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

Colonel Eric H. Froehlich
377 ABW/CC
2000 Wyoming Blvd SE
Kirtland AFB, NM 87117-5600

NOV 03 2015

Mr. John Kieling, Manager
RCRA Permits Management Program
Hazardous Waste Bureau (HWB)
New Mexico Environment Department (NMED)
2905 Rodeo Park Road
Santa Fe, New Mexico 87505

Dear Mr. Kieling

Please find attached, *Groundwater Extraction Wells KAFB-106233 and KAFB-106234 Aquifer Testing Letter Work Plan, Bulk Fuels Facility, Kirtland Air Force Base, New Mexico.* This letter Work Plan outlines the activities needed to complete aquifer testing at groundwater extraction wells Kirtland Air Force Base (KAFB)-106233 and KAFB-106234.

If you have any questions or concerns, please contact Mr. L. Wayne Bitner at (505) 853-3484 or at ludie.bitner@us.af.mil or Ms. Victoria Branson at (505) 846-6362 or at victoria.branson@us.af.mil.

ERIC H. FROEHLICH, Colonel, USAF
Commander

cc:
NMED-EHD (Roberts, McQuillan, Agnew)
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40 CFR 270.11
DOCUMENT CERTIFICATION
OCTOBER 2015

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.

ERIC H. FROEHLICH, Colonel, USAF
Commander, 377th Air Base Wing

This document has been approved for public release.

KIRTLAND AIR FORCE BASE
377th Air Base Wing Public Affairs

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October 27, 2015

Subject: Groundwater Extraction Wells KAFB-106233 and KAFB-106234 Aquifer Testing Letter Work Plan, Bulk Fuels Facility, Kirtland Air Force Base, New Mexico

This letter Work Plan outlines the activities needed to complete aquifer testing at groundwater extraction wells Kirtland Air Force Base (KAFB)-106233 and KAFB-106234. These aquifer tests will be conducted in accordance with the procedures outlined in the approved Groundwater Extraction Well KAFB-106228 Aquifer Pilot-Test Work Plan (U.S. Army Corps of Engineers [USACE], 2015) and associated fieldwork variance KAFB-FWV-14 (attached). Variations to the procedures are addressed in this letter Work Plan. A generalized schedule for the completion of aquifer testing activities is provided in Table 1. KAFB-106233 and KAFB-106234 Aquifer Testing Report will be submitted to New Mexico Environment Department.

Observation Network Variations

An observation well was drilled to monitor aquifer drawdown in the vicinity of the two extraction wells (i.e., KAFB-106233 and KAFB-106234). KAFB-106229 was drilled as an observation well for KAFB-106233. KAFB-106230 was drilled as an observation well for KAFB-106234, and was a data-gap groundwater monitoring well to monitor potential ethylene dibromide contamination in the Intermediate Zone of the aquifer. Along with the observation wells, a number of groundwater monitoring wells were selected as observation points for the aquifer tests. Additionally, one barometric pressure sensor will be used to measure barometric pressure fluctuations for the duration of aquifer testing instead of the three barometric pressure sensors described in the Aquifer Pilot-Test Work Plan for KAFB-106228 in Section 2 (USACE, 2015). It was determined the barometric pressure fluctuations did not vary across the three locations. Therefore, only one barometric pressure sensor will be used in the KAFB-106203 well vault. All observation points selected for aquifer testing are presented on Figures 1 and 2, and described in Tables 2 and 3.

Step-Drawdown Test Variation

In the Aquifer Pilot-Test Work Plan for KAFB-106228 in Section 2.1 (USACE, 2015), the step-drawdown (variable rate) test indicated pumping flow rates would be approximately 50, 100, and 150 gallons per minute, although the maximum flow rate may be limited by a temporary treatment system and/or discharge system. To prevent dictating the maximum extraction capacity of extraction wells KAFB-106233 and KAFB-106234, the step-drawdown test will be conducted at pumping flow rates of 50 percent (%), 100%, and 150% based on the anticipated maximum pumping for each extraction well. If the pump cannot maintain stable pumping at 50% of the proposed discharge rate, then the first step will be conducted at the lowest stable pumping rate. If the pump cannot reach 150% of the proposed discharge rate, then the third step will be conducted at the highest achievable pumping rate.

