DEPARTMENT OF THE AIR FORCE
377TH AIR BASE WING (AFGSC)

AUG 16 2017

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NMED
Hazardous Waste
Bureau

Colonel Richard W. Gibbs, USAF
Installation Commander
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2000 Wyoming Blvd SE
Kirtland AFB NM 87117

Mr. John Kieling, Bureau Chief
Hazardous Waste Bureau (HWB)
New Mexico Environment Department (NMED)
2905 Rodeo Park Drive East, Building 1
Santa Fe NM 87505-6303

Dear Mr. Kieling

Attached please find the replacement pages for the *Quarterly Report for October – December 2016 and Annual Report for 2016, Bulk Fuels Facility Spill, Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, New Mexico, dated March 2017* and originally submitted to NMED on March 27, 2017. These replacement pages address the: (1) laboratory revision of reports for volatile organic compound (VOC) dichlorodifluoromethane impacted by the limit of quantitation (LOQ) reported during the Q4 sample analyses (no actual sample results were impacted since all data for dichlorodifluoromethane were non-detect and reported at the limit of detection (LOD)); (2) arsenic screening level for KAFB-015 was exceeded and has been corrected and referenced as naturally occurring; (3) EDB plume mass units has been corrected on the applicable figure and tables; and (4) the incomplete drinking water well data packages have been updated to the complete package. Replacement pages are provided for the text (Executive Summary, Section 4, and References), Figure 5-14, Tables 4-1, 5-8, 5-9, and 5-10, and Appendices F-1, F-2, H-2, I-6, and K-2.

If you have any questions or concerns, please contact Ms. Holly O'Grady at (505) 853-3484 or holly.ogrady@us.af.mil or Mr. Scott Clark at (505) 846-9017 or at scott.clark@us.af.mil.

Sincerely

RICHARD W. GIBBS, Colonel, USAF
Installation Commander

Attachment:
Quarterly Report for October – December 2016 and Annual Report 2016, BFF, March 2017 REVISED July 2017; 2 Hard Copies/2 CDs

cc:
NMED (Borrego) letter
NMED GWQB (Agnew, Hunter), letter and CD
EPA Region 6 (King, Ellinger), letter and CD
SAF-IEE (Lynnes), electronic only
AFCEC/CZ (Renaghan, Clark, O'Grady), electronic only
USACE-ABQ District Office (Simpler, Phaneuf, Dreeland, Sanchez, Salazar), electronic only
Public Info Repository, Administrative Record/Information Repository (AR/IR) and File

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

Quarterly Monitoring Report – October-December 2016
and Annual Report for 2016
Bulk Fuels Facility
Solid Waste Management Unit ST-106/SS-111
Kirtland Air Force Base, New Mexico

March 2017

REVISED
July 2017

Text Section	Description
Section ES-3	Text was updated to indicated that arsenic exceeded the PSL at KAFB-015 in Q4 2016. Arsenic concentrations at this location are known to Kirtland AFB, and are naturally occurring. Text updates confirm that no other analytes exceeded PSLs in Q4 2016.
Section 4	Sections 4.2 and 4.3 were updated to indicated that arsenic exceeded the PSL at KAFB-015 in Q4 2016. An additional reference was cited to illustrate that arsenic concentrations at this location are known to Kirtland AFB, and are naturally occurring. Text updates confirm that no other analytes exceeded PSLs in Q4 2016.
References	The references section was updated to include the Final Environmental Assessment for Kirtland Air Force Base Arsenic Compliance System.
Figures	**Description**
Figure 5-14	Transect section, volume, and mass updated. Originally reported volume and mass was propagated vertically without being cropped by the water table surface. This has resulted in relatively minor differences in the reported plume volume and mass.
Tables	**Description**
Table 4-1	PSLs for iron, manganese, arsenic, and lead were corrected. These corrections lead to the identification that the Q4 2016 result for arsenic at KAFB-015 exceeded the screening criteria.
Table 5-8	Mass was updated to be correctly reported in grams. While column header was correct for grams, the numbers listed under the header were reported in kilograms.
Table 5-9	Mass was updated to be correctly reported in grams. While column header was correct for grams, the numbers listed under the header were reported in kilograms.

Table 5-10	Volume, and mass updated. Originally reported volume and mass was propagated vertically without being cropped by the water table surface. This has resulted in relatively minor differences in the reported plume volume and mass.
Appendix Section	**Description**
Appendix F-1	Section 1.4 - Sensitivity - updated due to data reporting discrepancy that was documented by the laboratory on June 19, 2017 that impacted the limit of quantitation (LOQ) reported for the VOC analyte dichlorodifluoromethane during Q4 analysis. No sample results were impacted since all data were non-detect for dichlorodifluoromethane and reported at the limit of detection (LOD).
Appendix F-2	Data reports (KR101, KR103, KR104, KR105, KR106, KR106, KR107, KR108, KR109, KR110, KR111, KR112, KR113, and KR114) impacted by the reporting discrepancy were updated by the laboratory.
Appendix H-2	Updated to include full data packages. Original Q4 2016 submittal had excluded some of the SDG data packages.
Appendix I-6, Table I-6-1	Mass was updated to be correctly reported in grams. While column header was correct for grams, the numbers listed under the header were reported in kilograms.
Appendix I-6, Table I-6-2	Mass was updated to be correctly reported in grams. While column header was correct for grams, the numbers listed under the header were reported in kilograms.
Appendix K-2	Data flat file was updated due to data reporting discrepancy that was documented by the laboratory on June 19, 2017 that impacted the limit of quantitation (LOQ) reported for the VOC analyte dichlorodifluoromethane during Q4 analysis. No sample results were impacted since all data for dichlorodifluoromethane were non-detect and reported at the limit of detection (LOD).

