KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

QUARTERLY MONITORING REPORT – JANUARY–MARCH 2019 BULK FUELS FACILITY SOLID WASTE MANAGEMENT UNIT ST-106/SS-111 KIRTLAND AIR FORCE BASE, NEW MEXICO

JUNE 2019

377 MSG/CEI
2050 Wyoming Boulevard SE
Kirtland Air Force Base, New Mexico 87117-5270

KIRTLAND AIR FORCE BASE
ALBUQUERQUE, NEW MEXICO

Quarterly Monitoring Report – January–March 2019
Bulk Fuels Facility
Solid Waste Management Unit ST-106/SS-111
Kirtland Air Force Base, New Mexico

June 2019

Prepared for

U.S. Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza Northeast
Albuquerque, New Mexico 87109-3435

Prepared by

EA Engineering, Science, and Technology, Inc., PBC
320 Gold Avenue Southwest, Suite 1300
Albuquerque, New Mexico 87102
Contract No. W912DR-12-D-0006
Delivery Order DM01

NOTICE

This report was prepared for the U.S. Army Corps of Engineers by EA Engineering, Science, and Technology, Inc., PBC for the purpose of documenting the progress of an Interim Action being implemented by the U.S. Air Force Environmental Restoration Program (ERP) at Kirtland Air Force Base. As the report relates to actual or possible releases of potentially hazardous substances, its release prior to a final decision on remedial action may be in the public's interest. The limited objectives of this report and the ongoing nature of the ERP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known that may make this report premature or inaccurate.

Government agencies and their contractors registered with the Defense Technical Information Center should direct requests for copies of this report to: Defense Technical Information Center, Cameron Station, Alexandria, Virginia 22304-6145.

Non-government agencies may purchase copies of this document from: National Technical Information Service, 5285 Port Royal Road, Springfield, Virginia 22161.

REPORT DOCUMENTATION PAGE	*Form Approved OMB No. 0704-0188*

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED *(From - To)***
30-06-2019	Revision 0	01-01-2019 – 31-03-2019

4. TITLE AND SUBTITLE	**5a. CONTRACT NUMBER**
Quarterly Monitoring Report – January–March 2019 Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111 Kirtland Air Force Base, New Mexico	W912DR-12-D-0006-DM01
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) EA Engineering, Science, and Technology, Inc., PBC	**5d. PROJECT NUMBER** 62599DM01
	5e. TASK NUMBER 1025
	5f. WORK UNIT NUMBER Not applicable
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) AND ADDRESS(ES) EA Engineering, Science, and Technology, Inc., PBC 320 Gold Avenue Southwest, Suite 1300 Albuquerque, New Mexico 87102	**8. PERFORMING ORGANIZATION REPORT NUMBER** Not assigned
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers–Albuquerque District 4101 Jefferson Plaza Northeast Albuquerque, New Mexico 87109-3435	**10.SPONSOR/MONITOR'S ACRONYM(S)**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)
12. DISTRIBUTION/AVAILABILITY STATEMENT	
13. SUPPLEMENTARY NOTES	

14. ABSTRACT

This Quarterly Report describes activities performed from January 1 through March 31, 2019 and the 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. During the quarter, groundwater, drinking water from supply wells, and the groundwater treatment system (GWTS) samples were collected and analyzed for contaminants of concern (notably ethylene dibromide [EDB]) and other relevant field and laboratory parameters. The GWTS extracted and treated 69,318,500 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 in the first quarter (Q1) 2019. The GWTS was operational 98 percent of the time and removed approximately 5,663 milligrams of EDB in Q1 2019.

15. SUBJECT TERMS

Bulk Fuels Facility, Solid Waste Management Unit ST-106/SS-111, ethylene dibromide, EDB, interim measures, RCRA, groundwater sampling, groundwater treatment system operation, granular activated carbon, ethylene dibromide

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					Devon Jercinovic
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**	ABSTRACT	13,444	**19b. TELEPHONE NUMBER** *(include area code)* 505-715-4248
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED			

Standard Form 298
(Rev. 8-98) **Prescribed by ANSI Std. Z39.18**

40 CFR 270.11
DOCUMENT CERTIFICATION

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 — 18 Jun 19

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

Date

This document has been approved for public release.

12 Jun 19

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

Date

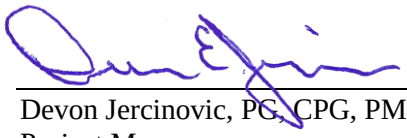
PREFACE

This Quarterly Monitoring Report – January–March 2019 has been prepared by EA Engineering, Science, and Technology, Inc., PBC (EA) for the U.S. Army Corps of Engineers, under Contract Number W912DR-12-D-0006, Delivery Order DM01 and pertains to the Base Bulk Fuels Facility, Solid Waste Management Unit ST-106/SS 111, located in Albuquerque, New Mexico.

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

This report was prepared in accordance with applicable federal, state, and local laws and regulations, including the New Mexico Hazardous Waste Act, New Mexico Statutes Annotated 1978, New Mexico Hazardous Waste Management Regulations, Resource Conservation and Recovery Act, and regulatory correspondence between the New Mexico Environment Department Hazardous Waste Bureau and the U.S. Air Force, dated March 25 and May 20, 2016.

Monitoring of groundwater and drinking water, and operation of the groundwater treatment system were conducted from January 1 through March 31, 2019. Mr. Behnaum Moayyad, CPG, is the U.S. Army Corps of Engineers–Albuquerque District Project Manager. The Environmental Restoration Section Chief for this program is Mr. Scott Clark of Kirtland Air Force Base. Ms. Devon Jercinovic is the EA Project Manager.



Devon Jercinovic, PG, CPG, PMP
Project Manager
EA Engineering, Science, and Technology, Inc., PBC

CONTENTS

Section **Page**

APPENDICES

FIGURES

TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	microgram(s) per liter
µS/cm	microSiemens per centimeter
%	percent
AFB	Air Force Base
BFF	Bulk Fuels Facility
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CFR	Code of Federal Regulations
DO	dissolved oxygen
DP	discharge permit
EA	EA Engineering, Science, and Technology, Inc., PBC
EDB	ethylene dibromide
EFF	effluent
EPA	U.S. Environmental Protection Agency
ERP	Environmental Restoration Program
ft	foot (feet)
GAC	granular activated carbon
GCMP	Golf Course main pond
gpm	gallon(s) per minute
GWM	groundwater monitoring
GWTS	groundwater treatment system
HC	hydrocarbon
ID	identification
IDW	investigation-derived waste
INF	influent
KAFB	Kirtland Air Force Base
LNAPL	light non-aqueous phase liquid
MCL	maximum contaminant level
mg	milligram(s)
mg/L	milligram(s) per liter
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
No.	number
ORP	oxidation-reduction potential

LIST OF ACRONYMS AND ABBREVIATIONS

psi	pound(s) per square inch
PSL	project screening level
Q1	first quarter of the year, January 1 through March 31
Q2	second quarter of the year, April 1 through June 30
Q3	third quarter of the year, July 1 through September 30
Q4	fourth quarter of the year, October 1 through December 31
RCRA	Resource Conservation and Recovery Act
REI	reference elevation interval
SE	Southeast
SVM	soil vapor monitoring
SWMU	Solid Waste Management Unit
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VA	Veterans Affairs

EXECUTIVE SUMMARY

The investigation and remediation of the Kirtland Air Force Base (AFB) Bulk Fuels Facility (BFF) leak (Solid Waste Management Units [SWMUs] ST-106/SS 111) are being implemented pursuant to the Resource Conservation and Recovery Act (RCRA) corrective action provisions in Part 6 of Kirtland AFB's Hazardous Waste Treatment Facility Operating Permit (Permit Number NM9570024423 –"RCRA Permit) (New Mexico Environment Department [NMED], 2010). This report for the first quarter (Q1) of calendar year 2019 summarizes the activities performed from January 1 through March 31, 2019. These activities are part of ongoing monitoring for the Phase 2 RCRA Facility Investigation and to support the evaluation of the dissolved-phase ethylene dibromide (EDB) groundwater pump and treat interim measure and the EDB *in situ* biodegradation pilot study.

This Executive Summary describes the following Q1 2019 groundwater monitoring (GWM), interim measure, and pilot activities performed at the BFF between January and March 2019:

- Coring and soil sampling completed at 11 locations in the vadose zone (Vadose Zone Coring Project) for biogeochemical conditions of subsurface soil impacted by residual light non-aqueous phase liquids (LNAPL)
- Installation of the remaining three planned nested groundwater monitoring wells in the cored borehole, each consisting of a water table well and a shallower contingency well (above the current groundwater elevation)
- Sampling the Q1 2019 designated wells in the GWM network
- Monthly sampling of the drinking water supply wells located in the vicinity of the plume containing dissolved-phase benzene (south of Ridgecrest Drive Southeast [SE]) and dissolved-phase EDB
- Operation and maintenance of the groundwater treatment system (GWTS) for groundwater extracted from the dissolved-phase EDB located in the distal portion of the plume (Target Capture Zone for the groundwater interim measure)
- Continuation of Phase 4 of the EDB *in situ* biodegradation pilot study
- Projected activities in the second quarter (Q2) 2019.

ES-1 Vadose Zone Monitoring

ES-1.1 Vadose Zone Coring and Well Installation Project

The objectives of the continuous coring were to provide supplemental data on the nature and extent of the residual fuels and to characterize the subsurface biogeochemical conditions relative to residual hydrocarbon and EDB treatment potential. Data collected from the project will support vadose zone treatability studies and address data gaps in the horizontal and vertical extent of LNAPL in the vadose and saturated zones. The project included a total of 11 corings and well installations, eight of which were completed in the fourth quarter (Q4) 2018.

Coring and soil sampling were completed at the remaining three locations in Q1 2019 (Figure 2-1). Three nested GWM wells were installed in the boreholes. Well completion reports for seven of the wells are provided in Appendix B; well completion reports for the remaining four wells will be provided with the Q2 2019 report; and a detailed discussion of the drilling and sampling program that includes the results of the assessment will be provided to NMED by November 1, 2019 under separate cover.

ES-1.2 Bioventing Pilot Test

The bioventing system was installed during Q1 2019, and the electrical service was accepted by USACE on March 15, 2019.

ES-2 Groundwater Monitoring Network Gauging and Sampling

In Q1 2019, 55 Kirtland BFF GWM wells (Figure 3-1) were sampled. One of these wells was sampled, but due to extreme cold temperatures during transit and sample management errors at the laboratory, was not analyzed. Depths to groundwater were measured in 158 GWM wells. Findings from the Q1 2019 sampling and gauging event include:

- Groundwater levels showed an overall average increase across the GWM network of 1.96 feet since Q4 2018 (Figures 3-2, 3-3, and 3-4). Twenty-six GWM well screens spanned the current water table allowing for representative sample collection from the top of the water table, while the remaining 130 wells are screened at various depths below the water table allowing for a detailed analysis of the vertical extent of the contaminant concentrations. The number of wells with no submerged screens (26) is consistent with the previous quarter.

- LNAPL was detected and measured in five wells (KAFB-106014, KAFB-106059, KAFB-106076, KAFB-106079, and KAFB-106154-484) during gauging (Figure 3-5). All 5 wells are on-Base near the BFF. KAFB-106014 and KAFB-106059 have not had detections of LNAPL for several years but have had LNAPL present historically. The reappearance of LNAPL in these 2 wells may be due to the drilling that was performed adjacent to these wells during the Vadose Zone Coring and Well installation project.

- Eleven newly added wells were sampled in Q1 2019 (Figure 3-1). Of the 11, 5 were wells completed as part of the Vadose Zone Coring project.

- All groundwater samples collected for the Q1 2019 monitoring event were analyzed for EDB. Select wells were also analyzed for benzene, toluene, ethylbenzene, and totals xylenes (BTEX) as well as select anions and metals.

The U.S. Geological Survey monitors 14 sentinel wells between the Kirtland AFB BFF EDB plume and the Albuquerque Bernalillo County Water Utility Authority water supply wells as a means of providing independent observation of water quality in the vicinity of the Albuquerque Bernalillo County Water Utility Authority water supply wells. Samples are collected from these sentinel wells quarterly. Due to the government shutdown that occurred during December 2018 through January 2019, passive diffusion bag samplers were not installed in the wells in January, as planned. Therefore, sampling of the sentinel wells for the Q1 2019 event was delayed and the results will be provided with the Q2 2019 report.

ES-3 Drinking Water Supply Well Monitoring

Four drinking water supply wells (KAFB-003, KAFB-015, KAFB-016, and ST106-VA-2) are located in the vicinity of the dissolved-phase EDB plume. KAFB-003 was not operational during January and February 2019 due to failed pump motor and thus was not sampled during these months. The three operational wells were sampled monthly from January to March in Q1 2019 and analyzed for EDB and BTEX. No EDB or BTEX were detected in groundwater samples collected from these four drinking water supply wells (Figure 4-1).

ES-4 Groundwater Treatment System Operation

The GWTS consists of two treatment trains. Each treatment train is comprised of a lead granular activated carbon vessel followed by a polishing granular activated carbon vessel. The GWTS was 98 percent operational from January 1 to March 31, 2019, and 69,318,500 gallons of groundwater was treated during this period. Of the treated water, 22,763,500 gallons was discharged to the Tijeras Arroyo Golf Course main pond, and 46,555,000 gallons was discharged to gravity-fed injection well KAFB-7. All analyte concentrations for effluent samples collected from Trains 1 and 2 during Q1 2019 were below their respective limits of detection. During Q1 2019, a calculated 5,663 milligrams (mg) of EDB was captured in the lead granular activated carbon vessels. Of this total, 2,740 mg was removed by Train 1, and 2,923 mg was removed by Train 2.

During Q1 2019, some short-term, unscheduled shutdowns occurred due to maintenance activities, electrical fluctuations, and vault leak detections from rain water intrusion. None of these events resulted in long-term shutdowns, and most shutdowns involved only one or two of the extraction wells, not the full extraction well system.

ES-5 Ethylene Dibromide *In Situ* Biodegradation Pilot Study

The main objective for conducting the *in situ* biodegradation pilot test is to investigate *in situ* anaerobic bioremediation of EDB in groundwater. Phase 4 of the pilot test began on November 19, 2018, upon completion of the final Phase 3 sampling event and continues into 2019. Phase 4 consists of long-term monitoring to evaluate performance of the technology and attempts to quantify rebound of EDB concentrations. An independent report summarizing all activities associated with the pilot test through the first Phase 4 sampling event (conducted in January 2019) was submitted on April 18, 2019 in accordance with the NMED letter dated February 25, 2019 (NMED, 2019).

ES-6 Projected Activities

Planned activities for Q2 2019 include:

- Sample the SVM points.
- Continue Phase 4 long-term rebound monitoring for the EDB *In Situ* Biodegradation Pilot Study and submit a report to NMED. The report summarizing the results of the EDB *In Situ* Biodegradation Pilot Study was submitted to NMED on April 18, 2019.
- Initiate the baseline sampling and respirometry testing for the bioventing pilot test. A report summarizing the available results of the bioventing pilot tests will be submitted to NMED by January 31, 2020.

- Sample the Q2 2019 designated wells in the GWM network beginning in April 2019.
- Measure depth to water in all wells in the GWM network.
- Sample drinking water supply wells for organic compounds on a monthly basis.
- Operate the GWTS and extraction wells KAFB-106228, KAFB-106233, KAFB-106234, and KAFB-106239 with discharge to the Golf Course main pond and injection well KAFB-7.

1. INTRODUCTION

The investigation and remediation of the Kirtland Air Force Base (AFB) Bulk Fuels Facility (BFF) leak (Solid Waste Management Units [SWMUs] ST-106/SS 111) are being implemented pursuant to the Resource Conservation and Recovery Act (RCRA) corrective action provisions in Part 6 of Kirtland AFB's Hazardous Waste Treatment Facility Operating Permit (Permit Number [No.] NM9570024423 – RCRA Permit) (New Mexico Environment Department [NMED], 2010). This Quarterly Report for the first quarter (Q1) of calendar year 2019 summarizes the activities performed from January 1 through March 31, 2019. This Q1 2019 Quarterly Report presents non-cumulative data for Q1 2019. Appendix A contains key regulatory correspondence for Q1 2019.

The BFF site is located within the northwestern portion of Kirtland AFB, on the southern end of the city of Albuquerque, as shown on the site location map (Figure 1-1). The Phase I RCRA Facility Investigation (U.S. Army Corps of Engineers [USACE], 2017a) provides a detailed site description, history, and conceptual site model. Vadose zone and groundwater investigation and remediation activities are required to address the potential impact of fuels that were released from leaking pipelines at the former fuel off-loading rack.

Groundwater monitoring (GWM) and interim measures for SWMUs ST-106/SS-111 were conducted concurrently. The Q1 2019 monitoring program was performed in accordance with multiple work plans: (1) vadose zone coring and sampling (NMED, 2017a; NMED, 2017b; USACE, 2017b), (2) GWM (NMED, 2017c; USACE, 2017c), and (3) drinking water supply wells (NMED, 2017a; USACE, 2017b). Groundwater treatment system (GWTS) operations, sampling, and treated effluent discharge were performed under the Operations and Maintenance Plan (NMED, 2016; USACE, 2016a, 2017d, 2018a).

2. VADOSE ZONE MONITORING

This section describes the field activities for the vadose zone coring project (Figure 2-1). Section 2.1 provides a brief summary of the coring project and the field activities that were completed in Q1 2019. No soil vapor monitoring (SVM) activities were performed during Q1 2019 (Section 2.1). Section 2.3 provides a brief overview of the bioventing pilot project and the construction completed in Q1 2019.

2.1 Vadose Zone Coring Project

Implementation of the vadose zone coring and well installation project was initiated in October 2018 in accordance with the Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Work Plan (USACE, 2017b). The project included coring at up to 12 locations in the vadose zone (Figure 2-1) with up to 10 boreholes cored below the water table. Two nested SVM wells (KAFB-106V1, and KAFB-106V2) were completed in the borings in Q1 2019 (Figure 2-1). The well completion report for KAFB-106V1 and KAFB-106V2 is provided in Appendix B-1.

Data collected from the project will support vadose zone treatability studies and address data gaps in the horizontal and vertical extent of light non-aqueous phase liquids (LNAPL) in the vadose and saturated zones. The objectives of the continuous coring are to provide supplemental data on the nature and extent of the residual fuels and to characterize the subsurface biogeochemical conditions relative to residual hydrocarbons (HC), including benzene and ethylene dibromide (EDB).

Soil samples were collected based on lithology and the presence of HCs as well as at predetermined depths as indicated in the Work Plan. Soil samples were sent to analytical laboratories for analysis of:

- Volatile organic compounds (U.S. Environmental Protection Agency [EPA] Method 8260C), EDB (EPA Method 8011), total petroleum hydrocarbons – gasoline range organics/diesel range organics/oil range organics (EPA Method 8015D), and moisture analysis (ASTM International D2216).

- Microbial analysis (QuantArray Chlor) and mineralogy (x-ray diffraction and energy dispersive x-ray spectrometry).

- The presence of LNAPL by ultraviolet light analysis.

- LNAPL transmissivity and mobility, grain size, fluid properties, capillary pressure, free product mobility, relative permeability, and hydraulic conductivity.

- LNAPL (if available) physical properties including gravity, HC component analysis, flash point, and viscosity.

Kirtland AFB and NMED jointly reviewed field screening data from KAFB-106S5 and determined that optional coring location KAFB-106S6 was not required (NMED, 2018a). Field screening data obtained from KAFB-106S5 did not indicate the presence of LNAPL and thus negated the need for an additional well further downgradient. A detailed discussion of the drilling and sampling program that includes the results of the assessment will be provided by November 1, 2019 as requested by NMED in a letter dated February 25, 2019 (NMED, 2019).

2.2 Vadose Zone Soil Vapor Data Collection

No SVM activities were performed during Q1 2019. The SVM program has been optimized to semiannual sampling events performed in Q2 and Q4 of each year (NMED, 2017b). Appendices C and D remain in this report as placeholders; information will be included in these appendices following the semiannual sampling events. The next semiannual SVM event will be performed in Q2 2019.

2.3 Bioventing Pilot Test

The bioventing pilot test is being performed to evaluate the feasibility of this technology during the Corrective Measures Evaluation. The bioventing pilot testing will include short-duration "dry" and "moist" respiration tests (approximately 3 weeks), followed by two longer-term (2 years in duration) bioventing pilot tests conducted simultaneously. Data collected from the short-duration respiration test will be used to refine the design and details of the long-term test.

The bioventing pilot test design utilizes existing soil vapor extraction wells and existing SVM wells for air injection and two new SVM well clusters at KAFB-106V1 and KAFB-106V2 (completed under a separate work plan [USACE, 2017b]) for observation. Well locations are shown on Figure 2-2. Pilot testing will use a rotary vane pump for the respiration testing and a regenerative blower for the longer-term bioventing test.

Installation of the bioventing system began in February 2019. A 230-volt, 3 phase electrical service was installed between February 25 and March 5, 2019. Power was pulled from panel B in Building 1033 within the bulk fuels facility and consists of the following components:

- 100 amp breaker within building 1033;
- Overhead power line installed across the service road;
- Electrical panel with disconnect;
- E-mon D-mon digital electric meter;
- Connection of the 1.5 HP regenerative blower; and
- Buried electrical completed with surface mounted outlets for vane pump power supply

The electrical service was inspected and accepted by USACE on March 15, 2019. Baseline analytical samples were collected in March 2019 and results will be reported in Q2 2019. Dry respiration testing will begin in April 2019 and is anticipated to continue until carbon dioxide and oxygen concentrations approach baseline readings, estimated to be by end of May 2019. Wet respiration testing will begin following completion of the dry respiration testing and is anticipated to start the beginning of June 2019. It is anticipated that the bioventing will begin mid-July 2019.

3. GROUNDWATER MONITORING NETWORK GAUGING AND SAMPLING

At the end of Q1 2019, the BFF GWM well network was comprised of 165 GWM wells (Figure 3-1, Table 3-1); 55 wells were sampled in Q1 in accordance with the monitoring schedule shown in Table 3-2.

Throughout this report, GWM wells, and their associated groundwater data, are described based on reference elevation intervals (REIs). REIs are below ground surface elevations that divide the GWM network into datasets comprised of wells that are screened across their respective elevations, allowing for a vertical evaluation of groundwater parameters and contaminant locations (Figure 3-2). Currently, there are three REIs (4857, 4838, and 4814). A detailed explanation of how the REIs are defined is presented in the Q4 2016 Quarterly and Annual Report (USACE, 2017e).

In previous reports, GWM wells were assigned designations based either on their location related to the groundwater gradient and their spatial relationship to the dissolved-phase EDB or simply on their location (i.e., source area, etc.). In response to the changing regional groundwater gradient (Q2 2018 Quarterly Monitoring Report [USACE, 2018b]), well designations are no longer used in figures and analytical results tables. The former well designations and monitoring well objectives are provided in Table 3-1 along with the current sampling regime by quarter. A detailed description of the former well designations and the frequency of samples collected by designation is provided in the 2018 Q4 Quarterly and Annual Report (USACE, 2019).

In this report, sample results from GWM wells are discussed based on their location (north or south) in relation to Ridgecrest Drive Southeast (SE). The plume containing dissolved-phase benzene is located south of Ridgecrest Drive SE, while the distal section of the EDB plume (Target Capture Zone for the groundwater interim measure) is primarily located north of Ridgecrest Drive SE.

GWM activities included measuring the depths to groundwater and LNAPL (Tables 3-3 and 3-4 and Figures 3-2 through 3-4) and measuring field parameters in wells sampled with low-flow sampling pumps (Table 3-5). Field parameter measurements are not part of the passive sampling methodology, as discussed in more detail in the Q4 2017 Quarterly and Annual Report (USACE, 2018c). Groundwater samples were collected and submitted for laboratory analysis from all Q1 2019 wells (Tables 3-6 through 3-9 and Figures 3-6 through 3-9).

Appendices pertinent to GWM are listed below:

- E-1 – Daily Quality Control Reports – Groundwater Sampling
- E-2 – Groundwater and LNAPL Measurements
- E-3 – Groundwater Purge Logs and Sample Collection Logs
- E-4 – Groundwater Sample Chain-of-Custody Forms
- E-5 – U.S. Geological Survey (USGS) Sentinel Well Data
- F-1 – Data Quality Evaluation Report – Groundwater Samples
- F-2 – Data Packages – Groundwater Samples.

3.1 New Groundwater Monitoring Activities

Five newly installed nested GWM wells were sampled in Q1 2019 (KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9). GWM wells KAFB-106S1, KAFB-106S7, KAFB-106S8, and KAFB-106247 were completed late in Q1 2019 and were not ready for sampling during this quarter. The nested wells consisted of one GWM well screened across (partially above and below) the groundwater

table and a second well (contingency well) constructed with the well screen above the current water table elevation. The contingency well will be available to monitor the upper zone of the plume in the future as the water table continues to rise. Appendix B-2 includes the well completion report for KAFB-106S2, KAFB-106S4, KAFB-106S5, KAFB-106S8, and KAFB-106S9. The well completion reports for the remaining wells will be provided with the Q2 2019 report.

After four quarters of baseline sampling, newly added wells will be assigned an objective and moved into their relevant sampling regime in the following quarter (Table 3-6). For wells KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9, baseline sampling will be completed in Q4 2019. For wells KAFB-106S1, KAFB-106S7, KAFB-106S8, and KAFB-106247, baseline sampling will be completed in Q1 2020.

Six data gap wells were installed in Q2 and Q3 2018. For four of these wells, KAFB-106240-499, KAFB-106241-428, KAFB-106242-418, and KAFB-106243-425, baseline sampling will be completed in Q3 2019. For wells KAFB-106244-445 and KAFB-106245-460, baseline sampling will be completed in Q4 2019.

3.2 Groundwater and Light Non-Aqueous Phase Liquid Gauging

Depth to water was measured in 158 GWM wells between February 4 and 8, 2019 (Figure 3-1; Table 3-3), using a Solinst Model 122 oil-water interface probe, in accordance with the approved work plan (USACE, 2017c). Each well was also checked for the presence of LNAPL. Depth to water in wells KAFB-106063 and KAFB-106064 could not be measured due to the presence of dedicated downhole equipment related to the Environmental Security Technology Certification Program pilot test project for EDB *in situ* biodegradation. Of the 84 GWM wells in REI 4857 gauged in Q1 2019, 26 had screens that intersected the current water table while the remaining wells had submerged well screens (Table 3-4 and Figure 3-6). Well screen submergence in REI 4857 wells that were gauged in Q1 2019 ranged from 4.71 to 16.14 feet (ft) (KAFB-106004) (Table 3-2).

The interface probe was checked for proper operation and cable integrity prior to each use and was decontaminated after gauging each well. If LNAPL was detected using the interface probe, a plastic bailer was used to confirm the presence and thickness of the LNAPL. Additionally, during the sampling using Bennett pumps, every well was checked for the presence of LNAPL. Depths to LNAPL and groundwater were recorded in the field on well gauging forms (Appendix E-2).

Depth to water in the GWM wells was gauged by two field teams each using dedicated Solinst Model 122 oil-water interface probes (Serial Nos. 253053 and 253056). Depth to water measurement differences between the two interface probes were identified by measuring depth to water with each interface probe in 3 GWM wells near the source area and comparing to a benchmark water level probe with minimal stretch. The interface probe Serial No. 253056 was adjusted by 0.05 ft and interface probe Serial No. 253053 was adjusted by 0.07 ft based on historical calibrations. Depth to water measurements were adjusted by the corresponding average differences based on which instrument was used to measure the depth to water in each well. Appendix Table E-2-1 presents the uncorrected and corrected depth to water measurements for each GWM well and also provides the correction factor applied per well. Depth to water measurements in Tables 3-3 and 3-4 have been corrected based on the method described above.

LNAPL was measured in KAFB-106014, KAFB-106059, KAFB-106076, KAFB-106079, and KAFB-106154-484 in Q1 2019 at thicknesses of 0.11, 0.34, 0.02, 0.18 and 0.11 ft, respectively (Table 3-3 and Figure 3-5). All 5 wells with LNAPL are located south of Ridgecrest Drive SE on-Base. KAFB-106076, KAFB-106079, and KAFB-106154-484 had measurable LNAPL sheens present in Q4 2018. KAFB-106014 and KAFB-106059 have not had LNAPL present in several years. The presence of LNAPL in

these two wells in Q1 2019 may be due to the air injection during well installation activities associated with the coring project (Section 2.1) nearby these wells.

3.3 Groundwater Sampling

Quarterly groundwater samples were collected from 55 wells in the GWM network between January 1 and February 6, 2019 using dedicated and portable low-flow pump systems or passive sampling methods (Table 3-2). Well locations are shown on Figure 3-1. All groundwater samples collected for the Q1 2019 monitoring event were analyzed for EDB, while select wells were additionally analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX); anions; and metals (Table 3-2). All groundwater samples were analyzed by Eurofins Lancaster Laboratories Environmental, LLC located in Lancaster, Pennsylvania, which maintains current Department of Defense Environmental Laboratory Accreditation Program certification. The groundwater purge and sampling forms are provided in Appendix E-3 and the chain-of-custody forms are provided in Appendix E-4.

For low-flow sampling, well water was purged continuously at a flow rate between 0.5 and 1 liter per minute, while field parameters (turbidity, temperature, dissolved oxygen [DO], specific conductivity, pH, and oxidation reduction potential [ORP]) were measured and recorded every 5 minutes. Samples were collected after parameters stabilized for three consecutive readings within 10 percent (%) of one another, or after 1 hour of purging. Field parameters were recorded on the field forms (Appendix E-3) and are summarized in Table 3-5. To be consistent with previous quarterly sampling events, wells without a dedicated low-flow pump sampling system were designated, based on historical analytical data, as either clean, intermediate, or hazardous. Decontaminated non-dedicated tubing and portable low-flow pumps were used to sample wells designated as clean. The entire sampling assembly was decontaminated following use at each well. Conversely, wells designated as intermediate or hazardous had dedicated tubing that was specific to that well.

Field parameters were not collected from wells that were sampled using passive sampling methods due to the unreliable field parameter data associated with this technology; this is discussed in more detail in the Q2 2017 quarterly report (USACE, 2017f). Field parameters were measured only from wells that were sampled using the low-flow methodology.

3.3.1 Sampling Deviations

The groundwater sample collected from KAFB-106236-519 was not analyzed for EDB due to extreme cold temperatures during transit in January 2019, resulting in the loss due to breakage from freezing of several bottle aliquots. In addition, the last available aliquot was lost due to a sample tracking login error at the laboratory. The groundwater sample from KAFB-106236-519 was to be analyzed for EDB only.

The groundwater samples collected from KAFB-106244 and KAFB-106245 were not analyzed for BTEX as required due to an error in the sample management database. This error was corrected for subsequent quarters.

When the deviations for KAFB-106236-519, KAFB-106244, and KAFB-106245 were identified, there was insufficient time remaining in the quarter to resample.

Due to faulty passive samplers in KAFB-106009 and KAFB-106S3-449, quality control samples had to be collected on an analysis-by-analysis basis from four subsequent wells. All the sampling quality control requirements were met using this analysis-by-analysis collection approach. This was not a deviation from the Work Plan, but rather an explanation of the anomalous steps taken to fulfill sampling quality control requirements.

3.4 Data Review and Usability Results

The Q1 2019 groundwater analytical data underwent EPA Level 3 data validation by an independent third-party subcontractor. Subsequent to performing data validation, the data qualifiers were uploaded to the EQuIS® project database. Data were further assessed for accuracy, precision, representativeness, comparability, completeness, and sensitivity and determined to achieve the project data quality objectives in Q1 2019. All groundwater data presented and discussed in this report are final validated data. The Environmental Resources Program Information Management System data deliverable is scheduled for submittal on June 3, 2019. The Data Quality Evaluation Report for groundwater samples collected in Q1 2019 is provided in Appendix F-1, and the final laboratory data reports are included in Appendix F-2.

3.5 Project Screening Levels

The project screening levels (PSLs) were selected to satisfy the requirements of the Kirtland AFB RCRA Permit (NMED, 2010) as the lower of:

- New Mexico Water Quality Control Commission (NMWQCC) standards per the New Mexico Administrative Code, Title 20.6.2.3103, Standards for Groundwater of 10,000 milligrams per liter (mg/L) Total Dissolved Solids Concentration or Less (New Mexico Administrative Code, 2018). For metals, the NMWQCC standard applies to dissolved metals and total mercury.

- EPA National Primary Drinking Water Regulations, maximum contaminant levels (MCLs) and secondary MCLs, and Title 40 Code of Federal Regulations (CFR) Part 141, 143 (EPA, 2018).

If no MCL or NMWQCC standard existed for an analyte, the PSL used was the EPA Tapwater Regional Screening Level (EPA, 2018).

The analytical method utilized to analyze for total nitrate/nitrite nitrogen concentrations (Method 353.2) cannot identify individual nitrate and nitrite concentrations without modification. Typically, in highly oxidizing and near neutral aquifers, nitrate is the primary nitrogen species found in groundwater (Langmuir, 1997). Previous studies in the Albuquerque Basin have used total nitrate/nitrite nitrogen concentrations as equivalent to nitrate nitrogen concentrations (Longmire, 2016; Anderholm et al., 1995). Therefore, total nitrate/nitrite nitrogen concentrations were compared to the 10 mg/L MCL for nitrate in this report.

Groundwater MCLs or PSLs for all analytes are provided in the groundwater analytical data tables included in this report.

3.6 Groundwater Quality Data

All groundwater samples collected for the Q1 2019 monitoring event were analyzed for EDB, while select wells were also analyzed for BTEX, total metals (arsenic, lead, calcium, magnesium, potassium, and sodium), dissolved metals (iron and manganese), anions (bromide, chloride, sulfate, and nitrate/nitrite nitrogen), and alkalinity (Table 3-2). Alkalinity, sulfate, dissolved iron, and dissolved manganese concentrations provide direct and indirect evidence of anaerobic conditions and thus are important indictors of bioremediation (Section 3.6.5). Contaminant concentrations were compared to their respective MCLs or PSLs and are discussed in the following sections. The analytical results for field duplicate samples are presented in the tables and were used to assess field and laboratory analytical precision. However, field duplicate results are not discussed in this text for comparison purposes unless

otherwise noted and duplicate data are not provided on figures. The results for the duplicate sample analyses are included in the Data Quality Evaluation Report (Appendix F-1).

The status of baseline sampling of newly added wells is provided in Table 3-6. Analytical data for both organic and inorganic compounds for the newly added wells are provided in Table 3-7. A complete field duplicate was collected for all suites in a combination of the following newly added wells: KAFB-106S2-451, KAFB-106S3-449, KAFB-106S4-446, KAFB-106S5-446, and KAFB-106S9-447. Data for organic compounds for GWM wells are provided in Table 3-8 and inorganic compounds in Table 3-9. Concentrations for various compounds are depicted on figures as listed below:

- EDB on Figure 3-6
- Benzene on Figure 3-7
- Toluene on Figure 3-7
- Ethylbenzene on Figure 3-7
- Total xylenes on Figure 3-7
- Nitrate/nitrite nitrogen on Figure 3-8
- Sulfate on Figure 3-8
- Total alkalinity on Figure 3-9
- Bromide on Figure 3-9
- Dissolved iron on Figure 3-9
- Dissolved manganese on Figure 3-9

3.6.1 Organic Compounds Analytical Results

3.6.1.1 EDB Analytical Results

Groundwater samples from 54 wells were analyzed for EDB in Q1 2019. This includes 34 wells located north of Ridgecrest Drive SE and 20 wells located south of Ridgecrest Drive SE. EDB analytical results are presented in Tables 3-7 and 3-8, and on Figure 3-6.

- EDB was detected in groundwater samples collected from 10 of the 54 GWM wells analyzed in Q1; six of those samples exceeded the 0.05 micrograms per liter (µg/L) MCL. Seven of the detections and five exceedances were in newly added wells; four of the newly added wells were non-detect for EDB (Table 3-7). All of the six EDB exceedances were in REI 4857.

- Only one EDB exceedance was detected north of Ridgecrest Drive SE, in KAFB-106241-428 at a concentration of 0.085 µg/L (Figure 3-6).

- Five of the EDB exceedances were from wells that are south of Ridgecrest Drive SE and four of those were on-Base in the immediate vicinity of or within the BFF. The highest EDB concentrations south of Ridgecrest Drive SE were detected in the groundwater samples collected from newly added wells KAFB-106S2-451 and KAFB-106S9-447 (240 and 120 µg/L, respectively [on-Base, in the BFF]).

3.6.1.2 BTEX Analytical Results

Seventeen wells were sampled for BTEX in Q1 2019; all 17 wells are located south of Ridgecrest Drive SE. BTEX analytical results are presented in Tables 3-7 and 3-8, and on Figure 3-7.

- Benzene was detected in groundwater samples collected from 5 of the 17 GWM wells; all 5 were in REI 4857 and exceeded the 5.0 µg/L MCL. The highest benzene concentration was detected in KAFB-106S9-447 (8,800 µg/L) in the source area. Four of the exceedances were in newly added wells, and one of the newly added wells was non-detect for benzene (Table 3-7).

- Toluene was detected in groundwater samples collected from 5 of the 17 GWM wells; 4 exceeded the 750 µg/L PSL. All four of the toluene exceedances were in REI 4857. The highest toluene concentration was detected in KAFB-106S9-447 (14,000 µg/L) in the source area. All four of the exceedances were in newly added wells, and one of the newly added wells was non-detect for toluene (Table 3-7).

- Ethylbenzene was detected in groundwater samples collected from 5 of the 17 GWM wells; 4 exceeded the 700 µg/L PSL. All four of the ethylbenzene exceedances were in REI 4857. The highest ethylbenzene concentration was detected in KAFB-106S3-449 (1,500 µg/L). All four of the exceedances were in newly added wells, and one of the newly added wells was non-detect for ethylbenzene (Table 3-7).

- Xylenes, total were detected in groundwater samples collected from 5 of the 17 GWM wells; 4 exceeded the 620 µg/L PSL. All four of the xylenes, total exceedances were in REI 4857. The highest xylenes, total concentration was detected in KAFB-106S2-451 (5,300 µg/L). All four of the exceedances were in newly added wells, and one of the newly added wells was non-detect for xylenes, total (Table 3-7).

3.6.2 Inorganic Compounds Analytical Results

Inorganic compounds include total alkalinity, nitrate/nitrite nitrogen, sulfate, bromide, and dissolved iron and manganese. Fourteen wells were sampled for inorganic compounds in Q1 2019; 3 of these wells are located north of Ridgecrest Drive SE, and 11 are located south of Ridgecrest Drive SE. The wells located north of Ridgecrest Drive SE are also newly added wells. All 14 of the wells sampled for inorganic compounds are screened in REI 4857. Inorganic analytical results are presented in Tables 3-7 and 3-9, and on Figures 3-8 and 3-9.

- Total alkalinity was detected in groundwater samples collected from all 14 GWM wells; however, there is no established PSL. Alkalinity concentrations are presented on Figure 3-9.