Step-Drawdown Test and Constant Rate and Recovery Test Variation

In the Aquifer Pilot-Test Work Plan for KAFB-106228 in Section 2 (USACE, 2015), the step-drawdown test and constant rate and recovery test recorded water-level measurements from the transducers in the observation points was 1-minute intervals. This increased frequency did not enhance the data

interpretation. Therefore, the recording frequencies for transducers in the observation points for step-drawdown test and constant rate and recovery test will be set to record at 5-minute intervals, as indicated in Tables 2 and 3.

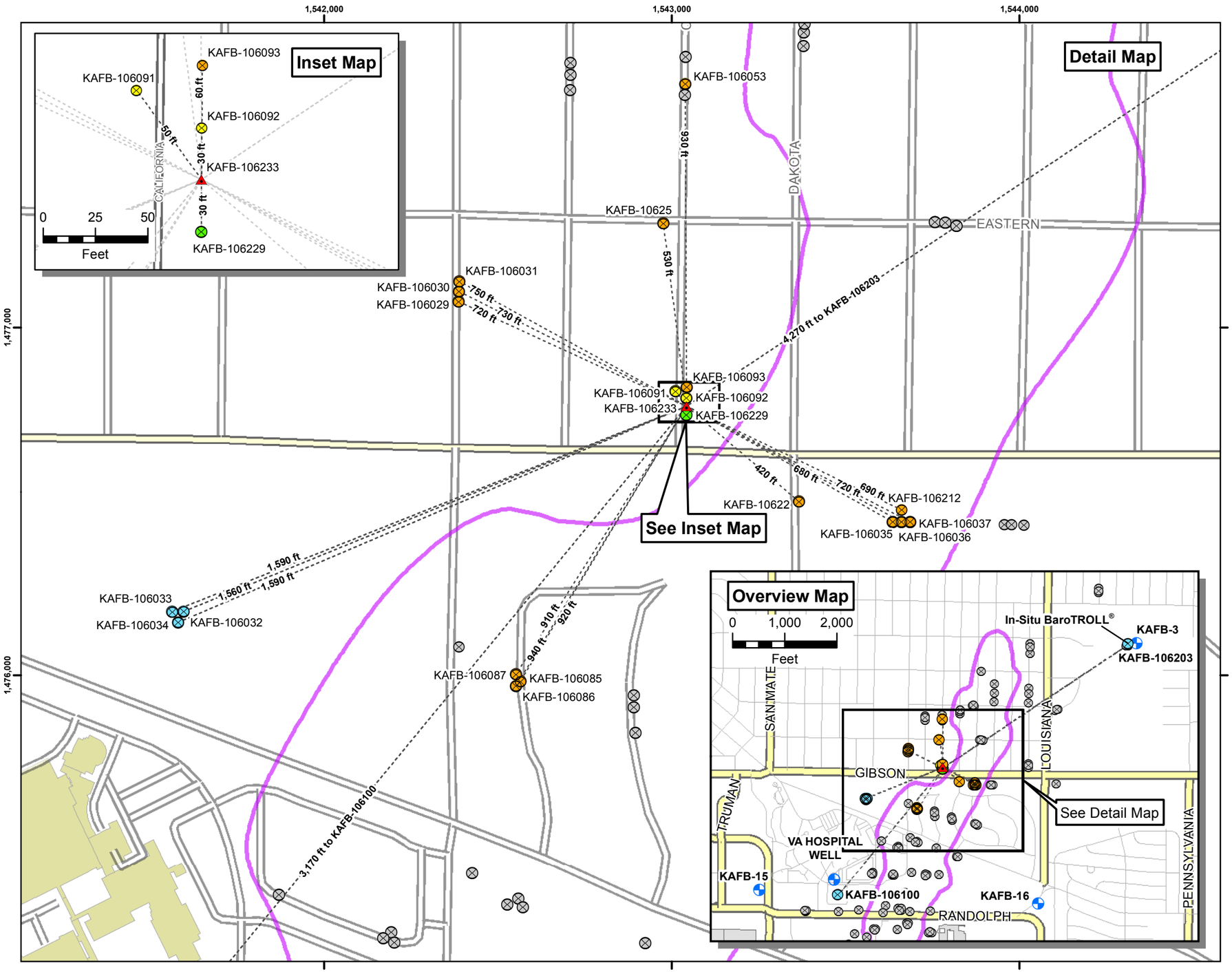
Aquifer Test Analysis Clarification

In the Aquifer Pilot-Test Work Plan for KAFB-106228 in Section 2.3 (USACE, 2015), analysis methods were discussed for a variety of aquifer conditions. The methods selected to analyze tests at KAFB-106233 and KAFB-106234 will be based on the water-table response to pumping and on the observed aquifer conditions, including lithology of the extraction well and observation points. This may include methods discussed in Section 2.3 of the Aquifer Pilot-Test Work Plan for KAFB-106228 as applicable based on data.