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

QUARTERLY MONITORING REPORT
OCTOBER-DECEMBER 2016
AND ANNUAL REPORT FOR 2016
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

March 2017
July 2017, Revision 1

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KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

QUARTERLY MONITORING REPORT
OCTOBER-DECEMBER 2016
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ALBUQUERQUE, NEW MEXICO

Quarterly Monitoring Report – October-December 2016 and Annual Report for 2016 Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111 Kirtland Air Force Base, New Mexico Revision 1

March 2017
July 2017, Revision 1

Prepared for
U.S. Army Corps of Engineers
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6. AUTHOR(S) EA Engineering, Science, and Technology, Inc., PBC Sundance Consulting, Inc.	**5d. PROJECT NUMBER** 62599DM01 **5e. TASK NUMBER** 1002 **5f. WORK UNIT NUMBER** Not applicable
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13. SUPPLEMENTARY NOTES	

14. ABSTRACT

This Quarterly and Annual Report describes activities performed from October 3 through December 31, 2016 and the annual progress of the Resource Conservation and Recovery Act interim measures for soil and groundwater remediation at Solid Waste Management Unit ST-106/SS-111, the Bulk Fuels Facility site, at Kirtland Air Force Base, New Mexico. Quarterly source area soil vapor, groundwater, proximal drinking water from supply well, and groundwater treatment system (GWTS) samples were collected and analyzed for contaminants of concern and other relevant field and laboratory parameters. The GWTS extracted and treated 30,070,100 gallons of groundwater through a granular activated carbon filtration system and discharged the treated effluent to the Tijeras Arroyo Golf Course main pond and injection well KAFB-7. The initial assessment of horizontal capture between the second quarter (Q2) and fourth quarter (Q4) 2016 within the interim measure objective zone shows the GWTS has captured (horizontally) between 92 and 97 percent (%) of the plume volume and contained 93-99% of the plume mass. The initial assessment of vertical capture within the interim measure objective zone shows that the GWTS is less effective at producing vertical plume containment. Between Q2 and Q4 2016, the GWTS has captured (vertically) between 68 and 85% of the plume volume and between 67 and 87% of the plume mass. Plume volume and mass changes within the plume suggest that the plume mass is starting to migrate toward the extraction points as designed.

15. SUBJECT TERMS

Bulk Fuels Facility, Solid Waste Management Unit ST-106/SS-111, Interim Measures, Resource Conservation and Recovery Act, soil vapor, vadose zone, groundwater sampling, groundwater treatment system operation, granular activated carbon, ethylene dibromide, vertical capture, horizontal capture, plume mass, performance assessment

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40 CFR 270.11
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I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.

Richard W. Gibbs

RICHARD W. GIBBS, Colonel, U.S. Air Force
Commander, 377th Air Base Wing

16 AUG 17
Date

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

16 AUG 17
Date

- Prior to Q4 2016 sampling, a Work Plan amendment was approved that modified the sampling techniques. Previous well purging (one casing volume) was replaced with low-flow sampling with field parameter stabilization. Forty dedicated sampling systems were removed during 2016 primarily due to pump failure and passive sampler evaluation. A combination of portable Bennett pump systems and passive sampling equipment (e.g., PDBs and DMSs) will be used to sample these wells in the future.

ES-3 Drinking Water Supply Well Monitoring

ES-3.1 Drinking Water Q4 Summary

Four drinking water supply wells (KAFB-003, KAFB-015, KAFB-016, and ST106-VA-2) are located in the vicinity of the benzene and EDB plumes. KAFB-003, ST106-VA-2, and KAFB-015 were sampled monthly for EDB and BTEX from October through December of 2016, and sampled for inorganic compounds in October 2016. KAFB-016 was not sampled during Q4 2016 due to ongoing repairs. EDB and BTEX were not detected at drinking water supply wells KAFB-003, ST106-VA-2, or KAFB-015. All inorganic compounds detected in drinking water supply wells KAFB-003 and ST106-VA-2 were below PSLs. The arsenic concentration detected at KAFB-015 in October 2016 was 0.0172 mg/L, which exceeded the PSL of 0.01 mg/L. All other inorganic compounds were below PSLs at KAFB-015. Elevated arsenic concentrations in KAFB-015 are naturally occurring, and Kirtland AFB operates an arsenic compliance system to ensure arsenic concentrations in the Kirtland AFB drinking water supply do not exceed drinking water criteria (Kirtland AFB, 2003).

ES-3.2 Drinking Water Annual Summary

KAFB-003 and ST106-VA-2 were sampled monthly for EDB and BTEX from February through December 2016. KAFB-015 was undergoing repairs and maintenance in Q1 through Q2 2016, and was sampled monthly from September to December 2016. KAFB-016 was not sampled in 2016 due to ongoing repairs.

The majority of drinking water supply well samples were nondetect for all fuel-related constituents. However, in February, March, and April 2016, toluene was detected at low concentrations in a total of five samples collected from both KAFB-003 and ST106-VA-2. These detections were validated as nondetect or as estimated (J -qualified) detections because of toluene detected in associated trip blanks. Toluene was nondetect in drinking water supply well samples collected from these two wells between May and December 2016. The sample collected from KAFB-015 in September 2016 had an estimated concentration of total xylenes that was likely due to well repairs that were completed shortly prior to sampling. Subsequent samples collected from KAFB-015 in October and December 2016 were nondetect for total xylene concentrations.

In April and October 2016, samples were collected from KAFB-003 and ST106-VA-2 and analyzed for inorganic constituents. No inorganic compounds were detected above PSLs at either KAFB-003 or ST106-VA-2. In October 2016, a drinking water supply well sample was collected from KAFB-015 after it resumed operation, and was analyzed for inorganic constituents. Arsenic was the only inorganic compound detected above PSLs at KAFB-015 in Q4 2016.

