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

JUN 2 5 2021

Colonel Jason F. Vattioni, USAF
Commander
377th Air Base Wing
2000 Wyoming Blvd SE
Kirtland AFB NM 87117

Mr. Ricardo Maestas
Acting Hazardous Waste Bureau Chief
New Mexico Environment Department
Harold Runnels Building
1190 St. Francis Drive Suite N2050
Santa Fe NM 87502

Dear Mr. Maestas

A groundwater model is a predictive tool whose utility tends to diminish as sufficient field data are collected. The plume capture model employed by the U.S. Air Force (Air Force) to evaluate the efficacy of the pump and treat interim measure has been supplanted by actual data collected from the robust groundwater monitoring network. As summarized below, the discontinuation of this modeling is supported by the U.S. Environmental Protection Agency's (USEPA's) Guidance, "*A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems, Final Project Report*" (USEPA 660/R-08/003, January 2008) (USEPA Guidance). The Air Force is therefore seeking approval from the New Mexico Environment Department (NMED) to discontinue the semiannual plume capture modeling related to this interim measure.

Background

The November 16, 2017 Notice of Deficiency (NOD) required the Air Force to perform the six-step plume capture analysis in accordance with USEPA Guidance. This NOD, which was issued ahead of the completion of NMED's formal review of the January 20, 2017 "Resource Conservation and Recovery Act Facility Investigation Report" (RFI Phase I), contained direction related to the potential impacts of the rising water table on the Air Force's "*...ability to complete a robust calculation of EDB* [ethylene dibromide] *plume mass and removal*". Specifically, the NOD required the development of a numerical or analytical model to address the impacts of "*...reduced resolution of monitoring data at the water table...*" from the rising water table.

The Air Force began semiannual plume capture modeling to support capture zone analysis and evaluate the performance of the interim measure in second quarter (Q2) 2018. The modeling results are presented in the Q2 and fourth quarter (Q4) periodic monitoring reports for the Bulk Fuels Facility (BFF), Solid Waste Management Units (SWMUs) ST-106/SS-111. Consistent with the iterative approach outlined in the USEPA Guidance, the Air Force has determined that capture is sufficient, modeling no longer adds value to the evaluation of the interim measure and that ongoing routine monitoring is sufficient to evaluate the future progress of the interim measure.

Summary of Six Step Systematic Evaluation of Capture Zones

Capture zone analysis, as detailed in the USEPA Guidance, is the process of evaluating field observations of hydraulic heads and groundwater chemistry to interpret the actual capture zone and then comparing the interpreted capture zone to a "Target Capture Zone" to determine if capture is sufficient. Specific techniques to assess the extent of capture achieved by the extraction wells are provided. Each of these techniques is subject to limitations, and in most cases no single line of evidence will conclusively differentiate between successful and failed capture. Therefore, developing "converging lines of evidence" by applying multiple techniques to evaluate capture increases confidence in the conclusions of the capture zone analysis. The systematic approach detailed in the USEPA Guidance is a six-step iterative process that advises the practitioner to obtain additional field information to address data gaps and ambiguities if present. Along each step of the process, the practitioner evaluates the completeness of the data set and how to address uncertainty. With each iteration, the need for simulated data and dependence on uncertainties is reduced and reliance on actual field monitoring and measurements is increased.

The six steps that are suggested for a systematic capture zone evaluation are: (1) review of available site data, site conceptual model, and remedy objectives; (2) determination of a site-specific target capture zone (TCZ); (3) interpretation of water level data; (4) calculations which may include estimating flow rate, capture zone width, and/or modeling (analytical or numerical) to simulate water levels, in conjunction with particle tracking and/or transport modeling; (5) evaluation of concentration trends, especially at down gradient monitoring wells; and (6) interpretation of actual capture based on the data obtained in the above five steps, comparison of the available data to the TCZ and evaluation of uncertainties and data gaps before the next iteration.

Basis of Request

In quarter four 2016, fifteen months after the first interim measure extraction well became active, the plume volume and mass were estimated at 114.7 million cubic feet and 104 grams, respectively. By the end of Q4 2020, the interim measure had extracted and treated approximately 1.026 billion gallons of groundwater, decreased the EDB plume volume by 89%, and reduced the overall EDB mass by 95%. The Interim Measure Operation Area (IMOA) is the part of the EDB plume that the pump and treat system is targeting and is illustrated on Figure 4-1 from the Q4 2020 Period Monitoring Report (see attached). Monitoring data collected in the IMOA demonstrates that the pump and treat system has successfully collapsed the targeted portion of the EDB plume and is currently containing the isolated EDB detections north of Ridgecrest Drive.