References

USACE, 2015, *Kirtland Air Force Base Bulk Fuels Facility – Groundwater Extraction Well KAFB-106228 Aquifer Pilot-Test Work Plan,* Prepared by CB&I Federal Services LLC for the USACE Albuquerque District under USACE Contract No. W912DY-10-D-0014, Delivery Order 0002, March.

FIGURES

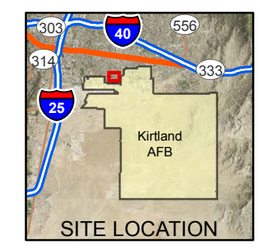


Legend

- Extraction Well
- Background Monitoring Well for the Step-Drawdown and Constant Rate Aquifer Tests
- Monitoring Well for the Constant Rate Aquifer Test
- Monitoring Well for the Step-Drawdown and Constant Rate Aquifer Tests
- Observation Well for the Step-Drawdown and Constant Rate Aquifer Tests
- Monitor Well
- Water Supply Well
- Distance Line
- Dissolved Plume Extent (April 2015)

Distance lines represent the horizontal distance from pumping test well KAFB-106233.

Water supply wells KAFB-15 and KAFB-16 are non-operational.



N

Revision Date: 10/29/15

0 150 300 600

Feet

1 inch = 300 feet

Projection : NAD83 State Plane New Mexico Central FIPS3002 Feet

AQUIFER TESTING WORK PLAN
RAPID RESPONSE
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 1

