Phone: | | | _ | | | | 1 | | | | |
| E E | 18c. S | ignature of Alten | nate Facility (or | r Generator) | | | | | <u>L</u> | | Month | Day Year | - |
| Š | 19 Ha | zardous Waste F | Report Manage | mont Mothed | Codes (i.e. and a finite state of the state | | | | | | | | |
| DESIGNATED FACILITY | 1. | | port manage | Sinch Method | Codes (i.e., codes for hazardous waste t 2. | reatment, disposal, 3. | and recycling systems) | | | | | |] |
| | | | | | | | | | 4. | | | | |
| | 20. De | signated Facility | Owner or Ope | rator: Certifica | tion of receipt of hazardous materials co | vered by the manife | est except as noted in iter | m 18a | I | · | | | - |
| $\left \right $ | rinteo | d/Typed Name | | | | | ature | | <u> </u> | | Month | Day Year | + |
| ▼ PA | Form | 8700-22 (Rev. | 3-05) Previo | ous editione | | | | · · | | | | | |
| | | | | | | | DESI | GNATED FA | CILITY TO DE | STINAT | ON STATE | (IF REQUIRED | ກ |

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