- Nitrate/nitrite nitrogen was detected in groundwater samples collected from 2 of the 3 wells north of Ridgecrest Drive SE; none exceeded the 10 mg/L PSL. Nitrate/nitrite nitrogen concentrations are presented of Figure 3-8.

- Nitrate/nitrite nitrogen was detected in groundwater samples from 6 of the 11 wells south of Ridgecrest Drive SE; none exceeded the 10 mg/L PSL. Three of the detections were in newly added wells. Four of the newly added wells south of Ridgecrest Drive SE were non-detect for nitrate/nitrite nitrogen. Concentrations of nitrate/nitrite nitrogen are presented on Figure 3-8.

- Sulfate was detected in groundwater samples collected from all 3 of the GWM wells north of Ridgecrest Drive SE; none exceeded the 250 mg/L PSL. Sulfate concentrations are presented on Figure 3-8.

- Sulfate was detected in groundwater samples from 9 of the 11 GWM wells south of Ridgecrest Drive SE; 4 exceeded the 250 mg/L PSL. The highest sulfate concentration was detected in

KAFB-106005 (393 mg/L). Two of the four sulfate exceedances were in newly added wells. One newly added well south of Ridgecrest Drive SE was non-detect for sulfate. Sulfate concentrations are presented on Figure 3-8.

- Bromide was detected in groundwater samples collected from 1 of the 3 GWM wells north of Ridgecrest Drive SE. There is no PSL for bromide. Bromide concentrations are presented on Figure 3-9.

- Bromide was detected in groundwater samples collected from 6 of the 11 GWM wells south of Ridgecrest Drive SE. There is no PSL for bromide. Five of the detections were in newly added wells. Three newly added wells south of Ridgecrest Drive SE were non-detect for bromide. Bromide concentrations are presented on Figure 3-9.

- Dissolved iron was detected in groundwater samples collected from 1 of the 3 GWM wells north of Ridgecrest Drive SE; none exceeded the 1 mg/L PSL. Dissolved iron concentrations are presented on Figure 3-9.

- Dissolved iron was detected in groundwater samples from 5 of the 11 wells south of Ridgecrest Drive SE; 4 exceeded the 1 mg/L PSL. The highest iron concentration was detected in KAFB-106S9-447 at 4 mg/L (J-qualified). All four of the exceedances were in newly added wells. Four of the newly added wells south of Ridgecrest Drive SE were non-detect for dissolved iron. Dissolved iron concentrations are presented on Figure 3-9.

- Dissolved manganese was detected in groundwater samples collected from all 3 of the GWM wells north of Ridgecrest Drive SE; none exceeded the 0.2 mg/L PSL. Dissolved manganese concentrations in REI 4857 are presented on Figure 3-9.

- Dissolved manganese was detected in groundwater samples collected from 8 of the 11 wells south of Ridgecrest Drive SE; 5 exceeded the 0.2 mg/L PSL. The highest manganese concentration was detected in KAFB-106S3-449 at 5.46 mg/L. Four of the exceedances were in newly added wells. One of the newly added wells south of Ridgecrest Drive SE was non-detect for dissolved manganese. Dissolved manganese concentrations are presented on Figure 3-9.

- Chloride was detected in groundwater samples collected from all 3 of the GWM wells north of Ridgecrest Drive SE; none exceeded the 250 mg/L PSL. Chloride concentrations are presented on Figure 3-8.

- Chloride was detected in groundwater samples collected from 10 of the 11 GWM wells south of Ridgecrest Drive SE; none exceeded the 250 mg/L PSL. Chloride was detected in all 8 of the newly added wells south of Ridgecrest Drive SE. Chloride concentrations are presented on Figure 3-8.

An investigation by Kirtland AFB found a junction manhole may have been a source of sanitary waste release to the subsurface and nearby sewer lines are intact. A replacement manhole was installed in Q4 2017. Wells KAFB-106005, KAFB-106009, and KAFB-106012R are in the vicinity of this release and have historically had higher concentrations of analytes that indicate the presence of a sewer leak (Table 3-10). Chloride and nitrogen levels in the area have been decreasing significantly since the manhole repair in Q4 2017 and are now detected below the MCL. Sulfate levels have remained fairly consistent to concentrations measured prior to the manhole replacement in Q4 2017, with the exception of KAFB-106009 which was non-detect for sulfate in Q1 2019. Further quarters of monitoring will be used to determine whether this is indicative of a decreasing sulfate trend at KAFB-106009.

3.6.3 Sampling Results for U.S. Geological Survey Sentinel Wells

USGS monitors 14 sentinel wells between the Kirtland AFB BFF EDB plume and the Albuquerque Bernalillo County Water Utility Authority water supply wells as a means of providing independent observation of water quality in the vicinity of the Albuquerque Bernalillo County Water Utility Authority water supply wells. Samples are collected from these sentinel wells quarterly. Due to the government shutdown that occurred during December 2018 through January 2019, deployment of the passive samplers was delayed. Therefore, the analytical results of the sentinel wells for the CY19 Q1 event was delayed and will be provided with the Q2 2019 report.

3.6.4 Field Parameters

Field parameters were collected for 1 well north of Ridgecrest Drive SE and 10 wells south of Ridgecrest Drive SE sampled using the low-flow sampling method. Field parameter data are presented in Table 3-5.

- Groundwater temperatures ranged from 15.0 degrees Celsius in KAFB-106013 to 17.6 degrees Celsius in KAFB-10612R.
- Sample pH ranged from 7.54 in KAFB-106098 to 7.97 in KAFB-106100.
- Specific conductivity ranged from 202.90 microSiemens per centimeter (µS/cm) in KAFB-106099 to 2184 µS/cm in KAFB-106012R.
- DO ranged from an anaerobic value of 2.45 mg/L in KAFB-106100 to 9.42 mg/L in KAFB-106012R.
- ORP ranged from 157.00 millivolts in KAFB-106012R to 217.20 millivolts in KAFB-106099.
- Turbidity ranged from 0.42 nephelometric turbidity units in KAFB-106097 to 30.30 nephelometric turbidity units in KAFB-106013.

3.6.5 Bioremediation Indicators

Bioremediation indicators are not assessed in Q1 and third quarter (Q3) due to the limited dataset.

3.7 Groundwater Monitoring Well Network Operation and Maintenance

The GWM well network was inspected to ensure that the condition of all protective covers and wellheads met the intended requirements for performance and security. During the inspection period, the necessary cleaning and maintenance were performed and all GWM wells were determined to be fully serviceable.

As of the end of Q1 2019, EA Engineering, Science, and Technology, Inc., PBC (EA) had removed 87 dedicated Bennett pumps from the GWM well network as part of a transition to passive sampling for the monitoring program. No dedicated Bennett pumps were removed during Q1 2019. Although several wells are sampled using portable Bennett pumps, ongoing issues with this sampling system continue to arise due to corrosion of components and mechanical failure due to aging parts.

4. DRINKING WATER SUPPLY WELL MONITORING

Three drinking water supply wells (KAFB-003, KAFB-015, and KAFB-016) provide drinking water to on-Base employees and tenants of Maxwell Housing, which is located off-Base. One drinking water supply well (ST106-VA-2) provides drinking water to Veterans Affairs (VA) Medical Center patients, employees, and visitors. These drinking water wells are community water systems that are regulated by the NMED Drinking Water Bureau in accordance with the Safe Drinking Water Act.

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 BFF plume containing dissolved-phase EDB and benzene.

4.1 Drinking Water Supply Well Sampling and Analysis Procedures

Drinking water supply wells KAFB-015, KAFB-016, and ST106-VA-2 were sampled in January, February, and March 2019. Drinking water supply well KAFB-003 was not sampled during January and February 2019 due to a failed pump motor but was sampled in March 2019.

All field measurements, sample collection, packaging, shipping, and analyses were performed in accordance with the Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Work Plan and associated Quality Assurance Project Plan (USACE, 2017b). Field DO, pH, ORP, conductivity, and temperature measurements were measured using an YSI Professional Plus multiparameter water quality probe; turbidity was measured using a Hach 2100Q or Geotech Portable Turbidity Meter. Instrument calibrations were performed at the start of each day of the sampling event to ensure accurate readings. The sample port at each drinking water well head was opened for 60 seconds prior to sampling to purge any entrained sediment. Upon filling, the sample containers were immediately sealed, checked for headspace bubbles, labeled, and put into an iced cooler. Daily quality control reports are presented in Appendix G-1. Completed sample collection logs and chain-of-custody forms are presented in Appendix G-2.

Drinking water supply samples were collected and submitted for the following analyses:

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

Samples were submitted to TestAmerica Laboratories in Savannah, Georgia, for analytical testing. Analytical results were validated by Environmental Data Services, Ltd. The Data Quality Evaluation Reports are included in Appendix H-1. The TestAmerica Laboratories Analytical Reports for January, February, and March 2019 are included in Appendix H-2.

4.2 Data Review and Usability

Environmental Data Services, Ltd. performed a 100% Level 3 data validation for Q1 2019 organic and inorganic compound analytical data. All data were valid based on necessary criteria, and no data were 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 quality control parameter and data quality indicators (precision, bias [accuracy], representativeness, comparability, completeness, and sensitivity) evaluation results are provided in the Data Quality Evaluation Report and Data Validation Report presented in Appendix H-1 for organic and inorganic compounds. Final validated data are presented in Table 4-1.

4.3 Drinking Water Supply Well Water Quality for Q1 2019

All 4 wells continue to show no detectable concentrations of EDB or BTEX in the drinking water that is supplied to Kirtland AFB employees and tenants and VA Medical Center patients, employees, and visitors. Analytical results for January, February, and March 2019 are presented in Table 4-1, Figure 4-1, and Appendix H-2. Analytical data were compared to drinking water MCLs and Secondary MCLs. The MCLs for drinking water supply wells are established in the EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40 CFR Parts 141 and 143 (EPA, 2018).

5. GROUNDWATER TREATMENT SYSTEM OPERATION AND PERFORMANCE

This section presents Q1 2019 operations, performance metrics, system expansion activities, maintenance activities of the GWTS, and plume capture evaluation.

5.1 Groundwater Treatment System Operation

The GWTS is part of the interim measure performed pursuant to the corrective action provisions in Kirtland AFB's RCRA Permit to collapse and treat the dissolved-phase EDB that extends north of Ridgecrest Drive SE 3,650 ft to the northwest. It was operated during Q1 2019 to treat groundwater extracted from the distal portion of the plume north of Ridgecrest Drive SE. The GWTS is comprised of 4 extraction wells (KAFB-106228, KAFB-106233, KAFB-106234, and KAFB-106239), conveyance piping, a dual train 800-gallon per minute (gpm) capacity carbon treatment system located within the GWTS building, and effluent conveyance lines discharging to either the Tijeras Arroyo Golf Course main pond (GCMP) or gravity-fed injection well KAFB-7 (Figure 5-1).

In addition to the operational procedures outlined in the Operations and Maintenance Plan (NMED, 2016; USACE, 2016a, 2017d, 2018a), the GWTS is also subject to the terms of a Class V Underground Injection Well Discharge Permit (DP) No. 1839 (NMED, 2017d) for injecting treated groundwater to KAFB-7. The DP became effective on April 28, 2017. The requirements associated with the conditions of the DP and the location of reporting requirements in this report are summarized in Table 5-1.

5.1.1 Groundwater Treatment System Treatment Volumes and Percentage Run Time

During Q1 2019, the GWTS treated 69,318,500 gallons of groundwater; 22,763,500 gallons was discharged to GCMP, and 46,555,000 gallons was discharged to injection well KAFB-7. During Q1 2019, Trains 1 and 2 treated 41,993,900 and 27,324,600 gallons, respectively. Table 5-2 provides a cumulative summary of groundwater quantities extracted, treated, and discharged.

For the purpose of run time evaluation, GWTS operation is defined as the time when groundwater was being pumped from at least one extraction well and was subsequently treated and discharged. Table 5-3 provides a monthly and quarterly summary of the extraction well performance, including individual extraction well run times.

From January 1 through March 31, 2019, the GWTS was operational 98% of the time (Table 5-3), representing a 5% increase relative to Q4 2018. Planned and unplanned system shutdowns affecting GWTS overall run time during Q1 2019 are described in Sections 5.3.1 and 5.3.3.

5.1.2 Extraction Well Performance Metrics

The following subsections provide a summary of the performance metrics for the 4 extraction wells. Quarterly injection well performance data required for DP reporting compliance are provided in Table 5-4. Average operational extraction flow rates do not include flow rates during downtime. Well performance figures are provided in Appendix I-1.

5.1.2.1 Quarterly Extraction Rates

During Q1 2019, all 4 extraction wells were operated based on GCMP capacity with the following priority: KAFB-106234 (highest priority), KAFB-10228, KAFB-106239, and KAFB-106233 (lowest priority).

Water was extracted from KAFB-106228 during Q1 2019 at an average operational flow rate of 140.4 gpm with a run time of 98% (Table 5-3).

Water was extracted from KAFB-106233 during Q1 2019 at an average operational flow rate of 168.5 gpm with a run time of 98% (Table 5-3).

Water was extracted from KAFB-106234 during Q1 2019 at an average operational flow rate of 159.0 gpm with a run time of 98% (Table 5-3).

Water was extracted from KAFB-106239 during Q1 2019 at an average operational flow rate of 73.7 gpm with a run time of 95% (Table 5-3).

5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal

GWTS performance monitoring is performed in conformance with the most recently approved Work Plan (USACE, 2017c) as well as Appendix L of the Operations and Maintenance Plan, Sampling and Analysis Plan, and any subsequent revisions. DP-1839 provides additional sampling criteria. Table 2 of DP-1839 provides a list of the constituents of concern that are most frequently monitored at the GWTS (NMED, 2017d). Q1 2019 GWTS analytical performance metrics and EDB mass removal are discussed in the following sections.

5.2.1 Quarterly Sampling and Analysis

Water samples from Train 1 and Train 2 were collected monthly from the untreated influent (GWTS-BFF-INF1 and GWTS-BFF-INF2) from a port located after the lead granular activated carbon (GAC) vessel (GWTS-BFF-GAC1 and GWTS-BFF-GAC2), and from the treated effluent (GWTS-BFF-EFF1 and GWTS-BFF-EFF2) in Q1 2019. These samples were analyzed for EDB, BTEX, and dissolved metals (iron and manganese). EDB concentrations and mass removal for Q1 2019 are summarized in Table 5-5. Sample results and effluent discharge limits are provided in Table 5-6 for Train 1, Table 5-7 for Train 2, and Table 5-8 for extraction wells. GWTS performance sample collection logs are provided in Appendix I-3.

In Q1 2019, an estimated 5,663 milligrams (mg) of EDB was captured in the lead GAC vessels. Of this total, 2,740 mg was removed by Train 1 and 2,923 mg was removed by Train 2. These quantities of mass were calculated by taking the sum of each monthly influent concentration multiplied by the respective total weekly treated volume (Table 5-5).

EDB in the influent sample of Train 1 was detected at estimated (J-flag) concentrations of 0.016, 0.021, and 0.013 µg/L in January, February, and March 2019, respectively (Table 5-6). EDB in the influent samples of Train 2 was detected at concentrations of estimated (J-flag) 0.023 µg/L, estimated (J-flag) 0.03 µg/L, and estimated (J-flag) 0.029 µg/L in January, February, and March 2019, respectively (Table 5-7). BTEX and dissolved iron were not detected in any influent samples collected from either train

during Q1 2019. Dissolved manganese was detected below the PSL in all monthly influent samples collected from Train 2 (Table 5-7).

EDB, BTEX, dissolved iron, and manganese were non-detect or in all post-GAC and effluent monthly samples collected from either train during Q1 2019.

All 4 extraction wells (KAFB-106228, KAFB-106233, KAFB-106234, and KAFB-106239) were sampled in January 2019 for EDB, BTEX, dissolved iron, and dissolved manganese. The concentration of EDB was detected at concentrations below the PSL in the samples from KAFB-106228, KAFB-106233, and KAFB-106234 (Table 5-8). EDB was not detected in KAFB-106239 (<0.019 µg/L). BTEX and dissolved iron were not detected in any extraction well samples. Dissolved manganese was detected only in extraction well KAFB-106239 but below the PSL.

5.2.2 Data Validation

All Q1 2019 GWTS analytical data underwent EPA Stage 3 data validation by Environmental Data Services, Ltd. Additionally, the data were assessed for accuracy, precision, representativeness, comparability, completeness, and sensitivity to determine if the project data quality objectives were achieved and usable for their intended purpose. The data validation results are included in the Data Quality Evaluation Report provided in Appendix I-4 and the final laboratory data reports included in Appendix I-5.

5.3 Groundwater Treatment System Maintenance and Expansion Activities

GWTS maintenance activities throughout Q1 2019 were performed in accordance with the Operations and Maintenance Plan (NMED, 2016; USACE, 2016a, 2017d, 2018a). All Q1 2019 GWTS maintenance activities are provided in the following sections.

5.3.1 Routine Maintenance Activities

Routine maintenance is any activity described as such in the GWTS Operations and Maintenance Plan (NMED, 2016; USACE, 2016a, 2017d, 2018a). A summary of routine maintenance activities is provided below.

During Q1 2019, the Train 2 effluent bag filters were changed on February 28, 2019. The Train 2 influent bag filters were not changed, and neither influent nor effluent bag filters changed out for Train 1. The differential pressure along the lead GAC vessel on Train 1 was 7.8 pounds per square inch (psi) on January 3, 2019; and, on March 29, 2019, the differential pressure was 7.1 psi (Appendix I-1) showing a decrease in lead GAC vessel differential pressure throughout the quarter without the need to skim or backwash the GAC. On January 2, 2019, the differential pressure along the lead GAC vessel of Train 2 was 6.0 psi. The differential pressure in the lead GAC of Train 2 was 5.9 psi as of March 29, 2019.

The influent Wye-strainers were cleaned 13 times for both Train 1 and Train 2 throughout Q1 2019. Y-strainers were cleaned to maintain equalization of the influent tanks and prevent cavitation at the influent pump intakes. The Wye-strainers accumulate biologic materials coming in with the influent.

The GWTS routine maintenance schedule is provided in Table 5-9 and non-routine maintenance activities that were performed during Q1 2019 are discussed in Section 5.3.3 and in Table 5-10.

5.3.2 Conveyance Line Security and Administrative Controls

Kirtland AFB is registered as a line-owner with New Mexico 811 for the off-Base portion of the conveyance lines. U.S. Air Force permits are required for all on-Base excavation projects. During Q1 2019, Kirtland AFB responded to 30 off-Base tickets requested through New Mexico 811 (Appendix I-2). There were no conveyance line breaches and all off-Base conveyance lines remained intact.

5.3.3 Non-Routine Maintenance Activities

Non-routine maintenance activities are defined as maintenance items that fall outside of the scope of the GWTS Operations and Maintenance Plan but need to be addressed in order to maintain consistent GWTS operation. A summary of shutdowns associated with non-routine maintenance activities occurring during Q1 2019 is provided on Table 5-10. Major non-routine maintenance performed in Q1 2019 is listed below.

KAFB-106233 was offline for approximately 0.5 hours on January 4, 2019 to reroute the air relief valve and Kunkle valve outputs into the top of the wellhead at KAFB-106233.

KAFB-106239 was disinfected on January 16, 2019, and again on March 6, 2019. Disinfection was performed in accordance with the Standard Operating Procedure (USACE, 2018d) approved by NMED on August 6, 2018 (NMED, 2018b) and the analytical sampling suites for pre-treatment and post-treatment groundwater samples approved on November 16, 2018 (NMED, 2018c). Both pre- and post-treatment samples were analyzed for bromate and chlorite using Method E300.1 and perchlorate was analyzed using Method E331.0. Bromate and chlorite were not detected in the samples. Perchlorate was detected at a concentration of 0.11-0.13 µg/L, below the PSL of 14 µg/L (Appendix I-1, Table I-1-5). Groundwater from the Middle Rio Grande Basin has naturally-occurring perchlorate concentrations of 0.12–1.8 µg/L (Plummer et al., 2006).

On February 26, 2019, the Square D Surgelogic surge counter was replaced in the well control house.

From February 26 to 28, 2019, the *in situ* water level transducer at KAFB-7 was replaced with a transmitter. Scaling calibration of the transmitter was performed on February 27 and 28, 2019.

The valve and diaphragm assemblies in the chlorine dosing pumps of both treatment trains were replaced on March 12, 2019.

All extraction well, air relief valve, and conveyance line junction vaults were cleaned on March 26 and 27, 2019. The KAFB-106239 magnetic flow meter was removed, cleaned, and replaced on March 28, 2019.

The GWTS was shut down a few times due to GCMP maintenance activities, rain events, and electrical disruptions throughout Q1 2019 (Appendix I-1).

5.3.4 Effluent Conveyance Line Integrity

Effluent line testing was not performed during Q1 2019. Final retesting of the segment between the changeover valve and KAFB-7 will be performed after final valves are installed at KAFB-7.

5.4 Ethylene Dibromide *In Situ* Biodegradation Pilot Test Q1 Summary

The EDB *in situ* biodegradation pilot test has been ongoing on Kirtland AFB. It is being performed directly south of Randolph Avenue, near the BFF groundwater source area. The main objective of the pilot test is to investigate *in situ* anaerobic bioremediation of EDB in groundwater. This pilot test is being completed under an NMED approved work plan titled EDB In Situ Biodegradation Pilot Test Work Plan (USACE, 2016b).

Several new wells and existing monitoring wells (KAFB-106064 and KAFB-106063) are being utilized for this pilot test. The new wells include extraction wells KAFB-106EX1 and KAFB-106EX2; injection well KAFB-106IN1; and nested monitoring wells KAFB-106MW1-S, KAFB-106MW1-I, KAFB-106MW2-S, and KAFB-106MW2-I. Underground conveyance piping was also constructed to carry groundwater between the extraction and injection wells, directing the flow through an aboveground installation where amendments and/or tracers are introduced to the recirculated groundwater.

The pilot test was to be implemented in four phases, each briefly described below:

- ***Phase 1***—Evaluate baseline conditions and the distribution of recirculated water using tracer amendments.

- ***Phase 2***—Evaluate biostimulation in the subsurface after distribution of treatment amendments in recirculated groundwater.

- ***Phase 3***—Evaluate bioaugmentation in the subsurface after distribution of treatment amendments and dehalogenating bacteria in recirculated groundwater.

- ***Phase 4***—Continued monitoring with no active extraction/injection.

Per the Work Plan (USACE, 2016b), Phase 3 was to consist of both biostimulation and bioaugmentation; however, after review of field results from both Phase 1 and Phase 2, it was determined that bioaugmentation was not warranted. Due to the success of biostimulation during Phase 2, Phase 3 was modified to further evaluate biostimulation. The modified Phase 3 was approved by NMED in a letter dated August 7, 2018 (NMED, 2018d).

Phase 4 of the pilot test, long-term rebound monitoring, began on November 19, 2018 and continues into 2019. Only one sampling event was conducted as a part of Phase 4, on January 16 through 21, 2019. This sampling event occurred approximately 2 months after the Phase 3 passive period was concluded, in accordance with the Work Plan (USACE, 2016b). The recirculation system was not operated during Phase 4, except briefly during extraction well sampling.

An independent report summarizing all activities associated with the pilot test through the first Phase 4 sampling event was submitted on April 18, 2019 in accordance with the NMED letter dated February 25, 2019 (NMED, 2019).

6. INVESTIGATION-DERIVED WASTE

During Q1 2019, non-hazardous and hazardous investigation-derived waste (IDW) was generated. Non-hazardous IDW consisted of both liquid and solids that were sourced from GWM drilling operations. Liquid hazardous waste was generated from routine GWM operations and monitoring well construction activities.

In addition to the IDW generated specifically during Q1 2019, additional non-hazardous IDW generated during Q4 2019 was accumulated and managed during Q1 2019. This section discusses the details of waste generated and managed during the quarter.

6.1 Non-Hazardous Investigation-Derived Waste

Non-hazardous IDW liquids and solids comprised the majority of waste volume generated during the quarter. This waste was generated from both the quarterly GWM sampling event and drilling of monitoring wells during the quarter. Appendices J-1 and J-2 provide specific information regarding the non-hazardous liquid and solid IDW waste generated and disposed of during Q1 2019.

6.1.1 Groundwater Monitoring Liquid Waste

Non-hazardous, IDW purge water collected during sampling of the GWM wells was placed in 55-gallon plastic (poly) drums. The drums were sealed with matching plastic lids with steel, locking-ring collars, labeled with vinyl non-hazardous waste labels, and transferred to the designated non-hazardous IDW yard located on Kirtland AFB. Small volumes of IDW water, typically generated from the sampling of drinking water wells, were placed in labeled, 5-gallon plastic buckets with sealing lids.

Eligibility for discharge of non-hazardous liquid IDW to the GWTS was determined by comparing historical, well-specific data from the previous two quarters to the acceptance criteria of the GWTS. Liquid IDW from monitoring wells that had historically met the GWTS acceptance criteria was discharged to the facility without further review. Liquid IDW sourced from wells with historical data from the previous two quarters that exceeded the GWTS acceptance criteria was held for further evaluation.

For Q1 2019, a total of 850.5 gallons of non-hazardous GWM purge water and equipment decontamination water met the GWTS acceptance criteria and was processed through the GWTS. All IDW water processed through the GWTS was discharged to the Tijeras Arroyo GCMP (Table J-1-1).

Any liquid IDW that is collected, but not yet processed through the GWTS, is temporarily accumulated in the "Pending Disposal" area of the IDW yard. Typically, this category includes non-hazardous purge water collected during the quarter that meets GWTS acceptance criteria, but was held due to GWTS discharge limitations, operation and maintenance activities, or disposal approvals. By the end of Q1 2019, a total of 207.5 gallons of GWM water was being held in the "Pending Disposal" category (Table J-1-2a).

Any liquid IDW that is collected, but held pending receipt and evaluation of analytical data, is placed in the "Pending Analysis" area of the IDW yard. The only waste in this area at the end of Q1 2019 was one, 5-gallon pail of calibration fluid (Table J-1-2b) from GWM equipment.

6.1.2 Non-Hazardous Drilling Liquid Investigation-Derived Waste

During Q1 2019, the "Vadose Zone Source Area" drilling project was in progress. Liquid IDW was generated associated with well construction and development activities (Section 2.1). As of the end of March 2019, approximately 303 gallons of water in this category was generated and processed through the GWTS for disposal. Small volumes were collected from excess water removed from waste roll-off bins, and hydroknife activities for utility clearance prior to drilling (Table J-1-3a).

6.1.3 Non-Hazardous Well Drilling Liquid Investigation-Derived Waste Pending Disposal

Liquid waste generated from well drilling activities, that had not been disposed by the end of Q1 2019, was held at the non-hazardous IDW yard, including 7,870 gallons of water from drilling decontamination activities being held in a properly labeled Baker tank onsite. By the end of March 2019, a total of 8,220 gallons of non-hazardous liquid waste was being held at the IDW yard pending disposal (Table J-1-3b).

6.1.4 Non-Hazardous Well Drilling Solid Investigation-Derived Waste

Approximately 159 cubic yards of non-hazardous, non-liquid IDW was managed and disposed during Q1 2019. This IDW included soil waste (drill cuttings and mud) associated with the drilling of "Vadose Zone Source Area" coring and well installation (Section 2.1) projects. A total of 153 cubic yards of soil was disposed of at the Kirtland AFB construction and demolition landfill after receiving approval by the Kirtland Solid Waste Program Manager. Six yards of mud/sand was transported to the Twin Enviro landfill in Penrose, Colorado as this waste was too high in water content for the Kirtland construction and demolition landfill. Table J-2-1 (Appendix J-2) provides a list of all solid, non-hazardous IDW disposed of in Q1 2019.

Soil and mud waste generated from well drilling activities, that had not been disposed by the end of Q1 2019, was held at the non-hazardous IDW yard. Table J-2-2 provides a list of containers holding the 22 cubic yards of non-hazardous material at the IDW yard as of March 31, 2019.

Additional non-hazardous, routine, and disposable solid wastes were generated during GWM activities. These included single-use dual membrane samplers, disposable in-line filters, nitrile gloves, and paper trash. These items were disposed of as municipal solid waste and volumes were not tracked.

6.1.5 Special Waste Well Drilling Solid Investigation-Derived Waste

Special waste is defined as petroleum contaminated soil that has total petroleum hydrocarbons concentration greater than 100 mg/kg (Subparagraph [i] of Paragraph [13] of Subsection S of 20.9.2.7 New Mexico Administrative Code [2011]). Approximately 43 cubic yards of Special Waste was managed and disposed of during Q1 2019. This IDW included soil waste (drill cuttings and mud) associated with drilling of the "Vadose Zone Source Area" coring and well installation (Section 2.1) project. Special wastes cannot not be disposed of in the Kirtland AFB landfill and must be disposed of at a facility permitted to handle special wastes (Subsection A of 20.9.8.9 New Mexico Administrative Code [2007]). A total of approximately 43 cubic yards of special waste soil was disposed of at the Waste Management Landfill in Rio Rancho, New Mexico. Table J-2-3a (Appendix J-2) provides a list of all solid, Special Waste IDW disposed of in Q1 2019.

A total of five 55-gallon drums of special waste mud generated from the drilling decontamination pad had not been disposed of by the end of Q1 2019 and were held at the non-hazardous IDW yard. Table J-2-3b provides a list of containers holding the 250 gallons of this special waste material as of March 31, 2019.

6.2 Hazardous Investigation-Derived Waste

Hazardous or suspected hazardous IDW is accumulated in one of two RCRA less than 90-day accumulation areas associated with the Kirtland BFF Project. Hazardous waste generated from routine GWM sampling activities (purge water) is placed in the Kirtland AFB BFF RCRA less than 90-day accumulation area. Hazardous or suspected hazardous waste generated during the Vadose Zone Source Area drilling project are exclusively held in the Kirtland AFB Zia Park temporary RCRA less than 90-day accumulation area. The Zia Park area holds both liquids (borehole liquids and development water) and solids (drill cuttings) generated during coring and well construction activities.

Prior to the start of each quarterly GWM sampling event, a preliminary evaluation is made to identify monitoring wells that are anticipated to generate characteristically hazardous liquid IDW for initial waste segregation purposes. Based on historical analytical data available for each well, the water is suspected to be characteristically hazardous if the concentration of benzene exceeded 500 µg/L (per 40 CFR Part 261.24) in either of the previous two sampling events. Liquid IDW from these wells is managed as a potentially characteristically hazardous waste pending confirmation from laboratory analytical results. The hazardous waste classification code for benzene is D018.

All liquid hazardous waste (purge or well development water) is placed in 55-gallon steel drums with steel tops and locking rings (UN designation 1A2/Y1.2/100/**). All waste containers are properly labeled, sealed, and placed on secondary containment pallets located within the BFF less than 90-day accumulation area. The accumulation area and waste containers are inspected on a weekly basis by trained personnel as required under 40 CFR 262.34.

Solid hazardous wastes are held in 20-yard capacity roll-off bins. Bin doors are sealed with an expanding foam to minimize the potential of leaks and the bins are double lined with 10-millimeter plastic liners. Bins have either integrated hard cover tops with ratcheting straps or have removable, heavy-duty vinyl covers that are secured to the bin using heavy-duty rubber straps. In either case, the bin contents are protected from weather or access by local fauna. All bins are placed on secondary containment composed of plastic sheeting with rolled edges.

Upon receipt of analytical data, the IDW remains in the less than 90-day accumulation area if confirmed to be a hazardous waste. If the IDW is determined to not meet hazardous criteria based on analytical data, the non-hazardous waste is transferred to the "Pending Disposal" area of the non-hazardous IDW yard.

All hazardous waste must be removed from Kirtland AFB and properly disposed of off-Base within the required 90-day accumulation time limit. Hazardous waste is transported off Kirtland AFB after it is properly profiled, manifested, and approved for transport by the Kirtland AFB Hazardous Waste Management Group. Waste is transported by a licensed hazardous waste hauler to a permitted treatment, storage, and disposal facility.

When possible, liquid hazardous waste may be consolidated after analytical data have been received. This is typically done to combine small volumes of waste generated when using passive sampling methodologies as well as to reduce the total number of drums that require offsite disposal.

6.2.1 Hazardous Investigation-Derived Waste Volume Q1 2019

During Q1 2019, no hazardous purge water was generated from GWM activities; consequently, no GWM hazardous waste was accumulated in the BFF less than 90-day accumulation yard at the end of Q1 2019.

A total of 406 gallons of confirmed liquid hazardous waste was generated from well drilling activities and accumulated in the Zia Park less than 90-day accumulation area at the end of Q1 2019. This waste was transported off Kirtland AFB for disposal on February 11, 2019 (Table J-3-1).

A total of 300 gallons of hazardous waste was also held in the area at the end of March 31, 2019, pending disposal. The accumulated characteristically hazardous waste consists entirely of well development water collected from monitoring wells constructed under the Vadose Zone Source Area drilling project (Section 2.1 and Table J-3-2).

No solid hazardous waste was generated, accumulated, or disposed of during Q1 2019 from any BFF site activities.

7. PROJECTED ACTIVITIES

Q2 2019 will comprise the period between April 1 and June 30, 2019. Planned Q2 2019 activities are summarized below.

Vadose Zone Characterization and Monitoring

- Perform semiannual SVM in Q2 2019
- Complete baseline respirometry sampling for bioventing pilot test system
- Begin bioventing pilot respirometry test.

Groundwater Monitoring

- Perform and report on quarterly GWM in Q2 2019
- Report quarterly monitoring of USGS sentinel wells (by USGS)

Drinking Water Supply Well Monitoring

- Perform drinking water supply well monitoring monthly for organic compound analysis and inorganic analysis for the April sampling event for the 4 wells sampled

Groundwater Treatment System Operation

- Continue operating the GWTS and extraction wells KAFB-106228, KAFB-106233, KAFB-106234, and KAFB-106239
- Perform GWTS well disinfection as required
- Complete performance assessment of the GWTS extraction system.

Reporting

- Complete reporting for the *in situ* EDB biodegradation pilot study
- A quarterly report will be prepared to detail the activities conducted during the quarter and to summarize the activities and GWM data in Q2 2019.

8. REFERENCES

Anderholm, S.K., M.J. Radell, and S.F. Richey. 1995. *Water-quality Assessment of the Rio Grande Valley Study Unit, Colorado, New Mexico, and Texas – Analysis of Selected Nutrient, Suspended-sediment, and Pesticide Data.* U.S. Geological Survey. 167 p.

EPA. 2018. Regional Screening Levels Master Table. Available online at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables . November.

Langmuir, D. 1997. *Aqueous Environmental Geochemistry*. Prentice-Hall, Upper Saddle River, New Jersey. 600 p.

Longmire, D. 2016. *Application of PHREEQC for Evaluating Precipitation of Reactive Phases During Injection of Treated Effluent Water at Well KAFB-7, Kirtland Air Force Base, Albuquerque, New Mexico.* NMED. 9 p. February 2.

New Mexico Administrative Code. 2007. *State of New Mexico, Title 20.9.8 Special Waste Requirements*.

New Mexico Administrative Code. 2011. *State of New Mexico, Title 20.9.2 Solid Waste Management General Requirements*.

New Mexico Administrative Code. 2018. *State of New Mexico, Title 20.6.2 Ground and Surface Water Protection*.

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

NMED. 2016. Correspondence from Kathryn Roberts, Director, Resource Protection Division to Colonel Eric. H. Froehlich, Base Commander, Kirtland AFB, New Mexico, and Mr. John Pike, Director, Environmental Management Division, 377 MSG, Kirtland AFB, New Mexico, regarding Operation and Maintenance Plan, Groundwater Treatment System, Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, EPA ID No. NM9570024423, HWB-KAFB-13-MISC. December 12.

NMED. 2017a. Correspondence from Mr. Juan Carlos Borrego, Deputy Secretary Environment Department, to Colonel Richard W. Gibbs, Base Commander, 377 ABW/CC, Kirtland AFB, New Mexico and Mr. Chris Segura, Chief, Installation Support Section, AFCEC/CZOW, Kirtland AFB, New Mexico, re: Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling, Revision 2, Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, New Mexico, EPA ID No. NM9570024423, HWB-KAFB-13-MISC. February 23.

NMED. 2017b. Correspondence from Kathryn Roberts, Director, Resource Protection Division to Colonel Eric. H. Froehlich, Base Commander, Kirtland AFB, New Mexico, and Lieutenant Colonel Wayne J. Acosta, Civil Engineer Office, Kirtland AFB, New Mexico, 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 No. NM9570024423, HWB-KAFB-13-MISC. January 4.

NMED. 2017c. Correspondence from Juan Carlos Borrego, Deputy Secretary, Environment Department to Colonel Eric H. Froehlich, Base Commander, Kirtland AFB, New Mexico, and Lieutenant Colonel Wayne J. Acosta, Civil Engineer Office, Kirtland AFB, New Mexico, regarding the Work Plan for Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design Revision 2, Bulk Fuels Facility Solid Waste Management Unit ST-106/SS-111, Kirtland Air Force Base, EPA ID No. NM9570024423, HWB-KAFB-13-MISC. May 31.

NMED. 2017d. Discharge Permit Issuance DP-1839, Kirtland Air Force Base, Bernalillo County, New Mexico, by the New Mexico Environment Department Groundwater Quality Bureau. April.

NMED. 2018a. Personal Communication (email) from Mr. Dennis McQuillan, Chief Scientist, Office of the Secretary, New Mexico Environment Department to Ms. Kate Lynnes, HQE, Senior Advisor Bulk Fuels Facility Project, Kirtland AFB, New Mexico (and others) *re*: *Approval of Coring Recommendations.* December 17.

NMED. 2018b. Correspondence from Ms. Michelle Hunter, Chief, Ground Water Quality Bureau, New Mexico Environment Department to Colonel Dawn A. Nickell, Base Vice Commander, 377 AB/CC, Kirtland AFB, NM *re: Conditional Approval of Standard Operating Procedure for Disinfection of the Groundwater Treatment System Remediation Wells and Groundwater Monitoring Wells, DP-1839, Bulk Fuels Facility*, Solid Waste Management Unit ST-106/SS-11, Kirtland Air Force Base. August 6.

NMED. 2018c. Personal Communication (email) from Mr. Andrew Romero, Environmental Scientist, Ground Water Quality Bureau, New Mexico Environment Department to Ms. Kate Lynnes, HQE, Senior Advisor Bulk Fuels Facility Project, Kirtland AFB, New Mexico *re*: *Approval of Proposed Analytical Methods, DP-1839.* November 16.

NMED. 2018d Correspondence from Mr. Juan Carlos Borrego, Deputy Secretary, Environment Department, to Colonel Richard W. Gibbs, Base Commander, 377 AB/CC, Kirtland AFB, NM and Mr. Chris Segura, Chief, Installation Support Section, AFCEC/CZOW, Kirtland AFB, NM, *re: Phase 3 Ethylene Dibromide In Situ Biodegradation Pilot Test, Notification letter, Bulk Fuels Facility, Solid Waste Management Unit ST-106/SS-11, Kirtland Air Force Base,* EPA ID# NM9570024423, HWB-KAFB-13-MISC. August 7.