AQUIFER TEST WELL LOCATIONS
GROUNDWATER EXTRACTION WELL
KAFB-106233

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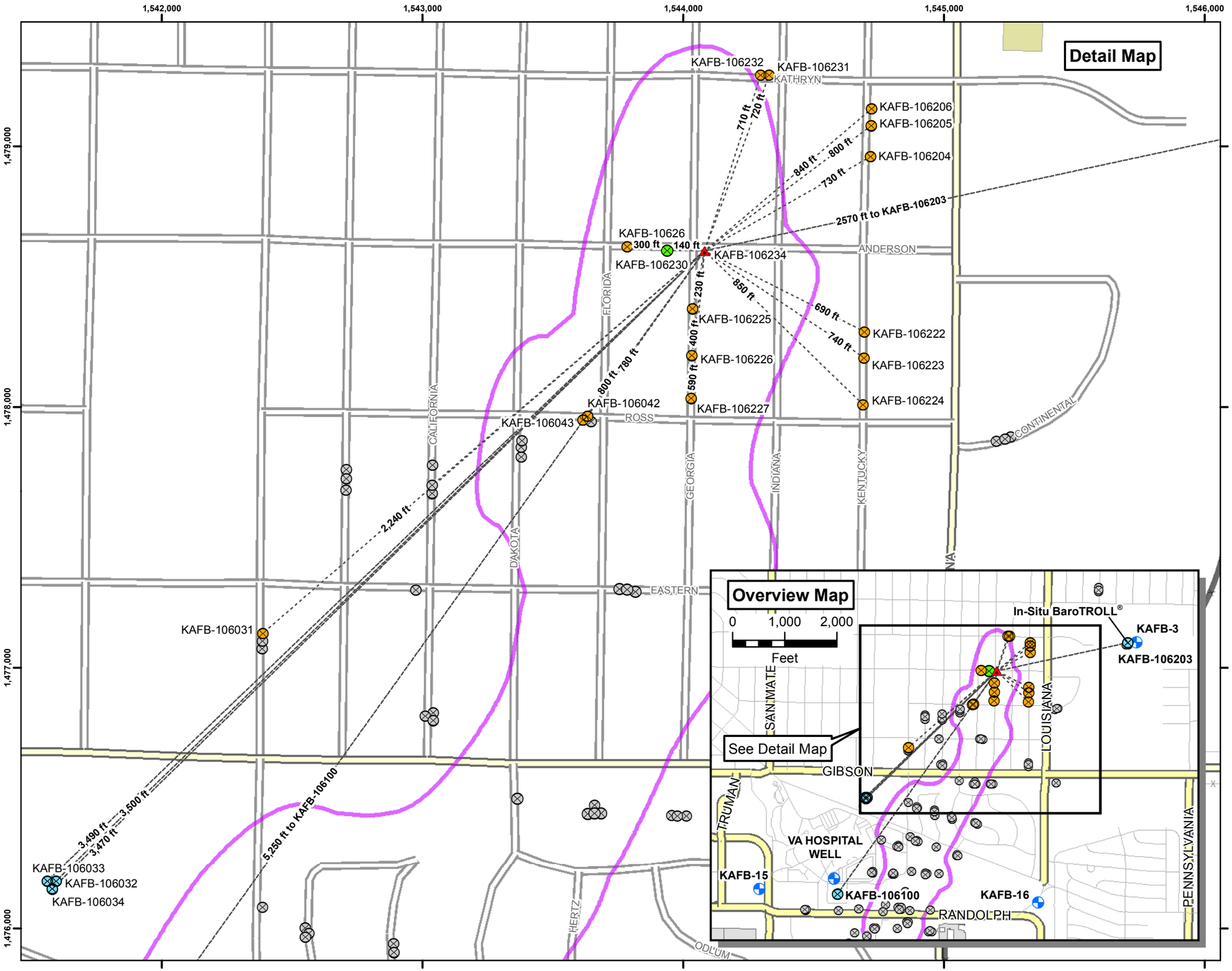
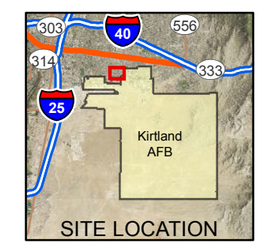


Legend

- Extraction Well
- Background Monitoring Well for the Step-Drawdown and Constant Rate Aquifer Tests
- Monitoring Well for the Constant Rate Aquifer Test
- Observation Well for the Step-Drawdown and Constant Rate Aquifer Tests
- Monitor Well
- Water Supply Well
- Distance Line
- Dissolved Plume Extent (April 2015)

Distance lines represent the horizontal distance from pumping test well KAFB-106234.

Water supply wells KAFB-15 and KAFB-16 are non-operational.



N

Revision Date: 10/29/15

0 200 400 800

Feet

1 inch = 400 feet

Projection : NAD83 State Plane New Mexico Central FIPS3002 Feet

AQUIFER TESTING WORK PLAN
RAPID RESPONSE
KIRTLAND AIR FORCE BASE, NEW MEXICO

FIGURE 2

AQUIFER TEST WELL LOCATIONS
GROUNDWATER EXTRACTION WELL
KAFB-106234

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TABLES

Table 1. Generalized Schedule for Aquifer Testing at KAFB-106233 and KAFB-106234

Week	1							2							3							4							5							6							7		
Day	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	*41*	*42*	*43*	*44*	*45*
Aquifer Stabilization[a]																																													
Background Monitoring																																													
Step-Drawdown Test (9 hours per well, conducted on subsequent days)															SD Test 1[c]	SD Test 2[c]																													
Recovery (at least equal to the pumping duration)																SD Rec 1	SD Rec 2								Constant Rate Recovery 1														Constant Rate Recovery 2						
Constant Rate Test[b] (3 to 7 days per well)																		Constant Rate Test 1[d]														Constant Rate Test 2[d]												
KAFB-106228 OFF																																													

[a]All extraction wells (KAFB-106228, KAFB-106233, and KAFB-106234) will be turned OFF prior to aquifer stabilization. During the aquifer testing period, only one extraction well will operate at a time (either KAFB-106233 or KAFB-106234), and only during the specified step-drawdown and constant rate pumping periods.