ES-4 Groundwater Treatment System Operation

ES-4.1 Operation Q4 Summary

The GWTS was 77% operational from October 1 to December 31, 2016 and treated 30,070,100 gallons of groundwater during the expansion construction. Of the treated water, 12,598,910 gallons were discharged to the Tijeras Arroyo Golf Course main pond, and 17,471,190 gallons were discharged to a gravity-fed injection well KAFB-7. Concentrations for all compounds analyzed in the effluent samples collected during Q4 2016 were below their respective limits of detection and below the New Mexico Water Quality Control Commission (NMWQCC) standards and EPA Maximum Contaminant Levels (MCLs). No non-routine maintenance was performed at the GWTS during Q4 2016. However, several unscheduled shutdowns occurred due to leak detection alarms in the vaults during rain events, GWTS expansion, and associated troubleshooting activities; high water level alarms at the golf course main pond; and interference with KAFB-7 radio communications between the GWTS and KAFB-7 primary logic controller. Run time for both pumps in extraction wells KAFB-106228 and KAFB-106234 was 77%. The pump in extraction well KAFB-106233 remained off-line for the entirety of Q4 2016 and has a corresponding run time of 0%.

Expansion efforts to install a second 400-gpm treatment train began at the GWTS during Q3 2016 and continued in Q4 2016. Work performed included installation of a fourth extraction well (KAFB-106239) and installation of flowmeters, electrical conduit, building conveyance piping and manifolds, and pressure transmitters at each of the extraction wells.

ES-4.2 Operation Annual Summary

For the whole of 2016, the GWTS was operational 83% of the time and treated a total of 120,806,300 gallons of groundwater. Of the treated water, 101,339,890 gallons were discharged to the Tijeras Arroyo Golf Course main pond, and 19,466,410 gallons were discharged to a gravity-fed injection well KAFB-7. Concentrations for all compounds analyzed in the effluent samples collected during the entire year of 2016 were below their respective limits of detection and below the NMWQCC standards and EPA MCLs. Run time for pumps in extraction wells KAFB-106228, KAFB-106233, and KAFB-106234 were 58, 28, and 74%, respectively.

The 2016 annual GWTS Performance Assessment provided a first look at how the aquifer has responded to the interim measure extraction system. The Target Capture Zone, defined at an EDB concentration of 0.05 µg/L, has been delineated from water chemistry sample analyses. Analyses have been performed on measured groundwater head data to delineate both the horizontal and the vertical hydraulic containment (capture) associated with the extraction wells. Water level pairs analyses have been performed to define the direction of flow from gradient control points. Simple 2-dimensional horizontal capture calculations have been performed to analyze if the interim measure extraction rates are appropriate for plume capture with respect to aquifer transmissivity estimates, and a concentration trends monitoring program has been presented that will be used to support capture assessment.

The initial assessment of horizontal capture between Q2 and Q4 2016, within the interim measure objective zone, shows the extraction system has been able to capture (horizontally) between 92 and 97% of the plume volume. Similarly, horizontal capture produced by the extraction system has contained 93-99% of the plume mass. The initial assessment of vertical capture within the interim measure objective zone shows that the extraction system is less effective at producing vertical plume containment. However, a cursory review of historical groundwater head data from the nested well network suggests that the vertical gradients in the plume area are controlled by variations in the regional aquifer flow

system. Between Q2 and Q4 2016, the extraction system was able to capture (vertically) between 68 and 85% of the plume volume and between 67 and 87% of the plume mass.

The initial analysis of plume changes due to interim measure extraction shows that the mass is moving and the plume volume is changing. Within the interim measure objective zone, plume volume and mass are collecting (increasing) around the extraction wells. In addition, plume volume and mass are decreasing south of the KAFB-106228 and KAFB-106233 extraction wells and between these wells and KAFB-106234 to the north. Both of these observations suggest that the plume mass is starting to migrate toward the extraction points. This performance assessment will be conducted every second and fourth quarter moving forward so that continued plume comparisons can be performed, plume reduction can be analyzed, and how capture changes with the regional hydrogeologic variation can be quantified. An assessment of the interim measure effectiveness should be postponed until the extraction network (all four extraction wells) is operational for at least one year. This includes activation of the fourth extraction well (KAFB-106239) and re-activation of extraction well KAFB-106233.

ES-5 Projected Activities

Planned activities for Q1 2017 include the following:

- There will be no vadose zone monitoring event in Q1 2017. In a November 9, 2016 meeting, the Vadose Zone Working Group identified the need to evaluate and optimize the current vadose zone monitoring and reporting practices with the goal of achieving a more effective monitoring and reporting program that aligns with New Mexico Environment Department (NMED) guidance requirements and industry standards. The decision was made to optimize the SVM program to remove the unnecessary analytical methods and reduce the sampling frequency to semi-annual (NMED, 2017). Therefore, the next SVM event will be performed in Q2 2017.

- GWM will be performed from January 9 to February 3, 2017.

- Vertical gradient evaluation with PDB samplers in a subset of GWM wells will continue to determine if vertical chemical gradients exist within the source area well screened intervals and evaluate where in the screens the PDBs/DMSs should be deployed to optimize data collection.

- Drinking water supply wells will be sampled monthly and analyzed for organic compounds.

- Operation of the GWTS and extraction wells KAFB-106228 and KAFB-106234 will continue.

- Rehabilitation of extraction well KAFB-106233 will be initiated in Q1 2017.

- Construction is anticipated for completion for the GWTS second treatment train, as well as integration of programming, and shakedown testing.

- Design of conveyance lines, electrical lines, and communication lines between extraction well KAFB-106239 and the GWTS will continue in anticipation of going on-line in Q3 2017.

- Removal of the remaining dedicated Bennett pump sampling systems north of Ridgecrest Drive, SE will begin as part of the transition to passive sampling in the distal portion of the EDB plume.

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4. DRINKING WATER SUPPLY WELL MONITORING

Four drinking water supply wells (KAFB-003, KAFB-015, KAFB-016, and ST106-VA-2) provide drinking water to Kirtland AFB employees and tenants, and VA Medical Center patients, employees, and visitors. As part of the monitoring associated with the BFF site, these wells are sampled monthly and analyzed for EDB and BTEX due to their proximity to the dissolved-phase EDB and benzene plumes. In 2016, Kirtland AFB well KAFB-016 was not operational due to ongoing maintenance, and was not sampled.