NMED. 2019. Correspondence from Mr. John Kieling, Bureau Chief to Colonel Richard W. Gibbs, Base Commander, 377 AB/CC, Kirtland AFB, NM and Mr. Chris Segura, Chief, Installation Support Section, AFCEC/CZOW, Kirtland AFB, NM, *re: Bulk Fuels Facility Spill, Solid Waste Management Unit ST-106/SS-11, Kirtland Air Force Base,* EPA ID# NM9570024423, HWB-KAFB-19-MISC. February 25.

Plummer, L.N., J.K. Bohlke, and M.W. Doughten. 2006. *Perchlorate in Pleistocene and Holocene Groundwater in North-Central New Mexico.* Environmental Science and Technology Vol. 40, pp. 1757-1763. February.

USACE. 2016a. *Operations and Maintenance Plan, Groundwater Treatment System, Bulk Fuels Facility, SWMU ST-106/SS-111, Kirtland Air Force Base, New Mexico.* Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. August.

USACE. 2016b. *Ethylene Dibromide In Situ Biodegradation Pilot Test Work Plan*. Prepared by CB&I Federal Services for the USACE Omaha District under USACE Contract No. W9128F-12-D-0003. December 22.

USACE. 2017a. *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. January 31.

USACE. 2017b. *Work Plan for Vadose Zone Coring, Vapor Monitoring, and Water Supply Sampling Revision 1, Bulk Fuels Facility, Solid Waste Management Unit ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for U.S. Army Corps of Engineers–Albuquerque District under Contract W9128F-13-D-0006. December.

USACE. 2017c. *Work Plan for Bulk Fuels Facility Expansion of the Dissolved-Phase Plume Groundwater Treatment System Design Revision 2, Solid Waste Management Unit ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. January.

USACE. 2017d. *Operations and Maintenance Plan, Groundwater Treatment System, Bulk Fuels Facility, SWMU ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision 1*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. September.

USACE. 2017e. *Quarterly Monitoring Report October-December 2016 and Annual Report for 2016, 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. W912DR-12-D-0006. March 30.

USACE. 2017f. *Quarterly Monitoring Report April-June 2017, 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. W912DR-12-D-0006. September.

USACE. 2018a. *Operations and Maintenance Plan, Groundwater Treatment System, Bulk Fuels Facility, SWMU ST-106/SS-111, Kirtland Air Force Base, New Mexico, Revision 2*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. June.

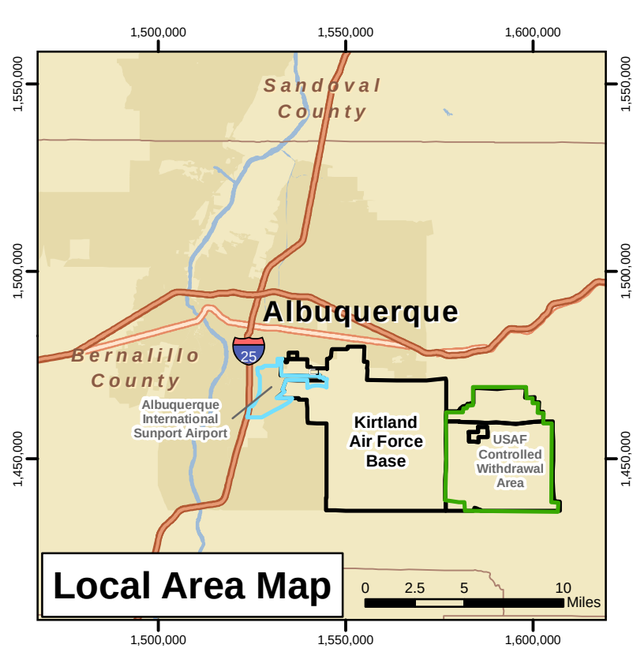
USACE. 2018b. *Quarterly Monitoring Report April-June 2018, Bulk Fuels Facility, SWMU ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. September.

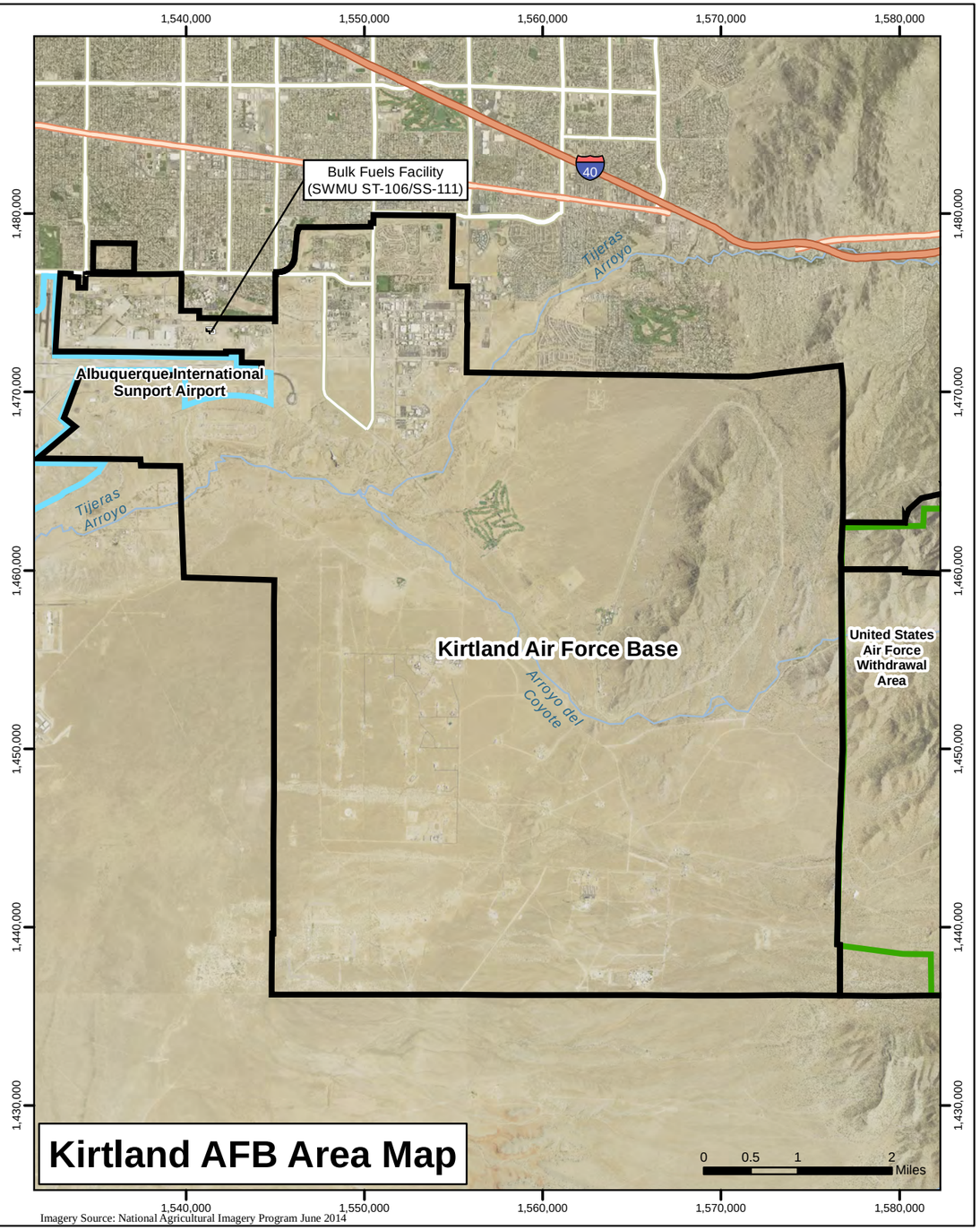
USACE. 2018c. *Quarterly Monitoring Report October-December 2017 and Annual Report for 2017, Bulk Fuels Facility, SWMU ST-106/SS-111*. Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. March 31.

USACE. 2018d. *Standard Operating Procedure for Disinfection of the Groundwater Treatment System Remediation Wells and Groundwater Monitoring Wells, DP-1839, Bulk Fuels Facility, SWMU ST-106/SS-111, Kirtland Air Force Base, New Mexico*, Prepared by EA Engineering, Science, and Technology, Inc., PBC for the USACE–Albuquerque District under USACE Contract No. W912DR-12-D-0006. April.

USACE. 2019. *Quarterly Monitoring Report October-December 2018 and Annual Report for 2018, 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. W912DR-12-0006. March.

FIGURES





Imagery Source: National Agricultural Imagery Program June 2014

Legend

- Kirtland Air Force Base Installation Boundary
- Albuquerque International Sunport Airport
- United States Air Force Withdrawal Area
- Major Highways
- Highways
- Major Roads
- Rivers
- Source Area

N

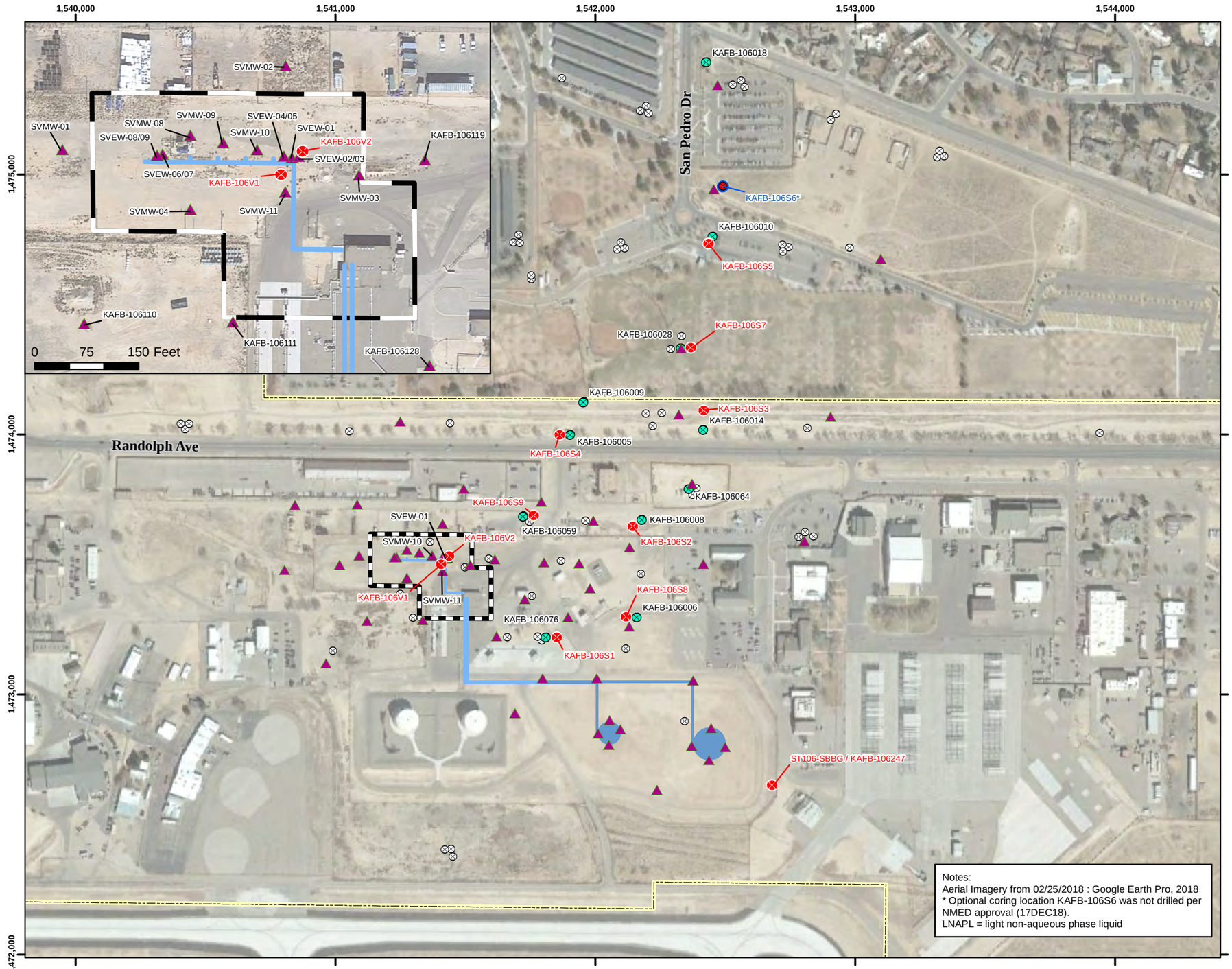
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 1-1

SITE LOCATION MAP

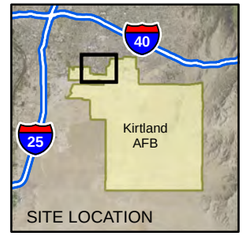
P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 1\1-1 SiteLocMap.mxd 2/12/2019 EA sbusby



Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
* Optional coring location KAFB-106S6 was not drilled per NMED approval (17DEC18).
LNAPL = light non-aqueous phase liquid

Legend

- Vadose Zone Continuous Core Location
- Optional Continuous Core Location not Drilled
- Existing Soil Vapor Well
- Monitoring Well with Historical LNAPL Observation
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area



N

0 200 400 800

Feet

1 inch = 400 feet

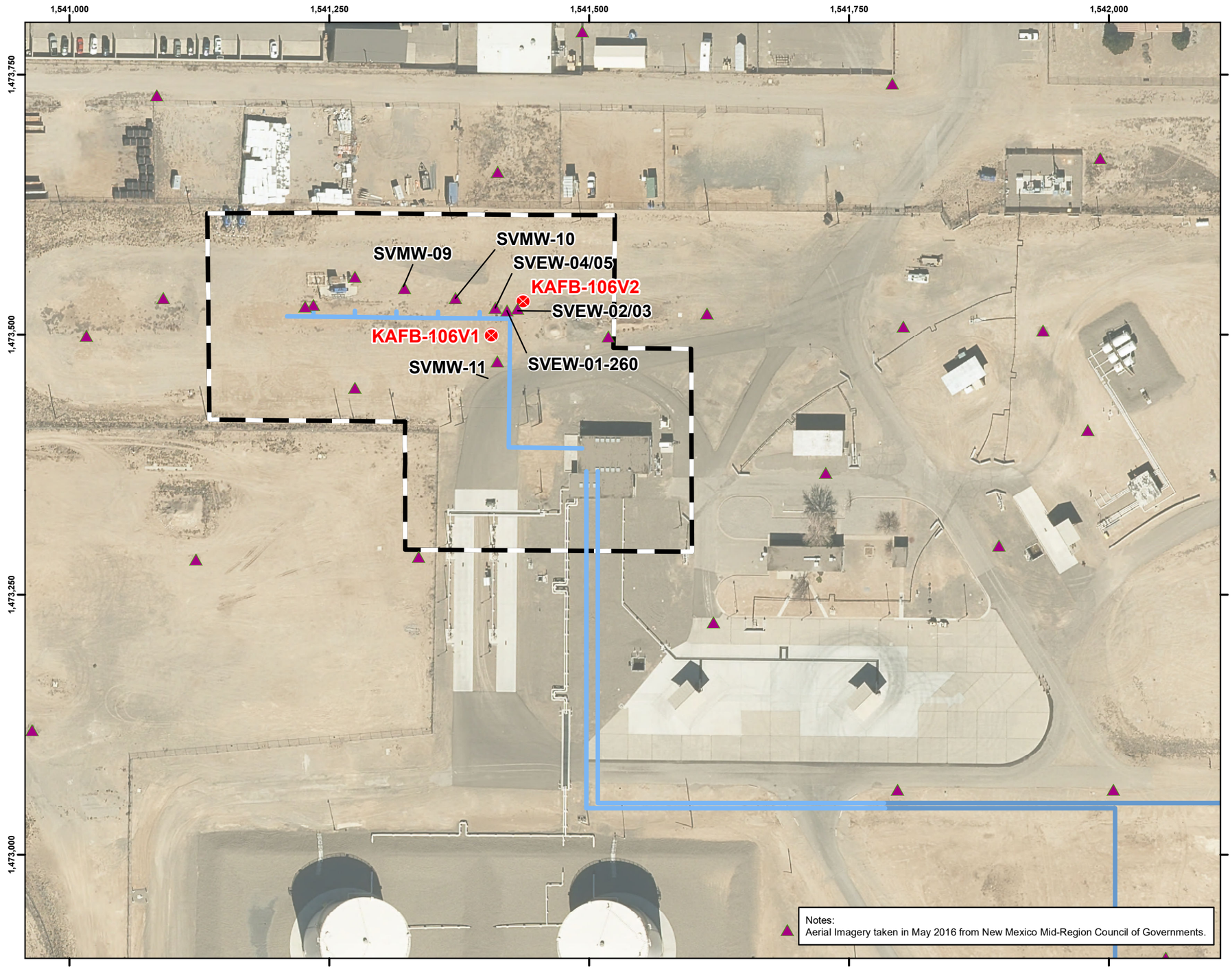
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 2-1

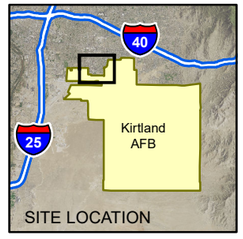
VADOSE ZONE CONTINUOUS CORING LOCATIONS

P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 2\2-1 Vadose Zone Continuous Coring Locations.mxd 4/11/2019 EA eomalia



Legend

- Existing Soil Vapor Well
- Proposed Biovent Observation
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Bulk Fuels Facility (SWMU ST-106/SS-111)



N

0 50 100 200

Feet

1 inch = 100 feet

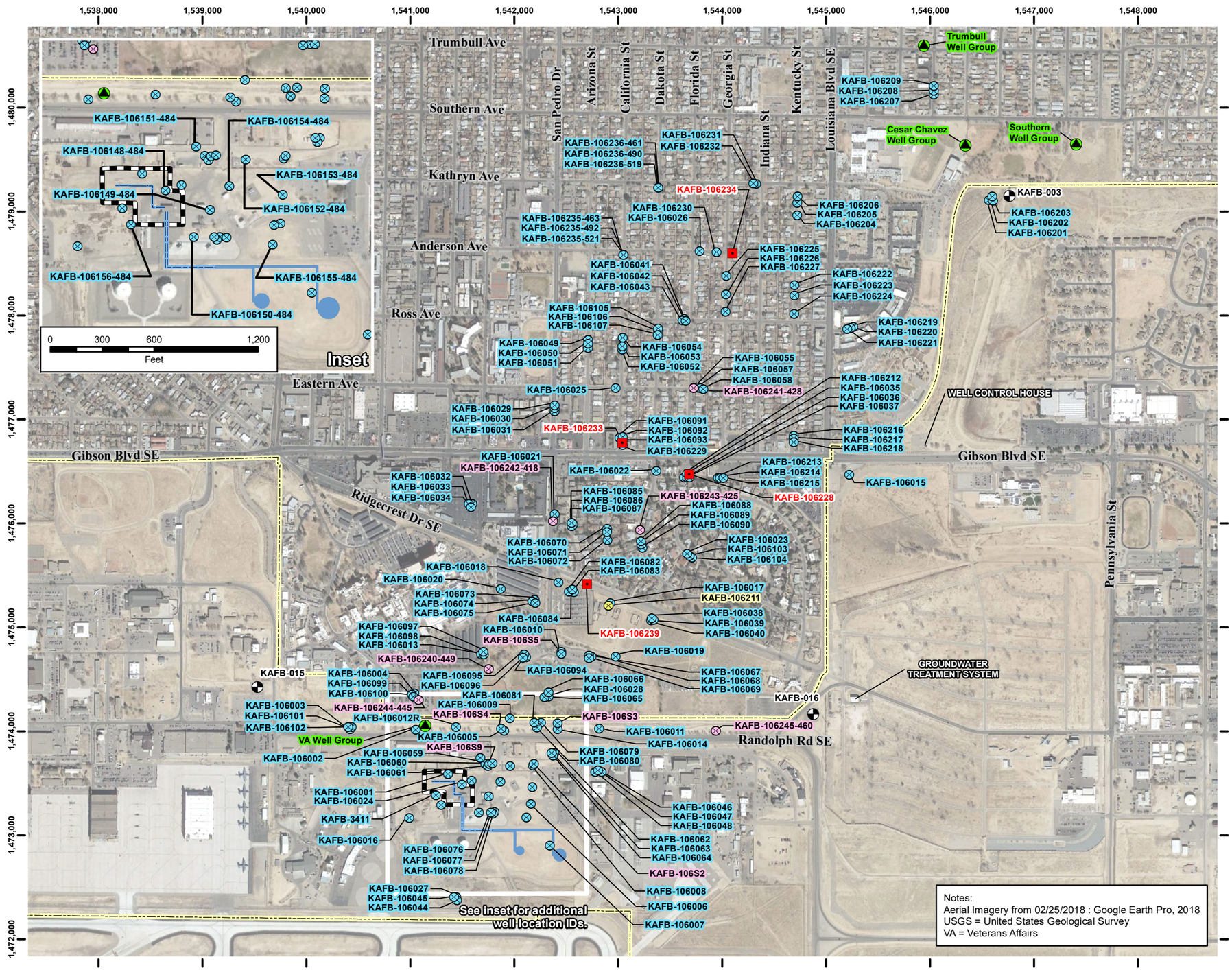
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 2-2

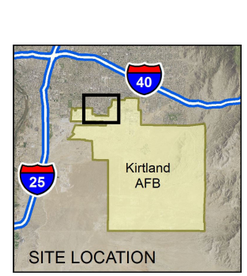
BIOVENTING PILOT TEST AREA

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 2\2-2 Bioventing Pilot Test Area.mxd 5/3/2019 EA ecarpio



Legend

- Groundwater Monitoring Well
- Newly Added Monitoring Well
- Monitoring Well (pending water table rise)
- Extraction Well
- USGS Monitored Sentinel Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

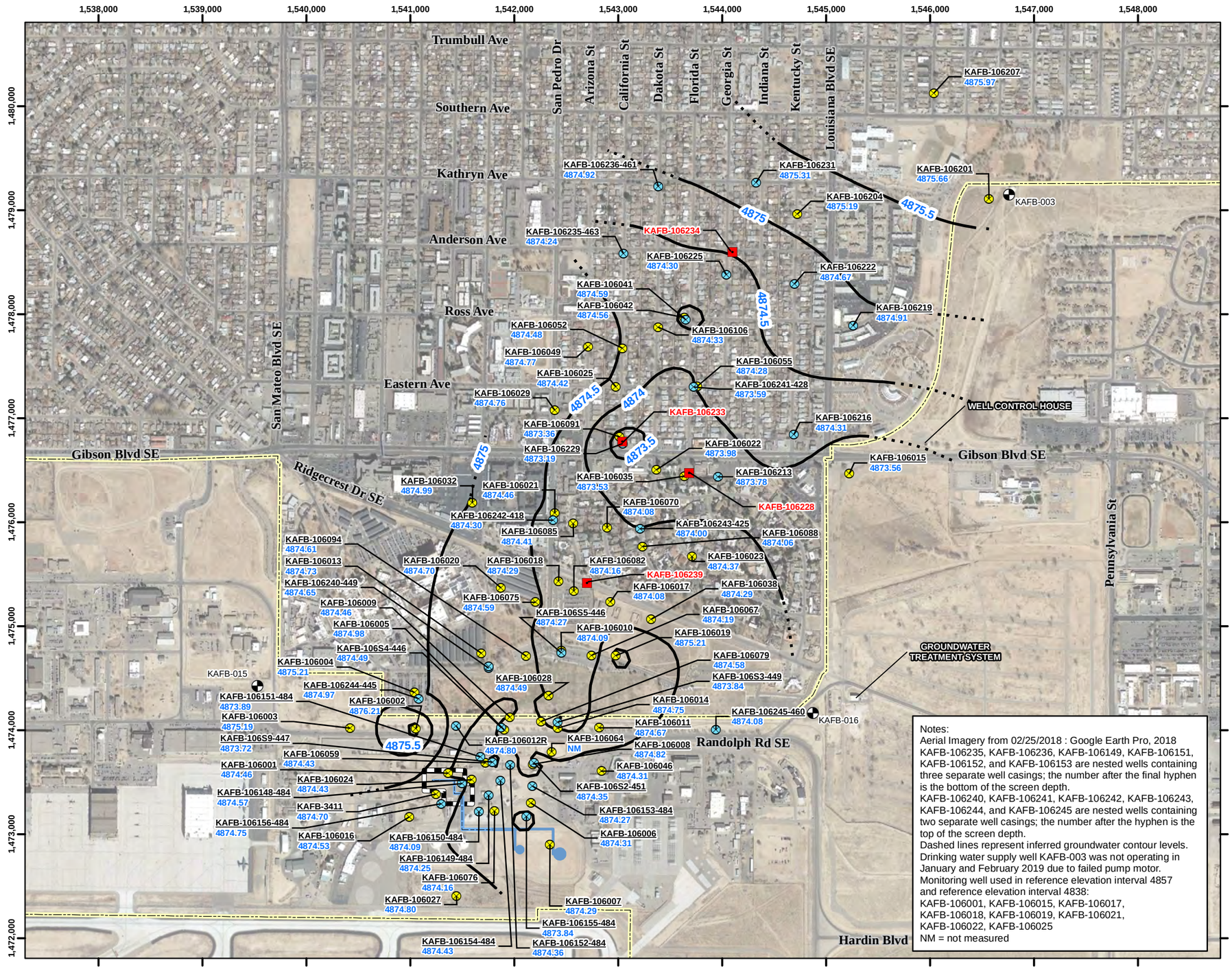
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-1

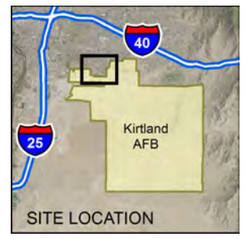
GROUNDWATER MONITORING NETWORK, DRINKING WATER SUPPLY WELL, AND EXTRACTION WELL LOCATIONS

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-1 Well Map.mxd 6/4/2019 EA ecarpio



Legend

- Reference Elevation Interval 4857 Monitoring Well (Screen Not Submerged)
- Reference Elevation Interval 4857 Monitoring Well (Screen Submerged)
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Groundwater Level Contour (ft AMSL)
- Inferred Groundwater Level Contour (ft AMSL)
- Source Area



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

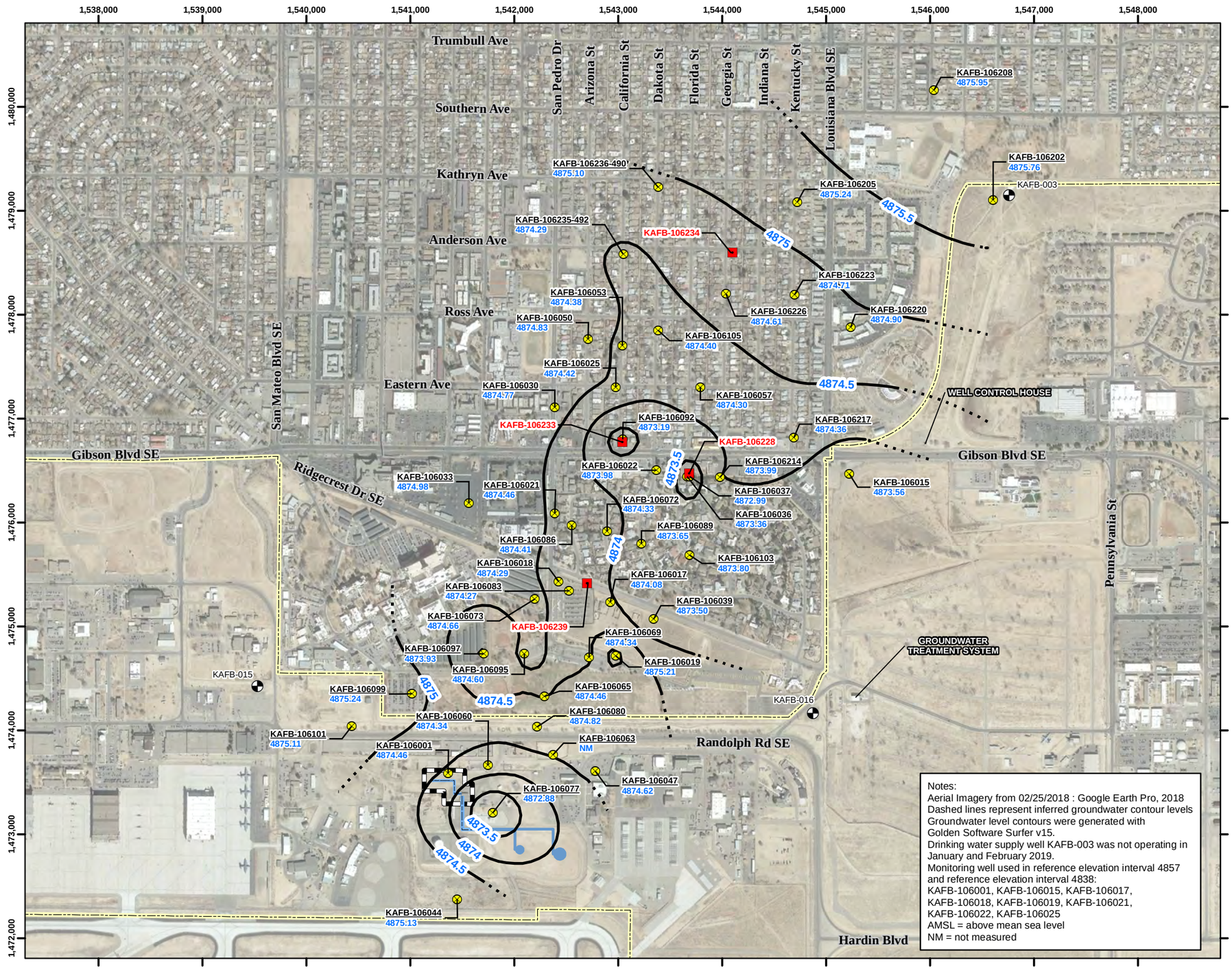
Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
KAFB-106235, KAFB-106236, KAFB-106149, KAFB-106151, KAFB-106152, and KAFB-106153 are nested wells containing three separate well casings; the number after the final hyphen is the bottom of the screen depth.
KAFB-106240, KAFB-106241, KAFB-106242, KAFB-106243, KAFB-106244, and KAFB-106245 are nested wells containing two separate well casings; the number after the hyphen is the top of the screen depth.
Dashed lines represent inferred groundwater contour levels.
Drinking water supply well KAFB-003 was not operating in January and February 2019 due to failed pump motor.
Monitoring well used in reference elevation interval 4857 and reference elevation interval 4838:
KAFB-106001, KAFB-106015, KAFB-106017, KAFB-106018, KAFB-106019, KAFB-106021, KAFB-106022, KAFB-106025
NM = not measured

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-2

POTENTIOMETRIC SURFACE MAP OF REFERENCE ELEVATION INTERVAL 4857, FEBRUARY 4-8, 2019

P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-2 Interval 4857 PotentiometricSurface.mxd 4/12/2019 EA eomalia



Legend

- Reference Elevation Interval 4838 Monitoring Well (Screen Submerged)
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Groundwater Level Contour (ft AMSL)
- Inferred Groundwater Level Contour (ft AMSL)
- Source Area

N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

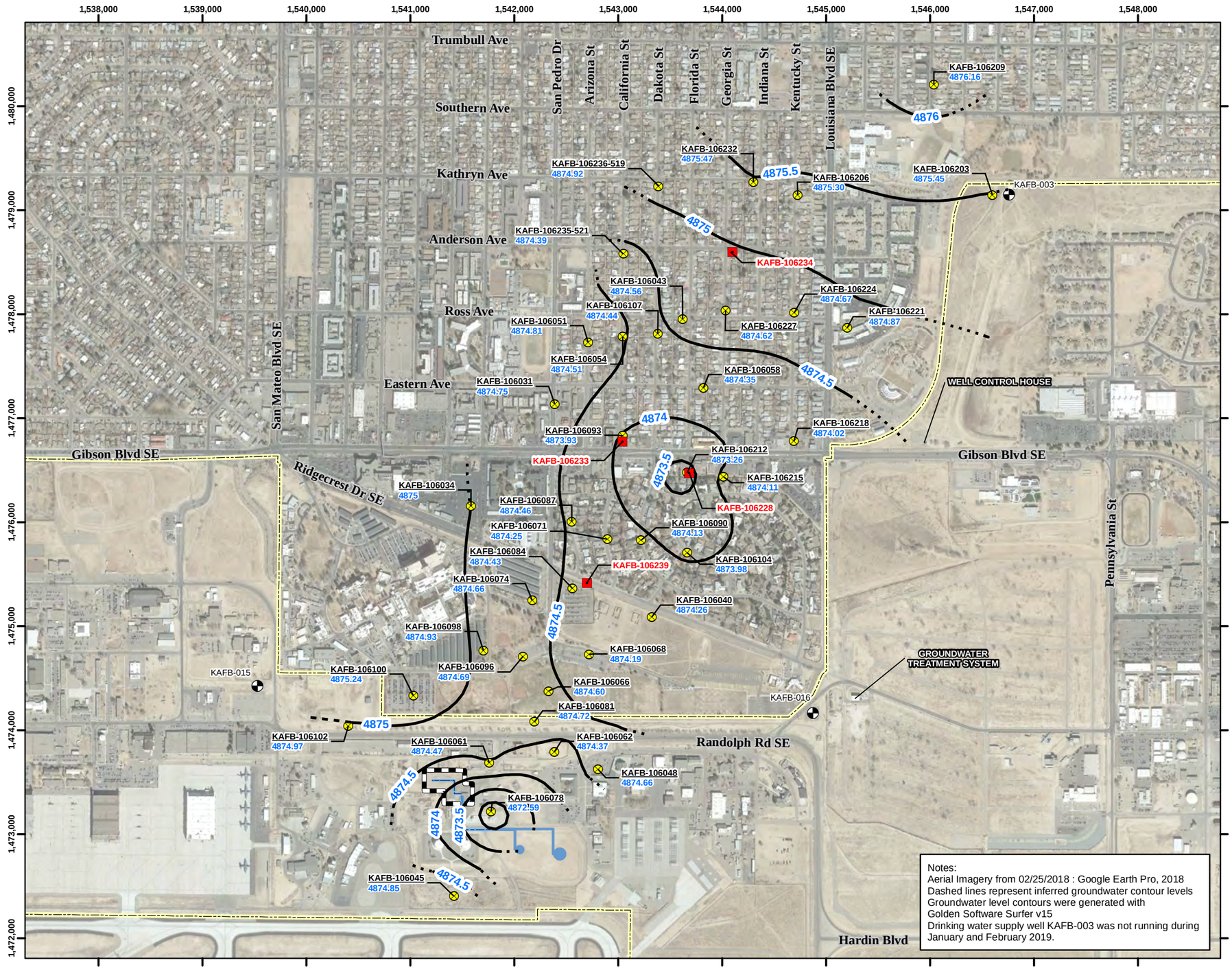
Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Dashed lines represent inferred groundwater contour levels
Groundwater level contours were generated with Golden Software Surfer v15.
Drinking water supply well KAFB-003 was not operating in January and February 2019.
Monitoring well used in reference elevation interval 4857 and reference elevation interval 4838:
KAFB-106001, KAFB-106015, KAFB-106017, KAFB-106018, KAFB-106019, KAFB-106021, KAFB-106022, KAFB-106025
AMSL = above mean sea level
NM = not measured

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-3

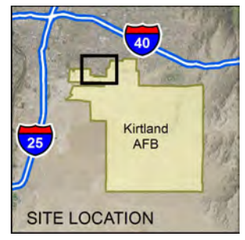
POTENTIOMETRIC SURFACE MAP OF REFERENCE ELEVATION INTERVAL 4838, FEBRUARY 4-8, 2019

Y:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-3 Interval 4838 PotentiometricSurface.mxd 4/12/2019 EA krobinson



Legend

- Reference Elevation Interval 4814 Monitoring Well (Screen Submerged)
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Groundwater Level Contour (ft AMSL)
- Inferred Groundwater Level Contour (ft AMSL)
- Source Area



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

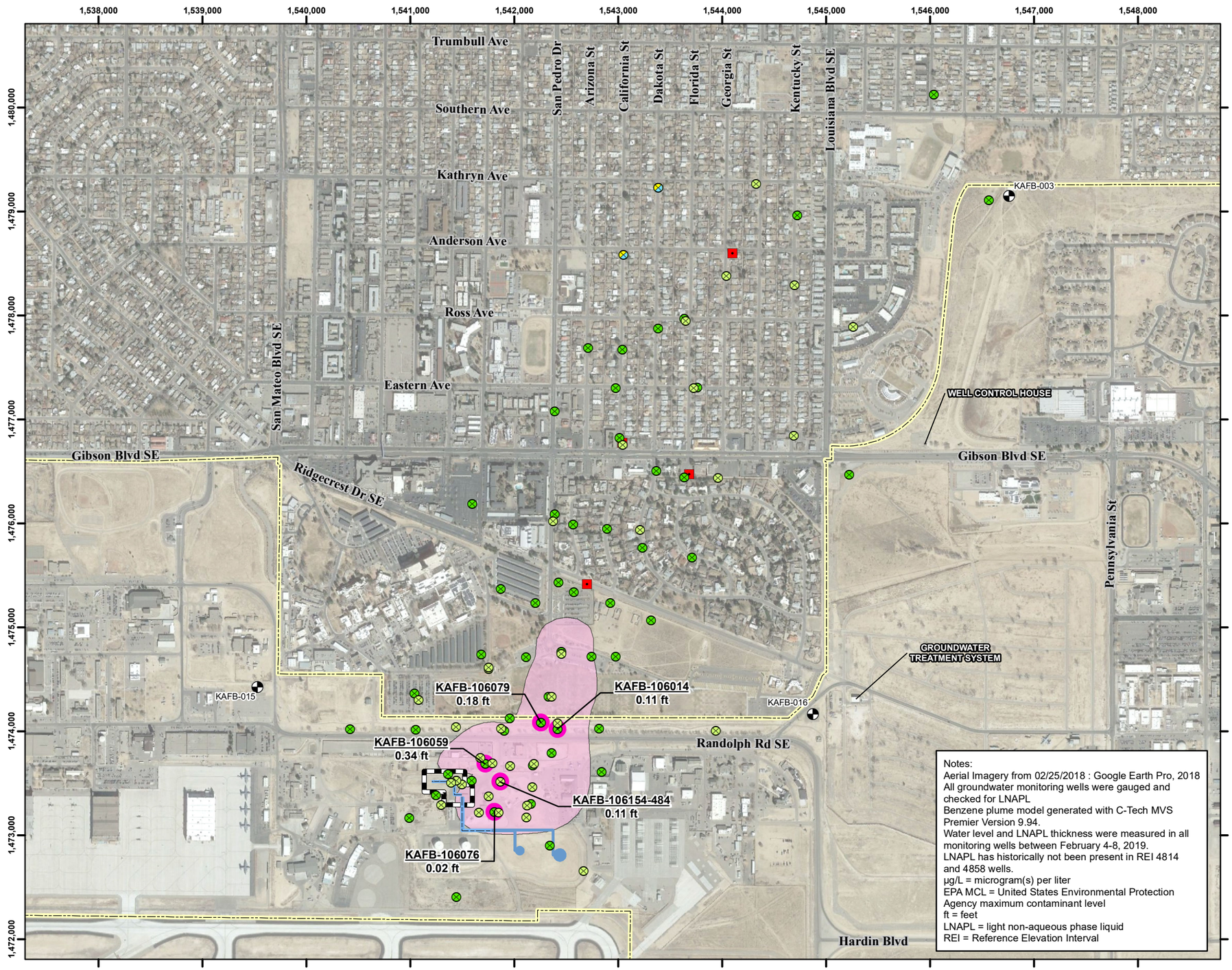
Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Dashed lines represent inferred groundwater contour levels
Groundwater level contours were generated with
Golden Software Surfer v15
Drinking water supply well KAFB-003 was not running during January and February 2019.