[b]This schedule assumes the maximum anticipated time of pumping and recovery. Pumping will be between 3 and 7 days, and the recovery period will be at least equal to the pumping duration, as specified in the approved Groundwater Extraction Well KAFB-106228 Aquifer Pilot-Test Work Plan (USACE, 2015).

[c]Either KAFB-106233 or KAFB-106234 will pumped for Step-Drawdown Test 1, and the other well will be pumped for Step-Drawdown Test 2. Which well is used for each test may be based on practical considerations.

[d]Either KAFB-106233 or KAFB-106234 will be pumped for Constant Rate Test 1, and the other well will be pumped for Constant Rate Test 2. Which well is used for each test may be based on practical considerations.

Pump OFF

Pumping at either KAFB-106233 or KAFB-106234

Table 2. KAFB-106233 Aquifer Test Well Summary

Well ID	Target Aquifer Zone	Screened Interval (feet bgs)	Depth to Groundwater[b] (feet bgs)	Horizontal Distance from KAFB-106233[c] (feet)	Observation Method[d]	Purpose	Transducer Log Setting		
							Background	Step-Drawdown Test	Constant Rate and Recovery Test
KAFB-106233[a]	Shallow, Intermediate, and Deep	430 to 532.1		0	Pressure Transducer and Electric Tape Water Level Meter	Extraction Well	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106092	Intermediate	474 to 489	449.95	30	Pressure Transducer and Electric Tape Water Level Meter	Monitoring Well for the Step-Drawdown and Constant Rate Aquifer Tests	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106229[a]	Shallow, Intermediate, and Deep	431 to 531	448.7	30	Pressure Transducer and Electric Tape Water Level Meter	Observation Well for the Step-Drawdown and Constant Rate Aquifer Tests	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106091	Shallow	454 to 474	449.81	50	Pressure Transducer and Electric Tape Water Level Meter	Monitoring Well for the Step-Drawdown and Constant Rate Aquifer Tests	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106093	Deep	544 to 599	449.95	60	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-10622	Shallow	462 to 487	453.65	420	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-10625	Shallow	465 to 490	452.91	530	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106035	Shallow	452 to 482	457.07	680	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106212	Deep	543 to 558	458.8	690	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106036	Intermediate	481.8 to 496.8	457.1	700	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106029	Shallow	450.8 to 470.8	446.7	720	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106037	Deep	507 to 522	457.21	720	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106030	Intermediate	469.5 to 484.5	446.84	730	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106031	Deep	495.8 to 509.5	446.91	750	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106087	Deep	546 to 561	452.29	910	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106085	Shallow	446.5 to 476.5	452.7	920	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106053	Intermediate	478.4 to 493.4	454.44	930	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106086	Intermediate	476 to 491	453.07	940	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106032	Shallow	456 to 476	452.36	1560	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106033	Intermediate	477 to 492	452.6	1590	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106034	Deep	502 to 517	453.41	1590	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106100	Shallow	526 to 541	477.2	3170	Pressure Transducer	Background Monitoring Well for the VA well pumping time	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106203	Deep	620 to 635	495.16	4270	Pressure Transducer	Background Monitoring Well for KAFB-3 pumping times	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106203	Atmosphere	NA	NA	4270	In-Situ BaroTROLL®	Barometric Pressure Sensor Installed in KAFB-106203 Well Vault.	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals

[a]These wells have been recently installed. Well completion diagrams with final construction details will be included in the Aquifer Test Report.

[b]Second Quarter CY 2015 water levels are presented here, with the exception of the recently installed wells where the water level at time of installation is presented.