4.1 Drinking Water Supply Well Sampling and Analysis Procedures

All field measurements, sample collection, packaging, shipping, and analyses were performed in accordance with the SVM and Drinking Water Monitoring Work Plan with the Quality Assurance Project Plan (USACE, 2016d).

Field DO, pH, ORP, conductivity, turbidity, and temperature measurements were made using a Yellow Springs Instrument 556 multi-probe system. Instrument calibration was performed daily for QC to ensure accurate readings. The sample port at each drinking water wellhead was opened for 30 seconds prior to sampling to purge any entrained sediment. Volatile organic analysis samples were collected first. Upon filling, the sample containers were immediately sealed, checked for head-space bubbles, labeled, and put into a cooler. Daily field activity logs and calibration logs are included in Appendix G-1. Completed sample collection logs and chain-of-custody forms are included in Appendix G-2.

Drinking water supply samples were collected for the following analyses:

- EDB using EPA Method 504.1
- BTEX using EPA Method 524.2.

Samples were submitted to ALS Environmental in Kelso, Washington, for analytical testing. Analytical results were validated by Laboratory Data Consultants, Inc. The Data Quality Evaluation Reports are included in Appendix H-1. ALS Environmental Laboratory Reports for October, November, and December 2016 are included in Appendix H-2.

In addition, semi-annual water samples were collected in October 2016, and analyzed for the following inorganic parameters:

- Total metals (calcium, magnesium, potassium, sodium) using EPA Method 6010C
- Dissolved metals (iron, manganese) using EPA Method 6010C
- Total metals (arsenic, lead) using EPA Method 6020A
- Anions (bromide, chloride, sulfate) using EPA Method 300.0A
- Anions (nitrate/nitrite nitrogen) using EPA Method 353.2
- Ammonia nitrogen using Standard Method (SM) 4500NH3B/C
- Sulfide using SM4500S2CF
- Alkalinity-bicarbonate/carbonate using SM2320B.

Inorganic parameter samples collected in Q4 2016 were submitted to ELLE for analytical testing. The Data Quality Evaluation Reports and data packages are included in Appendices F-1 and F-2, respectively.

4.2 Data Review and Usability

Laboratory Data Consultants, Inc. performed a 100% Level 3 data validation for Q4 2016 organic compound analytical data. All data complied with necessary criteria that determined the data valid, with no data qualified as rejected. The technical data completeness was 100%. The data met data quality objectives and were appropriate for use in project decision-making. The QC parameter and data quality indicators (precision, bias [accuracy], representativeness, comparability, completeness, and sensitivity) evaluation results are provided in the Data Quality Assessment Report and Data Validation Report included in Appendix H-1 for organic compounds and Appendix F-1 for inorganic parameters. Final validated data are presented in Table 4-1.

4.3 Drinking Water Supply Well Water Quality for Q4 2016

Analytical results for October, November, and December 2016 are presented in Table 4-1 and Appendix H-2, and presented in Figure 4-1. PSLs for drinking water supply wells were the lower of either the EPA or NMWQCC screening levels, as discussed in Section 3.6. All inorganic compounds detected in drinking water supply wells KAFB-003 and ST106-VA-2 were below PSLs. In October 2016, the arsenic concentration at KAFB-015 was 0.0172 mg/L, which exceeds the PSL of 0.01 mg/L. Elevated arsenic concentrations in KAFB-015 are naturally occurring, and Kirtland AFB operates an arsenic compliance system to ensure arsenic concentrations in the Kirtland AFB drinking water supply do not exceed drinking water criteria (KAFB, 2003). All other inorganic compounds detected at KAFB-015 were below their respective PSLs. No EDB or BTEX concentrations were above the limit of detection for drinking water supply wells KAFB-003, ST106-VA-2, or KAFB-015 sampled in October, November, and December 2016. This indicates that all three wells had no detectable concentrations of EDB and BTEX in the drinking water that is supplied to Kirtland AFB employees and tenants, and VA Medical Center patients, employees, and visitors.

4.4 Annual Drinking Water Supply Well Sampling Results

This section discusses the organic compound analytical results from sampling of the drinking water supply wells KAFB-003, KAFB-015, KAFB-016, and ST106-VA-2 during calendar year 2016.

- KAFB-003 and ST106-VA-2 were sampled monthly from February through December 2016 for organic compounds and sampled semi-annually in Q2 and Q4 2016 for inorganic compounds. All organic compounds were nondetect from February through December 2016, with the exceptions of low level toluene detections in February, March, and April 2016. These detections were validated as J-qualified detections or nondetects because of trip blank contamination and do not represent toluene in these drinking water supply wells. In Q2 and Q4 2016, all inorganic compounds were below PSLs.

- KAFB-015 was not sampled in February through August 2016 due to ongoing repairs; however, KAFB-015 was sampled monthly from September through December 2016 for organic compounds, and in Q4 2016 for inorganic compounds. Results were nondetect for all organic compounds, except for total xylenes in the September sampling event. This detection was most likely attributed to the repairs that were also completed in September; no xylenes were detected in Q4 2016 at KAFB-015. In Q4 2016, all inorganic compounds were below their respective PSLs with the exception of arsenic, which was detected above the PSL in Q4 2016 at KAFB-015.

- KAFB-016 was not sampled due to ongoing repairs in 2016.

8. REFERENCES

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NMED. 2016a. Correspondence from Ms. Kathryn Roberts, Director, Resource Protection Division to Colonel Eric H. Froehlich, Base Commander, 377 ABW/CC, Kirtland AFB, NM and Mr. John Pike, Director, Environmental Management Services, 377 MSG, Kirtland AFB, NM, regarding Suspension of Sampling at Groundwater Monitoring Wells KAFB-106026 and 106230, Kirtland Air Force Base, Bulk Fuels Facility. August 24.