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-4

POTENTIOMETRIC SURFACE MAP OF REFERENCE ELEVATION INTERVAL 4814, FEBRUARY 4-8, 2019

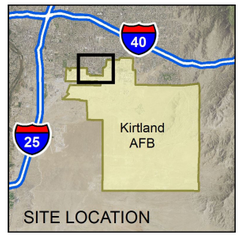
P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-4 Interval 4814 PotentiometricSurface.mxd 4/12/2019 EA eomalia



Legend

- REI 4857 Groundwater Monitoring Wells with top of screen unsubmerged
- REI 4857 and REI 4857/4838 Groundwater Monitoring Wells with fully submerged screens
- Nested Groundwater Monitoring Well
- Extraction Well
- Monitoring Well with Confirmed
- Drinking Water Supply Well
- Former Aboveground Storage
- Former Buried Fuel Transfer
- Former Aboveground Fuel Transfer
- Installation Fence Boundary
- Benzene Plume, Q4 2018 ≥5 µg/L (EPA
- Source

Well Location ID
LNAPL Thickness (ft)



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

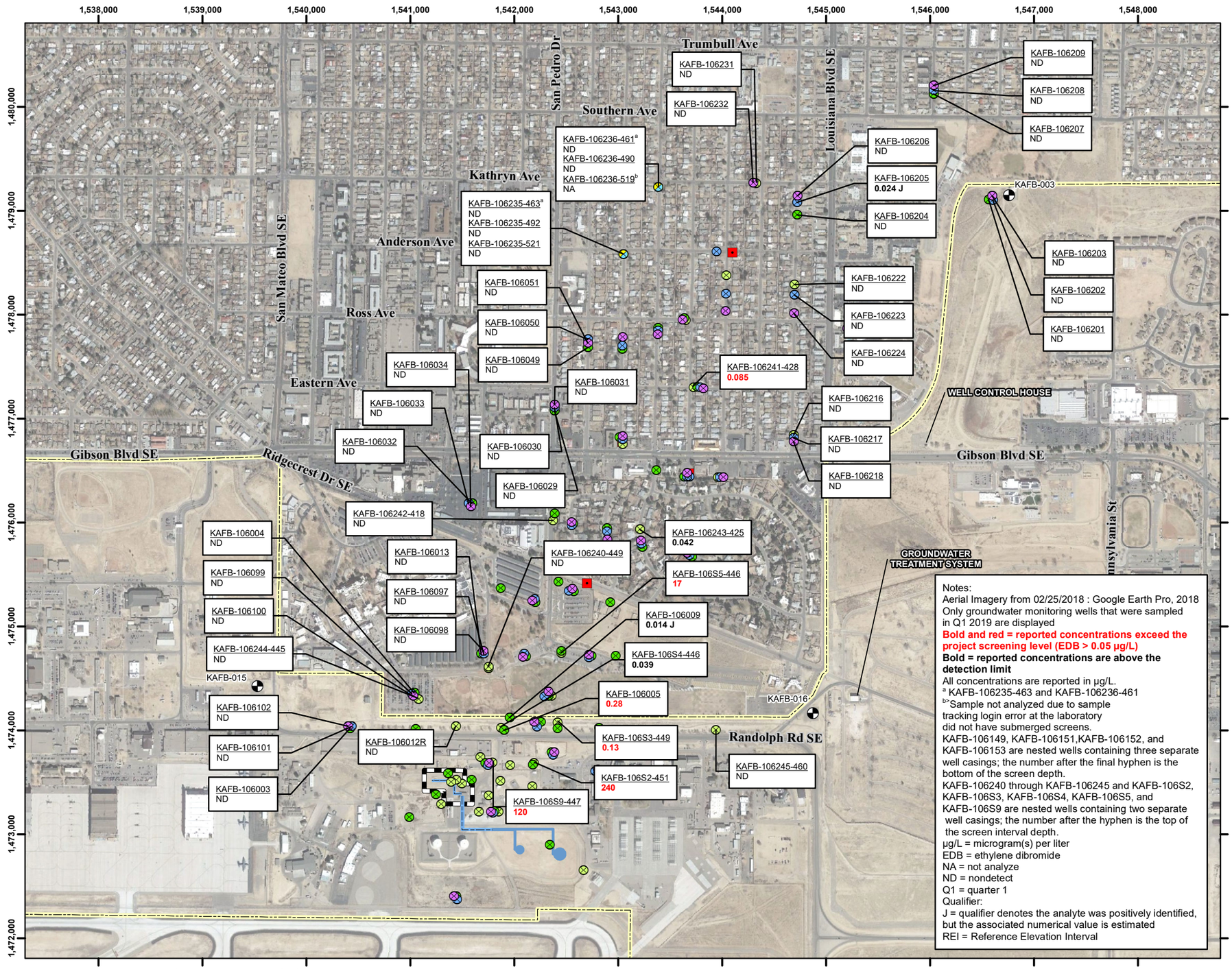
Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
All groundwater monitoring wells were gauged and checked for LNAPL
Benzene plume model generated with C-Tech MVS Premier Version 9.94.
Water level and LNAPL thickness were measured in all monitoring wells between February 4-8, 2019.
LNAPL has historically not been present in REI 4814 and 4858 wells.
µg/L = microgram(s) per liter
EPA MCL = United States Environmental Protection Agency maximum contaminant level
ft = feet
LNAPL = light non-aqueous phase liquid
REI = Reference Elevation Interval

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-5

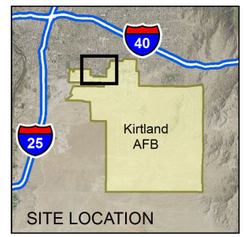
GROUNDWATER MONITORING WELLS WITH MEASURABLE LNAPL IN REFERENCE ELEVATION INTERVAL 4857
FEBRUARY 4-8, 2019

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-5 GWM with Measurable LNAPL.mxd 6/4/2019 EA ecarpio



Legend

- REI 4857 Groundwater Monitoring Wells with top of screen unsubmerged
- REI 4857 and REI 4857/4838 Groundwater Monitoring Wells with fully submerged screens
- REI 4838 Groundwater Monitoring Wells
- REI 4814 Groundwater Monitoring Wells
- Nested Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer
- Installation Fence Boundary
- Source Area



Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Only groundwater monitoring wells that were sampled in Q1 2019 are displayed
Bold and red = reported concentrations exceed the project screening level (EDB > 0.05 µg/L)
Bold = reported concentrations are above the detection limit
All concentrations are reported in µg/L.
[a] KAFB-106235-463 and KAFB-106236-461
[b]>Sample not analyzed due to sample tracking login error at the laboratory did not have submerged screens.
KAFB-106149, KAFB-106151,KAFB-106152, and KAFB-106153 are nested wells containing three separate well casings; the number after the final hyphen is the bottom of the screen depth.
KAFB-106240 through KAFB-106245 and KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9 are nested wells containing two separate well casings; the number after the hyphen is the top of the screen interval depth.
µg/L = microgram(s) per liter
EDB = ethylene dibromide
NA = not analyze
ND = nondetect
Q1 = quarter 1
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated
REI = Reference Elevation Interval

N

0 500 1,000 2,000
Feet
1 inch = 1,000 feet

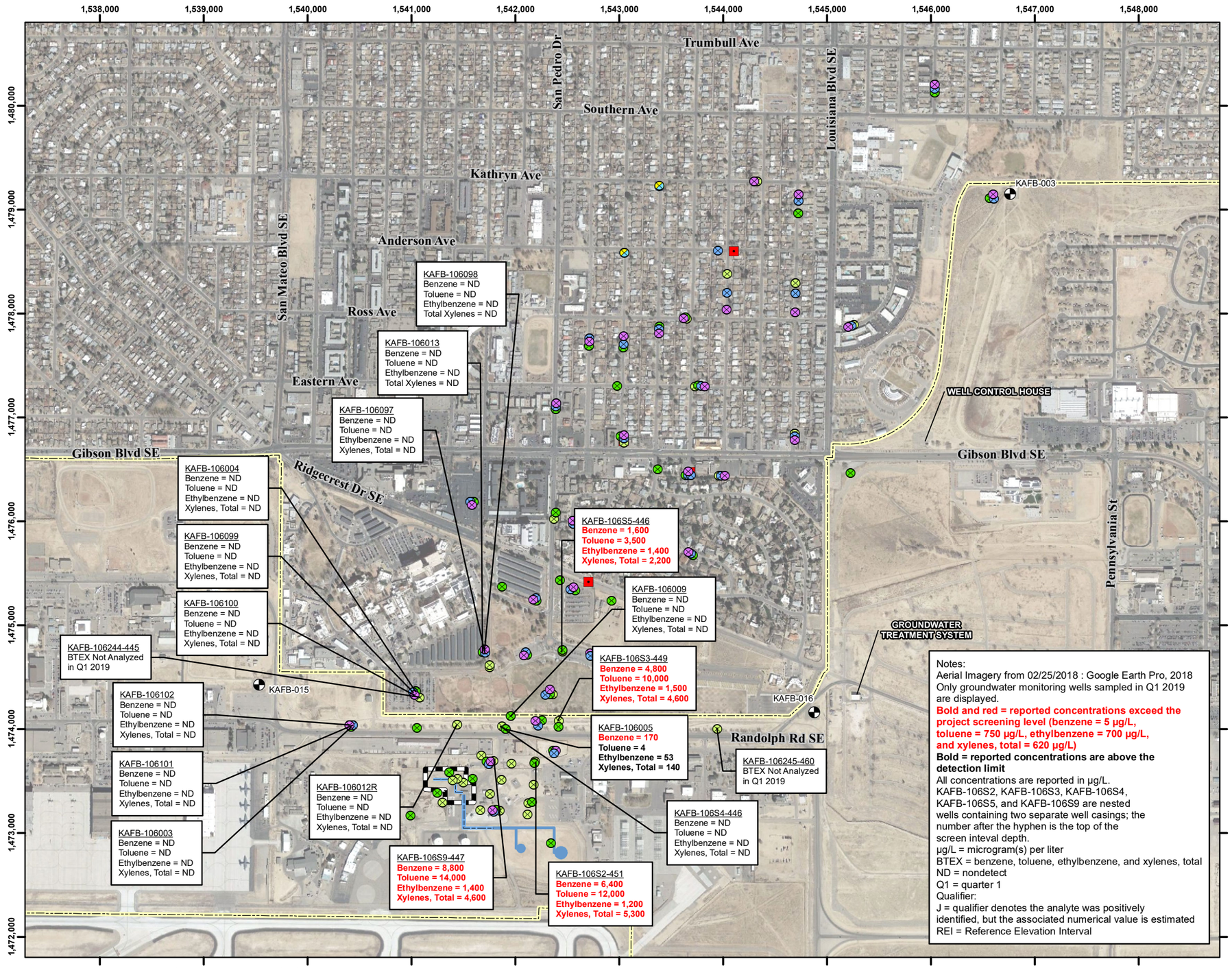
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY -MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-6

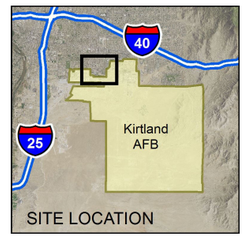
EDB CONCENTRATIONS, Q1 2019

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-6 EDB.mxd 6/4/2019 EA ecarpio



Legend

- REI 4857 Groundwater Monitoring Wells with top of screen unsubmerged
- REI 4857 and REI 4857/4838 Groundwater Monitoring Wells with fully submerged screens
- REI 4838 Groundwater Monitoring Wells
- REI 4814 Groundwater Monitoring Wells
- Nested Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area



Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Only groundwater monitoring wells sampled in Q1 2019 are displayed.
Bold and red = reported concentrations exceed the project screening level (benzene = 5 µg/L, toluene = 750 µg/L, ethylbenzene = 700 µg/L, and xylenes, total = 620 µg/L)
Bold = reported concentrations are above the detection limit
All concentrations are reported in µg/L.
KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9 are nested wells containing two separate well casings; the number after the hyphen is the top of the screen inteval depth.
µg/L = microgram(s) per liter
BTEX = benzene, toluene, ethylbenzene, and xylenes, total
ND = nondetect
Q1 = quarter 1
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated
REI = Reference Elevation Interval

N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

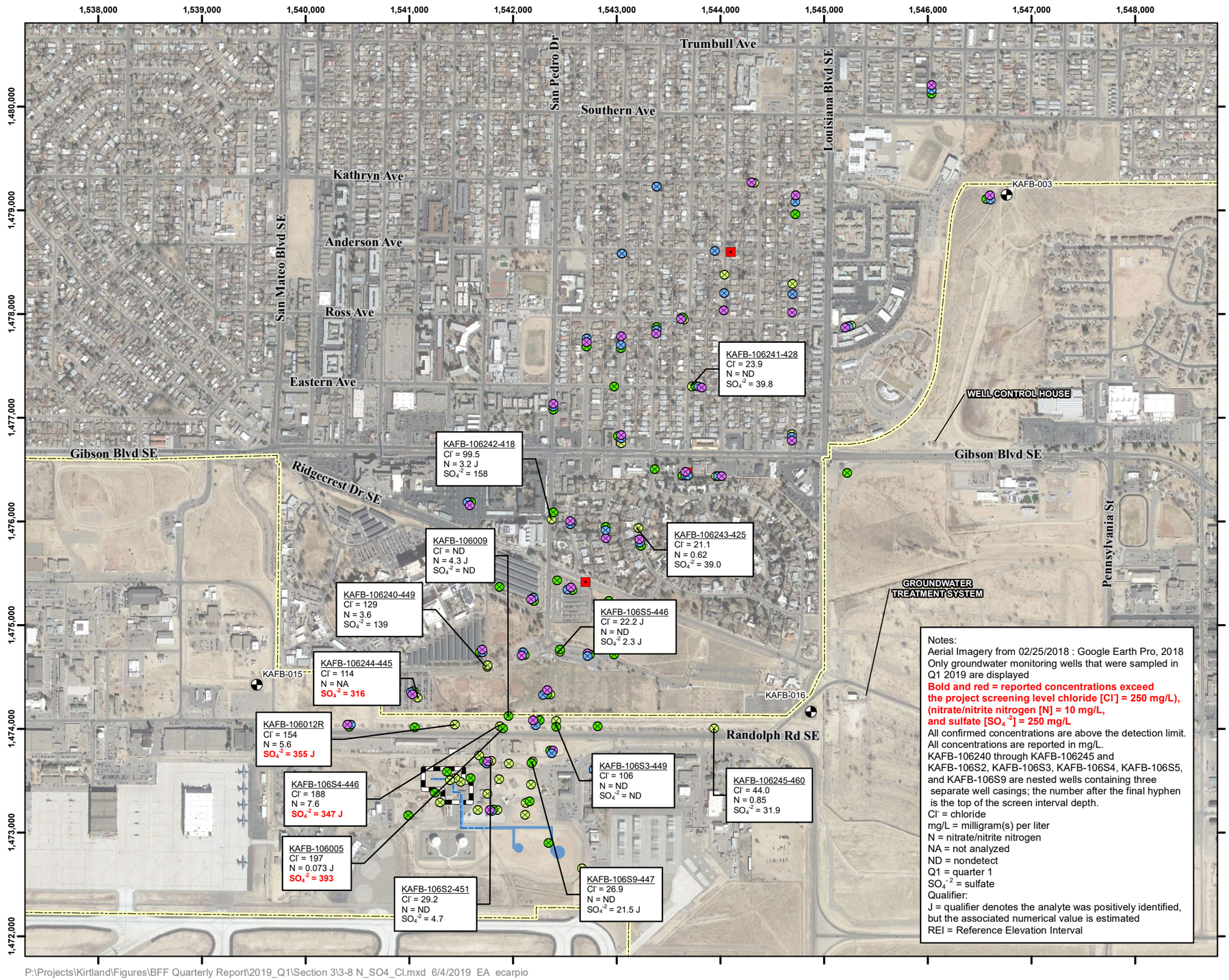
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-7

BTEX CONCENTRATIONS, Q1 2019

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-7 BTEX.mxd 6/4/2019 EA ecarpio



Legend

- REI 4857 Groundwater Monitoring Wells with top of screen unsubmerged
- REI 4857 and REI 4857/4838 Groundwater Monitoring Wells with fully submerged screens
- REI 4838 Groundwater Monitoring Wells
- REI 4814 Groundwater Monitoring Wells
- Nested Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer
- Installation Fence Boundary
- Source Area

Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Only groundwater monitoring wells that were sampled in Q1 2019 are displayed
Bold and red = reported concentrations exceed the project screening level chloride [Cl^-] = 250 mg/L), (nitrate/nitrite nitrogen [N] = 10 mg/L, and sulfate [SO_4^{-2}] = 250 mg/L
All confirmed concentrations are above the detection limit.
All concentrations are reported in mg/L.
KAFB-106240 through KAFB-106245 and KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9 are nested wells containing three separate well casings; the number after the final hyphen is the top of the screen interval depth.
Cl^- = chloride
mg/L = milligram(s) per liter
N = nitrate/nitrite nitrogen
NA = not analyzed
ND = nondetect
Q1 = quarter 1
SO_4^{-2} = sulfate
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated
REI = Reference Elevation Interval

N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

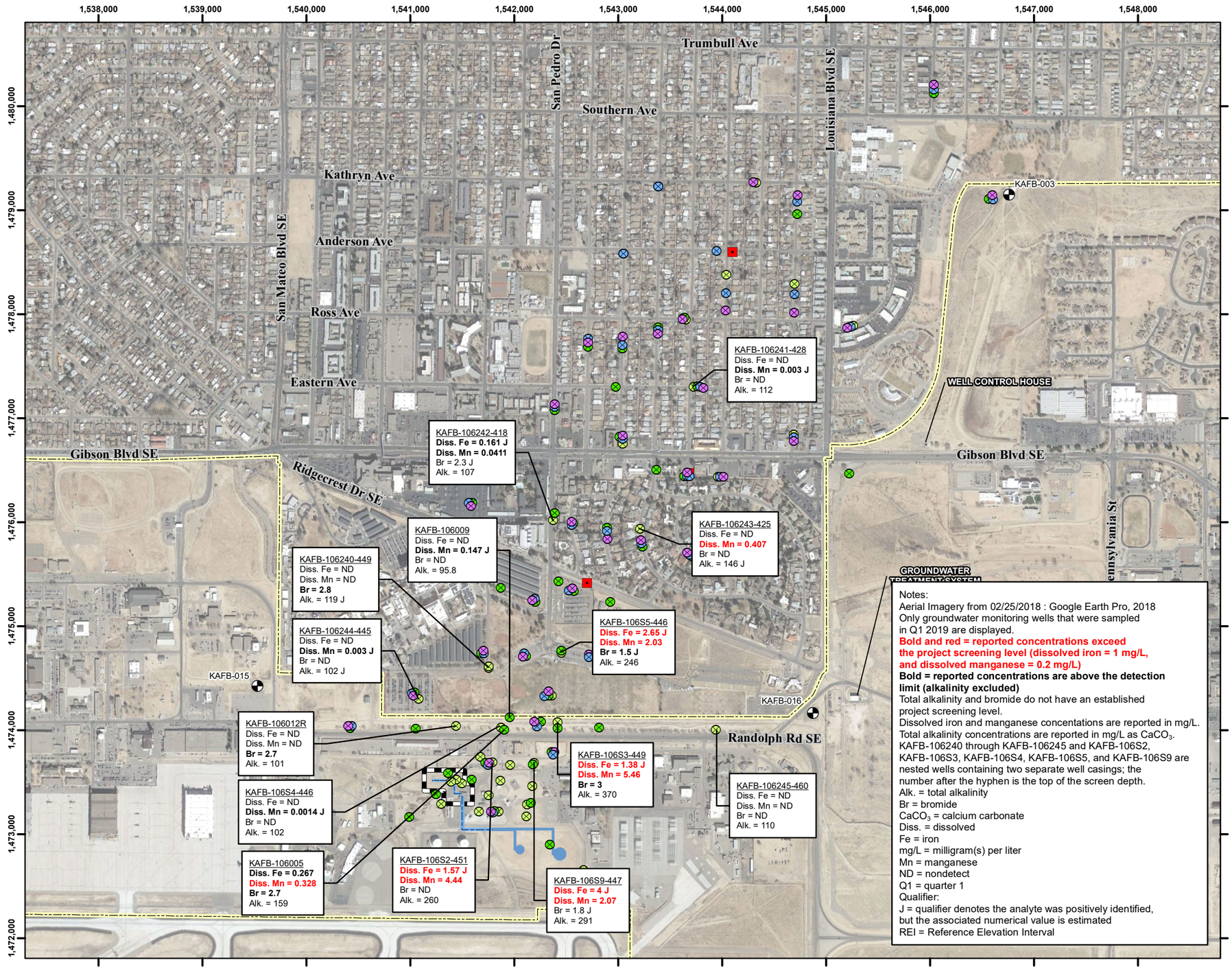
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
APRIL - JUNE 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-8

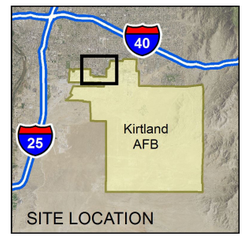
NITRATE/NITRITE NITROGEN, CHLORIDE, AND SULFATE CONCENTRATIONS
Q1 2019

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-8 N_SO4_Cl.mxd 6/4/2019 EA ecarpio



Legend

- REI 4857 Groundwater Monitoring Wells with top of screen unsubmerged
- REI 4857 and REI 4857/4838 Groundwater Monitoring Wells with fully submerged screens
- REI 4838 Groundwater Monitoring Wells
- REI 4814 Groundwater Monitoring Wells
- Nested Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer
- Installation Fence Boundary
- Source Area



Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
Only groundwater monitoring wells that were sampled in Q1 2019 are displayed.
Bold and red = reported concentrations exceed the project screening level (dissolved iron = 1 mg/L, and dissolved manganese = 0.2 mg/L)
Bold = reported concentrations are above the detection limit (alkalinity excluded)
Total alkalinity and bromide do not have an established project screening level.
Dissolved iron and manganese concentations are reported in mg/L.
Total alkalinity concentrations are reported in mg/L as $CaCO_3$.
KAFB-106240 through KAFB-106245 and KAFB-106S2, KAFB-106S3, KAFB-106S4, KAFB-106S5, and KAFB-106S9 are nested wells containing two separate well casings; the number after the hyphen is the top of the screen depth.
Alk. = total alkalinity
Br = bromide
$CaCO_3$ = calcium carbonate
Diss. = dissolved
Fe = iron
mg/L = milligram(s) per liter
Mn = manganese
ND = nondetect
Q1 = quarter 1
Qualifier:
J = qualifier denotes the analyte was positively identified, but the associated numerical value is estimated
REI = Reference Elevation Interval

N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

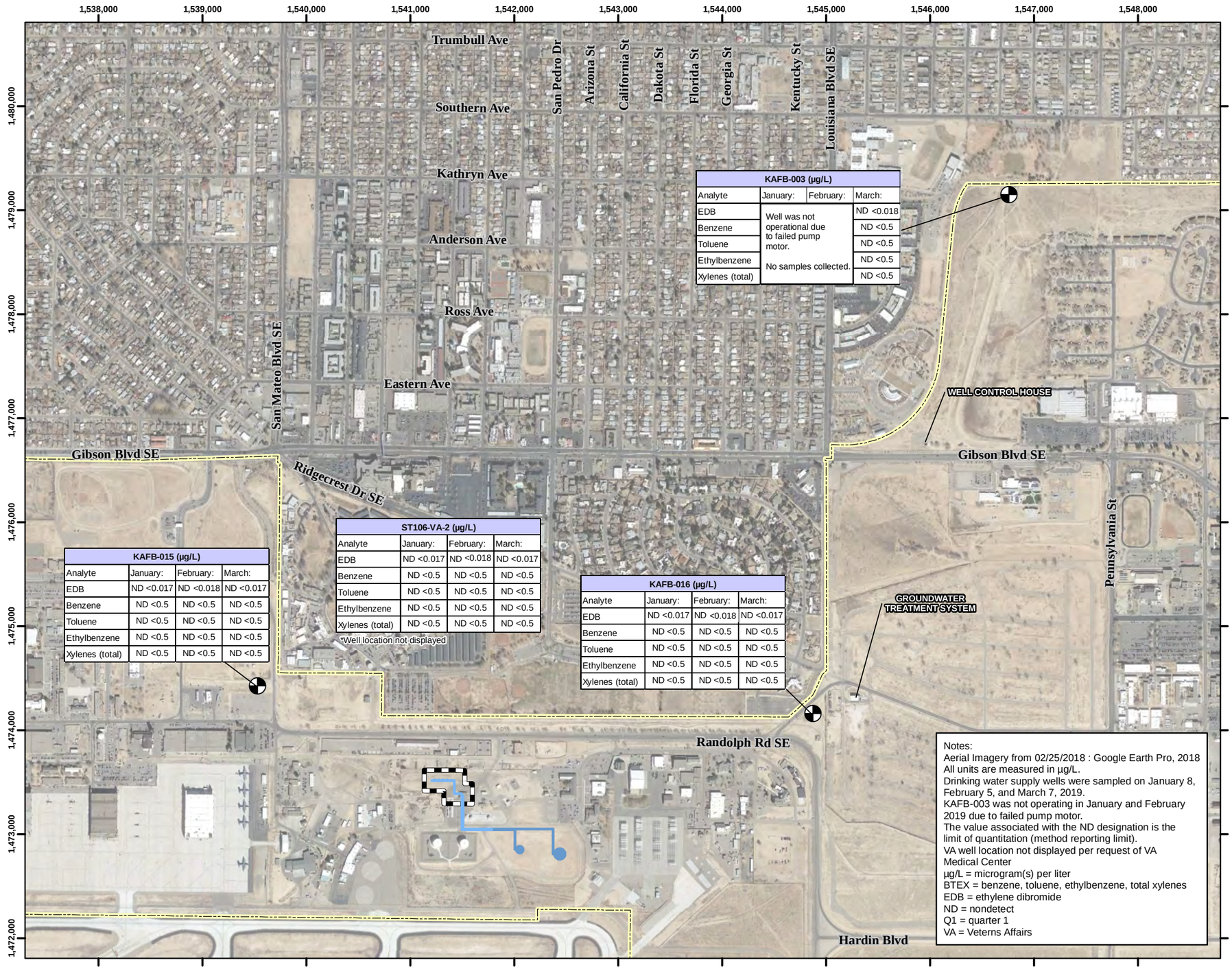
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 3-9

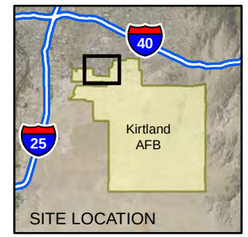
TOTAL ALKALINITY AS CALCIUM CARBONATE, BROMIDE, AND DISSOLVED IRON AND MANGANESE CONCENTRATIONS, Q1 2019

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 3\3-9 Fe_Mn_B_Alk.mxd 6/4/2019 EA ecarpio



Legend

- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Source Area



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

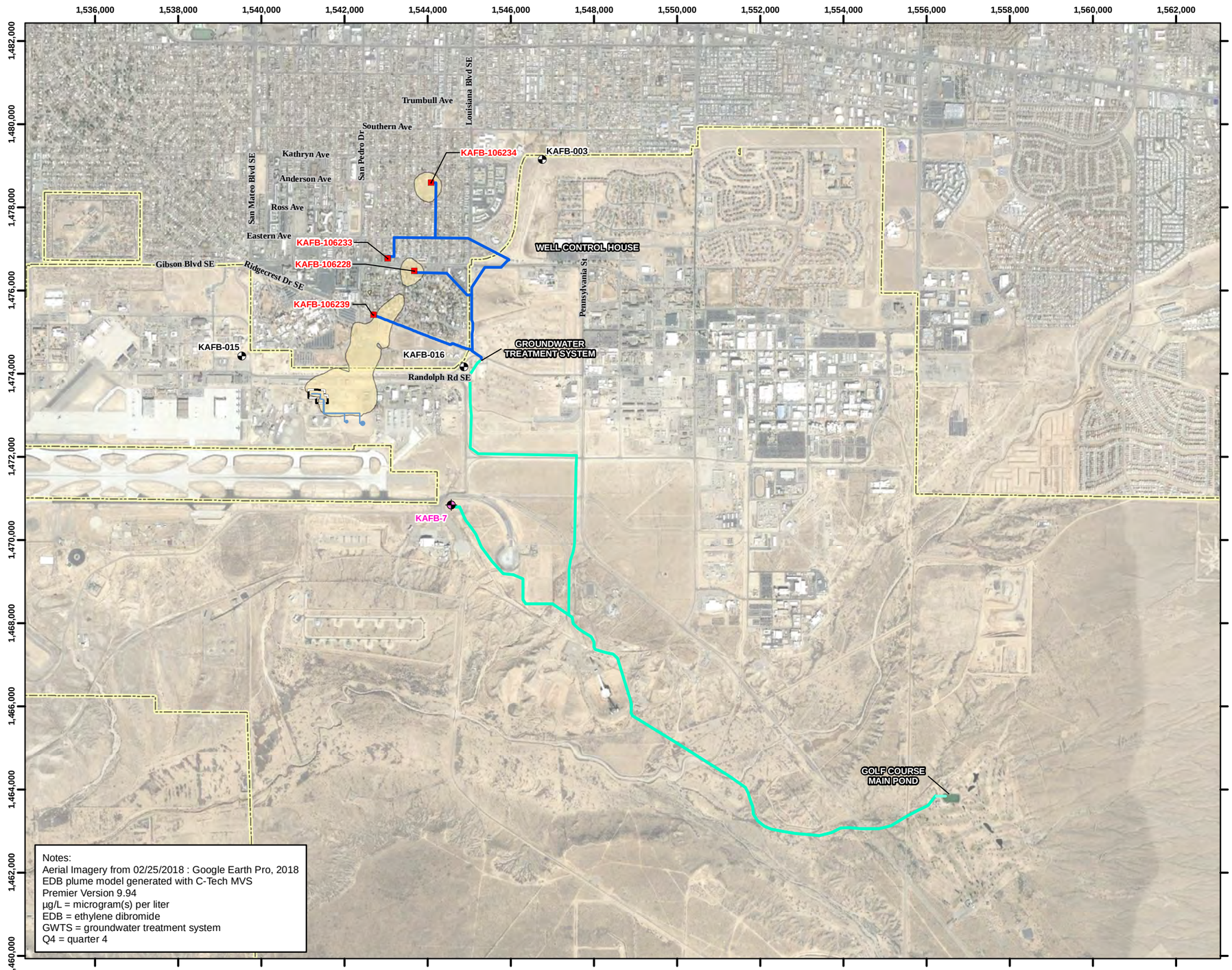
Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 4-1

EDB AND BTEX RESULTS IN DRINKING WATER SUPPLY WELLS, Q1 2019

P:\gis\Projects\Kirtland\Figures\Drinking Water Supply Wells\Quarterly Reports 2019\4-1 EDB BTEX Drinking Water Supply Q119.mxd 4/11/2019 EA eomalia



Notes:
Aerial Imagery from 02/25/2018 : Google Earth Pro, 2018
EDB plume model generated with C-Tech MVS Premier Version 9.94
µg/L = microgram(s) per liter
EDB = ethylene dibromide
GWTS = groundwater treatment system
Q4 = quarter 4

Legend

- Extraction Well
- Injection Well
- Drinking Water Supply Well
- Former Aboveground Storage Tank
- Former Fuel Transfer Line
- GWTS Influent Piping
- GWTS Effluent Piping
- Installation Fence Boundary
- EDB Plume Q4 2018 (> 0.05 µg/L)
- Source Area

N

0 1,250 2,500 5,000

Feet

1 inch = 2,500 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

QUARTERLY REPORT
JANUARY - MARCH 2019
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNIT ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 5-1

GROUNDWATER EXTRACTION AND TREATMENT SYSTEM LOCATION

P:\gis\Projects\Kirtland\Figures\BFF Quarterly Report\2019_Q1\Section 5\5-1 Groundwater Extraction and Treatment System.mxd 4/11/2019 EA eomalia

TABLES

Table 3-1
Groundwater Monitoring Program

Location ID	1st Quarter (January-March)	2nd Quarter Semiannual (April-June)	3rd Quarter (July-September)	4th Quarter Annual (October-December)	Former Well Designation and Monitoring Well Objective[g,h]
Newly Added Wells[a]					
KAFB-106240-449[b,d]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	VA Proximal
KAFB-106241-428[b,d]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106242-418[b,d]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106243-425[b,d]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106244-445[b,d,e]	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	VA Proximal
KAFB-106245-460[b,d,e]	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	KAFB-016 Sentinel
KAFB-106S2-451	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106S3-449	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106S4-446	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106S5-446	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106S9-447	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
Groundwater Monitoring Wells[a]					
KAFB-106001	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106002	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106003	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal, KAFB-015 Sentinel
KAFB-106004	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106005[b]	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106006	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106007	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106008	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106009[b]	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106010	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106011	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106012R	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, metals, anions, alkalinity, FP	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106013	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106014	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106015[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106016	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106017	None	BTEX, Naphthalene, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Signal
KAFB-106018	None	BTEX, Naphthalene, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Signal
KAFB-106019	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106020	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106021[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106022[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106023[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106024	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106025[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106026[c]	--	--	--	--	Groundwater Monitoring
KAFB-106027	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106028	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106029[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106030[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106031[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106032[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106033[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106034[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106035[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring

Table 3-1
Groundwater Monitoring Program

Location ID	1st Quarter (January-March)	2nd Quarter Semiannual (April-June)	3rd Quarter (July-September)	4th Quarter Annual (October-December)	Former Well Designation and Monitoring Well Objective[g,h]
KAFB-106036[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
Groundwater Monitoring Wells[a]					
KAFB-106037[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106038	None	BTEX, Naphthalene, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Signal
KAFB-106039	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106040	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106041[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106042[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106043[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106044	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106045	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106046	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106047	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106048	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106049[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106050[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106051[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106052[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106053[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106054[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106055[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106057[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106058[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106059	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106060	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106061	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106062	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106063	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106064	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106065	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106066	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106067	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106068	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106069	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106070[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106071[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106072[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106073	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106074	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106075	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106076	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106077	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106078	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106079[b]	None	BTEX, EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106080	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106081	None	BTEX, EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Source Area
KAFB-106082	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106083	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106084	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106085[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring

Table 3-1
Groundwater Monitoring Program

Location ID	1st Quarter (January-March)	2nd Quarter Semiannual (April-June)	3rd Quarter (July-September)	4th Quarter Annual (October-December)	Former Well Designation and Monitoring Well Objective[g,h]
KAFB-106086[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
Groundwater Monitoring Wells[a]					
KAFB-106087[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106088[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106089[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106090[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106091[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106092[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106093[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106094	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106095[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106096	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring
KAFB-106097	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106098	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106099	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106100	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal
KAFB-106101	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal, KAFB-015 Sentinel
KAFB-106102	BTEX, EDB, FP	BTEX, EDB, metals, anions, alkalinity, FP	BTEX, EDB, FP	EDB, VOCs, metals, anions, alkalinity, FP	VA Proximal, KAFB-015 Sentinel
KAFB-106103[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106104[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106105[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106106[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106107[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106149-484[b]	EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106151-484[b]	EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106152-484[b]	EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106153-484[b]	EDB, metals, anions, alkalinity	BTEX, EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Source Area
KAFB-106201[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	KAFB-003 Sentinel
KAFB-106202[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	KAFB-003 Sentinel
KAFB-106203[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	KAFB-003 Sentinel
KAFB-106204[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106205[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106206[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106207[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106208[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106209[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106212[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106213[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106214[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106215[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106216[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106217[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106218[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106219[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106220[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring

Table 3-1
Groundwater Monitoring Program

Location ID	1st Quarter (January-March)	2nd Quarter Semiannual (April-June)	3rd Quarter (July-September)	4th Quarter Annual (October-December)	Former Well Designation and Monitoring Well Objective[g,h]
KAFB-106221[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106222[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106223[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
Groundwater Monitoring Wells[a]					
KAFB-106224[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106225[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106226[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106227[b]	None	EDB, metals, anions, alkalinity	None	EDB, VOCs, metals, anions, alkalinity	Groundwater Monitoring
KAFB-106229[f]	None	EDB	None	EDB	NA
KAFB-106230[c]	--	--	--	--	Groundwater Monitoring
KAFB-106231[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106232[b]	EDB	EDB, metals, anions, alkalinity	EDB	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106235-463[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106235-492[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106235-521[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106236-461[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106236-490[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-106236-519[b]	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, metals, anions, alkalinity	EDB, VOCs, metals, anions, alkalinity	Downgradient Proximal
KAFB-3411	None	EDB, metals, anions, alkalinity, FP	None	EDB, VOCs, metals, anions, alkalinity, FP	Groundwater Monitoring

Table 3-1
Groundwater Monitoring Program

[a] The groundwater monitoring network consists of 161 wells that are currently sampled under Solid Waste Management Unit ST106/SS-111. Select wells are identified for additional or more frequent monitoring of risk-driving constituents. Metals analysis consists of select total metals (arsenic, calcium, lead, potassium, magnesium, and sodium) and select dissolved metals (iron and manganese). Anions analysis consists of bromide, chloride, nitrate/nitrite nitrogen, and sulfate. Field parameters include pH, specific conductivity, dissolved oxygen, oxidation reduction potential, temperature, and turbidity.

[b] Well sampled with passive sampling methodology; field parameter measurements are not representative and therefore are not collected.

[c] Well no longer sampled due to safety concerns.

[d] Newly installed groundwater monitoring well that was completed in third quarter 2018.

[e] KAFB-106244-445 and KAFB-106245-460 were not sampled for BTEX in Q1 2019 due to field error and work plan variance.

[f] KAFB-106229 is not formally part of the groundwater monitoring network. However, it gets sampled semiannually for EDB.

