

Cobrain, Dave, NMENV

 **ENTERED**

KAFB BFFS
ST-106 ST-111
~~Aquifer Test Draft~~
letter original

From: Cobrain, Dave, NMENV
Sent: Monday, August 12, 2013 12:04 PM
To: Blaine, Tom, NMENV
Cc: Kieling, John, NMENV; Reuter, Stephen, NMENV; Macias, Theresa, NMENV
Subject: Extraction well dev and test requirments 7-18-13
Attachments: Extraction well dev and test requirments 7-18-13.docx

Tom,

Here's the electronic version of the Aquifer Test letter to send to KAFB. It would probably be helpful for them to provide comments this week so it can be sent out formally before the 21st.

Dave





SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

**NEW MEXICO
ENVIRONMENT DEPARTMENT**

Hazardous Waste Bureau

**2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us**



RYAN FLYNN
Cabinet Secretary-Designate

BUTCH TONGATE
Deputy Secretary

TOM BLAINE, P.E.
Director
Environmental Health Division

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

July 29, 2013

Colonel Tom D. Miller
Base Commander
377 ABW/CC
2000 Wyoming Blvd. SE
Kirtland AFB, NM 87117-5606

John Pike
Director, Environmental Management Services
377 MSG
2050 Wyoming Blvd. SE, Suite 116
Kirtland AFB, NM 87117-5270

**RE: GROUNDWATER EXTRACTION WELL KAFB-106157
DEVELOPMENT AND AQUIFER TESTING REQUIREMENTS
BULK FUELS FACILITY SPILL,
SOLID WASTE MANAGEMENT UNITS ST-106 AND SS-111
KIRTLAND AIR FORCE BASE, EPA ID# NM9570024423,
HWB-KAFB-13-024**

Dear Colonel Miller and Mr. Pike:

The New Mexico Environment Department (NMED) has reviewed the available hydraulic data collected by U.S. Air Force (Permittee) in the vicinity of the Kirtland Air Force Base (KAFB) Bulk Fuels Facility Spill (BFFS) located in Albuquerque New Mexico. This letter provides the requirements for development and testing of groundwater extraction well KAFB-106157 located in Bullhead Park adjacent to the northern boundary of the Base. The extraction well was installed in December 2011.

In order for interim measures and a final remedy for the BFFS to be fully evaluated, conditions in the unconfined aquifer beneath, and downgradient from, the BFFS site must be assessed. To date, aquifer testing has been limited to slug tests conducted in selected wells; however, it is appropriate for the Permittee to utilize the existing extraction well to more adequately characterize aquifer conditions and to further evaluate contaminant fate and transport, support groundwater modeling activities and evaluate potential corrective measures. The extraction well was installed near the downgradient limit of the currently mostly submerged phase-separated

hydrocarbons plume that is collocated with the portion of the dissolved-phase groundwater plume that contains the highest concentrations of volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene, total xylenes (BTEX) and ethylene dibromide (EDB) and other fuels-related organic compounds.

Well Development

Development and testing of extraction well KAFB-106157 has not been conducted since the well was installed in 2011. The well must be adequately developed prior to conducting aquifer testing to ensure that the aquifer test accurately characterizes groundwater conditions in the vicinity of the well. Well development and testing will improve the performance of the well and optimize overall yield. Post-develop testing will provide hydrological and geochemical data and information on whether the well was developed properly and can deliver an acceptable yield for extraction purposes. This testing can be used to determine: a) the average specific yield of the screened interval, b) aquifer properties with respect to the zone of influence surrounding the well, c) an acceptable discharge rate or yield for extraction purposes if a permanent pump is installed, and d) the depth at which a permanent extraction pump should be positioned.

Well development should be conducted in general accordance with the United State Environmental Protection Agency's (USEPA) *RCRA Groundwater Monitoring: Draft Technical Guidance (USEPA, 1992)* or other applicable guidance (e.g., ASTM methods) for well development. Since the well was not developed at the time of installation, at a minimum, well-development procedures must include the following.