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NMED. 2016c. Correspondence from Ms. Kathryn Roberts, Director, Resource Protection Division, to Colonel Eric H. Froehlich, Base Commander, 377 ABW/CC, Kirtland AFB, New Mexico and Mr. John Pike, Director, Environmental Management Services, 377 MSG, Kirtland AFB, New Mexico, re: Work Plan for Soil Vapor Monitoring and Drinking Water Monitoring, Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, New Mexico, EPA ID# NM9570024423, HWB-KAFB-13-MISC. June 30.

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NMED. 2017. Correspondence from Kathryn Roberts, Director, Resource Protection Division to Colonel Eric. H. Froelich, Base Commander, Kirtland AFB, NM, and Lieutenant Colonel Wayne J. Acosta, Civil Engineer Office, Kirtland AFB, NM, regarding Technical Memo Requesting the Optimization of Soil Vapor Monitoring, Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, EPA ID# NM9570024423, HWB-KAFB-13-MISC. January 4.

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USACE. 2015. Quarterly Pre-Remedy Monitoring and Site Investigation Report for October-December 2014. Solid Waste Management Units ST-106 and SS-111, Kirtland Air Force Base, Albuquerque, New Mexico. Prepared by CB&I Federal Services, Inc. for the USACE Albuquerque District under USACE Contract No. W912DY-10-D-0014, Delivery Order 0002. March.

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USACE. 2016c. *Work Plan for Soil Vapor Monitoring and Drinking Water Monitoring, Solid Waste Management Unit ST-106/SS-111.* Prepared by Sundance Consulting, Inc. for USACE–Albuquerque District. August 16.

USACE. 2016d. *Work Plan for the Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design Revision 1, Solid Waste Management Unit ST-106/SS-111.* Prepared by EA Engineering, Science, and Technology, Inc., PBC for USACE–Albuquerque District. September 20.

USACE. 2016e. *Operations and Maintenance Plan, Groundwater Treatment System, Bulk Fuels Facility, SWMU ST-106/SS-111.* Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE Albuquerque District under USACE Contract No. W912WR-12-D-0006. August 22.

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USACE. 2016j. RCRA Facility Investigation Report, Bulk Fuels Facility Releases, Solid Waste Management Unit ST-106/SS-111. Prepared by Sundance Consulting, Inc. for the USACE Albuquerque District under USACE Contract No. W912PP-16-C-0002. December 31.

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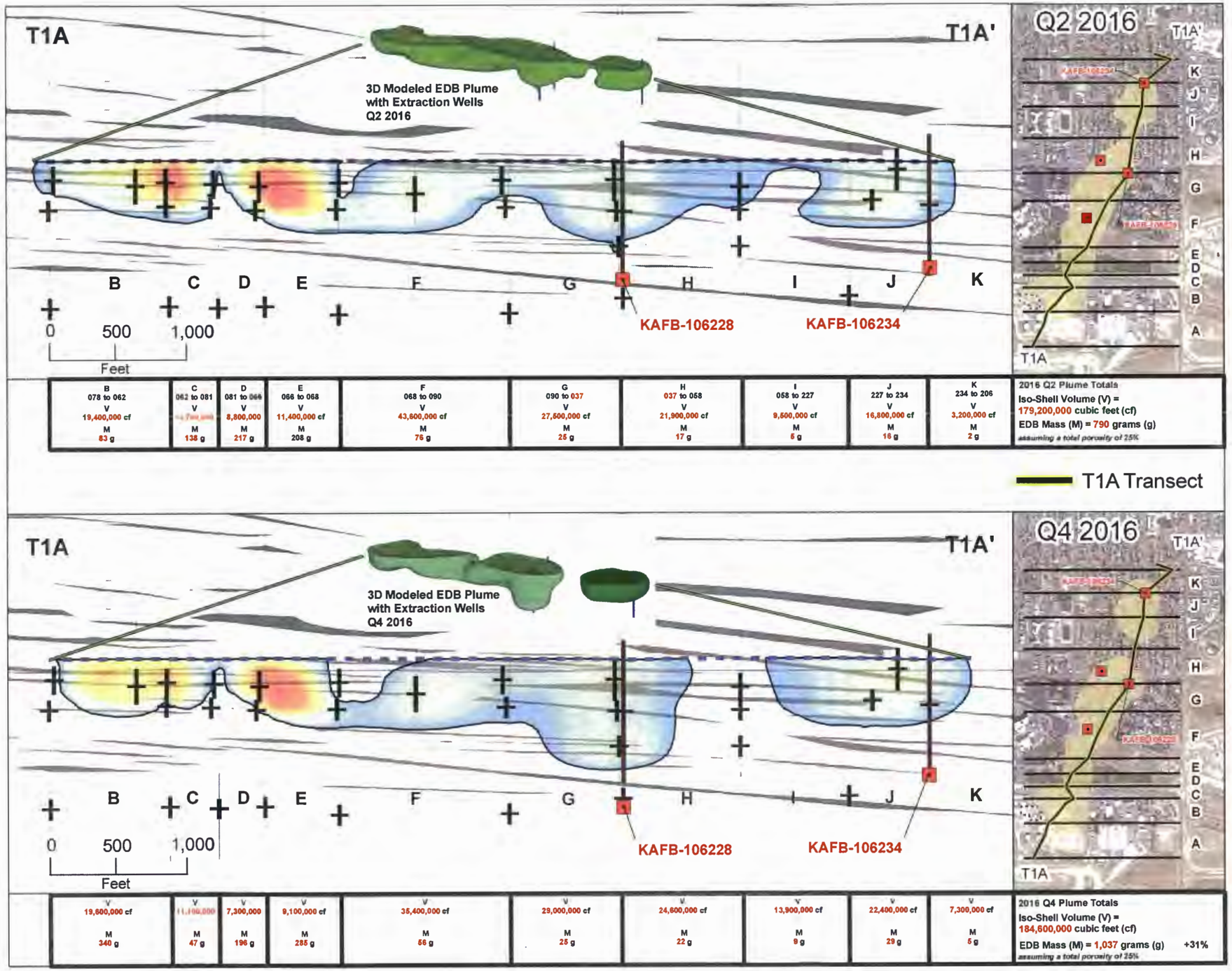
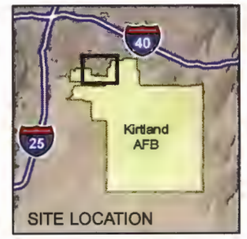