[g] In previous reports, groundwater monitoring wells were designated based on their location related to groundwater gradient and the EDB plume or on their location, i.e., “downgradient,” “source area,” etc. However, due to the changing regional groundwater gradient (see Quarter 2 2018 Quarterly Monitoring Report [USACE, 2018b]), these designations are not always appropriate. To simplify and more accurately represent dynamic hydrologic conditions, all groundwater monitorings wells will be designated simply as “groundwater monitoring well” after completing a baseline sampling of four quarters. Prior to the baseline sampling, the wells will be designated as "newly added".

[h] Monitoring Well Objective:
Downgradient Proximal Wells—Located north of Ridgecrest Drive SE surrounding the historical EDB plume to the west, north, and east into the distal portion of the GWM network. Analytical data for these wells have been historically below the maximum contaminant level (MCL) for EDB. Sampled every quarter. These wells assist in plume boundary definition.

Groundwater Monitoring Wells—Primarily location north of Ridgecrest Drive SE within the historical footprint of the EDB plume. Analytical data from these wells serve to define the volume and mass of the EDB plume throughout the GWM
KAFB-003 Sentinel Wells - One set of nested wells located west of drinking water production well KAFB-003. Sampled every quarter. These wells are a means to detect any potential contaminant migration towards KAFB-003, thereby providing additional wellhead protection monitoring.

KAFB-015 Sentinel Wells - One set of nested wells located east of drinking water production well KAFB-015. Sampled every quarter. These wells are a means to detect any potential contaminant migration towards KAFB-015, thereby providing additional wellhead protection monitoring.

KAFB-016 Sentinel Well - One well located west of drinking water production well KAFB-016. Sampled every quarter. This well is a means to detect any potential contaminant migration towards KAFB-016, thereby providing additional wellhead protection monitoring.

Newly Added Wells—Newly added wells can include both existing wells that are added to the GWM network as well as newly installed wells. Newly added GWM wells require a minimum of four consecutive quarters of baseline full-suite analytical sampling before receiving a designation that determines the long-term sampling regime. These wells have been added to define the plume boundaries and provide additional water table monitoring due to the rising groundwater

Signal Wells—Three wells located along the south side of Ridgecrest Drive SE to monitor BTEX and provide early indication if the benzene plume is migrating from the source area into the interim measure target area capture zone created by the groundwater extraction wells. Sampled during Q2 and Q4.

Source Area Wells—Primarily located in the BFF south of Randolph Road SE and proximal to the spill site on-Base. Sampled during Q2 and Q4. These wells monitor the higher concentrations of dissolved-phase plumes on-Base.

Veterans Affairs (VA) Proximal Wells—Three sets of nested wells located between the historical EDB plume south of Ridgecrest Drive SE and the Raymond G. Murphy VA Medical Center as a means to detect any potential contaminant migration towards the VA medical campus. Sampled every quarter. These wells provide additional wellhead protection monitoring for the VA supply well.

BTEX = benzene, toluene, ethylbenzene, and total xylenes

EDB = ethylene dibromide

FP = field parameter
ID = identification

NA = not applicable

VOC = volatile organic compound

USACE. 2018b. *Quarterly Monitoring Report April-June 2018, 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. September.

Table 3-2
Groundwater Monitoring Wells Included in Q1 2019 Monitoring Activities

Location ID	Reference Elevation Interval (ft AMSL)	Well Installation Date	Date Sampled	Screen Interval[a] (ft bgs)	Screen Interval[a] (ft AMSL)	Sampling System	Screen Submerged (Yes/No)?	Submergence Depth Q1 2019 (ft)	Estimated Pump Intake Depth (ft bgs)[b,c,d]	Analytical Suite[e]
Reference Elevation Interval 4857 (ft AMSL) Groundwater Monitoring Wells										
KAFB-106003	4857	1/25/2003	1/7/2019	476-501	4861 - 4836	Portable pump	Yes	13.91	478	EDB, BTEX, FP
KAFB-106004	4857	1/4/2006	1/11/2019	484-509	4859 - 4834	Portable pump	Yes	16.14	486	EDB, BTEX, FP
KAFB-106005	4857	1/22/2007	1/14/2019	479-504	4865 - 4840	Passive sampler	Yes	9.94	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106009	4857	11/28/2007	1/14/2018	480-505	4865 - 4840	Passive sampler	Yes	9.60	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106012R	4857	4/23/2014	1/17/2019	466-495	4877 - 4847	Portable pump	No	-1.71	493	EDB, BTEX, anions, alkalinity, metals, FP
KAFB-106013	4857	9/19/2008	1/11/2019	487-512	4861 - 4836	Portable pump	Yes	13.76	489	EDB, BTEX, FP
KAFB-106029	4857	6/4/2011	1/18/2019	451-471	4860 - 4840	Passive sampler	Yes	14.62	NA	EDB
KAFB-106032	4857	6/24/2011	1/14/2019	456-476	4862 - 4842	Passive sampler	Yes	13.39	NA	EDB
KAFB-106049	4857	5/13/2011	1/14/2019	457-477	4859 - 4839	Passive sampler	Yes	15.47	NA	EDB
KAFB-106201	4857	10/4/2012	1/14/2019	487-517	4867 - 4837	Passive sampler	Yes	8.31	NA	EDB
KAFB-106204	4857	8/29/2012	1/14/2019	463-493	4870 - 4840	Passive sampler	Yes	4.83	NA	EDB
KAFB-106207	4857	8/22/2012	1/14/2019	473-503	4871 - 4841	Passive sampler	Yes	4.71	NA	EDB
KAFB-106216	4857	2/10/2015	1/14/2019	456-486	4878 - 4848	Passive sampler	No	-4.10	NA	EDB
KAFB-106222	4857	1/15/2015	1/14/2019	458-488	4875 - 4845	Passive sampler	No	-0.77	NA	EDB
KAFB-106231	4857	9/8/2015	1/18/2019	440-475	4888 - 4853	Passive sampler	No	-12.25	NA	EDB
KAFB-106235-463[f]	4857	10/31/2016	1/14/2019	438-463	4878 - 4853	Passive sampler	No	-3.47	NA	EDB
KAFB-106236-461[f]	4857	11/23/2016	1/14/2019	436-461	4880 - 4855	Passive sampler	No	-5.16	NA	EDB
KAFB-106240-449	4857	6/14/2018	1/15/2019	449-489	4899 - 4859	Passive sampler	No	-23.88	NA	EDB, anions, alkalinity, metals
KAFB-106241-428	4857	8/16/2018	1/15/2019	428-468	4896 - 4856	Passive sampler	No	-22.37	NA	EDB, anions, alkalinity, metals
KAFB-106242-418	4857	8/23/2018	1/18/2019	418-458	4898 - 4858	Passive sampler	No	-23.71	NA	EDB, anions, alkalinity, metals
KAFB-106243-425	4857	7/17/2018	1/15/2019	425-465	4896 - 4856	Passive sampler	No	-21.53	NA	EDB, anions, alkalinity, metals
KAFB-106244-445[g]	4857	7/12/2018	1/15/2019	445-485	4898 - 4858	Passive sampler	No	-23.45	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106245-460[g]	4857	9/7/2018	1/15/2019	461-501	4897 - 4857	Passive sampler	No	-23.15	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106S2-451	4857	11/21/2018	1/15/2019	451-491	4898 - 4858	Passive sampler	No	-24.01	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106S3-449	4857	11/29/2018	1/15/2019	449-489	4899 - 4859	Passive sampler	No	-25.18	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106S4-446	4857	11/16/2018	1/15/2019	446-486	4898 - 4858	Passive sampler	No	-23.14	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106S5-446	4857	11/5/2018	1/15/2019	446-486	4898 - 4858	Passive sampler	No	-23.27	NA	EDB, BTEX, anions, alkalinity, metals
KAFB-106S9-447	4857	11/8/2019	1/15/2019	447-487	4899 - 4859	Passive sampler	No	-25.08	NA	EDB, BTEX, anions, alkalinity, metals
Reference Elevation Interval 4838 (ft AMSL) Groundwater Monitoring Wells										
KAFB-106030	4838	5/25/2011	2/6/2019	470-485	4842 - 4827	Passive sampler	Yes	33.24	NA	EDB
KAFB-106033	4838	6/24/2011	1/14/2019	477-492	4841 - 4826	Passive sampler	Yes	34.22	NA	EDB
KAFB-106050	4838	5/2/2011	2/6/2019	474-489	4841 - 4826	Passive sampler	Yes	33.72	NA	EDB
KAFB-106097	4838	4/27/2011	1/8/2019	506-521	4842 - 4827	Portable pump	Yes	32.23	508	EDB, BTEX, FP
KAFB-106099	4838	5/12/2011	1/10/2019	501-516	4842 - 4827	Portable pump	Yes	33.39	503	EDB, BTEX, FP
KAFB-106101	4838	2/21/2011	1/7/2019	496-511	4842 - 4826	Portable pump	Yes	33.60	498	EDB, BTEX, FP
KAFB-106202	4838	9/23/2012	1/14/2019	517-532	4838 - 4823	Passive sampler	Yes	37.86	NA	EDB
KAFB-106205	4838	8/21/2012	1/14/2019	493-508	4841 - 4826	Passive sampler	Yes	34.45	NA	EDB
KAFB-106208	4838	8/16/2012	1/14/2019	503-518	4841 - 4826	Passive sampler	Yes	35.08	NA	EDB
KAFB-106217	4838	2/17/2015	1/14/2019	485-500	4849 - 4834	Passive sampler	Yes	25.51	NA	EDB
KAFB-106223	4838	2/17/2015	1/14/2019	488-503	4846 - 4831	Passive sampler	Yes	28.55	NA	EDB
KAFB-106235-492[f]	4838	10/31/2016	1/14/2019	472-492	4844 - 4824	Passive sampler	Yes	30.58	NA	EDB

Table 3-2
Groundwater Monitoring Wells Included in Q1 2019 Monitoring Activities

Location ID	Reference Elevation Interval (ft AMSL)	Well Installation Date	Date Sampled	Screen Interval[a] (ft bgs)	Screen Interval[a] (ft AMSL)	Sampling System	Screen Submerged (Yes/No)?	Submergence Depth Q1 2019 (ft)	Estimated Pump Intake Depth (ft bgs)[b,c,d]	Analytical Suite[e]
KAFB-106236-490[f]	4838	11/23/2016	2/6/2019	470-490	4846 - 4826	Passive sampler	Yes	29.02	NA	EDB
Reference Elevation Interval 4814 (ft AMSL) Groundwater Monitoring Wells										
KAFB-106031	4814	5/25/2011	1/18/2019	496-510	4815 - 4802	Passive sampler	Yes	59.49	NA	EDB
KAFB-106034	4814	6/24/2011	1/14/2019	502-517	4817 - 4802	Passive sampler	Yes	58.37	NA	EDB
KAFB-106051	4814	4/26/2011	2/6/2019	501-516	4815 - 4800	Passive sampler	Yes	59.83	NA	EDB
KAFB-106098	4814	4/17/2011	1/8/2019	531-546	4817 - 4802	Portable pump	Yes	58.12	533	EDB, BTEX, FP
KAFB-106100	4814	5/3/2011	1/10/2019	526-541	4817 - 4802	Portable pump	Yes	58.39	528	EDB, BTEX, FP
KAFB-106102	4814	3/3/2011	1/7/2019	521-535	4816 - 4803	Portable pump	Yes	58.63	523	EDB, BTEX, FP
KAFB-106203	4814	9/9/2012	1/14/2019	620-635	4734 - 4719	Passive sampler	Yes	141.01	NA	EDB
KAFB-106206	4814	8/9/2012	1/14/2019	594-608	4740 - 4725	Passive sampler	Yes	135.34	NA	EDB
KAFB-106209	4814	8/7/2012	1/14/2019	603-617	4740 - 4726	Passive sampler	Yes	135.74	NA	EDB
KAFB-106218	4814	5/26/2015	1/14/2019	552-567	4782 - 4767	Passive sampler	Yes	92.38	NA	EDB
KAFB-106224	4814	5/15/2015	1/14/2019	555-570	4780 - 4765	Passive sampler	Yes	94.59	NA	EDB
KAFB-106232	4814	9/1/2015	1/18/2019	503-518	4824 - 4809	Passive sampler	Yes	51.27	NA	EDB
KAFB-106235-521[f]	4814	10/31/2016	2/6/2019	501-521	4815 - 4795	Passive sampler	Yes	59.68	NA	EDB
KAFB-106236-519[f,h]	4814	11/23/2016	1/14/2019	499-519	4817 - 4797	Passive sampler	Yes	57.84	NA	EDB

Table 3-2
Groundwater Monitoring Wells Included in Q1 2019 Monitoring Activities

[a] Screen interval is rounded to the nearest foot.
[b] Portable equipment sampling depths are estimated to the nearest foot due to slight inaccuracies with the mechanism measuring the pump setting in the field.
[c] Portable pump setting estimated as 2 ft below top of screen if submerged or 2 ft above bottom of screen if not submerged.
[d] Dedicated pump setting estimated as half-way between top and bottom of screen.
[e] The analytical methods for EDB and VOCs are 8011 and 8260C, respectively. Metals analyses consisted of select total metals (arsenic, calcium, lead, potassium, magnesium, and sodium by analytical method 6020A/6010C) and select dissolved metals (iron and manganeseby method 6010C). Anions analysis consisted of bromide by method 300.0A, chloride by method 300.0A, nitrate/nitrite nitrogen by method 353.2, and sulfate by method 300.0A. Field parameters include pH, specific conductivity, dissolved oxygen, oxidation reduction potential, temperature, and turbidity.
[f] Location ID for this well is based on the bottom of screen.
[g] KAFB-106244-445 and KAFB-106245-460 were not sampled for BTEX in Q1 2019 due to field error and work plan variance.
[h] Groundwater sample was collected and shipped to the laboratory for analysis, but due to sampling tracking login error at the laboratory, the sample was not analyzed.
AMSL = above mean sea level
bgs = below ground surface
BTEX = benzene, toluene, ethylbenzene and xylene
EDB = ethylene dibromide
FP = field parameter
ft = foot/feet
ID = identification
NA = not applicable
VOC = volatile organic compound

Table 3-3
Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness, Q1 2019

Location ID	Reference Elevation Interval (ft AMSL)	Date of Measurement	MRP Elevation (ft AMSL)	Depth to LNAPL (ft MRP)	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	LNAPL Elevation (ft AMSL)	Groundwater Elevation Corrected for LNAPL Thickness[a] (ft AMSL)
KAFB-106001[b]	4857/4838	2/7/2019	5344.90	—	470.44	—	—	4874.46
KAFB-106002	4857	2/5/2019	5342.24	—	466.03	—	—	4876.21
KAFB-106003	4857	2/4/2019	5340.28	—	465.09	—	—	4875.19
KAFB-106004	4857	2/4/2019	5345.81	—	470.60	—	—	4875.21
KAFB-106005	4857	2/5/2019	5346.91	—	471.93	—	—	4874.98
KAFB-106006	4857	2/7/2019	5351.48	—	477.17	—	—	4874.31
KAFB-106007	4857	2/7/2019	5349.60	—	475.31	—	—	4874.29
KAFB-106008	4857	2/5/2019	5351.77	—	476.95	—	—	4874.82
KAFB-106009	4857	2/7/2019	5348.55	—	474.09	—	—	4874.46
KAFB-106010	4857	2/7/2019	5343.26	—	469.17	—	—	4874.09
KAFB-106011	4857	2/5/2019	5353.15	—	478.48	—	—	4874.67
KAFB-106012R	4857	2/5/2019	5345.00	—	470.20	—	—	4874.80
KAFB-106013	4857	2/4/2019	5350.62	—	475.89	—	—	4874.73
KAFB-106014	4857	2/5/2019	5350.22	475.44	475.55	0.11	4874.78	4874.75
KAFB-106015[b]	4857/4838	2/5/2019	5342.44	—	468.88	—	—	4873.56
KAFB-106016	4857	2/7/2019	5342.43	—	467.90	—	—	4874.53
KAFB-106017[b]	4857/4838	2/5/2019	5342.52	—	468.44	—	—	4874.08
KAFB-106018[b]	4857/4838	2/5/2019	5336.31	—	462.02	—	—	4874.29
KAFB-106019[b]	4857/4838	2/5/2019	5354.62	—	479.41	—	—	4875.21
KAFB-106020	4857	2/5/2019	5341.05	—	466.35	—	—	4874.70
KAFB-106021[b]	4857/4838	2/6/2019	5314.33	—	439.87	—	—	4874.46
KAFB-106022[b]	4857/4838	2/5/2019	5318.06	—	444.08	—	—	4873.98
KAFB-106023	4857	2/5/2019	5328.76	—	454.39	—	—	4874.37
KAFB-106024	4857	2/7/2019	5343.55	—	469.12	—	—	4874.43
KAFB-106025[b]	4857/4838	2/4/2019	5317.28	—	442.86	—	—	4874.42
KAFB-106027	4857	2/4/2019	5348.62	—	473.82	—	—	4874.80
KAFB-106028	4857	2/5/2019	5348.89	—	474.40	—	—	4874.49
KAFB-106029	4857	2/6/2019	5310.94	—	436.18	—	—	4874.76
KAFB-106030	4838	2/6/2019	5311.03	—	436.26	—	—	4874.77
KAFB-106031	4814	2/6/2019	5311.06	—	436.31	—	—	4874.75
KAFB-106032	4857	2/4/2019	5317.60	—	442.61	—	—	4874.99
KAFB-106033	4838	2/4/2019	5317.76	—	442.78	—	—	4874.98
KAFB-106034	4814	2/4/2019	5318.63	—	443.63	—	—	4875.00
KAFB-106035	4857	2/4/2019	5321.58	—	448.05	—	—	4873.53
KAFB-106036	4838	2/4/2019	5321.85	—	448.49	—	—	4873.36
KAFB-106037	4838	2/4/2019	5322.10	—	449.11	—	—	4872.99
KAFB-106038	4857	2/5/2019	5351.61	—	477.32	—	—	4874.29
KAFB-106039	4838	2/5/2019	5351.32	—	477.82	—	—	4873.50
KAFB-106040	4814	2/5/2019	5350.26	—	476.00	—	—	4874.26
KAFB-106041	4857	2/4/2019	5324.35	—	449.76	—	—	4874.59
KAFB-106042	4857	2/4/2019	5324.07	—	449.51	—	—	4874.56
KAFB-106043	4814	2/4/2019	5324.30	—	449.74	—	—	4874.56
KAFB-106044	4838	2/4/2019	5348.79	—	473.66	—	—	4875.13
KAFB-106045	4814	2/4/2019	5348.52	—	473.67	—	—	4874.85
KAFB-106046	4857	2/7/2019	5352.84	—	478.53	—	—	4874.31
KAFB-106047	4838	2/5/2019	5352.81	—	478.19	—	—	4874.62
KAFB-106048	4814	2/5/2019	5352.58	—	477.92	—	—	4874.66
KAFB-106049	4857	2/4/2019	5316.10	—	441.33	—	—	4874.77
KAFB-106050	4838	2/4/2019	5315.51	—	440.68	—	—	4874.83
KAFB-106051	4814	2/4/2019	5315.78	—	440.97	—	—	4874.81

Table 3-3
Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness, Q1 2019

Location ID	Reference Elevation Interval (ft AMSL)	Date of Measurement	MRP Elevation (ft AMSL)	Depth to LNAPL (ft MRP)	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	LNAPL Elevation (ft AMSL)	Groundwater Elevation Corrected for LNAPL Thickness[a] (ft AMSL)
KAFB-106052	4857	2/7/2019	5318.86	—	444.38	—	—	4874.48
KAFB-106053	4838	2/4/2019	5318.67	—	444.29	—	—	4874.38
KAFB-106054	4814	2/4/2019	5318.38	—	443.87	—	—	4874.51
KAFB-106055	4857	2/4/2019	5325.09	—	450.81	—	—	4874.28
KAFB-106057	4838	2/4/2019	5325.46	—	451.16	—	—	4874.30
KAFB-106058	4814	2/4/2019	5326.05	—	451.70	—	—	4874.35
KAFB-106059	4857	2/7/2019	5347.87	473.36	473.70	0.34	4874.51	4874.43
KAFB-106060	4838	2/7/2019	5345.32	—	470.98	—	—	4874.34
KAFB-106061	4814	2/7/2019	5345.43	—	470.96	—	—	4874.47
KAFB-106062	4814	2/7/2019	5351.20	—	476.83	—	—	4874.37
KAFB-106063[c]	4838	—	—	—	—	—	—	—
KAFB-106064[c]	4857	—	—	—	—	—	—	—
KAFB-106065	4838	2/5/2019	5348.76	—	474.30	—	—	4874.46
KAFB-106066	4814	2/5/2019	5349.09	—	474.49	—	—	4874.60
KAFB-106067	4857	2/5/2019	5347.50	—	473.31	—	—	4874.19
KAFB-106068	4814	2/5/2019	5347.23	—	473.04	—	—	4874.19
KAFB-106069	4838	2/5/2019	5347.25	—	472.91	—	—	4874.34
KAFB-106070	4857	2/5/2019	5318.54	—	444.46	—	—	4874.08
KAFB-106071	4814	2/5/2019	5320.90	—	446.65	—	—	4874.25
KAFB-106072	4838	2/5/2019	5319.29	—	444.96	—	—	4874.33
KAFB-106073	4838	2/5/2019	5339.87	—	465.21	—	—	4874.66
KAFB-106074	4814	2/5/2019	5340.59	—	465.93	—	—	4874.66
KAFB-106075	4857	2/5/2019	5340.50	—	465.91	—	—	4874.59
KAFB-106076	4857	2/7/2019	5344.92	470.76	470.78	0.02	4874.16	4874.16
KAFB-106077	4838	2/7/2019	5344.72	—	471.84	—	—	4872.88
KAFB-106078	4814	2/7/2019	5344.60	—	472.01	—	—	4872.59
KAFB-106079	4857	2/5/2019	5349.67	475.04	475.22	0.18	4874.63	4874.58
KAFB-106080	4838	2/5/2019	5348.48	—	473.66	—	—	4874.82
KAFB-106081	4814	2/5/2019	5349.48	—	474.76	—	—	4874.72
KAFB-106082	4857	2/5/2019	5335.26	—	461.10	—	—	4874.16
KAFB-106083	4838	2/5/2019	5335.04	—	460.77	—	—	4874.27
KAFB-106084	4814	2/4/2019	5337.94	—	463.51	—	—	4874.43
KAFB-106085	4857	2/5/2019	5317.23	—	442.82	—	—	4874.41
KAFB-106086	4838	2/5/2019	5317.65	—	443.24	—	—	4874.41
KAFB-106087	4814	2/5/2019	5316.87	—	442.41	—	—	4874.46
KAFB-106088	4857	2/5/2019	5324.27	—	450.21	—	—	4874.06
KAFB-106089	4838	2/5/2019	5323.54	—	449.89	—	—	4873.65
KAFB-106090	4814	2/5/2019	5322.85	—	448.72	—	—	4874.13
KAFB-106091	4857	2/4/2019	5314.33	—	440.97	—	—	4873.36
KAFB-106092	4838	2/4/2019	5314.51	—	441.32	—	—	4873.19
KAFB-106093	4814	2/4/2019	5314.62	—	440.69	—	—	4873.93
KAFB-106094	4857	2/4/2019	5345.07	—	470.46	—	—	4874.61
KAFB-106095	4838	2/4/2019	5344.66	—	470.06	—	—	4874.60
KAFB-106096	4814	2/4/2019	5345.31	—	470.62	—	—	4874.69
KAFB-106097	4838	2/4/2019	5347.74	—	473.81	—	—	4873.93
KAFB-106098	4814	2/4/2019	5347.83	—	472.90	—	—	4874.93
KAFB-106099	4838	2/4/2019	5342.85	—	467.61	—	—	4875.24
KAFB-106100	4814	2/4/2019	5342.85	—	467.61	—	—	4875.24
KAFB-106101	4838	2/4/2019	5340.32	—	465.21	—	—	4875.11
KAFB-106102	4814	2/4/2019	5340.32	—	465.35	—	—	4874.97
KAFB-106103	4838	2/5/2019	5328.44	—	454.64	—	—	4873.80

Table 3-3
Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness, Q1 2019

Location ID	Reference Elevation Interval (ft AMSL)	Date of Measurement	MRP Elevation (ft AMSL)	Depth to LNAPL (ft MRP)	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	LNAPL Elevation (ft AMSL)	Groundwater Elevation Corrected for LNAPL Thickness[a] (ft AMSL)
KAFB-106104	4814	2/5/2019	5328.08	—	454.10	—	—	4873.98
KAFB-106105	4838	2/4/2019	5321.96	—	447.56	—	—	4874.40
KAFB-106106	4857	2/4/2019	5321.80	—	447.47	—	—	4874.33
KAFB-106107	4814	2/4/2019	5322.12	—	447.68	—	—	4874.44
KAFB-106148-484[d]	4857	2/7/2019	5344.24	—	469.67	—	—	4874.57
KAFB-106149-484[d]	4857	2/7/2019	5345.94	—	471.69	—	—	4874.25
KAFB-106150-484[d]	4857	2/7/2019	5344.10	—	470.01	—	—	4874.09
KAFB-106151-484[d]	4857	2/7/2019	5345.49	—	471.60	—	—	4873.89
KAFB-106152-484[d]	4857	2/7/2019	5347.68	—	473.32	—	—	4874.36
KAFB-106153-484[d]	4857	2/7/2019	5348.99	—	474.72	—	—	4874.27
KAFB-106154-484[d]	4857	2/7/2019	5347.34	472.88	472.99	0.11	4874.46	4874.43
KAFB-106155-484[d]	4857	2/7/2019	5347.13	—	473.29	—	—	4873.84
KAFB-106156-484[d,e]	4857	2/26/2019	5341.19	—	466.44	—	—	4874.75
KAFB-106201	4857	2/4/2019	5357.00	—	481.34	—	—	4875.66
KAFB-106202	4838	2/4/2019	5357.80	—	482.04	—	—	4875.76
KAFB-106203	4814	2/4/2019	5357.52	—	482.07	—	—	4875.45
KAFB-106204	4857	2/4/2019	5332.86	—	457.67	—	—	4875.19
KAFB-106205	4838	2/4/2019	5333.29	—	458.05	—	—	4875.24
KAFB-106206	4814	2/4/2019	5333.46	—	458.16	—	—	4875.30
KAFB-106207	4857	2/4/2019	5344.20	—	468.23	—	—	4875.97
KAFB-106208	4838	2/4/2019	5343.85	—	467.90	—	—	4875.95
KAFB-106209	4814	2/4/2019	5343.38	—	467.22	—	—	4876.16
KAFB-106211[d]	4857	2/4/2019	5342.51	—	—	—	—	—
KAFB-106212	4814	2/4/2019	5321.80	—	448.54	—	—	4873.26
KAFB-106213	4857	2/4/2019	5325.19	—	451.41	—	—	4873.78
KAFB-106214	4838	2/4/2019	5325.45	—	451.46	—	—	4873.99
KAFB-106215	4814	2/4/2019	5325.77	—	451.66	—	—	4874.11
KAFB-106216	4857	2/4/2019	5333.91	—	459.60	—	—	4874.31
KAFB-106217	4838	2/4/2019	5333.85	—	459.49	—	—	4874.36
KAFB-106218	4814	2/4/2019	5333.64	—	459.62	—	—	4874.02
KAFB-106219	4857	2/4/2019	5340.41	—	465.50	—	—	4874.91
KAFB-106220	4838	2/4/2019	5340.34	—	465.44	—	—	4874.90
KAFB-106221	4814	2/4/2019	5340.10	—	465.23	—	—	4874.87
KAFB-106222	4857	2/4/2019	5333.24	—	458.57	—	—	4874.67
KAFB-106223	4838	2/4/2019	5333.96	—	459.25	—	—	4874.71
KAFB-106224	4814	2/4/2019	5335.08	—	460.41	—	—	4874.67
KAFB-106225	4857	2/4/2019	5326.36	—	452.06	—	—	4874.30
KAFB-106226	4838	2/4/2019	5327.31	—	452.70	—	—	4874.61
KAFB-106227	4814	2/4/2019	5328.09	—	453.47	—	—	4874.62
KAFB-106229[b,d]	4857/4838	2/4/2019	5314.31	—	441.12	—	—	4873.19
KAFB-106231	4857	2/6/2019	5327.56	—	452.25	—	—	4875.31
KAFB-106232	4814	2/6/2019	5327.20	—	451.73	—	—	4875.47
KAFB-106235-463[f]	4857	2/4/2019	5315.67	—	441.43	—	—	4874.24
KAFB-106235-492[f]	4838	2/4/2019	5315.67	—	441.38	—	—	4874.29
KAFB-106235-521[f]	4814	2/5/2019	5315.67	—	441.28	—	—	4874.39
KAFB-106236-461[f]	4857	2/4/2019	5316.02	—	441.10	—	—	4874.92
KAFB-106236-490[f]	4838	2/5/2019	5316.02	—	440.92	—	—	4875.10
KAFB-106236-519[f]	4814	2/4/2019	5316.02	—	441.10	—	—	4874.92
KAFB-106240-449	4857	2/4/2019	5347.57	—	472.92	—	—	4874.65

Table 3-3
Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness, Q1 2019

Location ID	Reference Elevation Interval (ft AMSL)	Date of Measurement	MRP Elevation (ft AMSL)	Depth to LNAPL (ft MRP)	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	LNAPL Elevation (ft AMSL)	Groundwater Elevation Corrected for LNAPL Thickness[a] (ft AMSL)
KAFB-106241-428	4857	2/4/2019	5324.06	—	450.47	—	—	4873.59
KAFB-106242-418	4857	2/6/2019	5316.15	—	441.85	—	—	4874.30
KAFB-106243-425	4857	2/4/2019	5320.57	—	446.57	—	—	4874.00
KAFB-106244-445	4857	2/4/2019	5343.51	—	468.54	—	—	4874.97
KAFB-106245-460	4857	2/5/2019	5360.90	—	486.82	—	—	4874.08
KAFB-3411[e]	4857	2/26/2019	5343.49	—	468.79	—	—	4874.70
KAFB-106S2-451	4857	2/7/2019	5352.40	—	478.08	—	—	4874.32
KAFB-106S3-449	4857	2/7/2019	5351.01	—	477.18	—	—	4873.83
KAFB-106S4-446	4857	2/7/2019	5346.57	—	472.10	—	—	4874.47
KAFB-106S5-446	4857	2/7/2019	5343.58	—	469.33	—	—	4874.25
KAFB-106S9-447	4857	2/7/2019	5345.82	—	472.11	—	—	4873.71

[a] Groundwater elevation corrected for LNAPL thickness was calculated by the following formula: MRP Elevation - Depth to LNAPL/water interface + (LNAPL Thickness * Specific Gravity of Weathered JP4/JP8 Fuel) where the specific gravity of JP4/JP8 fuel is 0.7592. The specific gravity is based on the December 13, 2018 site-specific fuel testing report from PTS Laboratories using LNAPL collected from wells KAFB-106014, KAFB-106059, and KAFB-106079.

[b] Well used in analyses for both REI 4857 and 4838.

[c] Well was not gauged due to presence of monitoring equipment.

[d] Well not permanently designated in REI listed.

[e] Depth to groundwater re-measurement outside of five day gauging window.

[f] Location ID for this well is based on the bottom of screen.

See appendix table E-2-1 for water level interface probe calibration corrections.

AMSL = above mean sea level

ft = foot/feet

ID = identification

JP = jet propellant

LNAPL = light non-aqueous phase liquid

MRP = measurement reference point

REI = reference elevation interval

Table 3-4
Changes in Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness between Q4 2018 and Q1 2019

Location ID	Q4 2018					Q1 2019					Change Compared to the Previous Quarter Gauged	
	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Difference between Q1 2019 and Q4 2018 LNAPL Thickness (ft)	Difference between Q1 2019 and Q4 2018 Groundwater Elevations (ft)
Reference Elevation Interval 4857 (ft AMSL) Groundwater Monitoring Wells												
KAFB-106001[a]	10/10/2018	471.79	0	4873.11	Yes	2/7/2019	470.44	0	4874.46	Yes	-	1.35
KAFB-106002	10/9/2018	468.70	0	4873.54	Yes	2/5/2019	466.03	0	4876.21	Yes	-	2.67
KAFB-106003	10/9/2018	466.43	0	4873.85	Yes	2/4/2019	465.09	0	4875.19	Yes	-	1.34
KAFB-106004	10/10/2018	472.49	0	4873.32	Yes	2/4/2019	470.60	0	4875.21	Yes	-	1.89
KAFB-106005	10/10/2018	473.87	0	4873.04	Yes	2/5/2019	471.93	0	4874.98	Yes	-	1.94
KAFB-106006	10/11/2018	478.65	0	4872.83	Yes	2/7/2019	477.17	0	4874.31	Yes	-	1.48
KAFB-106007	10/10/2018	476.72	0	4872.88	Yes	2/7/2019	475.31	0	4874.29	Yes	-	1.41
KAFB-106008	10/10/2018	478.86	0	4872.91	Yes	2/5/2019	476.95	0	4874.82	Yes	-	1.91
KAFB-106009	10/9/2018	475.39	0	4873.16	Yes	2/7/2019	474.09	0	4874.46	Yes	-	1.30
KAFB-106010	10/10/2018	470.62	0	4872.64	Yes	2/7/2019	469.17	0	4874.09	Yes	-	1.45
KAFB-106011	10/9/2018	480.33	0	4872.82	Yes	2/5/2019	478.48	0	4874.67	Yes	-	1.85
KAFB-106012R	10/9/2018	471.92	0	4873.08	No	2/5/2019	470.20	0	4874.80	No	-	1.72
KAFB-106013	10/10/2018	477.76	0	4872.86	Yes	2/4/2019	475.89	0	4874.73	Yes	-	1.87
KAFB-106014	10/9/2018	477.21	0	4873.01	No	2/5/2019	475.55	0.11	4874.75	Yes	0.11	1.74
KAFB-106015[a]	10/11/2018	470.84	0	4871.60	Yes	2/5/2019	468.88	0	4873.56	Yes	-	1.96
KAFB-106016	10/9/2018	468.88	0	4873.55	Yes	2/7/2019	467.90	0	4874.53	Yes	-	0.98
KAFB-106017[a]	10/10/2018	470.29	0	4872.23	Yes	2/5/2019	468.44	0	4874.08	Yes	-	1.85
KAFB-106018[a]	10/11/2018	463.86	0	4872.45	Yes	2/5/2019	462.02	0	4874.29	Yes	-	1.84
KAFB-106019[a]	10/10/2018	482.30	0	4872.32	Yes	2/5/2019	479.41	0	4875.21	Yes	-	2.89
KAFB-106020	10/11/2018	468.15	0	4872.90	Yes	2/5/2019	466.35	0	4874.70	Yes	-	1.80
KAFB-106021[a]	10/8/2018	441.38	0	4872.95	Yes	2/6/2019	439.87	0	4874.46	Yes	-	1.51
KAFB-106022[a]	10/10/2018	445.87	0	4872.19	Yes	2/5/2019	444.08	0	4873.98	Yes	-	1.79
KAFB-106023	10/10/2018	456.47	0	4872.29	Yes	2/5/2019	454.39	0	4874.37	Yes	-	2.08
KAFB-106024	10/10/2018	470.47	0	4873.08	Yes	2/7/2019	469.12	0	4874.43	Yes	-	1.35
KAFB-106025[a]	10/10/2018	444.63	0	4872.65	Yes	2/4/2019	442.86	0	4874.42	Yes	-	1.77
KAFB-106027	10/9/2018	475.23	0	4873.39	Yes	2/4/2019	473.82	0	4874.80	Yes	-	1.41
KAFB-106028	10/10/2018	476.20	0	4872.69	Yes	2/5/2019	474.40	0	4874.49	Yes	-	1.80
KAFB-106029	10/8/2018	437.74	0	4873.20	Yes	2/6/2019	436.18	0	4874.76	Yes	-	1.56
KAFB-106032	10/11/2018	444.36	0	4873.24	Yes	2/4/2019	442.61	0	4874.99	Yes	-	1.75
KAFB-106035	10/10/2018	449.89	0	4871.69	Yes	2/4/2019	448.05	0	4873.53	Yes	-	1.84
KAFB-106038	10/10/2018	479.29	0	4872.32	Yes	2/5/2019	477.32	0	4874.29	Yes	-	1.97
KAFB-106041	10/9/2018	451.72	0	4872.63	No	2/4/2019	449.76	0	4874.59	No	-	1.96
KAFB-106042	10/9/2018	451.46	0	4872.61	Yes	2/4/2019	449.51	0	4874.56	Yes	-	1.95
KAFB-106046	10/9/2018	479.92	0	4872.92	Yes	2/7/2019	478.53	0	4874.31	Yes	-	1.39
KAFB-106049	10/10/2018	443.14	0	4872.96	Yes	2/4/2019	441.33	0	4874.77	Yes	-	1.81
KAFB-106052	10/10/2018	446.24	0	4872.62	Yes	2/7/2019	444.38	0	4874.48	Yes	-	1.86
KAFB-106055	10/9/2018	452.68	0	4872.41	Yes	2/4/2019	450.81	0	4874.28	Yes	-	1.87
KAFB-106059	10/10/2018	474.89	0	4872.98	No	2/7/2019	473.70	0.34	4874.43	Yes	0.34	1.45
KAFB-106064[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA
KAFB-106067	10/10/2018	475.13	0	4872.37	Yes	2/5/2019	473.31	0	4874.19	Yes	-	1.82
KAFB-106070	10/10/2018	446.25	0	4872.29	Yes	2/5/2019	444.46	0	4874.08	Yes	-	1.79
KAFB-106075	10/11/2018	467.76	0	4872.74	Yes	2/5/2019	465.91	0	4874.59	Yes	-	1.85
KAFB-106076	10/11/2018	472.21	0.01	4872.72	No	2/7/2019	470.78	0.02	4874.16	Yes	0.01	1.44
KAFB-106079	10/10/2018	476.99	0	4872.68	No	2/5/2019	475.22	0.18	4874.58	Yes	0.18	1.91
KAFB-106082	10/11/2018	463.00	0	4872.26	Yes	2/5/2019	461.10	0	4874.16	Yes	-	1.90

Table 3-4
Changes in Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness between Q4 2018 and Q1 2019