As illustrated on Figure 4-9 from the Q4 2020 Period Monitoring Report (see attached), EDB was not detected in any of the deep monitoring wells site wide. Of the 82 groundwater monitoring wells within the IMOA north of Ridgecrest Drive, 76 wells were either below USEPA maximum contaminant level (MCL) or non-detect. All groundwater monitoring wells that produced a detection above the MCL have down gradient monitoring wells with non-detect values.

Over the past several years of model development, pumping rates and hydraulic parameters have been established and are now well understood, and no further estimation of aquifer parameters are anticipated at present or in the near future. Therefore, based on the information provided above, Step 4 of the six step process will be accomplished in the future by performing simple horizontal analyses related to capture by using the known extraction rates and parameters to calculate the capture zone width. This line of evidence will then be combined with Step 5 using the vast amount of data that has been collected to support trend analysis within the IMOA.

USEPA Guidance points out that capture zone analysis based on concentration trends can be complicated by several factors including: 1) limited chemical concentration data; 2) long time periods (years) to interpret concentration data related to capture; 3) multiple hydrogeological units; and 4) multiple releases. However, a review of each of these factors as they relate to the Kirtland BFF demonstrates that none of the above factors are present. Over the last four years of interim measure operations, the Air Force has collected chemical data and hydraulic monitoring information that spans 16 quarterly sampling events. Based on the

current conceptual site model, the BFF has only one hydrogeological unit that was impacted by fuels resulting from a single release. Therefore, none of the complicating factors identified in the USEPA Guidance exist at the Kirtland AFB BFF site.

USEPA Guidance states that conducting concentration trend analysis at down gradient performance monitoring wells over time may ultimately provide the most solid and compelling line of evidence that successful capture has been achieved. Furthermore, hydraulic and chemical monitoring should be components of capture zone evaluations. As indicated above, each extraction well that is a component of the interim measure is surrounded by an extensive groundwater monitoring well network in the IMOA. The extensive and robust monitoring well network spans three groundwater horizons ensuring continuous monitoring of EDB concentrations both laterally and vertically. Finally, the USEPA Guidance states that capture zone effectiveness is ultimately determined by field monitoring that typically includes some combination of hydraulic head measurements and groundwater sampling and analysis. Based on the information provided above, the Air Force is seeking approval from NMED to discontinue the semiannual modeling efforts related to the interim measure.

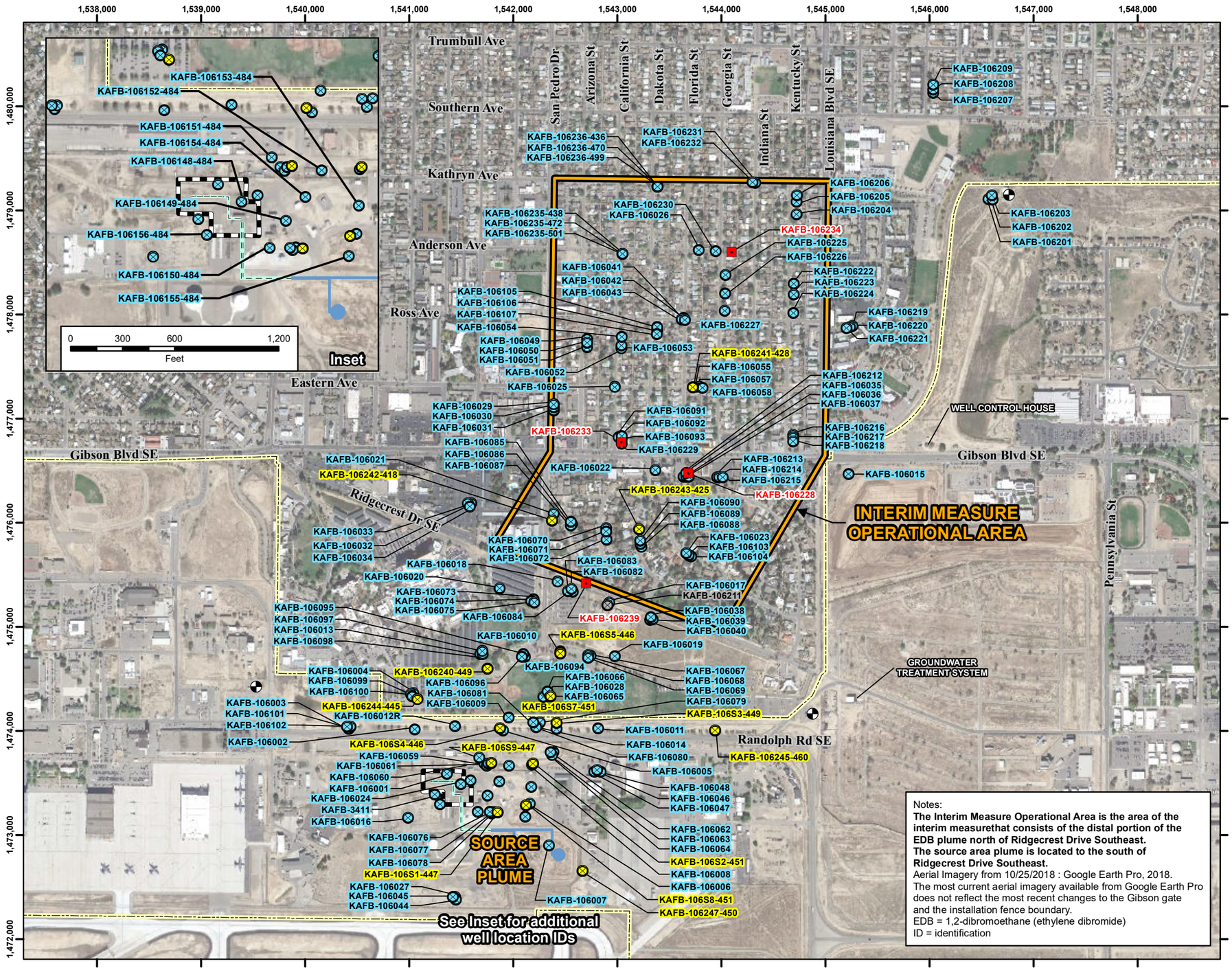
As the Q2 2021 Groundwater Monitoring Report is currently under development, the Air Force would appreciate your prompt attention to this matter. If you have any questions or concerns, please contact Mr. Sheen Kottkamp at commercial line (505) 846-7674 or email sheen.kottkamp.1@us.af.mil.