Legend

- Groundwater Monitoring Well Screen
- Extraction Well
- Volumetric Lines
- Installation Boundary
- EDB Plume with Concentration > 0.05 µg/L (EPA MCL)
- AECOM Defined Fine Grained Lithology
- Source Area
- EDB Concentration of 0.05 µg/L
- EDB Concentration of 1.00 µg/L
- EDB Concentration of > 30.0 µg/L

Notes:
Aerial Imagery from 11/1/2015 : Google Earth Pro, 2016
EDB plume model generated with C-Tech MVS Premier Version 9.94.
3D model exaggerated by a factor of 10.
Q2 = quarter 2
Q4 = quarter 4
µg/L = microgram(s) per liter
EDB = ethylene dibromide
EPA MCL = United States Environmental Protection Agency Maximum Contaminant Level
EDB concentrations were screened against the EPA MCL (0.05 µg/L).
AECOM = Architecture, Engineering, Consulting, Operations, and Maintenance



N

0 1,250 2,500 5,000

Feet

1 inch = 2,500 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY AND ANNUAL REPORT
OCTOBER-DECEMBER 2016
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-14

T1A PLUME CROSS SECTION COMPARISON
Q2 - Q4, 2016

P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2016_Q4\Report Figures\Section 5\5-14 T1A Plume Cross Section Comparison 2016.mxd 7/11/2017 EA eomalia

Table 4-1
Drinking Water Supply Well Analytical Results, Q4 2016

					Well Location ID		KAFB-003			ST 106-VA-2			ST 106-VA-2			KAFB-015		
					Field Sample ID		GW16030			GW16031			GW16032			GW16033		
					Sample Date		10/3/2016			10/3/2016			10/3/2016			10/3/2016		
					Sample Type / Laboratory		REG			REG			Field Duplicate			REG		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**
EDB	Method E504.1 (µg/L)	Ethylene Dibromide	0.1	0.05	0.075	0.05	ND	U	0.017	ND	U	0.017	ND	U	0.017	ND	U	0.018
VOCs	Method SW8260 (µg/L)	Benzene	10	5	0.46	5	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Ethylbenzene	750	700	15	700	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Toluene	750	1,000	1,100	750	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Xylenes, Total	620	10,000	190	620	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
Total metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Iron	1.0	NS	NS	1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Magnesium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Manganese	0.2	NS	NS	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Potassium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Sodium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SW6020A (mg/L)	Arsenic	NS	0.01	0.000052	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Lead	NS	0.015	0.015	0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Chloride	250	250	NS	250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Sulfate	600	250	NS	250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SM4500S2F (mg/L)	Sulfide	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SM4500NH3BC (mg/L)	Nitrogen, ammonia	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method E353.2 (mg/L)	Nitrogen as nitrate + nitrite	10[e]	10[e]	NS	10[e]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	Method SM2320B (mg/L)	Alkalinity, total (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Parameters		Temperature (°C)	NS	NS	NS	NS		20.1			21.9			21.9			26.0	
		pH	NS	NS	NS	NS		7.98			7.99			7.99			7.66	
		Specific Conductance (µS/cm)	NS	NS	NS	NS		366.0			376.6			376.6			414.1	
		DO (mg/L)	NS	NS	NS	NS		4.71			1.80			1.80			1.10	
		ORP (mV)	NS	NS	NS	NS		101.0			110.6			110.6			129.2	
		Trubidity (NTU)	NS	NS	NS	NS		0.73			0.40			0.40			0.44	

Table 4-1
Drinking Water Supply Well Analytical Results, Q4 2016

					Well Location ID		KAFB-003			KAFB-003			ST 106-VA-2			KAFB-015		
					Field Sample ID		K003-164			K003-564			VA2-164			K015-164		
					Sample Date		10/3/2016			10/3/2016			10/3/2016			10/3/2016		
					Sample Type / Laboratory		REG / ELLE			DUP / ELLE			REG / ELLE			REG / ELLE		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result[d]**	**VAL QUAL**	**LOQ**
EDB	Method E504.1 (µg/L)	Ethylene Dibromide	0.1	0.05	0.075	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	U	0.017
VOCs	Method SW8260 (µg/L)	Benzene	10	5	0.46	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	U	0.5
		Ethylbenzene	750	700	15	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	U	0.5
		Toluene	750	1,000	1,100	750	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	U	0.5
Total metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	44.7	–	0.400	44.1	–	0.400	35.8	–	0.400	29.9	–	0.400
		Iron	1.0	NS	NS	1.0	ND	U	0.400	ND	U	0.400	ND	U	0.400	ND	U	0.400
		Magnesium	NS	NS	NS	NS	6.06	J	0.200	5.97	J	0.200	7.02	J	0.200	7.52	J	0.200
		Manganese	0.2	NS	NS	0.2	ND	U	0.0100	ND	U	0.0100	ND	U	0.0100	0.027	–	0.0100
		Potassium	NS	NS	NS	NS	2.48	–	1.00	2.52	–	1.00	3.77	–	1.00	6.48	–	1.00
		Sodium	NS	NS	NS	NS	23.7	–	2.00	23.3	–	2.00	22.0	–	2.00	36.5	–	2.00
	Method SW6020A (mg/L)	Arsenic	NS	0.01	0.000052	0.01	0.00087	J	0.004	0.001	J	0.004	0.0027	J	0.004	**0.0172**	–	0.004
		Lead	NS	0.015	0.015	0.015	0.00022	J	0.002	0.00022	J	0.002	0.00067	J	0.002	0.00025	U	0.002
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	ND	U	2.5	ND	U	2.5	ND	U	2.5	ND	U	2.5
		Chloride	250	250	NS	250	24	–	2.00	24.2	–	2.00	38.9	–	20.0	46.6	–	20.0
		Sulfate	600	250	NS	250	34.4	–	5.00	34.7	–	5.00	26.9	–	5.00	32.8	–	5.00
	Method SM4500S2F (mg/L)	Sulfide	NS	NS	NS	NS	ND	U	2.00	ND	U	2.00	ND	U	2.00	ND	U	2.00
	Method SM4500NH3BC (mg/L)	Nitrogen, ammonia	NS	NS	NS	NS	ND	U	0.6	ND	U	0.6	ND	U	0.6	ND	U	0.6
	Method E353.2 (mg/L)	Nitrogen as nitrate + nitrite	10[e]	10[e]	NS	10[e]	0.76	J	0.10	0.65	J	0.10	0.12	J	0.10	ND	U	0.10
Alkalinity	Method SM2320B (mg/L)	Alkalinity, total (as CaCO3)	NS	NS	NS	NS	121	J	5.0	121	–	5.0	103	–	5.0	102	J	5.0
		Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	121	J	5.0	121	–	5.0	103	–	5.0	102	J	5.0
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	5.0	ND	U	5.0	ND	U	5.0	ND	U	5.0
Field Parameters		Temperature (°C)	NS	NS	NS	NS	20.1			20.1			21.9			26.0		
		pH	NS	NS	NS	NS	7.98			7.98			7.99			7.66		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	366.0			366.0			376.6			414.1		
		DO (mg/L)	NS	NS	NS	NS	4.71			4.71			1.80			1.10		
		ORP (mV)	NS	NS	NS	NS	101.0			101.0			110.6			129.2		
		Trubidity (NTU)	NS	NS	NS	NS	0.73			0.73			0.40			0.44		