Location ID	Q4 2018					Q1 2019					Change Compared to the Previous Quarter Gauged	
	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Difference between Q1 2019 and Q4 2018 LNAPL Thickness (ft)	Difference between Q1 2019 and Q4 2018 Groundwater Elevations (ft)
KAFB-106085	10/10/2018	444.56	0	4872.67	Yes	2/5/2019	442.82	0	4874.41	Yes	-	1.74
KAFB-106088	10/10/2018	452.03	0	4872.24	Yes	2/5/2019	450.21	0	4874.06	Yes	-	1.82
KAFB-106091	10/10/2018	441.80	0	4872.53	Yes	2/4/2019	440.97	0	4873.36	Yes	-	0.83
KAFB-106094	10/10/2018	472.30	0	4872.77	Yes	2/4/2019	470.46	0	4874.61	Yes	-	1.84
KAFB-106106	10/9/2018	449.34	0	4872.46	Yes	2/4/2019	447.47	0	4874.33	Yes	-	1.87
KAFB-106148-484	10/10/2018	471.18	0	4873.06	No	2/7/2019	469.67	0	4874.57	No	-	1.51
KAFB-106149-484	10/11/2018	473.26	0	4872.68	No	2/7/2019	471.69	0	4874.25	No	-	1.57
KAFB-106150-484	10/11/2018	471.52	0.11	4872.66	No	2/7/2019	470.01	0	4872.67	No	-0.11	0.01
KAFB-106151-484	10/10/2018	473.06	0	4872.54	No	2/7/2019	471.60	0	4874.00	No	-	1.46
KAFB-106152-484	10/10/2018	474.87	0	4872.81	No	2/7/2019	473.32	0	4874.36	No	-	1.55
KAFB-106153-484	10/10/2018	476.29	0	4872.70	No	2/7/2019	474.72	0	4874.27	No	-	1.57
KAFB-106154-484	10/11/2018	474.40	0.04	4872.97	No	2/7/2019	472.99	0.11	4874.43	No	0.07	1.46
KAFB-106155-484	10/10/2018	474.79	0	4872.37	No	2/7/2019	473.29	0	4873.87	No	-	1.50
KAFB-106156-484[d]	10/10/2018	468.11	0	4873.08	No	2/26/2019	466.44	0	4874.75	No	-	1.67
KAFB-106201[c]	10/10/2018	486.84	0	4870.16	Yes	2/4/2019	481.34	0	4875.66	Yes	-	5.50
KAFB-106204	10/9/2018	460.55	0	4872.31	Yes	2/4/2019	457.67	0	4875.19	Yes	-	2.88
KAFB-106207	10/9/2018	472.51	0	4871.69	Yes	2/4/2019	468.23	0	4875.97	Yes	-	4.28
KAFB-106211	10/10/2018	NA	NA	NA	NA	2/4/2019	NA	NA	NA	NA	-	NA
KAFB-106213	10/10/2018	453.40	0	4871.79	Yes	2/4/2019	451.41	0	4873.78	No	-	1.99
KAFB-106216	10/11/2018	461.96	0	4871.95	Yes	2/4/2019	459.60	0	4874.31	No	-	2.36
KAFB-106219	10/10/2018	468.62	0	4871.79	Yes	2/4/2019	465.50	0	4874.91	No	-	3.12
KAFB-106222	10/9/2018	461.21	0	4872.03	Yes	2/4/2019	458.57	0	4874.67	No	-	2.64
KAFB-106225	10/9/2018	454.45	0	4871.91	Yes	2/4/2019	452.06	0	4874.30	No	-	2.39
KAFB-106229	10/10/2018	441.76	0	4872.55	No	2/4/2019	441.12	0	4873.19	No	-	0.64
KAFB-106231	10/8/2018	455.11	0	4872.45	Yes	2/6/2019	452.25	0	4875.31	No	-	2.86
KAFB-106235-463[e]	10/11/2018	443.43	0	4872.08	No	2/4/2019	441.43	0	4874.08	No	-	2.00
KAFB-106236-461[e]	10/9/2018	443.25	0	4872.45	No	2/5/2019	441.10	0	4874.60	No	-	2.15
KAFB-106240-449	10/10/2018	474.66	0	4870.10	No	2/4/2019	472.92	0	4871.84	No	-	1.74
KAFB-106241-428	10/9/2018	452.31	0	4871.75	No	2/4/2019	450.47	0	4873.59	No	-	1.84
KAFB-106242-418	10/8/2018	443.35	0	4872.80	No	2/6/2019	441.85	0	4874.30	No	-	1.50
KAFB-106243-425	10/10/2018	448.28	0	4872.29	No	2/4/2019	446.57	0	4874.00	No	-	1.71
KAFB-106244-445	10/10/2018	470.25	0	4873.26	No	2/4/2019	468.54	0	4874.97	No	-	1.71
KAFB-106245-460	10/9/2018	488.60	0	4872.30	No	2/5/2019	486.82	0	4874.08	No	-	1.78
KAFB-3411[d]	10/9/2018	470.14	0	4873.35	Yes	2/26/2019	468.74	0	4874.75	Yes	-	1.40
KAFB-106S2-451	NA	NA	NA	NA	NA	2/7/2019	478.08	0	4874.35	No	-	NA
KAFB-106S3-449	NA	NA	NA	NA	NA	2/7/2019	477.18	0	4873.84	No	-	NA
KAFB-106S4-446	NA	NA	NA	NA	NA	2/7/2019	472.10	0	4874.49	No	-	NA
KAFB-106S5-446	NA	NA	NA	NA	NA	2/7/2019	469.33	0	4874.27	No	-	NA
KAFB-106S9-447	NA	NA	NA	NA	NA	2/7/2019	438.49	0	4907.34	No	-	NA
Reference Elevation Interval 4838 (ft AMSL) Groundwater Monitoring Wells												
KAFB-106030	10/8/2018	438.82	0	4872.21	Yes	2/6/2019	436.26	0	4874.77	Yes	-	2.56
KAFB-106033	10/11/2018	444.49	0	4873.27	Yes	2/4/2019	442.78	0	4874.98	Yes	-	1.71
KAFB-106036	10/10/2018	450.35	0	4871.50	Yes	2/4/2019	448.49	0	4873.36	Yes	-	1.86
KAFB-106037	10/10/2018	451.02	0	4871.08	Yes	2/4/2019	449.11	0	4872.99	Yes	-	1.91
KAFB-106039	10/10/2018	479.11	0	4872.21	Yes	2/5/2019	477.82	0	4873.50	Yes	-	1.29
KAFB-106044	10/9/2018	475.37	0	4873.42	Yes	2/4/2019	473.66	0	4875.13	Yes	-	1.71
KAFB-106047	10/9/2018	480.01	0	4872.80	Yes	2/5/2019	478.19	0	4874.62	Yes	-	1.82

Table 3-4
Changes in Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness between Q4 2018 and Q1 2019

Location ID	Q4 2018					Q1 2019					Change Compared to the Previous Quarter Gauged	
	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Difference between Q1 2019 and Q4 2018 LNAPL Thickness (ft)	Difference between Q1 2019 and Q4 2018 Groundwater Elevations (ft)
KAFB-106050	10/10/2018	442.55	0	4872.96	Yes	2/4/2019	440.68	0	4874.83	Yes	-	1.87
KAFB-106053	10/10/2018	446.16	0	4872.51	Yes	2/4/2019	444.29	0	4874.38	Yes	-	1.87
KAFB-106057	10/9/2018	453.06	0	4872.40	Yes	2/4/2019	451.16	0	4874.30	Yes	-	1.90
KAFB-106060	10/10/2018	472.38	0	4872.94	Yes	2/7/2019	470.98	0	4874.34	Yes	-	1.40
KAFB-106063[b]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	-	NA
KAFB-106065	10/10/2018	476.12	0	4872.64	Yes	2/5/2019	474.30	0	4874.46	Yes	-	1.82
KAFB-106069	10/10/2018	474.75	0	4872.50	Yes	2/5/2019	472.91	0	4874.34	Yes	-	1.84
KAFB-106072	10/10/2018	446.76	0	4872.53	Yes	2/5/2019	444.96	0	4874.33	Yes	-	1.80
KAFB-106073	10/10/2018	467.06	0	4872.81	Yes	2/5/2019	465.21	0	4874.66	Yes	-	1.85
KAFB-106077	10/10/2018	473.22	0	4871.50	Yes	2/7/2019	471.84	0	4872.88	Yes	-	1.38
KAFB-106080	10/9/2018	475.37	0	4873.11	Yes	2/5/2019	473.66	0	4874.82	Yes	-	1.71
KAFB-106083	10/11/2018	462.67	0	4872.37	Yes	2/5/2019	460.77	0	4874.27	Yes	-	1.90
KAFB-106086	10/10/2018	444.98	0	4872.67	Yes	2/5/2019	443.24	0	4874.41	Yes	-	1.74
KAFB-106089	10/11/2018	451.74	0	4871.80	Yes	2/5/2019	449.89	0	4873.65	Yes	-	1.85
KAFB-106092	10/10/2018	441.94	0	4872.57	Yes	2/4/2019	441.32	0	4873.19	Yes	-	0.62
KAFB-106095	10/10/2018	471.86	0	4872.80	Yes	2/4/2019	470.06	0	4874.60	Yes	-	1.80
KAFB-106097	10/10/2018	474.73	0	4873.01	Yes	2/4/2019	473.81	0	4873.93	Yes	-	0.92
KAFB-106099	10/10/2018	469.44	0	4873.41	Yes	2/4/2019	467.61	0	4875.24	Yes	-	1.83
KAFB-106101	10/9/2018	466.67	0	4873.65	Yes	2/4/2019	465.21	0	4875.11	Yes	-	1.46
KAFB-106103	10/10/2018	456.75	0	4871.69	Yes	2/5/2019	454.64	0	4873.80	Yes	-	2.11
KAFB-106105	10/9/2018	449.42	0	4872.54	Yes	2/4/2019	447.56	0	4874.40	Yes	-	1.86
KAFB-106202[c]	10/10/2018	487.87	0	4869.93	Yes	2/4/2019	482.04	0	4875.76	Yes	-	5.83
KAFB-106205	10/9/2018	460.99	0	4872.30	Yes	2/4/2019	458.05	0	4875.24	Yes	-	2.94
KAFB-106208	10/9/2018	472.23	0	4871.62	Yes	2/4/2019	467.90	0	4875.95	Yes	-	4.33
KAFB-106214	10/10/2018	453.54	0	4871.91	Yes	2/4/2019	451.46	0	4873.99	Yes	-	2.08
KAFB-106217	10/11/2018	461.90	0	4871.95	Yes	2/4/2019	459.49	0	4874.36	Yes	-	2.41
KAFB-106220	10/10/2018	468.53	0	4871.81	Yes	2/4/2019	465.44	0	4874.90	Yes	-	3.09
KAFB-106223	10/9/2018	461.86	0	4872.10	Yes	2/4/2019	459.25	0	4874.71	Yes	-	2.61
KAFB-106226	10/9/2018	455.05	0	4872.26	Yes	2/4/2019	452.70	0	4874.61	Yes	-	2.35
KAFB-106235-492[e]	10/11/2018	443.40	0	4872.11	Yes	2/4/2019	441.38	0	4874.13	Yes	-	2.02
KAFB-106236-490[e]	10/9/2018	443.22	0	4872.48	Yes	2/4/2019	440.92	0	4874.78	Yes	-	2.30
Reference Elevation Interval 4814 (ft AMSL) Groundwater Monitoring Wells												
KAFB-106031	10/8/2018	437.85	0	4873.21	Yes	2/6/2019	436.31	0	4874.75	Yes	-	1.54
KAFB-106034	10/11/2018	445.36	0	4873.27	Yes	2/4/2019	443.63	0	4875.00	Yes	-	1.73
KAFB-106040	10/10/2018	478.02	0	4872.24	Yes	2/5/2019	476.00	0	4874.26	Yes	-	2.02
KAFB-106043	10/9/2018	451.70	0	4872.60	Yes	2/4/2019	449.74	0	4874.56	Yes	-	1.96
KAFB-106045	10/9/2018	475.09	0	4873.43	Yes	2/4/2019	473.67	0	4874.85	Yes	-	1.42
KAFB-106048	10/9/2018	479.72	0	4872.86	Yes	2/5/2019	477.92	0	4874.66	Yes	-	1.80
KAFB-106051	10/10/2018	442.85	0	4872.93	Yes	2/4/2019	440.97	0	4874.81	Yes	-	1.88
KAFB-106054	10/10/2018	445.77	0	4872.61	Yes	2/4/2019	443.87	0	4874.51	Yes	-	1.90
KAFB-106058	10/9/2018	453.61	0	4872.44	Yes	2/4/2019	451.70	0	4874.35	Yes	-	1.91
KAFB-106061	10/10/2018	472.37	0	4873.06	Yes	2/7/2019	470.96	0	4874.47	Yes	-	1.41
KAFB-106062	10/10/2018	478.34	0	4872.86	Yes	2/7/2019	476.83	0	4874.37	Yes	-	1.51
KAFB-106066	10/10/2018	476.37	0	4872.72	Yes	2/5/2019	474.49	0	4874.60	Yes	-	1.88
KAFB-106068	10/10/2018	474.95	0	4872.28	Yes	2/5/2019	473.04	0	4874.19	Yes	-	1.91
KAFB-106071	10/10/2018	448.50	0	4872.40	Yes	2/5/2019	446.65	0	4874.25	Yes	-	1.85
KAFB-106074	10/11/2018	467.81	0	4872.78	Yes	2/5/2019	465.93	0	4874.66	Yes	-	1.88

Table 3-4
Changes in Groundwater Elevation and Light Non-Aqueous Phase Liquid Thickness between Q4 2018 and Q1 2019

	Q4 2018					Q1 2019					Change Compared to the Previous Quarter Gauged	
Location ID	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Date of Measurement	Depth to Water (ft MRP)	Measured LNAPL Thickness (ft)	Groundwater Elevation Corrected for LNAPL Thickness (ft AMSL)	Screen Submerged (Yes/No?)	Difference between Q1 2019 and Q4 2018 LNAPL Thickness (ft)	Difference between Q1 2019 and Q4 2018 Groundwater Elevations (ft)
KAFB-106078	10/10/2018	472.36	0	4872.24	Yes	2/7/2019	472.01	0	4872.59	Yes	-	0.35
KAFB-106081	10/9/2018	476.57	0	4872.91	Yes	2/5/2019	474.76	0	4874.72	Yes	-	1.81
KAFB-106084	10/11/2018	465.47	0	4872.47	Yes	2/4/2019	463.51	0	4874.43	Yes	-	1.96
KAFB-106087	10/10/2018	444.17	0	4872.70	Yes	2/5/2019	442.41	0	4874.46	Yes	-	1.76
KAFB-106090	10/10/2018	450.56	0	4872.29	Yes	2/5/2019	448.72	0	4874.13	Yes	-	1.84
KAFB-106093	10/10/2018	442.02	0	4872.60	Yes	2/4/2019	440.69	0	4873.93	Yes	-	1.33
KAFB-106096	10/10/2018	472.45	0	4872.86	Yes	2/4/2019	470.62	0	4874.69	Yes	-	1.83
KAFB-106098	10/10/2018	474.78	0	4873.05	Yes	2/4/2019	472.90	0	4874.93	Yes	-	1.88
KAFB-106100	10/10/2018	469.53	0	4873.32	Yes	2/4/2019	467.61	0	4875.24	Yes	-	1.92
KAFB-106102	10/9/2018	466.78	0	4873.54	Yes	2/4/2019	465.35	0	4874.97	Yes	-	1.43
KAFB-106104	10/10/2018	456.18	0	4871.90	Yes	2/5/2019	454.10	0	4873.98	Yes	-	2.08
KAFB-106107	10/9/2018	449.54	0	4872.58	Yes	2/4/2019	447.68	0	4874.44	Yes	-	1.86
KAFB-106203[c]	10/10/2018	488.25	0	4869.27	Yes	2/4/2019	482.07	0	4875.45	Yes	-	6.18
KAFB-106206	10/9/2018	461.16	0	4872.30	Yes	2/4/2019	458.16	0	4875.30	Yes	-	3.00
KAFB-106209	10/9/2018	471.71	0	4871.67	Yes	2/4/2019	467.22	0	4876.16	Yes	-	4.49
KAFB-106212	10/10/2018	450.60	0	4871.20	Yes	2/4/2019	448.54	0	4873.26	Yes	-	2.06
KAFB-106215	10/10/2018	453.76	0	4872.01	Yes	2/4/2019	451.66	0	4874.11	Yes	-	2.10
KAFB-106218	10/11/2018	462.06	0	4871.58	Yes	2/4/2019	459.62	0	4874.02	Yes	-	2.44
KAFB-106221	10/10/2018	468.30	0	4871.80	Yes	2/4/2019	465.23	0	4874.87	Yes	-	3.07
KAFB-106224	10/9/2018	462.97	0	4872.11	Yes	2/4/2019	460.41	0	4874.67	Yes	-	2.56
KAFB-106227	10/9/2018	455.75	0	4872.34	Yes	2/4/2019	453.47	0	4874.62	Yes	-	2.28
KAFB-106232	10/8/2018	454.63	0	4872.57	Yes	2/6/2019	451.73	0	4875.47	Yes	-	2.90
KAFB-106235-521[e]	10/11/2018	443.46	0	4872.05	Yes	2/5/2019	441.28	0	4874.23	Yes	-	2.18
KAFB-106236-519[e]	10/9/2018	443.27	0	4872.43	Yes	2/4/2019	441.10	0	4874.60	Yes	-	2.17

[a] Well used in analyses for both REI 4857 and 4838.
[b] Well was not gauged due to presence of monitoring equipment.
[c] Well within immediate proximity of drinking water supply well KAFB-003. KAFB-003 was not pumping during gauging in Q1 2019.
[d] Depth to groundwater re-measurement outside of five day gauging window.
[e] Location ID for this well is based on the bottom of screen.
AMSL = above mean sea level
ft = foot/feet
ID = identification
LNAPL = light non-aqueous phase liquid
MRP = measurement reference point
NA = not applicable
Q1 = first quarter
Q4 = fourth quarter
REI = reference elevation interval
- = LNAPL not detected in Q4 2018 and Q1 2019

Table 3-5
Water Quality Field Measurements for Groundwater Monitoring Well Samples, Q1 2019

Location ID	Sample Date	Temperature (°C)	pH (S.U.)	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)
KAFB-106003	1/7/2019	16.1	7.81	848.0	8.38	214.9	2.58
KAFB-106004	1/11/2019	16.4	7.91	453.1	6.25	181.7	3.69
KAFB-106005[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106009[a]	1/14/2018	NA	NA	NA	NA	NA	NA
KAFB-106012R	1/17/2019	17.6	7.63	2184.0	9.42	157.0	21.20
KAFB-106013	1/11/2019	15.0	7.90	425.1	4.58	190.0	30.30
KAFB-106029[a]	1/18/2019	NA	NA	NA	NA	NA	NA
KAFB-106030[b]	2/6/2019	16.4	7.89	692.0	7.47	193.8	6.00
KAFB-106031[a]	1/18/2019	NA	NA	NA	NA	NA	NA
KAFB-106032[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106033[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106034[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106049[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106050[a]	2/6/2019	NA	NA	NA	NA	NA	NA
KAFB-106051[a]	2/6/2019	NA	NA	NA	NA	NA	NA
KAFB-106097	1/8/2019	16.3	7.95	308.6	3.10	185.8	0.42
KAFB-106098	1/8/2019	16.1	7.54	232.8	3.17	186.7	0.56
KAFB-106099	1/10/2019	16.0	7.89	202.9	8.16	217.2	25.9
KAFB-106100	1/10/2019	16.9	7.97	271.1	2.45	207.4	1.17
KAFB-106101	1/7/2019	16.9	7.94	476.6	5.27	214.3	0.85
KAFB-106102	1/7/2019	16.3	7.88	329.5	4.44	196.5	1.54
KAFB-106201[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106202[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106203[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106204[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106205[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106206[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106207[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106208[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106209[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106216[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106217[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106218[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106222[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106223[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106224[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106231[a]	1/18/2019	NA	NA	NA	NA	NA	NA
KAFB-106232[a]	1/18/2019	NA	NA	NA	NA	NA	NA
KAFB-106235-463[a]	1/14/2019	NA	NA	NA	NA	NA	NA

Table 3-5
Water Quality Field Measurements for Groundwater Monitoring Well Samples, Q1 2019

Location ID	Sample Date	Temperature (°C)	pH (S.U.)	Spec. Cond. (µS/cm)	DO (mg/L)	ORP (mV)	Turbidity (NTU)
KAFB-106235-492[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106235-521[a]	2/6/2019	NA	NA	NA	NA	NA	NA
KAFB-106236-461[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106236-490[a]	2/6/2014	NA	NA	NA	NA	NA	NA
KAFB-106236-519[a]	1/14/2019	NA	NA	NA	NA	NA	NA
KAFB-106240-449[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106241-428[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106242-418[a]	1/18/2019	NA	NA	NA	NA	NA	NA
KAFB-106243-425[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106244-445[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106S2-451[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106S3-449[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106S4-446[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106S5-446[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106S9-447[a]	1/15/2019	NA	NA	NA	NA	NA	NA
KAFB-106245-460[a]	1/15/2019	NA	NA	NA	NA	NA	NA

[a] Samples collected via passive sampling methodology; no field water quality measurement available.
[b] Sample collected from KAFB-106030 using a Bennett pump in Q1 2019
°C = degrees Celsius
µS/cm = microSiemens per centimeter
DO = dissolved oxygen
ID = identification
mg/L = milligram per liter
mV = millivolt
NA = not available
NTU = nephelometric turbidity unit
ORP = oxidation reduction potential
Spec. Cond. = specific conductivity
S.U. = standard unit

Table 3-6
Status of Quarterly Baseline Sampling Newly Added Wells and Summary of Q1 2019 Analytical Results

Well Location ID	Reference Elevation Interval (ft AMSL)	Dates Newly Added Wells Sampled	Number of Quarters Sampled	Remaining Quarters to Complete Baseline	Quarter for Baseline Completion	Analytical Results for Samples Collected During Q1 2019
KAFB-106240-449[a]	4857	9/4/2018	1	2	4	EDB was not detected. No inorganic compounds exceeded their respective PSL.
		10/1/2018	2			
		1/15/2019	3			
		TBD	4			
		TBD	5			
KAFB-106241-428	4857	10/2/2018	1	2	4	EDB was detected above MCL. No inorganic compounds exceeded their respective PSL.
		1/15/2019	2			
		TBD	3			
		TBD	4			
KAFB-106242-418	4857	10/8/2018	1	2	4	EDB was not detected. No inorganic compounds exceeded their respective PSL.
		1/18/2019	2			
		TBD	3			
		TBD	4			
KAFB-106243-425[a]	4857	9/4/2018	1	3	4	EDB was detected below the MCL. Dissolved manganese exceeded the PSL. No other inorganic compounds exceeded their PSL.
		10/2/2018	2			
		1/15/2019	3			
		TBD	4			
		TBD	5			
KAFB-106244-445[a,b]	4857	9/4/2018	1	3	4	EDB was not detected. Sulfate was detected above PSL. No other inorganic compounds exceeded their respective PSL. Not analyzed for BTEX in Q1 2019; this was a variance from the work plan.
		10/1/2018	2			
		1/15/2019	3			
		TBD	4			
		TBD	5			
		TBD	6			
KAFB-106245-460[b]	4857	10/9/2018	1	3	4	EDB was not detected. No inorganic compounds exceeded their respective PSL. Not analyzed for BTEX in Q1 2019; this was a variance from the work plan.
		1/15/2019	2			
		TBD	3			
		TBD	4			
		TBD	5			
KAFB-106S2-451	4857	1/15/2019	1	3	4	EDB and BTEX were detected above their respective MCLs. Dissolved manganese and iron exceeded the PSL. No other inorganic compounds exceeded their PSL.
		TBD	2			
		TBD	3			
		TBD	4			
KAFB-106S3-449	4857	1/15/2019	1	3	4	EDB and BTEX were detected above their respective MCLs. Dissolved manganese and iron exceeded the PSL. No other inorganic compounds exceeded their PSL.
		TBD	2			
		TBD	3			
		TBD	4			
KAFB-106S4-446	4857	1/15/2019	1	3	4	EDB was not detected below the MCL. Sulfate was detected above PSL. No other inorganic compounds exceeded their respective PSL.
		TBD	2			
		TBD	3			
		TBD	4			
KAFB-106S5-446	4857	1/15/2019	1	3	4	EDB and BTEX were detected above their respective MCLs. Dissolved manganese and iron exceeded the PSL. No other inorganic compounds exceeded their PSL.
		TBD	2			
		TBD	3			
		TBD	4			
KAFB-106S9-447	4857	1/15/2019	1	3	4	EDB and BTEX were detected above their respective MCLs. Dissolved manganese and iron exceeded the PSL. No other inorganic compounds exceeded their PSL.
		TBD	2			
		TBD	3			
		TBD	4			

[a]Because the Q3 2018 and Q4 2018 sampling events were only one month apart, these wells will be sampled for an additional quarter to complete baseline.
[b]This well was not analyzed for BTEX in Q1 2019; this was a variance from the work plan and these wells will be sampled for an additional quarter to complete baseline.
AMSL = above mean sea level
BTEX = benzene, toluene, ethylbenzene, xylenes total
EDB = ethylene dibromide (1,2-dibromoethane)
ft = foot/feet
ID = identification
MCL = maximum contaminant level
PSL = project screening level
TBD = to be determined

Table 3-7
Groundwater Analytical Results for Newly Added Wells, Q1 2019

			Well Location ID:				KAFB-106240-449			KAFB-106241-428			KAFB-106242-418			KAFB-106243-425		
			Field Sample ID:				GW240-449-191			GW241-428-191			GW242-418-191			GW243-425-191		
			Sample Date:				1/15/2019			1/15/2019			1/18/2019			1/15/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				478.34			454.8			444.84			449		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	**0.085**	--	0.019	ND	U	0.019	0.042	--	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	121	--	0.100	44.1	--	0.100	112	--	0.100	51.3	--	0.100
		Iron, dissolved	1.0	NS	NS	1.0	ND	U	0.100	ND	U	0.100	0.161	J	0.100	ND	U	0.100
		Magnesium	NS	NS	NS	NS	17.4	--	0.0500	6.21	--	0.0500	15.8	--	0.0500	7.25	--	0.0500
		Manganese, dissolved	0.2	NS	NS	0.2	ND	U	0.0025	0.0030	J	0.0025	0.0411	--	0.0025	**0.407**	--	0.0025
		Potassium	NS	NS	NS	NS	3.54	--	0.375	2.53	--	0.375	3.79	--	0.375	3.03	--	0.375
		Sodium	NS	NS	NS	NS	33.7	--	0.500	25.2	--	0.500	35.2	--	0.500	29.1	--	0.500
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.0013	J	0.0016	0.0010	J	0.0016	0.0011	J	0.0016	0.00095	J	0.0016
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	ND	U	0.0024	ND	U	0.0024	ND	U	0.0024
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	2.8	--	2.0	ND	U	2.0	2.3	J	2.0	ND	U	2.0
		Chloride	250	250	NS	250	129	--	30.0	23.9	--	1.5	99.5	--	15.0	21.1	--	1.5
		Sulfate	600	250	NS	250	139	--	18.0	39.8	--	4.5	158	--	45.0	39.0	--	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	3.6	--	0.090	ND	U	0.090	3.2	J	0.090	0.62	--	0.090
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	119	J	4.0	112	J	4.0	107	--	4.0	146	J	4.0
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4.0	ND	U	4.0	ND	U	4.0	ND	U	4.0
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	119	J	4.0	112	J	4.0	107	--	4.0	146	J	4.0

Table 3-7
Groundwater Analytical Results for Newly Added Wells, Q1 2019

			Well Location ID:				KAFB-106244-445[f]			KAFB-106245-460[f]			KAFB-106S2-451			KAFB-106S2-451[g]		
			Field Sample ID:				GW244-445-191			GW245-460-191			GWS2-451-191			GWS2-451-591		
			Sample Date:				1/15/2019			1/15/2019			1/15/2019			1/15/2019		
			Sample Type:				REG			REG			REG			Field Duplicate		
			Sample Depth (ft bgs):				472			490			451-491			451-491		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	**240**	--	37	—	—	—
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	**6400**	--	100	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	**1200**	--	16	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	**12000**	--	100	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	**5300**	--	40	—	—	—
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	152	--	0.100	46.9	--	0.100	95.8	--	0.1	—	—	—
		Iron, dissolved	1.0	NS	NS	1.0	ND	U	0.100	ND	U	0.100	**1.57**	J	0.1	—	—	—
		Magnesium	NS	NS	NS	NS	23.7	--	0.0500	6.98	--	0.0500	16.2	--	0.05	—	—	—
		Manganese, dissolved	0.2	NS	NS	0.2	0.0030	J	0.0025	ND	U	0.0025	**4.44**	--	0.0025	—	—	—
		Potassium	NS	NS	NS	NS	5.00	--	0.375	2.23	--	0.375	3.67	--	0.375	—	—	—
		Sodium	NS	NS	NS	NS	60.1	--	0.500	22.6	--	0.500	34.1	--	0.5	—	—	—
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.00073	J	0.0016	0.00088	J	0.0016	0.005	--	0.0016	—	—	—
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	ND	U	0.0024	ND	U	0.0024	—	—	—
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	ND	U	2.0	ND	U	2.0	ND	U	2	2.1	J	2
		Chloride	250	250	NS	250	114	--	15.0	44.0	--	15.0	29.2	--	3	31.7	--	3
		Sulfate	600	250	NS	250	**316**	--	45.0	31.9	--	4.5	4.7	J	4.5	4.7	J	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	—	—	—	0.85	--	0.090	ND	U	0.09	ND	U	0.09
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	102	J	4.0	110	J	4.0	260	--	4	—	—	—
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4.0	ND	U	4.0	ND	U	4	—	—	—
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	102	J	4.0	110	J	4.0	260	--	4	—	—	—

Table 3-7
Groundwater Analytical Results for Newly Added Wells, Q1 2019

			Well Location ID:				KAFB-106S3-449			KAFB-106S3-449[g]			KAFB-106S4-446			KAFB-106S4-446[g]		
			Field Sample ID:				GWS3-449-191			GWS3-449-591			GWS4-446-191			GWS4-446-591		
			Sample Date:				1/15/2019			1/15/2019			1/15/2019			1/15/2019		
			Sample Type:				REG			Field Duplicate			REG			Field Duplicate		
			Sample Depth (ft bgs):				449-489			449-489			446-486			446-486		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	**0.13**	--	0.019	—	—	—	0.039	--	0.019	—	—	—
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	**4800**	--	10	—	—	—	ND	U	0.5	—	—	—
		Ethylbenzene	700	700	15	700	**1500**	--	16	—	—	—	ND	U	0.8	—	—	—
		Toluene	1,000	1,000	1,100	1,000	**10000**	--	100	—	—	—	ND	U	0.5	—	—	—
		Xylenes, Total	620	10,000	190	620	**4600**	--	40	—	—	—	ND	U	2	—	—	—
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	150	--	0.1	—	—	—	192	--	0.1	191	--	0.1
		Iron, dissolved	1.0	NS	NS	1.0	**1.38**	J	0.1	**1.85**	J	0.1	ND	U	0.1	—	—	—
		Magnesium	NS	NS	NS	NS	25.3	--	0.05	—	—	—	30.1	--	0.05	29.7	--	0.05
		Manganese, dissolved	0.2	NS	NS	0.2	**5.46**	--	0.0025	**5.8**	--	0.0025	0.0014	J	0.0025	—	—	—
		Potassium	NS	NS	NS	NS	4.76	--	0.375	—	—	—	5.2	--	0.375	5.99	--	0.375
		Sodium	NS	NS	NS	NS	45.1	--	0.5	—	—	—	68.7	--	0.5	69.2	--	0.5
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.0037	--	0.0016	—	—	—	0.00075	J	0.0016	0.002	J	0.0016
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	—	—	—	ND	U	0.0024	0.0011	J	0.0024
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	3	--	2	—	—	—	3.3	--	2	—	—	—
		Chloride	250	250	NS	250	106	--	15	—	—	—	188	--	30	—	—	—
		Sulfate	600	250	NS	250	ND	U	4.5	—	—	—	**347**	J	90	—	—	—
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	ND	U	0.09	—	—	—	7.6	--	0.45	—	—	—
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	370	--	4	—	—	—	102	--	4	—	—	—
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4	—	—	—	ND	U	4	—	—	—
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	370	--	4	—	—	—	102	--	4	—	—	—

Table 3-7
Groundwater Analytical Results for Newly Added Wells, Q1 2019

							Well Location ID:	KAFB-106S5-446			KAFB-106S5-446[g]			KAFB-106S9-447			KAFB-106S9-447[g]		
							Field Sample ID:	GWS5-446-191			GWS5-446-591			GWS9-447-191			GWS9-447-591		
							Sample Date:	1/15/2019			1/15/2019			1/15/2019			1/15/2019		
							Sample Type:	REG			Field Duplicate			REG			Field Duplicate		
							Sample Depth (ft bgs):	446-486			446-486			447-487			447-487		
							Reference Elevation Interval (ft AMSL):	4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	**17**	--	1.9	**17**	--	3.8	**120**	--	38	—	—	—
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	**1600**	--	5	**1700**	--	5	**8800**	--	100	—	—	—
		Ethylbenzene	700	700	15	700	**1400**	--	8	**1400**	--	8	**1400**	--	16	—	—	—
		Toluene	1,000	1,000	1,100	1,000	**3500**	J	50	**6700**	J	50	**14000**	--	100	—	—	—
		Xylenes, Total	620	10,000	190	620	**2200**	--	20	**2200**	--	20	**4600**	--	40	—	—	—
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	70.3	--	0.1	—	—	—	97.3	--	0.1	—	—	—
		Iron, dissolved	1.0	NS	NS	1.0	**2.65**	J	0.1	—	—	—	**4**	J	0.1	—	—	—
		Magnesium	NS	NS	NS	NS	11.3	--	0.05	—	—	—	17.4	--	0.05	—	—	—
		Manganese, dissolved	0.2	NS	NS	0.2	**2.03**	--	0.0025	—	—	—	**2.07**	--	0.0025	—	—	—
		Potassium	NS	NS	NS	NS	3.13	--	0.375	—	—	—	4.28	--	0.375	—	—	—
		Sodium	NS	NS	NS	NS	31.5	--	0.5	—	—	—	36.1	--	0.5	—	—	—
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.005	--	0.0016	—	—	—	0.0042	--	0.0016	—	—	—
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	—	—	—	ND	U	0.0024	—	—	—
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	1.5	J	2	—	—	—	1.8	J	2	—	—	—
		Chloride	250	250	NS	250	22.2	J	1.5	—	—	—	26.9	--	1.5	—	—	—
		Sulfate	600	250	NS	250	2.3	J	4.5	—	—	—	21.5	J	4.5	—	—	—
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	ND	U	0.09	—	—	—	ND	U	0.09	—	—	—
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	246	--	4	—	—	—	291	--	4	287	--	4
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4	—	—	—	ND	U	4	ND	U	4
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	246	--	4	—	—	—	291	--	4	287	--	4

Table 3-7
Groundwater Analytical Results for Newly Added Wells, Q1 2019

[a] NMWQCC numeric standards per the NMAC Title 20.6.2.3101A, Standards for Ground Water of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018). For metals, the NMWQCC numeric standard applies to dissolved metals.

[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40CFR Part 141, 143 (May 2018).

[c] EPA Region 6 RSL for Tapwater (November 2018) for hazard index = 1.0 for noncarcinogens and a 10-5 cancer risk level for carcinogens.

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

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

[f] Not analyzed for BTEX; this is a variance from the work plan.

[g] Field duplicate for this suite was not collected from this well. A total field duplicate was collected for all suites in a combination of wells KAFB-106S2-451, KAFB-106S3-449, KAFB-106S4-446, KAFB-106S5-446, and KAFB-106S9-447.

µg/L = microgram per liter
AFB = Air Force Base
AMSL = above mean sea level
BFF = Bulk Fuels Facility
bgs = below-ground surface
$CaCO_3$ = calcium carbonate
CFR = Code of Federal Regulations
EDB = ethylene dibromide (1,2-dibromoethane)
EPA = U.S. Environmental Protection Agency
ft = foot/feet
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
MCL = maximum contaminant level
mg/L = milligram per liter
ND = not detected
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
NS = not specified
REG = normal field sample
RSL = regional screening level
SWMU = Solid Waste Management Unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation

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

U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.
— = Compound not analyzed for.

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106003			KAFB-106004			KAFB-106005			KAFB-106009		
			Field Sample ID:				GW003-191			GW004-191			GW005-191			GW009-191		
			Sample Date:				1/7/2019			1/11/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				479-504			486.74-511.74			482.57			484.39		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	**0.28**	--	0.019	0.014	J	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	**170**	--	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	ND	U	0.8	ND	U	0.8	53	--	0.8	ND	U	0.8
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	4	--	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	ND	U	2	ND	U	2	140	--	2	ND	U	2

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106009			KAFB-106012R			KAFB-106012R			KAFB-106013		
			Field Sample ID:				GW009-591			GW012R-191			GW012R-591			GW013-191		
			Sample Date:				1/14/2019			1/17/2019			1/17/2019			1/11/2019		
			Sample Type:				Field Duplicate			REG			Field Duplicate			REG		
			Sample Depth (ft bgs):				484.39			468.49-497.74			468.49-497.74			489.72-514.72		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	0.015	J	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106029			KAFB-106030			KAFB-106031			KAFB-106032		
			Field Sample ID:				GW029-191			GW030-191			GW031-191			GW032-191		
			Sample Date:				1/18/2019			2/6/2019			1/18/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				451.5			469.5-484.5			496.5			456.7		
			Reference Elevation Interval (ft AMSL):				4857			4838			4814			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.018	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106033			KAFB-106034			KAFB-106049			KAFB-106050		
			Field Sample ID:				GW033-191			GW034-191			GW049-191			GW050-191		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019			2/6/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				477.7			502.7			457.5			476		
			Reference Elevation Interval (ft AMSL):				4838			4814			4857			4838		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106051			KAFB-106097			KAFB-106098			KAFB-106099		
			Field Sample ID:				GW051-191			GW097-191			GW098-191			GW099-191		
			Sample Date:				2/6/2019			1/8/2019			1/8/2019			1/10/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				503			506.04-521.04			531.02-546.02			501-516		
			Reference Elevation Interval (ft AMSL):				4814			4838			4814			4838		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	—	—	—	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	1,100	1,000	—	—	—	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	—	—	—	ND	U	2	ND	U	2	ND	U	2

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106100			KAFB-106101			KAFB-106102			KAFB-106201		
			Field Sample ID:				GW100-191			GW101-191			GW102-191			GW201-191		
			Sample Date:				1/10/2019			1/7/2019			1/7/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				526-541			523.98-537.68			498.81-514.11			490		
			Reference Elevation Interval (ft AMSL):				4814			4838			4814			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	—	—	—
		Ethylbenzene	700	700	15	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	—	—	—
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	—	—	—
		Xylenes, Total	620	10,000	190	620	ND	U	2	ND	U	2	ND	U	2	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106202			KAFB-106203			KAFB-106204			KAFB-106205		
			Field Sample ID:				GW202-191			GW203-191			GW204-191			GW205-191		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				520.6-520.6			623.78			463			493		
			Reference Elevation Interval (ft AMSL):				4838			4814			4857			4838		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	0.024	J	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106206			KAFB-106207			KAFB-106208			KAFB-106209		
			Field Sample ID:				GW206-191			GW207-191			GW208-191			GW209-191		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				594			474			504			603.7		
			Reference Elevation Interval (ft AMSL):				4814			4857			4838			4814		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106216			KAFB-106217			KAFB-106217			KAFB-106218		
			Field Sample ID:				GW216-191			GW217-191			GW217-591			GW218-191		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			Field Duplicate			REG		
			Sample Depth (ft bgs):				461			486			486			553		
			Reference Elevation Interval (ft AMSL):				4857			4838			4838			4814		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106218			KAFB-106222			KAFB-106223			KAFB-106224		
			Field Sample ID:				GW218-591			GW222-191			GW223-191			GW224-191		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019			1/14/2019		
			Sample Type:				Field Duplicate			REG			REG			REG		
			Sample Depth (ft bgs):				553			461.1			488.5			555.7		
			Reference Elevation Interval (ft AMSL):				4814			4857			4838			4814		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106231			KAFB-106232			KAFB-106235-463			KAFB-106235-492		
			Field Sample ID:				GW231-191			GW232-191			GW235-463-191			GW235-492-191		
			Sample Date:				1/18/2019			1/18/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			REG			REG		
			Sample Depth (ft bgs):				456.3			503.7			444			473		
			Reference Elevation Interval (ft AMSL):				4857			4814			4857			4814		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106235-521			KAFB-106236-461			KAFB-106236-490			KAFB-106236-490		
			Field Sample ID:				GW235-521-191			GW236-461-191			GW236-490-191			GW236-490-591		
			Sample Date:				2/6/2019			1/14/2019			2/6/2019			2/6/2019		
			Sample Type:				REG			REG			REG			Field Duplicate		
			Sample Depth (ft bgs):				503			444.5			472			472		
			Reference Elevation Interval (ft AMSL):				4838			4857			4838			4834		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.018	ND	U	0.020	ND	U	0.018	ND	U	0.018
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—	—	—	—	—	—	—	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—	—	—	—	—	—	—	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—	—	—	—	—	—	—	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—	—	—	—	—	—	—	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106236-519		
			Field Sample ID:				GW236-519-191 [e]		
			Sample Date:				1/14/2019		
			Sample Type:				REG		
			Sample Depth (ft bgs):				499.7		
			Reference Elevation Interval (ft AMSL):				4814		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.075	0.05	—	—	—
VOCs	Method SW8260C (µg/L)	Benzene	5	5	4.6	5	—	—	—
		Ethylbenzene	700	700	15	700	—	—	—
		Toluene	1,000	1,000	1,100	1,000	—	—	—
		Xylenes, Total	620	10,000	190	620	—	—	—

Table 3-8
Groundwater Analytical Results for Organic Compounds for Groundwater Monitoring Wells, Q1 2019

[a] NMWQCC numeric standards per the NMAC Title 20.6.2.3101A, Standards for Ground Water of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018). For metals, the NMWQCC numeric standard applies to dissolved metals.