Sincerely

JASON F. VATTIONI, Colonel, USAF
Commander

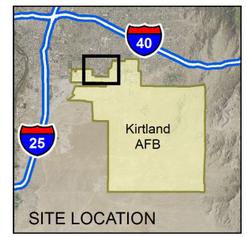
2 Attachments:
1. Figure 4-1 Groundwater Monitoring Network, Drinking Water Well Supply, and Extraction Well Locations
2. Figure 4-9 EDB Concentrations in Groundwater, Reference Elevation Interval 4814, Q4 2020

cc:
NMED HWB (Maestas, Andress), letter and electronic
NMED RPD (Catechis), electronic only
EPA Region 6 (King, Ellinger), electronic only
SAF/IEE (Lynnes), electronic only
AFCEC/CZ (Banks, Wortman, Segura), electronic only
USACE-ABQ District Office (Moayyad, Phaneuf, Dreeland, Cordova, Kunkel), electronic only
Public Info Repository, Administrative Record/Information Repository (AR/IR) and File



Legend

- Groundwater Monitoring Well
- Extraction Well
- Drinking Water Supply Well
- Monitoring Well (pending water table rise)
- Data Gap Wells Installed in 2018 and 2019
- Former Aboveground Storage Tank
- Former Buried Fuel Transfer Line
- Former Aboveground Fuel Transfer Line
- Installation Fence Boundary
- Interim Measure Operational Area
- Source Area