Table 4-1
Drinking Water Supply Well Analytical Results, Q4 2016

					Well Location ID		KAFB-003			ST 106-VA-2			KAFB-015			KAFB-015		
					Field Sample ID		GW16034			GW16035			GW16036			GW16037		
					Sample Date		11/9/2016			11/9/2016			11/9/2016			11/9/2016		
					Sample Type / Laboratory		REG			REG			REG			Field Duplicate		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**	**Result**	**VAL QUAL**	**LOQ**
EDB	Method E504.1 (µg/L)	Ethylene Dibromide	0.1	0.05	0.075	0.05	ND	U	0.017	ND	U	0.017	ND	U	0.017	ND	U	0.017
VOCs	Method SW8260 (µg/L)	Benzene	10	5	0.46	5	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Ethylbenzene	750	700	15	700	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Toluene	750	1,000	1,100	750	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
		Xylenes, Total	620	10,000	190	620	ND	U	0.50	ND	U	0.50	ND	U	0.50	ND	U	0.50
Total metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Iron	1.0	NS	NS	1.0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Magnesium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Manganese	0.2	NS	NS	0.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Potassium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Sodium	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SW6020A (mg/L)	Arsenic	NS	0.01	0.000052	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Lead	NS	0.015	0.015	0.015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Chloride	250	250	NS	250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Sulfate	600	250	NS	250	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SM4500S2F (mg/L)	Sulfide	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method SM4500NH3BC (mg/L)	Nitrogen, ammonia	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Method E353.2 (mg/L)	Nitrogen as nitrate + nitrite	10[e]	10[e]	NS	10[e]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Alkalinity	Method SM2320B (mg/L)	Alkalinity, total (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Field Parameters		Temperature (°C)	NS	NS	NS	NS	19.6			21.40			25.3			25.3		
		pH	NS	NS	NS	NS	7.82			8.00			8.09			8.09		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	342.8			336.4			378.6			378.6		
		DO (mg/L)	NS	NS	NS	NS	4.57[g]			2.59[g]			1.60[g]			1.60[g]		
		ORP (mV)	NS	NS	NS	NS	45.3[h]			-13.5[h]			-8.6[h]			-8.6[h]		
		Trubidity (NTU)	NS	NS	NS	NS	0.45			0.68			0.97			0.97		

Table 4-1
Drinking Water Supply Well Analytical Results, Q4 2016

					Well Location ID		KAFB-003		
					Field Sample ID		GW16038		
					Sample Date		12/1/2016		
					Sample Type / Laboratory		REG		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**VAL QUAL**	**LOQ**
EDB	Method E504.1 (µg/L)	Ethylene Dibromide	0.1	0.05	0.075	0.05	ND	U	0.017
VOCs	Method SW8260 (µg/L)	Benzene	10	5	0.46	5	ND	U	0.50
		Ethylbenzene	750	700	15	700	ND	U	0.50
		Toluene	750	1,000	1,100	750	ND	U	0.50
		Xylenes, Total	620	10,000	190	620	ND	U	0.50
Total metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	NA	NA	NA
		Iron	1.0	NS	NS	1.0	NA	NA	NA
		Magnesium	NS	NS	NS	NS	NA	NA	NA
		Manganese	0.2	NS	NS	0.2	NA	NA	NA
		Potassium	NS	NS	NS	NS	NA	NA	NA
		Sodium	NS	NS	NS	NS	NA	NA	NA
	Method SW6020A (mg/L)	Arsenic	NS	0.01	0.000052	0.01	NA	NA	NA
		Lead	NS	0.015	0.015	0.015	NA	NA	NA
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	NA	NA	NA
		Chloride	250	250	NS	250	NA	NA	NA
		Sulfate	600	250	NS	250	NA	NA	NA
	Method SM4500S2F (mg/L)	Sulfide	NS	NS	NS	NS	NA	NA	NA
	Method SM4500NH3BC (mg/L)	Nitrogen, ammonia	NS	NS	NS	NS	NA	NA	NA
	Method E353.2 (mg/L)	Nitrogen as nitrate + nitrite	10[e]	10[e]	NS	10[e]	NA	NA	NA
Alkalinity	Method SM2320B (mg/L)	Alkalinity, total (as CaCO3)	NS	NS	NS	NS	NA	NA	NA
		Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	NA	NA	NA
Field Parameters		Temperature (°C)	NS	NS	NS	NS	18.2		
		pH	NS	NS	NS	NS	7.29		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	313.0		
		DO (mg/L)	NS	NS	NS	NS	6.5		
		ORP (mV)	NS	NS	NS	NS	186.4		
		Trubidity (NTU)	NS	NS	NS	NS	0.20		

Table 4-1
Drinking Water Supply Well Analytical Results, Q4 2016

[a] NMWQCC numeric standards per the New Mexico Administrative Code Title 20.6.2.3101A, Standards for Ground Water of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2004). For metals, the NMWQCC numeric standard applies to dissolved metals and total mercury.