[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40CFR Part 141, 143 (May 2018).

[c] EPA Region 6 RSL for Tapwater (November 2018) for hazard index = 1.0 for noncarcinogens and a 10-5 cancer risk level for carcinogens.

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

[e] Sample was collected but not analyzed due to extreme cold temperatures during transit and sample management errors at the laboratory.

µg/L = microgram per liter
AFB = Air Force Base
AMSL = above mean sea level
BFF = Bulk Fuels Facility
bgs = below-ground surface
CFR = Code of Federal Regulations
EDB = ethylene dibromide (1,2-dibromoethane)
EPA = U.S. Environmental Protection Agency
ft = foot/feet
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
MCL = maximum contaminant level
ND = not detected
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
NS = not specified
REG = normal field sample
RSL = regional screening level
SWMU = Solid Waste Management Unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.
— = Compound not analyzed for.

Table 3-9
Groundwater Analytical Results for Inorganic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106005			KAFB-106009			KAFB-106009		
			Field Sample ID:				GW005-191			GW009-191			GW009-591		
			Sample Date:				1/14/2019			1/14/2019			1/14/2019		
			Sample Type:				REG			REG			Field Duplicate		
			Sample Depth (ft bgs):				482.57			484.39			484.39		
			Reference Elevation Interval (ft AMSL):				4857			4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	221	--	0.100	223	--	0.100	204	--	0.100
		Iron, dissolved	1.0	NS	NS	1.0	0.267	--	0.100	ND	U	0.100	ND	U	0.100
		Magnesium	NS	NS	NS	NS	36.6	--	0.0500	32.2	--	0.0500	29.5	--	0.0500
		Manganese, dissolved	0.2	NS	NS	0.2	**0.328**	--	0.0025	0.147	J	0.0025	**0.769**	J	0.0025
		Potassium	NS	NS	NS	NS	5.14	--	0.375	5.05	--	0.375	4.70	--	0.375
		Sodium	NS	NS	NS	NS	75.0	--	0.500	63.2	--	0.500	57.7	--	0.500
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.0012	J	0.0016	ND	U	0.0016	ND	U	0.0016
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	ND	U	0.0024	ND	U	0.0024
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	2.7	--	2.0	ND	U	2.0	ND	U	2.0
		Chloride	250	250	NS	250	197	--	30.0	ND	U	1.5	ND	U	1.5
		Sulfate	600	250	NS	250	**393**	--	90.0	ND	U	4.5	ND	U	4.5
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	0.073	J	0.090	4.3	J	0.18	ND	U	0.090
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	159	--	4.0	95.8	--	4.0	92.6	--	4.0
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4.0	ND	U	4.0	ND	U	4.0
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	159	--	4.0	95.8	--	4.0	92.6	--	4.0

Table 3-9
Groundwater Analytical Results for Inorganic Compounds for Groundwater Monitoring Wells, Q1 2019

			Well Location ID:				KAFB-106012R			KAFB-106012R		
			Field Sample ID:				GW012R-191			GW012R-591		
			Sample Date:				1/17/2019			1/17/2019		
			Sample Type:				REG			Field Duplicate		
			Sample Depth (ft bgs):				468.49-497.74			468.49-497.74		
			Reference Elevation Interval (ft AMSL):				4857			4857		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**EPA MCL[b]**	**EPA RSL[c]**	**Project Screening Level[d]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
Metals	Method SW6010C (mg/L)	Calcium	NS	NS	NS	NS	197	--	0.100	182	--	0.100
		Iron, dissolved	1.0	NS	NS	1.0	ND	U	0.100	ND	U	0.100
		Magnesium	NS	NS	NS	NS	30.1	--	0.0500	27.8	--	0.0500
		Manganese, dissolved	0.2	NS	NS	0.2	ND	U	0.0025	ND	U	0.0025
		Potassium	NS	NS	NS	NS	5.30	--	0.375	5.25	--	0.375
		Sodium	NS	NS	NS	NS	69.2	--	0.500	63.3	--	0.500
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.00052	0.01	0.0012	J	0.0016	0.0011	J	0.0016
		Lead	0.015	0.015	0.015	0.015	ND	U	0.0024	ND	U	0.0024
Anions	Method E300.0 (mg/L)	Bromide	NS	NS	NS	NS	2.7	--	2.0	2.5	--	2.0
		Chloride	250	250	NS	250	154	--	15.0	146	--	15.0
		Sulfate	600	250	NS	250	**355**	J	45.0	**333**	J	45.0
	Method E353.2 (mg/L)	Nitrate/Nitrite Nitrogen	10[e]	10[e]	NS	10[e]	5.6	--	0.18	5.5	--	0.18
Alkalinity	Method SM2320B (mg/L)	Alkalinity, bicarbonate (as CaCO3)	NS	NS	NS	NS	101	--	4.0	101	--	4.0
		Alkalinity, carbonate (as CaCO3)	NS	NS	NS	NS	ND	U	4.0	ND	U	4.0
		Alkalinity, total (as CaCO3)	NS	NS	NS	NS	101	--	4.0	101	--	4.0

Table 3-9
Groundwater Analytical Results for Inorganic Compounds for Groundwater Monitoring Wells, Q1 2019

[a] NMWQCC numeric standards per the NMAC Title 20.6.2.3101A, Standards for Ground Water of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018). For metals, the NMWQCC numeric standard applies to dissolved metals.

[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40CFR Part 141, 143 (May 2018).

[c] EPA Region 6 RSL for Tapwater (November 2018) for hazard index = 1.0 for noncarcinogens and a 10-5 cancer risk level for carcinogens.

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

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

µg/L = microgram per liter
AFB = Air Force Base
AMSL = above mean sea level
BFF = Bulk Fuels Facility
bgs = below-ground surface
$CaCO_3$ = calcium carbonate
CFR = Code of Federal Regulations
EDB = ethylene dibromide (1,2-dibromoethane)
EPA = U.S. Environmental Protection Agency
ft = foot/feet
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
MCL = maximum contaminant level
mg/L = milligram per liter
ND = not detected
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
NS = not specified
REG = normal field sample
RSL = regional screening level
SWMU = Solid Waste Management Unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation

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

U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

	Chemical Class		**Anions (mg/L)**									
	Parameter		Chloride			Sulfate			Nitrate/Nitrite Nitrogen			
	Analytical Method		Method E300.0			Method E300.0			Method E353.2			
	NMAC NMWQCC[a]		250			600			10[e]			
	EPA MCLs[b]		250			250			10[e]			
	EPA RSLs[c]		NS			NS			NS			
	Project Screening Level[d]		250			250			10[e]			
Location ID	**Field Sample ID**	**Sample Date**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
KAFB-106005	ST106-GW-P-1065-16062010	6/16/2010	133	--	10.0	173	--	10	—	—	—
	ST106-GW-P-1065-14072010	7/14/2010	145	--	10.0	181	--	10	—	—	—
	ST106-GW-P-1065-20102010	10/20/2010	161	--	10.0	164	--	10	—	—	—
	GW0005	2/21/2011	160	--	0.5	154	--	2.0	—	—	—
	GW0045	6/10/2011	156	--	10.0	101	J	25	—	—	—
	GW0134	9/20/2011	151	--	20.0	20.3	J	40	ND	U	1.5
	GW0259	12/12/2011	137	--	0.5	19.0	--	2.0	ND	U	1.5
	GW0384	3/1/2012	130	--	2.5	33.3	--	10	ND	U	1.5
	GW0508	5/9/2012	175	--	0.5	106	--	2.5	ND	U	1.5
	GW0632	8/9/2012	19.3	--	0.5	8.73	--	2.5	ND	U	1.5
	GW0756	11/12/2012	149	--	0.5	28.7	--	2.5	ND	U	1.5
	GW0890	3/25/2013	154	--	0.5	114	--	2.5	1.01	J	1.5
	GW1025	5/15/2013	149	--	2.5	99.6	--	2.5	0.67	J	1.5
	GW1159	8/27/2013	141	--	0.5	69.3	--	2.5	0.934	J	1.5
	GW1292	11/13/2013	101	--	0.5	ND	U	2.0	ND	U	1.5
	GW1425	3/13/2014	183	--	0.5	101	--	2.0	0.734	J	1.5
	GW1558	6/3/2014	173	--	0.5	91	--	2.5	0.704	J	1.5
	GW1722	9/4/2014	167	--	0.5	88.7	--	2.5	1.51	--	1.5
	GW1855	11/20/2014	174	--	0.5	97.3	--	2.5	1.12	--	0.2
	GW1988	3/12/2015	208	--	0.5	184	--	2.5	1.85	--	0.2
	GW2154	6/18/2015	185	--	0.5	123	--	2.5	1.11	--	0.2
	GW2304	9/1/2015	159	--	0.5	108	--	2.5	1.62	--	0.2
	GW2445	11/30/2015	171	--	0.5	147	--	2.5	2.12	--	0.2
	GW005-161	2/11/2016	147	--	20.0	130	--	50	2.3	J-	0.10
	GW005-162	5/17/2016	155	--	20.0	158	--	20	2.3	--	0.10
	GW005-163	8/3/2016	154	--	40.0	216	--	100	2.7	--	0.10
	GW005-164	11/15/2016	225	--	20.0	**339**	--	50	0.45	--	0.10
	GW005-171	1/16/2017	202	--	40.0	**404**	--	100	1.2	J	0.10
	GW005-172	5/2/2017	**257**	J	80.0	**524**	J	200	0.27	--	0.10
	GW005-173	7/18/2017	205	--	40.0	**396**	--	100	0.22	--	0.10
	GW005-174	10/23/2017	211	J	20.0	**480**	--	50	0.5	J	0.10
	GW005-181	1/11/2018	204	--	80.0	**353**	--	200	0.65	--	0.10
	GW005-182	4/19/2018	188	J	20.0	**379**	J	50.0	0.40	--	0.10
	GW005-183	8/15/2018	231	--	40.0	**519**	--	100	0.13	--	0.10
	GW005-184	10/3/2018	207	--	40.0	**517**	--	100	ND	U	0.10
	GW005-191	1/14/2019	197	--	30.0	**393**	--	90.0	0.073	J	0.090

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

		Chemical Class	Anions (mg/L)								
		Parameter	Chloride			Sulfate			Nitrate/Nitrite Nitrogen		
		Analytical Method	Method E300.0			Method E300.0			Method E353.2		
		NMAC NMWQCC[a]	250			600			10[e]		
		EPA MCLs[b]	250			250			10[e]		
		EPA RSLs[c]	NS			NS			NS		
		Project Screening Level[d]	250			250			10[e]		
Location ID	Field Sample ID	Sample Date	Result	Val Qual	LOD	Result	Val Qual	LOD	Result	Val Qual	LOD
KAFB-106009	ST106-GW-1069-06052010	5/6/2010	26	--	1.0	25.3	--	1.0	—	—	—
	ST106-GW-P-1069-16062010	6/16/2010	25.1	--	1.0	29.8	--	1.0	—	—	—
	ST106-GW-P-1069-14072010	7/14/2010	39	--	1.0	28.7	--	1.0	—	—	—
	ST106-GW-P-1069-20102010	10/20/2010	47.1	--	2.0	17.4	--	1.0	—	—	—
	GW0010	2/17/2011	50.2	--	0.5	14.9	--	2.0	—	—	—
	GW0049	5/13/2011	52.2	--	1.0	7.58	--	2.5	—	—	—
	GW0139	9/28/2011	74.5	--	20.0	15.2	J	40	ND	U	1.5
	GW0263	11/22/2011	83.9	--	10.0	4.13	J	20	ND	U	1.5
	GW0388	2/27/2012	107	--	2.5	ND	U	10	ND	U	1.5
	GW0513	5/9/2012	118	--	0.5	ND	U	2.5	ND	U	1.5
	GW0637	8/9/2012	124	--	0.5	ND	U	2.5	ND	U	1.5
	GW0761	11/5/2012	129	--	0.5	ND	U	2.5	ND	U	1.5
	GW0895	1/23/2013	129	--	0.5	ND	U	2.0	ND	U	1.5
	GW1030	5/21/2013	118	--	2.5	12.2	--	2.5	0.421	J	1.5
	GW1163	8/20/2013	135	--	0.5	7.95	--	2.5	ND	U	1.5
	GW1296	11/19/2013	120	--	0.5	2.76	--	2.0	ND	U	1.5
	GW1429	3/5/2014	129	--	0.5	52.6	--	2.0	ND	U	1.5
	GW1562	6/3/2014	186	--	0.5	135	--	2.5	5.64	--	1.5
	GW1726	9/2/2014	205	--	0.5	129	--	2.5	8.18	--	1.5
	GW1859	11/18/2014	248	--	0.5	165	--	2.5	**15.7**	--	1.2
	GW1992	3/11/2015	**312**	--	1.0	**292**	--	5.0	**18.7**	--	1.0
	GW2158	6/18/2015	**312**	--	2.5	**273**	--	12.5	**14.2**	--	1.0
	GW2308	8/27/2015	**308**	--	2.5	**289**	--	12.5	**15.1**	--	2.0
	GW2459	11/3/2015	**330**	J-	2.5	**319**	J-	12.5	**16.3**	J-	2.0
	GW009-161	2/9/2016	**421**	J+	200.0	**372**	--	50.0	**14.9**	--	0.5
	GW009-162	5/5/2016	**336**	--	40.0	**423**	--	100.0	**25.3**	--	1.0
	GW009-163	7/21/2016	**367**	--	40.0	**446**	--	100	**13.5**	J	0.5
	GW009-164	11/3/2016	**411**	--	200.0	**428**	--	50.0	**19.9**	J	0.5
	GW009-171	2/1/2017	**354**	--	200.0	**468**	--	200.0	**15.3**	--	0.5
	GW009-172	5/1/2017	**289**	--	40.0	**442**	--	100.0	**12.5**	--	1.0
	GW009-173	7/12/2017	**315**	J	200.0	**433**	J	50.0	**12.9**	--	1.0
	GW009-174	11/3/2017	**284**	--	20.0	**396**	J	50.0	**10.6**	--	0.5
	GW009-181	1/8/2018	ND	U	2.0	1.8	J	5.0	**11.2**	--	1.0
	GW009-182	4/9/2018	**282**	J	20.0	**391**	--	50.0	**10.9**	J	0.50
	GW009-183	7/11/2018	273	--	20.0	**357**	--	50.0	**10.7**	--	0.50
	GW009-184	10/3/2018	212	--	40.0	**308**	--	100	8.6	--	1.0
	GW009-191	1/14/2019	ND	U	1.5	ND	U	4.5	4.3	J	0.18

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

	Chemical Class		Anions (mg/L)								
	Parameter		Chloride			Sulfate			Nitrate/Nitrite Nitrogen		
	Analytical Method		Method E300.0			Method E300.0			Method E353.2		
	NMAC NMWQCC[a]		250			600			10[e]		
	EPA MCLs[b]		250			250			10[e]		
	EPA RSLs[c]		NS			NS			NS		
	Project Screening Level[d]		250			250			10[e]		
Location ID	**Field Sample ID**	**Sample Date**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
KAFB-106012R	GW1565	5/20/2014	95.4	--	0.5	128	--	2.5	2.37	--	1.5
	GW1730	8/12/2014	154	--	0.5	**262**	--	5.0	4.40	--	1.5
	GW1862	10/23/2014	170	--	1.0	**302**	--	5.0	2.22	--	0.2
	GW1995	2/2/2015	162	--	0.5	**329**	--	5.0	4.75	--	0.4
	GW2161	5/27/2015	179	--	0.5	**330**	--	12.5	5.21	--	0.4
	GW2311	7/27/2015	186	--	0.5	**336**	--	12.5	5.36	--	1.0
	GW2462	10/21/2015	189	--	0.5	**344**	--	12.5	5.92	--	1.0
	GW012R-161	2/8/2016	168	J+	20.0	**297**	--	50	5.7	--	0.5
	GW012R-162	4/25/2016	200	--	40.0	**343**	--	25	ND	U	0.6
	GW012R-163	7/19/2016	194	--	40.0	**372**	--	25	5.8	--	0.5
	GW012R-164	11/8/2016	175	--	20.0	**378**	--	50.0	5.6	--	0.50
	GW012R-171	1/26/2017	176	--	20.0	**396**	J	50.0	6.1	--	0.50
	GW012R-172	4/24/2017	158	--	20.0	**355**	--	50.0	5.7	--	0.50
	GW012R-173	7/19/2017	156	J	20.0	**357**	J	50.0	5.4	--	0.50
	GW012R-174	10/24/2017	154	J	20.0	**352**	--	50.0	5.4	--	0.20
	GW012R-181	1/22/2018	183	--	20.0	**390**	--	50.0	5.1	J	0.20
	GW012R-182	4/24/2018	153	J	20.0	**340**	J	50.0	5.3	J	0.20
	GW012R-183	7/17/2018	156	--	20.0	**359**	--	50.0	6.0	--	0.50
	GW012R-184	11/9/2018	163	J	20.0	**338**	J	50.0	5.3	--	0.50
	GW012R-191	1/17/2019	154	--	15.0	**355**	J	45.0	5.6	--	0.18

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

	Chemical Class		Metals (mg/L)						Field Parameter
	Parameter		Calcium			Sodium			ORP (mV)
	Analytical Method		Method SW6010C			Method SW6010C			--
	NMAC NMWQCC[a]		NS			NS			NS
	EPA MCLs[b]		NS			NS			NS
	EPA RSLs[c]		NS			NS			NS
	Project Screening Level[d]		NS			NS			NS
Location ID	**Field Sample ID**	**Sample Date**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**
KAFB-106005	ST106-GW-P-1065-16062010	6/16/2010	128	--	0.100	64.4	--	0.300	94.1
	ST106-GW-P-1065-14072010	7/14/2010	122	--	0.100	64.7	--	0.300	288
	ST106-GW-P-1065-20102010	10/20/2010	118	--	0.100	65.9	--	0.300	145
	GW0005	2/21/2011	138	--	5.000	79.8	--	5.000	-61
	GW0045	6/10/2011	117	--	5.000	67.2	--	5.000	-25
	GW0134	9/20/2011	132	--	5.000	69.9	--	5.000	-114
	GW0259	12/12/2011	137	--	5.000	71.7	--	5.000	-239
	GW0384	3/1/2012	131	--	5.000	59.8	--	5.000	-290
	GW0508	5/9/2012	147	--	5.000	73.9		5.000	-295
	GW0632	8/9/2012	44.8	--	5.000	27.5	--	5.000	-293
	GW0756	11/12/2012	136	--	5.000	64.9	--	5.000	-335
	GW0890	3/25/2013	146	--	5.000	67.6	--	5.000	-329
	GW1025	5/15/2013	138	--	5.000	65.1	--	5.000	-332
	GW1159	8/27/2013	131	--	5.000	62	--	5.000	-320
	GW1292	11/13/2013	125	--	5.000	54	--	5.000	-300
	GW1425	3/13/2014	143	--	5.000	71.6	--	5.000	-276
	GW1558	6/3/2014	153	--	5.000	75.4	--	5.000	-329
	GW1722	9/4/2014	141	--	5.000	72.3	--	5.000	-341
	GW1855	11/20/2014	136	--	5.000	69.2	--	5.000	-309
	GW1988	3/12/2015	176	--	5.000	83.1	--	5.000	-336
	GW2154	6/18/2015	164	J	5.000	67.6	--	5.000	-333
	GW2304	9/1/2015	150	--	10.000	73.4	--	5.000	-329
	GW2445	11/30/2015	138	--	10.000	62.7	--	5.000	0.01
	GW005-161	2/11/2016	165	--	0.400	73.9	--	2.000	-303.5
	GW005-162	5/17/2016	157	--	0.400	69.6	--	2.000	-315.5
	GW005-163	8/3/2016	177	J	0.200	75.1	--	0.500	-313.9
	GW005-164	11/15/2016	226	--	0.200	88.0	--	0.500	-213
	GW005-171	1/16/2017	245	--	0.200	91.1	J	0.500	-207.5
	GW005-172	5/2/2017	247	--	0.400	86.8	--	2.000	-200.5
	GW005-173	7/18/2017	255	--	0.200	86.8	--	0.500	-178.7
	GW005-174	10/23/2017	250	--	0.200	80.9	--	0.500	-154.9
	GW005-181	1/11/2018	231	--	0.200	80.3	--	0.500	-288.6
	GW005-182	4/19/2018	255	--	0.200	85.2	--	0.500	-221.2
	GW005-183	8/15/2018	244	--	0.100	76.5	--	0.500	NA
	GW005-184	10/3/2018	216	--	0.100	66.5	--	0.500	NA
	GW005-191	1/14/2019	221	--	0.100	75.0	--	0.500	NA

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

		Chemical Class	Metals (mg/L)						Field Parameter
		Parameter	Calcium			Sodium			ORP (mV)
		Analytical Method	Method SW6010C			Method SW6010C			--
		NMAC NMWQCC[a]	NS			NS			NS
		EPA MCLs[b]	NS			NS			NS
		EPA RSLs[c]	NS			NS			NS
		Project Screening Level[d]	NS			NS			NS
Location ID	Field Sample ID	Sample Date	Result	Val Qual	LOD	Result	Val Qual	LOD	Result
KAFB-106009	ST106-GW-1069-06052010	5/6/2010	67.9	--	0.100	30.6	--	0.300	NA
	ST106-GW-P-1069-16062010	6/16/2010	61.4	--	0.100	27.4	--	0.300	-215
	ST106-GW-P-1069-14072010	7/14/2010	76.7	--	0.100	30.2	--	0.300	0.2
	ST106-GW-P-1069-20102010	10/20/2010	89.1	--	0.100	34.8	--	0.300	-2.44
	GW0010	2/17/2011	110	--	5.000	37.7	--	5.000	-127
	GW0049	5/13/2011	124	--	5.000	38.3	--	5.000	-203
	GW0139	9/28/2011	122	--	5.000	36.9	--	5.000	-207
	GW0263	11/22/2011	120	--	5.000	34.5	--	5.000	-147
	GW0388	2/27/2012	163	--	5.000	44.0	--	5.000	-145
	GW0513	5/9/2012	174	--	5.000	46.3	--	5.000	-235
	GW0637	8/9/2012	172	--	5.000	46.6	--	5.000	-173
	GW0761	11/5/2012	169	--	5.000	46.3	--	5.000	-146
	GW0895	1/23/2013	170	--	5.000	48.1	--	5.000	-175
	GW1030	5/21/2013	149	--	5.000	50.3	--	5.000	-165
	GW1163	8/20/2013	171	--	5.000	49.2	--	5.000	-306
	GW1296	11/19/2013	153	--	5.000	42.9	--	5.000	-302
	GW1429	3/5/2014	147	--	5.000	49.7	J+	5.000	-127
	GW1562	6/3/2014	164	--	5.000	49.7	--	5.000	-170
	GW1726	9/2/2014	191	--	5.000	53.7	--	5.000	86
	GW1859	11/18/2014	184	--	5.000	51.3	--	5.000	-53
	GW1992	3/11/2015	242	--	5.000	59.9	--	5.000	89
	GW2158	6/18/2015	246	--	5.000	52.3	--	5.000	88
	GW2308	8/27/2015	244	--	25.000	54.7	--	5.000	79
	GW2459	11/3/2015	266	--	25.000	55.4	--	5.000	NR
	GW009-161	2/9/2016	285	--	0.400	55.4	--	2.000	115.7
	GW009-162	5/5/2016	302	--	0.400	59.7	--	2.000	14.1
	GW009-163	7/21/2016	329	--	0.200	65	--	0.500	80.7
	GW009-164	11/3/2016	305	--	0.200	62.8	--	0.500	55.0
	GW009-171	2/1/2017	311	--	0.400	67.3	--	2.000	165.9
	GW009-172	5/1/2017	287	--	0.400	68.3	--	2.000	4.2
	GW009-173	7/12/2017	265	--	0.200	65.7	--	0.500	132.2
	GW009-174	11/3/2017	259	--	0.200	65.6	--	0.500	-7.2
	GW009-181	1/8/2018	242	--	0.200	63.4	--	0.500	NA
	GW009-182	4/9/2018	260		0.200	71.1	--	0.500	-221.2
	GW009-183	7/11/2018	228		0.100	68.6	--	0.500	NA
	GW009-184	10/3/2018	178	--	0.100	50.0	--	0.500	NA
	GW009-191	1/14/2019	223	--	0.100	63.2	--	0.500	NA

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

		Chemical Class	Metals (mg/L)						Field Parameter
		Parameter	Calcium			Sodium			ORP (mV)
		Analytical Method	Method SW6010C			Method SW6010C			--
		NMAC NMWQCC[a]	NS			NS			NS
		EPA MCLs[b]	NS			NS			NS
		EPA RSLs[c]	NS			NS			NS
		Project Screening Level[d]	NS			NS			NS
Location ID	Field Sample ID	Sample Date	Result	Val Qual	LOD	Result	Val Qual	LOD	Result
KAFB-106012R	GW1565	5/20/2014	101	--	5.000	35.8	--	5.000	103
	GW1730	8/12/2014	175	--	5.000	50.8	--	5.000	147
	GW1862	10/23/2014	165	--	5.000	47.7	--	5.000	136
	GW1995	2/2/2015	165	--	5.000	50.6	--	5.000	128
	GW2161	5/27/2015	169	--	5.000	49.1	J-	5.000	132.2
	GW2311	7/27/2015	173	--	10.000	50.9	--	5.000	122
	GW2462	10/21/2015	189	--	25.000	52.8	--	5.000	181
	GW012R-161	2/8/2016	186	--	0.400	53.7	--	2.000	164.4
	GW012R-162	4/25/2016	191	--	0.400	55.3	--	2.000	106.8
	GW012R-163	7/19/2016	214	--	0.200	59.3	--	0.500	179.2
	GW012R-164	11/8/2016	200	--	0.200	56.9	--	0.500	150.9
	GW012R-171	1/26/2017	192	--	0.200	57.0	--	0.500	113.4
	GW012R-172	4/24/2017	196	--	0.400	56.7	--	2.000	157.3
	GW012R-173	7/19/2017	198	--	0.200	57.4	--	0.500	46.3
	GW012R-174	10/24/2017	191	--	0.200	58.2	--	0.500	146
	GW012R-181	1/22/2018	185	--	0.200	58.1	--	0.500	175.2
	GW012R-182	4/24/2018	196	--	0.200	61.5	--	0.500	57.7
	GW012R-183	7/17/2018	189	--	0.100	62.2	--	0.500	77.2
	GW012R-184	11/9/2018	191	--	0.100	60.1	--	0.500	132.6
	GW012R-191	1/17/2019	197	--	0.100	69.2	--	0.500	157

Table 3-10
Chloride, Sulfate, Nitrate/Nitrite Nitrogen, Calcium, and Sodium Concentrations, and Oxidation Reduction Potential in Wells KAFB-106005, KAFB-106009, and KAFB-106012R, Q1 2019

[a] NMWQCC numeric standards per the NMAC Title 20.6.2.3101A, Standards for Groundwater of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018).
[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40 CFR Part 141, 143 (May 2018).
[c] EPA Region 6 RSL for Tapwater (November 2018) for hazard index = 1.0 for noncarcinogens and a 10^{-5} cancer risk level for carcinogens.
[d] The project screening level was selected to satisfy the requirements of the Kirtland AFB Hazardous Waste Permit Number NM9570024423 as the lowest of (1) NMWQCC 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.
[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
AMSL = above mean sea level
BFF = Bulk Fuels Facility
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
ID = identification
KAFB = Kirtland Air Force Base
LOD = limit of detection
MCL = maximum contaminant level
mg/L = milligram per liter
mV = millivolt
NA = not available
ND = nondetect
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
NS = not specified
ORP = oxidation reduction potential
RSL = regional screening level
SWMU = Solid Waste Management Unit
Val Qual = validation qualifier
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
-- = Validation qualifier not assigned.
— = Compound not analyzed for.

Table 4-1
Drinking Water Supply Well Analytical Results, Q1 2019

			Location ID:				KAFB-003			KAFB-015			KAFB-015			KAFB-015		
			Field Sample ID:				GKK003-1913			GWK015-1911			GWK015-5911			GWK015-1912		
			Sample Date:				3/7/2019			1/8/2019			1/8/2019			2/5/2019		
			Sample Type:				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)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.018	ND	U	0.017	ND	U	0.018	ND	U	0.018
BTEX	Method E524.2 (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
Field Parameters		Temperature (°C)	NS	NS	NS	NS	19.8			22.0			22.0			22.2		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	369.6			817			817			477.9		
		pH (S.U.)	NS	NS	NS	NS	6.91			7.83			7.83			8.06		
		ORP (mV)	NS	NS	NS	NS	132.1			144.2			144.2			102.8		
		DO (mg/L)	NS	NS	NS	NS	4.65			1.71			1.71			0.42		
		Turbidity (NTU)	NS	NS	NS	NS	0.57			0.04			0.04			0.02		

Table 4-1
Drinking Water Supply Well Analytical Results, Q1 2019

			Location ID:				KAFB-015			KAFB-016			KAFB-016			KAFB-016		
			Field Sample ID:				GWK015-1913			GWK016-1911			GWK016-1912			GWK016-1913		
			Sample Date:				3/7/2019			1/8/2019			2/5/2019			3/7/2019		
			Sample Type:				REG			REG			REG			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)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.017	ND	U	0.017	ND	U	0.018	ND	U	0.017
BTEX	Method E524.2 (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
Field Parameters		Temperature (°C)	NS	NS	NS	NS	24.7			22.0			23.5			24.5		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	427.2			875			509.3			547		
		pH (S.U.)	NS	NS	NS	NS	7.53			6.72			7.77			6.2		
		ORP (mV)	NS	NS	NS	NS	90.8			182.0			118.3			138.5		
		DO (mg/L)	NS	NS	NS	NS	1.48			3.08			0.77			1.84		
		Turbidity (NTU)	NS	NS	NS	NS	0.16			0.02			0.46			0.23		

Table 4-1
Drinking Water Supply Well Analytical Results, Q1 2019

			Location ID:				ST106-VA2			ST106-VA2			ST106-VA2			ST106-VA2		
			Field Sample ID:				GWVA2-1911			GWVA2-1912			GWVA2-1913			GWVA2-5913		
			Sample Date:				1/8/2019			2/5/2019			3/7/2019			3/7/2019		
			Sample Type:				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)	1,2-dibromoethane	0.05	0.05	0.075	0.05	ND	U	0.017	ND	U	0.018	ND	U	0.017	ND	U	0.017
BTEX	Method E524.2 (µg/L)	Benzene	5	5	4.6	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	15	700	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Toluene	1,000	1,000	1,100	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	10,000	190	620	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
Field Parameters		Temperature (°C)	NS	NS	NS	NS	20.4			19.8			21.8			21.8		
		Specific Conductance (µS/cm)	NS	NS	NS	NS	419.6			426.6			388.8			388.8		
		pH (S.U.)	NS	NS	NS	NS	7.79			8.02			7.6			7.6		
		ORP (mV)	NS	NS	NS	NS	122.5			170.7			97.9			97.9		
		DO (mg/L)	NS	NS	NS	NS	2.03			2.86			1.84			1.84		
		Turbidity (NTU)	NS	NS	NS	NS	0.02			0.02			0.07			0.07		

Table 4-1
Drinking Water Supply Well Analytical Results, Q1 2019

[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 2018).
[b] EPA National Primary Drinking Water Regulations, MCLs and Secondary MCLs, Title 40CFR Part 141, 143 (May 2018).
c EPA Region 6 RSL for Tapwater (November 2018) for hazard index = 1.0 for non-carcinogens and a 10-5 cancer risk level for carcinogens.
[d] The project screening level was selected to satisfy the requirements of the Kirtland AFB Hazardous Waste Permit Number NM9570024423 as the lowest of (1) 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.
[e] Based on the geochemical equilibrium of the site groundwater and previous site data analyses, nitrate/nitrite results represent nitrate concentrations.
µg/L = microgram per liter
µS/cm = micro siemens per centimeter
ºC = degree Celsius
CFR = Code of Federal Regulations
DO = dissolved oxygen
EDB = ethylene dibromide (1,2-dibromoethane)
EPA = U.S. Environmental Protection Agency
GW = groundwater
ID = identification
KAFB = Kirtland Air Force Base
LOQ = limit of quantitation
MCL = maximum contaminant level
mg/L = milligram per liter
mV = millivolt
NA = not applicable
ND = nondetect
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
NS = not specified
NTU = nephelometric turbidity unit
ORP = oxidation reduction potential
REG = normal field sample
RSL = regional screening level
S.U. = standard units
VA = U.S. Department of Veterans Affairs
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screeni
Val Quals based on independent data validation
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOQ.
-- = Qualifier not assigned to the associated numerical value.