N

0 500 1,000 2,000

Feet

1 inch = 1,000 feet

Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

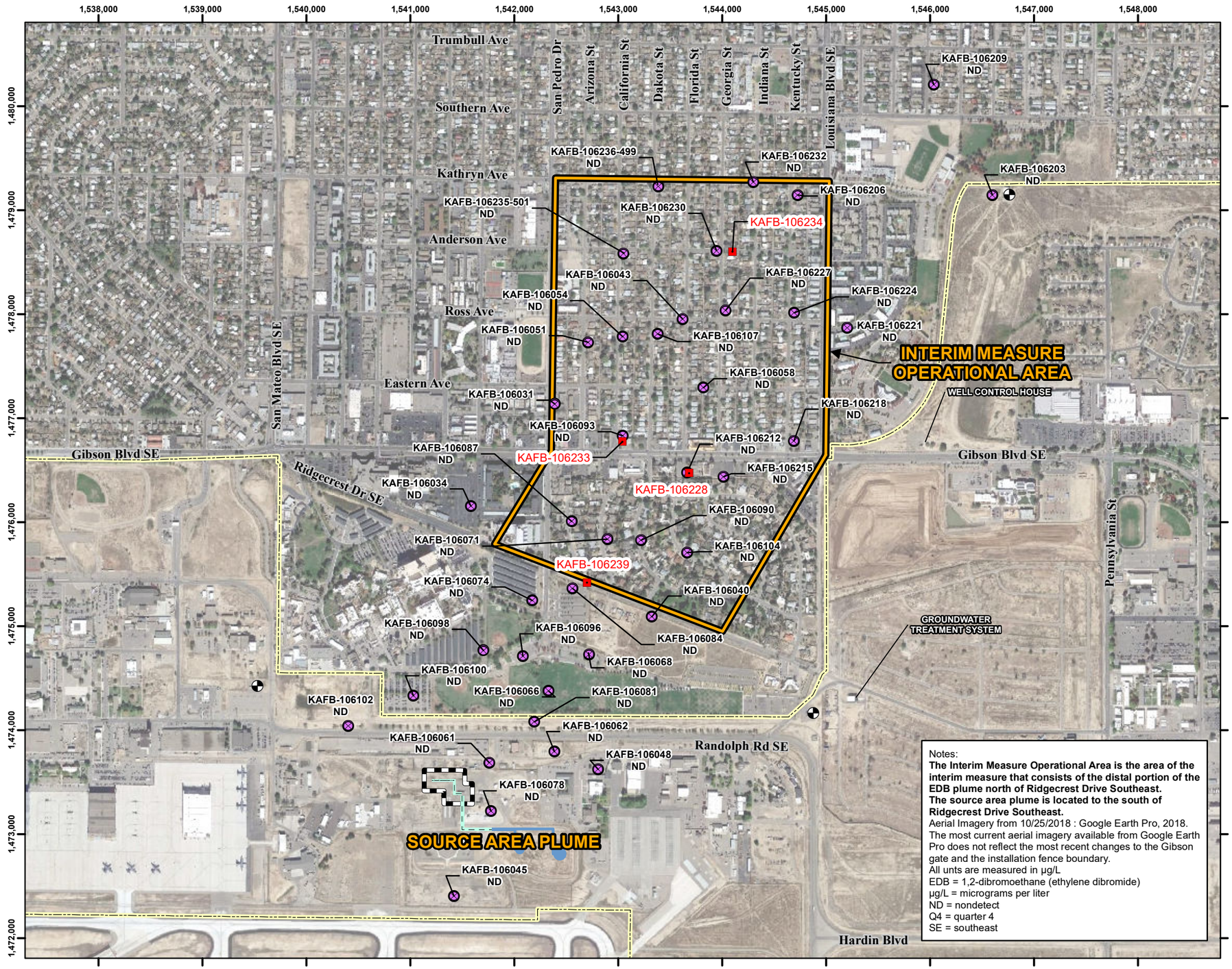
Notes:
The Interim Measure Operational Area is the area of the interim measurethat consists of the distal portion of the EDB plume north of Ridgecrest Drive Southeast.
The source area plume is located to the south of Ridgecrest Drive Southeast.
Aerial Imagery from 10/25/2018 : Google Earth Pro, 2018.
The most current aerial imagery available from Google Earth Pro does not reflect the most recent changes to the Gibson gate and the installation fence boundary.
EDB = 1,2-dibromoethane (ethylene dibromide)
ID = identification

PERIODIC MONITORING REPORT
OCTOBER - DECEMBER 2020
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 4-1

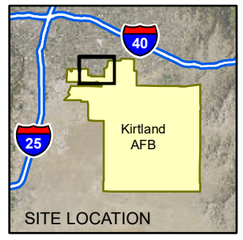
GROUNDWATER MONITORING NETWORK, DRINKING WATER SUPPLY WELL, AND EXTRACTION WELL LOCATIONS

P:\Projects\Kirtland\Figures\BFF Quarterly Report\2020_Q4\Section 4 New\4-1 Well Map_Q420.mxd 3/17/2021 EA ecarpio



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
- Interim Measure Operational Area
- Source Area



N

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Feet

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Projection: NAD83 State Plane New Mexico Central FIPS3002 Feet

Notes:
The Interim Measure Operational Area is the area of the interim measure that consists of the distal portion of the EDB plume north of Ridgecrest Drive Southeast. The source area plume is located to the south of Ridgecrest Drive Southeast.
Aerial Imagery from 10/25/2018 : Google Earth Pro, 2018.
The most current aerial imagery available from Google Earth Pro does not reflect the most recent changes to the Gibson gate and the installation fence boundary.
All unts are measured in µg/L
EDB = 1,2-dibromoethane (ethylene dibromide)
µg/L = micrograms per liter
ND = nondetect
Q4 = quarter 4
SE = southeast

PERIODIC MONITORING REPORT
OCTOBER - DECEMBER 2020
BULK FUELS FACILITY
SOLID WASTE MANAGEMENT UNITS ST-106/SS-111
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 4-9

EDB CONCENTRATIONS IN GROUNDWATER
REFERENCE ELEVATION INTERVAL 4814,
Q4 2020

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