[b] EPA National Primary Drinking Water Regulations, Maximum Contaminant Levels and Secondary Maximum Contaminant Levels, Title 40CFR Part 141, 143 (May 2009).

level for carcinogens.

[d] The project screening level was selected to satisfy the requirements of the Kirtland AFB Hazardous Waste Permit Number NM9570024423 as the lowest of (1) NMWQCC numeric standard or (2) EPA MCL. If no NMQWCC numeric standard or MCL exists for any analyte, then the project screening level will be the EPA RSL. Project screening levels below the LOD are highlighted and these project screening levels are set at the LOQ.

[e] Based on the geochemical equilibrium of the site groundwater and previous site data analyses, nitrate/nitrite results represent nitrate concentrations

AFB = Air Force Base

°C = degrees Celsius

CFR = Code of Federal Regulations

ELLE = Eurofins Lancaster Laboratories Environmental, LLC

EPA = U.S. Environmental Protection Agency

DO = dissolved oxygen

EPA = Environmental Protection Agency

ID = identification

LOD = limit of detection

LOQ = limit of quantitation

MCL = maximum contaminant level

µg/L = microgram per liter

µS/cm = microsiemens per centimeter

mg/L = milligram per liter

mV = millivolts

NA = not applicable

ND = not detected

NMAC = New Mexico Administrative Code

NMWQCC = New Mexico Water Quality Control Commission

NS = not specified

NTU = nephelometric turbidity unit

ORP = oxidation reduction potential

REG = regular or parent sample

S.U. = standard unit

SWMU = Solid Waste Management Unit

VA = United States Department of Veterans Affairs

Val Qual = validation qualifier based on independent data validation

VOC = volatile organic compound

Shading = reported concentrations are above the detection limit

Qualifiers:

J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.

U = Qualifier denotes the analyte was analyzed but not detected above the LOD.

-- = result

Bold:

Bolded values represent an exceedance

Table 5-8
Horizontal Capture Anaylsis for the Interim Measure Objective Area

2016 Sample Period	Capture Interval	Plume[a]		Horizontal Capture[a]		Percent Captured	
		Volume (cubic ft.)	Mass (grams)	Volume (cubic ft.)	Mass (grams)	Volume	Mass
Q2	Interval 4857	6.10E+07	51	6.06E+07	51	99.3%	99.7%
	Interval 4838	3.45E+07	27	2.71E+07	22	78.6%	80.0%
		9.55E+07	78	8.77E+07	72	91.8%	92.9%
Q4	Interval 4857	6.70E+07	65	6.63E+07	65	99.0%	99.5%
	Interval 4838	4.63E+07	38	4.39E+07	37	94.7%	96.6%
		1.13E+08	103	1.10E+08	101	97.2%	98.5%

[a] Volume and mass value assumes a uniform total porosity of 25% for the aquifer

Table 5-9
Vertical Capture Anaylsis for the Interim Measure Objective Area

2016 Sample Period	Dissolved EDB Plume Segment North of Ridgecrest Drive SE	Plume[a]		Vertical Capture[a]		Percent Captured	
		Volume (cubic ft.)	Mass (grams)	Volume (cubic ft.)	Mass (grams)	Volume	Mass
Q2	Above Interval 4838 mid-point	7.60E+07	64	3.72E+07	31	48.9%	48.5%
		7.60E+07	64	3.27E+07	29	43.0%	44.7%
	Below Interval 4838 mid-point	1.96E+07	14	1.14E+07	8	58.2%	56.4%
	Total	9.55E+07	78	8.12E+07	67	85.0%	86.8%
Q4	Above Interval 4838 mid-point	8.24E+07	79	4.56E+07	44	55.3%	55.2%
		8.24E+07	79	1.66E+07	13	20.1%	16.3%
	Below Interval 4838 mid-point	3.09E+07	24	1.52E+07	13	49.3%	53.4%
	Total	1.13E+08	103	7.74E+07	69	68.3%	67.3%

[a] Plume and mass value assumes a uniform total porosity of 25% for the aquifer

Table 5-10
Plume Volume and Mass Comparison between Q2 2016 and Q4 2016

Interval	Well		Q2 2016		Q4 2016	
	From	To	Volume (cubic ft.)	Mass (grams)	Volume (cubic ft.)	Mass (grams)
A	KAFB-106045	KAFB-106078	3,400,000	3	4,900,000	23
B	KAFB-106078	KAFB-106062	19,400,000	83	19,600,000	340
C	KAFB-106062	KAFB-106081	13,700,000	138	11,100,000	47
D	KAFB-106081	KAFB-106068	8,800,000	217	7,300,000	196
E	KAFB-106066	KAFB-106068	11,400,000	208	9,100,000	285
F	KAFB-106068	KAFB-106090	43,600,000	76	35,400,000	56
G	KAFB-106090	KAFB-106037	27,500,000	25	29,000,000	25
H	KAFB-106037	KAFB-106058	21,900,000	17	24,600,000	22
I	KAFB-106058	KAFB-106227	9,500,000	5	13,900,000	9
J	KAFB-106227	KAFB-106234	16,800,000	16	22,400,000	29
K	KAFB-106234	KAFB-106206	3,200,000	2	7,300,000	5
		Total	179,200,000	790	184,600,000	1037

Differences between total and summed interval values are due to rounding errors in the interval values.
Mass value assumes a uniform total porosity of 25% for the contaminated thickness of the aquifer.
Table corresponds to Figure 5-14.

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