1. Determine depth to water, total water column, total well depth and sediment thickness at the bottom of the well prior to the start of well development.
2. Mechanically surge or swab the well screen using a surge block(s), while simultaneously pumping the water column to remove natural and introduced solid-particulate material (e.g., formation fines, drilling materials) from the screened interval.
 - a) Surging and pumping within the water column above the screen should be conducted first to assess whether the well is producing excessive amounts of filter-pack sand or other material that might lock the surge block during swabbing along the screened interval. Water levels should be measured during this initial stage of development to help determine the optimal pumping rate during surging.
 - b) Conduct multiple runs of swabbing and pumping from the top of the screened interval down to the sump and back to the top of water. The total volume of water that is necessary to pump during swabbing will depend on the observed physical and chemical conditions of the pumped groundwater.

- c) During surging and swabbing, monitoring of generated well development water should be conducted by measuring turbidity, dissolved oxygen, temperature, pH, specific conductivity and oxidation-reduction potential at 15 to 30 minute time intervals. All data and observations must be documented.
3. After surging and swabbing the well screen, overpumping of the screened interval must be conducted at different depth intervals along the well screen. During overpumping, field parameters including turbidity, dissolved oxygen, temperature, pH, specific conductivity, and oxidation-reduction potential must be measured and documented. Groundwater samples must be collected at the beginning, middle and end of the overpumping sequence and analyzed for field water quality parameters, major ions (e.g., chloride), alkalinity, total organic carbon, total and dissolved metals, EDB, VOCs, semivolatile organic compounds (SVOCs), gasoline- and diesel-range organics.
4. Sediment thickness in the well sump must then be re-measured and assessed. If the amount of sediment in the well is not acceptable then additional development may be needed with focus on sediment removal.

Aquifer Testing

Step Drawdown Test

A step drawdown test must be conducted in order to determine the optimal pumping rate for a constant discharge aquifer test. The step-drawdown test must incorporate four to five pumping rates for a minimum of one to two hours where progressively higher rates of pumping are induced while measuring water-level drawdown. The time interval for each step must be long enough to allow for dissipation of wellbore storage effects. Groundwater levels must be measured continuously during pumping and also during the recovery period after the end of each step-test. The water level data will aid in estimating aquifer properties such as storativity. The number of step-drawdown tests and associated depth of pump placement must be determined based on the lithologic and hydrogeologic characteristics of the aquifer along the screened interval.

Water-levels must be monitored both in the extraction well and at all nearby monitoring wells during the step drawdown test. Data derived from the step-tests will be used to estimate the performance of the well and, as previously mentioned, determine the optimal pumping rate for the aquifer test.

Constant Discharge Aquifer Test

Following the step-drawdown test, a multi-day constant-discharge aquifer test must be conducted. The size of the pump, depth of pump placement, and pumping rate and duration for the aquifer test must be determined based on the step-drawdown data and any other pertinent

Col. Miller and Mr. Pike
July 29, 2013
Page 4

aquifer information. Water-levels must be monitored in the extraction well and all nearby groundwater monitoring wells prior to, during, and after the pumping test until recovery is complete or near complete. The drawdown and recovery water levels in the extraction well and surrounding monitoring wells will be used to determine aquifer characteristics and the capability and radius of influence of the well for possible use as an extraction well as part of a pump and treat system. During aquifer testing, two groundwater samples must be collected each day, one at 0900 hours and one at 1500 hours. The samples must be analyzed for major ions, total and dissolved metals, EDB, VOCs, gasoline- and diesel-range organics.

The Permittee must submit a work plan describing the procedures to conduct development and testing of extraction well KAFB-106157. The work plan must also include detailed descriptions of proposed activities, a proposed schedule to both complete development of the well and conduct aquifer tests and that also provides the details for the disposition of all generated water no later than September 15, 2013.

Please contact Dave Cobrain of my staff at (505) 476-6055, if you have questions.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: T. Blaine, P.E., NMED EHD
D. Cobrain, NMED HWB
W. Moats, NMED HWB
W. McDonald, NMED HWB
S. Brandwein, NMED HWB
J. Schoeppner, NMED GWQB
B. Gallegos, AEHD
F. Shean, ABCWUA
L. King, EPA-Region 6 (6PD-N)

File: KAFB 2013 Bulk Fuels Facility Spill and Reading