Table 5-1
DP-1839 Discharge Permit Terms and Conditions, Operations and Maintenance Plan Cross References

Condition No.	Terms and Conditions	Reference Location in Quarterly Report
15	The Permittee shall ensure the treated effluent conveyance system, i.e., piping, between the GWTS and the UIC well(s) does not leak and shall report any such leakage to the NMED GWQB in accordance with 20.6.2.1203(A) NMAC and copy the NMED HWB.	5.3.4 Effluent Conveyance Line Integrity (not applicable in Q1 2019)
	Within 1 year of the effective date of this Discharge Permit, the Permittee shall demonstrate the structural integrity of the treated effluent conveyance system between the GWTS and KAFB-7.	5.3.4 Effluent Conveyance Line Integrity (not applicable in Q1 2019)
	Prior to testing, the Permittee shall propose for NMED approval the test method to be used.	5.3.4 Effluent Conveyance Line Integrity (not applicable in Q1 2019)
	The results of the mechanical integrity testing shall be submitted to NMED within 60 days of test completion.	5.3.4 Effluent Conveyance Line Integrity (not applicable in Q1 2019)
	The Permittee shall integrity test the treated effluent conveyance system between GWTS and the UIC well(s) prior to submitting a permit renewal application. [20.6.2.3106(C) NMAC, 20.6.2.3107(A) NMAC]	5.3.4 Effluent Conveyance Line Integrity (not applicable in Q1 2019)
17	The Permittee shall conduct the monitoring, operations, and reporting listed below.	5.1 Groundwater Treatment System Operation
	Unless otherwise specified, all periodic monitoring results or general information obtained shall be reported in the forthcoming quarterly report. [20.6.2.3107 NMAC]	5.1 Groundwater Treatment System Operation
18	Unless otherwise approved by NMED, the Permittee shall conduct sampling in accordance with standard industry practice.	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal
	Sampling in accordance with the most current version of the GWTS Sampling and Analysis Plan (Appendix L of the O&M Plan), which includes sampling locations, procedures, field measurements, quality control samples, handling and custody, analytical methods, quality control, analytical validation, and reporting requirements, satisfies this Condition. [20.6.2.3107(B) NMAC]	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal
19	The Permittee shall submit quarterly and annual reports to NMED pursuant to the most recent NMED HWB approved Work Plans.	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal
	The Permittee shall identify the portions of these reports pertaining to this Discharge Permit with a table in the reports that identifies those portions.	Table 5-1 DP-1839 Discharge Permit Terms and Conditions, Operations and Maintenance Plan Cross References
	Quarterly reports shall be submitted as specified below unless otherwise authorized by NMED: • January 1st through March 31st - due by June 30th • April 1st through June 30th - due by September 30th • July 1st through September 30th - due by December 31st • October 1st through December 31st - due by March 31st	Noted
	Annual reporting requirements for the previous year, i.e., January 1 through December 31, shall be reported in the March 31 quarterly report. [20.6.2.3107(A) NMAC]	Noted
20	The Permittee shall monitor the concentration of all COCs listed on Table 2 in GWTS treated effluent. Associated sampling and analysis shall be performed monthly at a minimum.	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal Table 5-6 Monthly GWTS Performance Analytical Results for Train 1, Q1 2019 Table 5-7 Monthly GWTS Performance Analytical Results for Train 2, Q1 2019
	When groundwater from a new extraction well is first introduced to the GWTS, COC monitoring of the GWTS treated effluent shall occur daily for the first week of treatment, weekly for the first month of treatment, and monthly thereafter.	Not applicable in Q1 2019
	If alterations to, or conditions at, the GWTS result in a potential impact to effluent quality, the Permittee will repeat this sampling sequence as directed by NMED.	No effluent quality impacts Q1 2019
20	A representative sample of GWTS influent and effluent shall be analyzed annually for the constituents identified in Table 3.	Performed in Q3 2018, last reported in Q3 2018; Not applicable to Q1 2019
	A representative sample of GWTS influent and effluent shall be analyzed every 5 years for the constituents identified in Table 4	Performed in Q3 2017; last reported in Q3 2017; Not applicable to Q1 2019
	The first analysis of the 5-year constituent list shall occur in July 2017. Any newly identified constituents detected during the 5-year sampling events will be added to the annual sampling constituent list in Table 3.	Performed in Q3 2017; last reported in Q3 2017; Not applicable to Q1 2019
	All analysis of GWTS influent and effluent shall utilize analytical methods with detection limits that are sufficiently low to allow comparison to the standards included in the above referenced state and federal regulations.	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal Table 5-6 Monthly GWTS Performance Analytical Results for Train 1, Q1 2019 Table 5-7 Monthly GWTS Performance Analytical Results for Train 2, Q1 2019
	All sampling, analysis, and reporting shall comply with the most recent approved Work Plans. [20.6.2.3107(A) NMAC and 20.6.2.3107(B) NMAC]	5.2 Groundwater Treatment System Performance Monitoring and Ethylene Dibromide Removal

Table 5-1
DP-1839 Discharge Permit Terms and Conditions, Operations and Maintenance Plan Cross References

Condition No.	Terms and Conditions	Reference Location in Quarterly Report
21	The Permittee shall report the volume of treated GWTS effluent discharged to each UIC well each quarter. This report shall include the following:	See Below
	a. Monthly average, maximum, and minimum values for flow rate and volume of treated effluent transferred to each UIC well	Table 5-4 Groundwater Treatment System Injection Well Performance, Q1 2019
	b. The totalized monthly volume of treated effluent transferred to all UIC wells	Table 5-2 Quantities of Groundwater Treated and Discharged, Q1 2019
	c. Monthly average, maximum, and minimum head values of injection water for each UIC well.	Table 5-4 Groundwater Treatment System Injection Well Performance, Q1 2019
	The Permittee shall monitor the GWTS effluent volume utilizing an effluent flow meter installed on the effluent pump skid after the GAC units. Each UIC well shall have a dedicated flowmeter. Flowmeters shall be inspected and calibrated in accordance with the associated manufacturer's recommendations. [20.6.2.3107 NMAC]	Table 5-4 Groundwater Treatment System Injection Well Performance, Q4 2018 Table 5-9 GWTS Routine Maintenance (Monthly Flowmeter Inspection and Annual Calibration Verification)
22	The Permittee shall include the following results and general information in quarterly reports to NMED:	See Below
	a. Any mechanical integrity (tests) conducted on either the GWTS or a UIC well	5.3.3 Non-Routine Maintenance Table 5-10 GWTS Non-Routine Maintenance Items, Q1 2019
	b. Any replacement of GAC media and the associated data that initiated the decision to replace the media	5.3.3 Non-Routine Maintenance Table 5-10 GWTS Non-Routine Maintenance Items, Q1 2019
	c. Any UIC well rehabilitation conducted	5.3.3 Non-Routine Maintenance Table 5-10 GWTS Non-Routine Maintenance Items, Q1 2019
	d. Any malfunction, repair, or replacement of a flowmeter	5.3.3 Non-Routine Maintenance Table 5-10 GWTS Non-Routine Maintenance Items, Q1 2019
	e. Any additional operational changes with the potential to affect the discharge. [20.6.2.3107 NMAC]	5.3.3 Non-Routine Maintenance Table 5-10 GWTS Non-Routine Maintenance Items, Q1 2019
23	The Permittee shall monitor the groundwater wells in the vicinity of KAFB-7 and in the vicinity of any newly installed UIC well(s) to determine any change to aquifer chemistry that may be the result of injection.	Performed in Q4 of each year, last reported in Q4 2018
	This monitoring shall be performed annually, shall conform to the procedures of the most current approved Work Plan, and shall measure the COCs listed in Table 2. This chemistry will be reported in the Annual Report for BFF.	Reported in Q4 of each year, last reported in Q4 2018
	ST-105 Annual Report includes elevation contour mapping and analytical parameters identified in the Stage 2 Abatement Plan.	Reported annually in the ST-105 Annual Report
	The Permittee shall develop a groundwater elevation contour map depicting the groundwater flow direction in the vicinity of each UIC well and report it in the ST-105 Annual Report.	Reported annually in the ST-105 Annual Report Also reported in Q4 of each year, last reported in Q4 2018
	If the chemical quality of the treated groundwater being injected changes over time, NMED may require the Permittee to repeat geochemical modeling (numeric or analytical) to predict the interaction between the treated effluent and receiving groundwater. [20.6.2.3107 NMAC]	Not applicable in Q1 2019
24	The Permittee shall post all reports required by this Discharge Permit on Kirtland AFB's most current website (e.g., https://kirtlandafb.tlisolutions.com/main.aspx.) [20.6.2.3107(A) NMAC]	http://afcec.publicadmin-record.us.af.mil/search.aspx
34	In the event the Permittee proposes a change to the facility or the facility's discharge that would result in a change in the volume discharged; the location of the discharge; or in the amount or character of water contaminants received, treated, or discharged by the facility that differs from the terms and conditions in this Discharge Permit, the Permittee shall notify NMED prior to implementing such changes.	Noted
	The Permittee shall obtain approval (which may require modification of this Discharge Permit) by NMED prior to implementing such changes. [20.6.2.7(P) NMAC, 20.6.2.3107(C) NMAC, 20.6.2.3109(E) and (G) NMAC]	Noted
35	In the event the Permittee proposes to construct or change an existing system such that the quantity or quality of the discharge will change substantially from that authorized by this Discharge Permit, the Permittee shall submit construction plans and specifications to NMED for the proposed system or process unit prior to the commencement of construction.	Noted
	In the event the Permittee implements changes to an existing system authorized by this Discharge Permit which will result in only a minor effect on the quality of the discharge, the Permittee shall report such changes (including the submission of record drawings, where applicable) in the next quarterly report to NMED. [20.6.2.1202(A) and (C) NMAC, New Mexico Statutes Annotated 1978, §§ 61-23-1 through 61-23-32]	Not applicable in Q1 2019

Table 5-1
DP-1839 Discharge Permit Terms and Conditions, Operations and Maintenance Plan Cross References

COC = contaminant of concern
GAC = granular activated carbon
GWTS = groundwater treatment system
GWQB = Groundwater Quality Bureau
HWB = Hazardous Waste Bureau
NMAC = New Mexico Administrative Code
NMED = New Mexico Environment Department
No. = number
O&M = Operations and Maintenance
UIC = underground injection control

Table 5-2
Cumulative Quantities of Groundwater Treated and Discharged, Q1 2019

GWTS Operating Month	Train 1 Total Groundwater Treated (gallons)	Train 2 Total Groundwater Treated (gallons)	Total Groundwater Extracted (gallons)	Treated Groundwater Injected to Injection Well KAFB-7 (gallons)	Treated Groundwater Discharged to the GCMP[a] (gallons)
Totalizing Flowmeter[b]	FE/FIT-3108	FE/FIT-3208	FE/FIT-3108 + FE/FIT-3208	FE/FIT-3108 + FE/FIT-3208	FE/FIT-3108 + FE/FIT-3208
Dec-15[c]	17,664,900	0	17,664,900	0	17,664,900
2015 Total	17,664,900	0	17,664,900	0	17,664,900
Jan-16	1,777,200	0	1,777,200	0	1,777,200
Feb-16	881,000	0	881,000	181,300	699,700
Mar-16	22,168,080	0	22,168,080	1,231,350	20,936,730
Apr-16	12,649,920	0	12,649,920	582,570	12,067,350
May-16	12,090,000	0	12,090,000	0	12,090,000
Jun-16	8,850,000	0	8,850,000	0	8,850,000
Jul-16	9,940,000	0	9,940,000	0	9,940,000
Aug-16	9,400,000	0	9,400,000	0	9,400,000
Sep-16	12,980,000	0	12,980,000	0	12,980,000
Oct-16	8,300,000	0	8,300,000	0	8,300,000
Nov-16	7,200,000	0	7,200,000	2,970,000	4,230,000
Dec-16	14,570,100	0	14,570,100	14,501,190	68,910
2016 Total	120,806,300	0	120,806,300	19,466,410	101,339,890
Jan-17	6,089,700	87,300	6,177,000	5,877,600	299,400
Feb-17	1,637,100	2,357,400	3,994,500	2,216,600	1,777,900
Mar-17	5,551,200	5,705,400	11,256,600	5,172,800	6,083,800
Apr-17	7,269,000	6,712,700	13,981,700	2,248,062	11,733,638
May-17	9,234,900	9,453,700	18,688,600	4,722,563	13,966,037
Jun-17	9,706,100	9,055,100	18,761,200	1,592,700	17,168,500
Jul-17	13,260,800	10,875,200	24,136,000	3,023,500	21,112,500
Aug-17	9,461,200	8,999,500	18,460,700	4,847,500	13,613,200
Sep-17	9,734,500	9,227,600	18,962,100	6,752,400	12,209,700
Oct-17	8,684,700	12,941,900	21,626,600	14,775,800	6,850,800
Nov-17	0	12,513,400	12,513,400	3,734,900	8,778,500
Dec-17	0	13,304,300	13,304,300	10,724,700	2,579,600
2017 Total	80,629,200	101,233,500	181,862,700	65,689,125	116,173,575
Jan-18	9,865,000	5,497,700	15,362,700	13,887,700	1,475,000
Feb-18	10,785,300	6,786,100	17,571,400	13,765,300	3,806,100
Mar-18	11,006,000	7,092,900	18,098,900	9,235,300	8,863,600
Apr-18	7,468,200	5,800,700	13,268,900	0[d]	13,268,900

Table 5-2
Cumulative Quantities of Groundwater Treated and Discharged, Q1 2019

GWTS Operating Month	Train 1 Total Groundwater Treated (gallons)	Train 2 Total Groundwater Treated (gallons)	Total Groundwater Extracted (gallons)	Treated Groundwater Injected to Injection Well KAFB-7 (gallons)	Treated Groundwater Discharged to the GCMP[a] (gallons)
May-18	11,238,400	8,061,600	19,300,000	0[d]	19,300,000
Jun-18	14,746,800	10,186,400	24,933,200	0[d]	24,933,200
Jul-18	12,038,500	7,901,100	19,939,600	0[d]	19,939,600
Aug-18	14,973,100	9,583,900	24,557,000	0[d]	24,557,000
Sep-18	9,516,900	7,509,600	17,026,500	0[d]	17,026,500
Oct-18	1,572,600	7,288,500	8,861,100	0[d]	8,861,100
Nov-18	7,788,300	4,682,900	12,471,200	7,517,100	4,954,100
Dec-18	15,521,500	10,282,100	25,803,600	23,080,800	2,722,800
2018 Total	126,520,600	90,673,500	217,194,100	67,486,200	149,707,900
Jan-19	13,105,900	8,431,000	21,536,900	19,494,500	2,042,400
Feb-19	12,821,800	8,443,300	21,265,100	13,624,600	7,640,500
Mar-18[e]	16,066,200	10,450,300	26,516,500	13,435,900	13,080,600
Q1 2019 Total	41,993,900	27,324,600	69,318,500	46,555,000	22,763,500
2019 Total[f]	41,993,900	27,324,600	69,318,500	46,555,000	22,763,500
Cumulative Total	387,614,900	219,231,600	606,846,500	199,196,735	407,649,765

[a] Corrected volumes from human machine interface datasets.

[b] Flowmeters are inspected monthly, see Appendix I-1.

[c] Train 1 treatment volume for December 2015 includes all water treated by the temporary treatment system and water treated by train 1 during December 2015.

[d] On March 14, 2018 at 0206, the KAFB-7 V-Smart valve hydraulic assembly failed downhole. Repairs to KAFB-7 were completed on November 14, 2018. All treated water between March 14, 2018 and November 15, 2018 was discharged to the GCMP.

[e] Treatment volumes for March 2019 are calculated through March 31, 2019.

[f] Cumulative 2019 total through March 31, 2019.

FE/FIT-3208 = Flow meter/flow meter transmitter (followed by the component designation)
GCMP = Tijeras Arroyo Golf Course main pond.
GWTS = groundwater treatment system.
Q = quarter.

Table 5-3
Groundwater Treatment System Extraction Well Performance, Q1 2019

Well ID	Well Parameter	January	February	March	Q1 (Average)
KAFB-106228	Average Operational Flow Rate[a] (gpm)	140.7	140.4	139.9	140.4
	Flow Rate Range[b] (gpm; min-max)	140.1 - 143.6	139.7 - 140.8	139.4 - 143.2	139.4 -143.6
	Average Drawdown[c] (ft)	17.7	17.2	17.3	17.4
	Water Level Elevation Range[b] (ft; min-max)	4856.8 - 4858.4	4857.2 - 4858.4	4857.4 - 4858.5	4856.8 - 4858.5
	Average Specific Capacity[d] (gpm/ft)	8.0	8.2	8.1	8.1
	Average Transmissivity[d] (gpd/ft)	11,932	12,229	12,163	12,108
	Run Time %[e]	99%	97%	98%	98%
	Notes	NA	NA	NA	NA
KAFB-106233	Average Operational Flow Rate[a] (gpm)	169.3	169.1	167.2	168.5
	Flow Rate Range[b] (gpm; min-max)	168.5 - 169.9	168.4 - 169.6	164.6 - 168.5	164.6 - 169.9
	Average Drawdown[c] (ft)	12.2	11.6	11.0	11.6
	Water Level Elevation Range[b] (ft; min-max)	4860.8 - 4861.7	4861.4 - 4862.3	48621.1 - 4862.8	4860.8 - 4862.8
	Average Specific Capacity[d] (gpm/ft)	13.8	14.6	15.2	14.6
	Average Transmissivity[d] (gpd/ft)	20,756	21,939	22,875	21,859
	Run Time %[e]	99%	96%	98%	98%
	Notes	NA	NA	NA	NA
KAFB-106234	Average Operational Flow Rate[a] (gpm)	160.2	158.5	158.4	159.0
	Flow Rate Range[b] (gpm; min-max)	158.0 - 164.0	158.1 - 159.8	157.9 - 158.8	157.9 - 163.9
	Average Drawdown[c] (ft)	5.9	5.0	4.4	5.1
	Water Level Elevation Range[b] (ft; min-max)	4867.2 - 4868.4	4868.3 - 4869.1	4869.1 - 4869.8	4867.2 - 4869.8
	Average Specific Capacity[d] (gpm/ft)	27.1	32.1	36.3	31.8
	Average Transmissivity[d] (gpd/ft)	40,683	48,084	54,502	47,745
	Run Time %[e]	99%	98%	98%	98%
	Notes	NA	NA	NA	NA
KAFB-106239	Average Operational Flow Rate[a] (gpm)	73.9	74.2	73.1	73.7
	Flow Rate Range[b] (gpm; min-max)	72.6 - 74.6	73.8 - 74.7	72.2 - 74.7	72.2 - 74.7
	Average Drawdown[c] (ft)	10.9	10.2	8.8	10.0
	Water Level Elevation Range[b] (ft; min-max)	4862.3 - 4867.2	4864.4 - 4865.4	4864.4 - 4868.9	4862.3 - 4868.9
	Average Specific Capacity[d] (gpm/ft)	6.9	7.3	8.5	7.6
	Average Transmissivity[d] (gpd/ft)	10,364	10,906	12,686	11,333
	Run Time %[e]	95%	97%	95%	95%
	Notes	NA	NA	NA	NA
Combined Extraction Well Totals	Combined Average Operational Flow Rate[a] (gpm)	544.1	542.1	538.6	541.6
	Combined Flow Rate Range (gpm)	541.0 - 548.0	540.3 - 543.3	534.8 - 543.2	534.8 - 548.0
	Run Time %[e]	99%	98%	98%	98%

Table 5-3
Groundwater Treatment System Extraction Well Performance, Q1 2019

[a] Flow rate calculation is an average rate that only includes time while the system was operational; average values were computed from daily values throughout Q1 2019.

[b] Ranges are provided from daily values throughout Q1 2019.

[c] Average drawdown calculated from approximate static water elevation in Q1 2019, only includes time while system was operational and does not account for dynamic water elevation increases in the aquifer; average values were computed from daily values throughout Q1 that were obtained from the HMI for all the extraction wells.

[d] Specific capacity and transmissivity average values only include pump run time (i.e., pump down time is not factored into the calculation); average values were computed from daily values throughout Q1.

[e] Percent run time is calculated when the given well is running at a minimum of 50 gpm; dataset includes readings for every minute throughout Q1.

% = percent

ft = foot/feet
gpd = gallon per day
gpm = gallon per minute
HMI = human machine interface

max = maximum

min = minimum

NA = not applicable

Q1 = first quarter

Table 5-4
Groundwater Treatment System Injection Well Performance, Q1 2019

Well ID	Well Parameter	January	February	March	Q1
KAFB-7	Average Operational Flow Rate[a] (gpm)	575.1	568.1	564.3	570.3
	Flow Rate Range[b] (gpm; min-max)	0.0 - 669.8	0.0 - 666.9	0.0 - 944.0	0.0 - 944.0
	Volume Injected[c] (gal)	19,494,500	13,624,600	13,435,900	15,518,333
	Average Water Level Elevation[d] (ft AMSL)	4899.8	4899.3	4893.5	4897.9
	Water Level Elevation Range[d] (ft AMSL)	4875.1 - 4909.8	4879.3 - 4910.4	4872.9 - 4912.8	4872.9 - 4912.8
	Notes	NA	NA	NA	NA
GWTS Effluent	Average Operational Flow Rate[a] (gpm)	546.9	545.7	543.3	545.3
	Flow Rate Range[b] (gpm; min-max)	0.0 - 823.8	0.0 - 660.4	0.0 - 675.6	0.0 - 823.8

[a] Flow rate calculation is an average rate that only includes time while the system was operational; average values were computed from HMI values throughout Q1 2019.

[b] Ranges are provided from HMI values throughout Q1 2019. KAFB-7 flow rate fluctuates due to surging, etc. and is not consistent with GWTS effluent flow rates.

[c] Volume injected is calculated using totalizer readings from flow meters installed on the GWTS effluent skids. March injection volume calculated through March 31, 2019.

[d] Water level elevation averages and ranges include times when injection wells are not being utilized and data was collected from the HMI for Q1

AMSL = above mean sea level
ft = foot/feet
gal = gallon
gpd = gallon per day
gpm = gallon per minute
GWTS = groundwater treatment system
HMI = human machine interface
max = maximum
min = minimum
NA = not applicable

Table 5-5
Groundwater Treatment System EDB Removal, Q1 2019

Treatment Train	Month	Date[a]	Cumulative Volume Extracted (gal)	Monthly Volume Treated (gal)	EDB Concentration (µg/L)[b]	Cumulative Mass of EDB Extracted (mg)	Mass of EDB Removed (mg)[c]
Train 1	January	12/31/2018	345,621,000	13,105,900	0.024	75,020	894
		1/7/2019	348,925,700		0.024	75,321	
		1/14/2019	352,236,400		0.016	75,521	
		1/21/2019	355,447,900		0.016	75,716	
		1/28/2019	358,726,900		0.016	75,914	
	February	2/4/2019	361,925,800	12,821,800	0.016	76,108	959
		2/11/2019	365,188,600		0.021	76,367	
		2/18/2019	368,432,600		0.021	76,625	
		2/25/2019	371,548,700		0.021	76,873	
	March	3/4/2019	374,747,500	16,066,200	0.021	77,127	887
		3/11/2019	377,974,800		0.013	77,286	
		3/18/2019	381,169,300		0.013	77,443	
		3/25/2019	384,399,000		0.013	77,602	
		4/1/2019	387,614,900		0.013	77,760	
Train 2	January	12/31/2018	191,907,000	8,431,000	0.039	32,643	864
		1/7/2019	194,047,400		0.039	32,959	
		1/14/2019	196,203,700		0.023	33,146	
		1/21/2019	198,185,500		0.023	33,319	
		1/28/2019	200,338,000		0.023	33,506	
	February	2/4/2019	202,408,300	8,443,300	0.023	33,687	904
		2/11/2019	204,554,000		0.030	33,930	
		2/18/2019	206,683,500		0.030	34,172	
		2/25/2019	208,781,300		0.030	34,410	
	March	3/4/2019	210,885,900	10,450,300	0.030	34,649	1155
		3/11/2019	212,902,000		0.029	34,871	
		3/18/2019	214,999,100		0.029	35,101	
		3/25/2019	217,124,600		0.029	35,334	
		4/1/2019	219,231,600		0.029	35,566	

Table 5-5
Groundwater Treatment System EDB Removal, Q1 2019

Treatment Train	Month	Date[a]	Cumulative Volume Extracted (gal)	Monthly Volume Treated (gal)	EDB Concentration (µg/L)[b]	Cumulative Mass of EDB Extracted (mg)	Mass of EDB Removed (mg)[c]
Q1 2019 Train 1 Total				41,993,900			2,740
Q1 2019 Train 2 Total				27,324,600			2,923
Q1 2019 Total				69,318,500			5,663

[a] Monthly date ranges may include dates falling outside of the actual month as weekly human machine interface data retrievals occur every Monday.
[b] Estimated EDB concentrations from monthly EDB sampling.
[c] Quantities of mass = sum of weekly influent concentration multiplied by respective weekly treated volume.
µg/L = microgram per liter
EDB = 1,2-dibromoethane
gal = gallon
mg = milligram

Table 5-6
Monthly Groundwater Treatment System Performance Analytical Results for Train 1, Q1 2019

			Well Location ID:		GWTS-BFF-INF1			GWTS-BFF-GAC1			GWTS-BFF-EFF1			GWTS-BFF-INF1			GWTS-BFF-GAC1		
			Field Sample ID:		GWTS-INF1-010919			GWTS-GAC1-010919			GWTS-EFF1-010919			GWTS-INF1-020719			GWTS-GAC1-020719		
			Sample Date:		1/9/2019			1/9/2019			1/9/2019			2/7/2019			2/7/2019		
			Sample Type:		REG			REG			REG			REG			REG		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.016	J	0.019	0.018	J	0.019	ND	U	0.019	0.021	J	0.019	0.014	J	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2	ND	U	2
Dissolved Metals	Method SW6010C (mg/L)	Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Manganese, dissolved	0.2	0.2	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025
Field Parameters		Temperature (°C)	NS	NS	19.4			19.6			19.8			19.7			19.6		
		Spec Cond (µS/cm)	NS	NS	428.7			428.4			425.5			549.9			488.3		
		pH (S.U.)	NS	NS	7.83			7.46			7.44			7.93			7.56		
		ORP (mV)	NS	NS	671.2			34.7			122.8			671.6			45.4		
		DO (mg/L)	NS	NS	7.08			5.27			6.49			6.86			3.7		

Table 5-6
Monthly Groundwater Treatment System Performance Analytical Results for Train 1, Q1 2019

			Well Location ID:		GWTS-BFF-EFF1			GWTS-BFF-EFF1			GWTS-BFF-INF1			GWTS-BFF-GAC1			GWTS-BFF-EFF1		
			Field Sample ID:		GWTS-EFF1-020719			GWTS-EFF1DUP-020719			GWTS-INF1-030719			GWTS-GAC1-030719			GWTS-EFF1-030719		
			Sample Date:		2/7/2019			2/7/2019			3/7/2019			3/7/2019			3/7/2019		
			Sample Type:		REG			Field Duplicate			REG			REG			REG		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	ND	U	0.019	ND	U	0.019	0.013	J	0.019	0.018	J	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2	ND	U	2
Dissolved Metals	Method SW6010C (mg/L)	Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Manganese, dissolved	0.2	0.2	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025
Field Parameters		Temperature (°C)	NS	NS	19.7			19.7			19.8			20.1			19.8		
		Spec Cond (µS/cm)	NS	NS	548.7			548.7			466.2			465.3			464.1		
		pH (S.U.)	NS	NS	7.43			7.43			7.56			7.09			7.01		
		ORP (mV)	NS	NS	99.7			99.7			400.1			107.6			141.2		
		DO (mg/L)	NS	NS	4.83			4.83			6.53			3.71			6.02		

Table 5-6
Monthly Groundwater Treatment System Performance Analytical Results for Train 1, Q1 2019

[a] NMWQCC numeric standards per the New Mexico Administrative Code Title 20.6.2.3101A, Standards for Groundwater of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018).

[b] 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.

µg/L = microgram per liter
µS/cm = microSiemens per centimeter
ºC = degree Celsius
BFF = Bulk Fuels Facility
EDB = ethylene dibromide (1,2-dibromoethane)
EFF = effluent
EPA = U.S. Environmental Protection Agency
ft = foot/feet
GAC = granular activated carbon
GWTS = groundwater treatment system
ID = identification
INF = influent
LOD = limit of detection
MCL = maximum contaminant level
mg/L= milligram per liter
mV = millivolt
ND = nondetect
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
ORP = oxidation reduction potential
REG = normal field sample
RSL = regional screening level
Spec Cond = specific conductivity
S.U. = standard unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation.
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.

Table 5-7
Monthly Groundwater Treatment System Performance Analytical Results for Train 2, Q1 2019

			Well Location ID:		GWTS-BFF-INF2			GWTS-BFF-GAC2			GWTS-BFF-EFF2			GWTS-BFF-EFF2		
			Field Sample ID:		GWTS-INF2-010919			GWTS-GAC2-010919			GWTS-EFF2-010919			GWTS-EFF2DUP-010919		
			Sample Date:		1/9/2019			1/9/2019			1/9/2019			1/9/2019		
			Sample Type:		REG			REG			REG			Field Duplicate		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.023	J	0.019	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2
GAC = granular	Method SW6010C (mg/L)	Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Manganese, dissolved	0.2	0.2	0.029	--	0.0025	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025
Field Parameters		Temperature (°C)	NS	NS	19.4			18.2			19.6			19.6		
		Spec Cond (µS/cm)	NS	NS	293.2			2.7			338.4			338.4		
		pH (S.U.)	NS	NS	7.32			7.30			7.37			7.37		
		ORP (mV)	NS	NS	538.7			136.5			430.8			430.8		
		DO (mg/L)	NS	NS	7.00			7.12			4.74			4.74		

Table 5-7
Monthly Groundwater Treatment System Performance Analytical Results for Train 2, Q1 2019

			Well Location ID:		GWTS-BFF-INF2			GWTS-BFF-GAC2			GWTS-BFF-EFF2			GWTS-BFF-INF2		
			Field Sample ID:		GWTS-INF2-020719			GWTS-GAC2-020719			GWTS-EFF2-020719			GWTS-INF2-030719		
			Sample Date:		2/7/2019			2/7/2019			2/7/2019			3/7/2019		
			Sample Type:		REG			REG			REG			REG		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.03	J	0.019	ND	U	0.019	ND	U	0.019	0.029	--	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2
GAC = granular	Method SW6010C (mg/L)	Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Manganese, dissolved	0.2	0.2	0.0292	--	0.0025	ND	U	0.0025	ND	U	0.0025	0.0016	J	0.0025
Field Parameters		Temperature (°C)	NS	NS	19.7			19.7			19.7			19.9		
		Spec Cond (µS/cm)	NS	NS	437.9			439.6			436.8			372.7		
		pH (S.U.)	NS	NS	7.93			7.51			7.49			7.53		
		ORP (mV)	NS	NS	569.3			213.4			211.2			422.0		
		DO (mg/L)	NS	NS	6.06			5.89			5.26			6.14		

Table 5-7
Monthly Groundwater Treatment System Performance Analytical Results for Train 2, Q1 2019

			Well Location ID:		GWTS-BFF-GAC2			GWTS-BFF-EFF2			GWTS-BFF-EFF2		
			Field Sample ID:		GWTS-GAC2-030719			GWTS-EFF2-030719			GWTS-EFF2DUP-030719		
			Sample Date:		3/7/2019			3/7/2019			3/7/2019		
			Sample Type:		REG			REG			Field Duplicate		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	ND	U	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2
GAC = granular	Method SW6010C (mg/L)	Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Manganese, dissolved	0.2	0.2	0.0017	J	0.0025	ND	U	0.0025	ND	U	0.0025
Field Parameters		Temperature (°C)	NS	NS	19.8			19.8			19.8		
		Spec Cond (µS/cm)	NS	NS	371.7			375.5			375.5		
		pH (S.U.)	NS	NS	7.07			6.95			6.95		
		ORP (mV)	NS	NS	284.0			331.0			331.0		
		DO (mg/L)	NS	NS	1.42			5.07			5.07		

Table 5-7
Monthly Groundwater Treatment System Performance Analytical Results for Train 2, Q1 2019

[a] NMWQCC numeric standards per the New Mexico Administrative Code Title 20.6.2.3101A, Standards for Groundwater of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018).

[b] 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.

µg/L = microgram per liter
µS/cm = microSiemens per centimeter
ºC = degree Celsius
BFF = Bulk Fuels Facility
EDB = ethylene dibromide (1,2-dibromoethane)
EFF = effluent
EPA = U.S. Environmental Protection Agency
ft = foot/feet
GAC = granular activated carbon
GWTS = groundwater treatment system
ID = identification
INF = influent
LOD = limit of detection
MCL = maximum contaminant level
mg/L= milligram per liter
mV = millivolt
ND = nondetect
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
ORP = oxidation reduction potential
REG = normal field sample
RSL = regional screening level
Spec Cond = specific conductivity
S.U. = standard unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation.
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
'-- = Validation qualifier not assigned.

Table 5-8
Extraction Well Analytical Results, Q1 2019

			Well Location ID:		KAFB-106228			KAFB-106233			KAFB-106234			KAFB-106239			KAFB-106239		
			Field Sample ID:		GW228-191			GW233-191			GW234-191			GW239-191			GW239-591		
			Sample Date:		1/24/2019			1/24/2019			1/24/2019			1/24/2019			1/24/2019		
			Sample Type:		REG			REG			REG			REG			Field Duplicate		
Parameter	**Analytical Method**	**Analyte**	**NMAC NMWQCC[a]**	**Project Screening Level[b]**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**	**Result**	**Val Qual**	**LOD**
EDB	Method SW8011 (µg/L)	1,2-dibromoethane	0.05	0.05	0.036	--	0.019	0.013	J	0.019	0.022	J	0.019	ND	U	0.019	ND	U	0.019
VOCs	Method SW8260C (µg/L)	Benzene	5	5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Ethylbenzene	700	700	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8	ND	U	0.8
		Toluene	1,000	1,000	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5	ND	U	0.5
		Xylenes, Total	620	620	ND	U	2	ND	U	2	ND	U	2	ND	U	2	ND	U	2
GAC = granular activated carbon	Method SW6010C (mg/L)	Calcium	NS	NS	38.4	--	0.1	51.8	--	0.1	53.6	--	0.1	44.1	--	0.1	43.6	--	0.1
		Iron, dissolved	1	1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1	ND	U	0.1
		Magnesium	NS	NS	5.34	--	0.05	7.07	--	0.05	7.32	--	0.05	6.23	--	0.05	6.15	--	0.05
		Manganese, dissolved	0.2	0.2	ND	U	0.0025	ND	U	0.0025	ND	U	0.0025	0.135	--	0.0025	0.135	--	0.0025
		Potassium	NS	NS	2.22	--	0.375	2.77	--	0.375	2.76	--	0.375	2.38	--	0.375	2.37	--	0.375
		Sodium	NS	NS	25	--	0.5	26.3	--	0.5	26.7	--	0.5	25	--	0.5	24.7	--	0.5
	Method SW6020A (mg/L)	Arsenic	0.01	0.01	0.001	J	0.0016	0.00099	J	0.0016	0.00093	J	0.0016	0.0011	J	0.0016	0.0012	J	0.0016
		Lead	0.015	0.015	0.0011	J	0.0024	ND	U	0.0024	ND	U	0.0024	0.0012	J	0.0024	0.0013	J	0.0024
Field Parameters		Temperature (°C)	NS	NS	18.3			19.4			19.3			19.4			19.4		
		Spec Cond (µS/cm)	NS	NS	333.4			228.9			450.1			357.9			357.9		
		pH (S.U.)	NS	NS	7.79			7.65			7.55			7.6			7.6		
		ORP (mV)	NS	NS	97.1			81.8			110.3			115.2			115.2		
		DO (mg/L)	NS	NS	3.96			4.24			4.91			3.93			3.93		

Table 5-8
Extraction Well Analytical Results, Q1 2019

[a] NMWQCC numeric standards per the New Mexico Administrative Code Title 20.6.2.3101A, Standards for Groundwater of 10,000 mg/L Total Dissolved Solids Concentration or Less (NMAC 2018).

[b] 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.

µg/L = microgram per liter
µS/cm = microSiemens per centimeter
ºC = degree Celsius
BFF = Bulk Fuels Facility
EDB = ethylene dibromide (1,2-dibromoethane)
EFF = effluent
EPA = U.S. Environmental Protection Agency
ft = foot/feet
GAC = granular activated carbon
GWTS = groundwater treatment system
ID = identification
INF = influent
LOD = limit of detection
MCL = maximum contaminant level
mg/L= milligram per liter
mV = millivolt
ND = nondetect
NMAC = New Mexico Administrative Code
NMWQCC = New Mexico Water Quality Control Commission
ORP = oxidation reduction potential
REG = normal field sample
RSL = regional screening level
Spec Cond = specific conductivity
S.U. = standard unit
Val Qual = validation qualifier
VOC = volatile organic compound
Shading = detected concentrations above the detection limit
Bold/Shading = reported concentrations exceed the project screening level
Val Quals based on independent data validation.
J = Qualifier denotes the analyte was positively identified, but the associated numerical value is estimated.
U = Qualifier denotes the analyte was analyzed but not detected above the detection limit. The value associated with the U-qualifier is the LOD.
'-- = Validation qualifier not assigned.

Table 5-9
Groundwater Treatment System Routine Maintenance Schedule, Q1 2019

	Frequency			
Maintenance Activity	**Daily**	**Weekly**	**Monthly**	**As Needed**
Recording and inspecting influent, GAC vessel, and effluent skid pressure, flow rate, and totalizer readings from their respective gauges and the human machine interface	X			
Recording extraction well pressure, flow rate, and totalizer readings from the human machine interface	X			
Recording extraction well pressure, flow rate, and totalizer readings from the gauges at the well vaults		X		
Inspecting well control house and recording well control house pressure, flow rate, and totalizer readings		X		
Recording totalizer reading at KAFB-7		X		
Running and inspecting the GWTS air compressor		X		
Inspecting extraction well, conveyance line, and air release valve vaults			X	
Inspecting wellhead and associated equipment of injection well KAFB-7			X	
Inspecting and performing maintenance of flowmeters throughout the system			X	
Inspecting and performing maintenance on actuating valves throughout the system			X	
Performing confined space entries			X	
Gauging extraction well filter pack			X	
Semiannual inspections and maintanence of Tijeras Arroyo Gold Course ponds				X
Logging lockout-tagout entries				X
Logging system shutdowns				X
Emptying storm water runoff flooded vaults				X
Performing air compressor maintenance				X
Cleaning GWTS sumps				X
Draining air release valve containment vessels				X
Grounds keeping including vegetation control				X
Inspecting and cleaning the GWTS Wye-strainer				X
Performing flow meter calibration				X[a]
Greasing pump bearings				X[b]
Changing process pump oil				X[b]
Changing air filter on control room air conditioner				X[b]
Changing bag filters				X[c]
Changing out GAC				X[c]
Disinfection of extraction wells and conveyance lines				X[d]
Testing of alarms and interlocks				X[e]
Cleaning coils and replacing air filter for the Well Control House air conditioner				X[f]
GAC Skimming of the lead GAC vessel				X[g]

Table 5-9
Groundwater Treatment System Routine Maintenance Schedule, Q1 2019

[a] Flowmeters are calibrated at a minimum of once per year, but may be calibrated more often as needed.

[b] Changing of process pump oil, greasing pump bearings, and replacing the air filter in the air conditioning unit are required every 3 months, but may be changed more often as needed.

[c] Bag filters are scheduled for change out when the pressure differential across a bag filter vessel exceeds 15 psi and GAC is scheduled for change out when the pressure differential across a GAC vessel exceeds 10 psi.

[d] Disinfection of extraction wells and conveyance lines occurs semiannually or more often as needed.

[e] Testing of alarms and interlocks occurs annually or more often as needed.

[f] Cleaning of the coil and replacing of the air filter are scheduled as quarterly activities, but frequency may be adjusted as necessary.

[g] GAC skimming is performed when the differential pressure in the lead GAC vessel has increased from the operational differential pressure by at least 7 psi.

GAC = granular activated carbon
GWTS = groundwater treatment system
KAFB = Kirtland Air Force Base
psi = pound per square inch

Table 5-10
Groundwater Treatment System Non-Routine Maintenance Items, Q1 2019

Date	Extent of Shutdown	Approximate Downtime (hours)	Cause of Shutdown
1/7/2019	KAFB-106233	0.5	Rerouted/bypassed ARV and Kunkle valve outputs to top of wellhead at KAFB-106233
1/10/2019	N/A	N/A	Received and stocked delivery of KAFB-106228 emergency piping supply
1/10/2019	N/A	N/A	Received and stocked delivery of spare KAFB-106239 pump/motor assembly
1/11/2019	N/A	N/A	Installed bulletin board in GWTS
1/16/2019	KAFB-106239	12.0	Disinfected KAFB-106239
1/17/2019	KAFB-106239	12.0	Disinfected KAFB-106239
1/29/2019	N/A	N/A	Cleaned GWTS internal sump
2/26/2019	KAFB-106233 and KAFB-106234	1.0	Replaced Square D Surgelogic (TVS3DSPHC) surge counter at the well control house
2/26/2019	N/A	N/A	Replaced the water level transducer with transmitter at injection well KAFB-7
2/27/2019	N/A	N/A	Scaled the new water level transmitter at KAFB-7
2/28/2019	N/A	N/A	Scaled the new water level transmitter at KAFB-7
2/28/2019	KAFB-106228 and KAFB-106239	0.5	Replaced RJ45 connector at the Train 2 effluent skid VFD
3/6/2019	KAFB-106239	12.0	Disinfected KAFB-106239
3/7/2019	KAFB-106239	12.0	Disinfected KAFB-106239
3/12/2019	Entire GWTS	1.0	Replaced the valve and diaphragm assembly of both Trains' chlorine dosing pumps
3/26/2019	N/A	N/A	Cleaned extraction well vaults
3/27/2019	N/A	N/A	Cleaned remaining extration well vaults, ARV vaults, and conveyance line junction vault
3/28/2019	KAFB-106239	4.0	Cleaned the mag meter (flowmeter) in KAFB-106239 vault

ARV = air relief valve
CPVC = chlorinated polyvinyl chloride
GCMP = Golf Course Main Pond
GWTS = groundwater treatment system
HMI = human machine interface
KAFB = Kirtland Air Force Base
PLC = programmable logic controller
VFD = variable-frequency drive