[c]These distances are based on the planned locations of recently installed wells. Accurate distances will be determined after KAFB-106233 and all of the observation wells are completed and surveyed, and those distances will be used in the aquifer test analysis.

[d]In-Situ Level TROLL® 700 pressure transducers will be used.

bgs - below ground surface

ID - Identification

NA - not applicable

Table 3. KAFB-106234 Aquifer Test Well Summary

Well ID	Target Aquifer Zone	Screened Interval (feet bgs)	Depth to Groundwater[b] (feet bgs)	Horizontal Distance From KAFB-106234[c] (feet)	Observation Method[d]	Purpose	Transducer Log Setting		
							Background	Step-Drawdown Test	Constant Rate and Recovery Test
KAFB-106234[a]	Shallow, Intermediate, and Deep	439.7 to 539.7	460	0	Pressure Transducer and Electric Tape Water Level Meter	Extraction Well	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106230[a]	Intermediate	501 to 516	458.67	140	Pressure Transducer and Electric Tape Water Level Meter	Observation Well for the Step-Drawdown and Constant Rate Aquifer Tests	Linear, 20-minute intervals	True logarithmic, maximum interval of 5 minutes. Re-set at the start of each step.	True logarithmic with a maximum interval of 5 minutes. Re-set at the start of recovery.
KAFB-106225	Shallow	450 to 480	462.46	230	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-10626	Shallow	466 to 486	458.4	300	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106226	Intermediate	480 to 495	463.11	400	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106227	Deep	548 to 563	463.1	570	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106222	Shallow	457.8 to 487.8	469.36	690	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106231[a]	Shallow	440 to 475	461.36	720	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106204	Shallow	462.5 to 492.5	468.85	730	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106232[a]	Intermediate	503 to 518	460.9	730	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106223	Intermediate	487.8 to 502.8	469.94	740	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106042	Intermediate	469.0 to 483.5	459.71	780	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106043	Deep	543 to 557.5	459.99	800	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106205	Intermediate	492.5 to 507.5	469.2	800	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106206	Deep	593.2 to 608.2	469.35	840	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106224	Deep	555 to 570	470.42	850	Pressure Transducer	Monitoring Well for the Constant Rate Aquifer Test	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106203	Deep	620 to 635	496.16	2570	Pressure Transducer	Background Monitoring Well for KAFB-3 pumping times	Linear, 20-minute intervals	Linear, 20-minute intervals	Linear, 5-minute intervals
KAFB-106032	Shallow	456 to 476	452.36	3470	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106033	Intermediate	477 to 492	452.6	3490	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106034	Deep	502 to 517	453.41	3500	Pressure Transducer	Background Monitoring Well	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106100	Shallow	526 to 541	477.2	5250	Pressure Transducer	Background Monitoring Well for the VA well pumping times	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals
KAFB-106203	Atmosphere	NA	NA	2570	In-Situ BaroTROLL®	Barometric Pressure Sensor Installed in KAFB-106203 Well Vault.	Linear, 20-minute intervals	Linear, 5-minute intervals	Linear, 5-minute intervals

[a]These wells have been recently installed. Well completion diagrams with final construction details will be included in the Aquifer Test Report.

[b]Second Quarter CY 2015 water levels are presented here, with the exception of wells installed since that time, where the water level at time of installation is presented.

[c]These distances are based on the planned locations of recently installed wells. Accurate distances will be determined after KAFB-106233 and all of the observation wells are completed and surveyed, and those distances will be used in the aquifer test analysis.

[d]In-Situ Level TROLL® 700 pressure transducers will be used.

bgs - below ground surface

ID - Identification

NA - not applicable

ATTACHMENT

Field Work Variance No. KAFB-FWV-14

Page 1 of 2

FIELD WORK VARIANCE

Project Name/Number	140705		
Contract No.	USACE Contract No. W912DY-10-D-0014 Delivery Order 0002		
Applicable Document(s)	GROUNDWATER EXTRACTION WELL KAFB-106228 AQUIFER TESTING WORK PLAN Bulk Fuels Facility Spill solid waste management units ST-106 and SS-111	Date	7/20/15

Problem Description:

Aquifer Testing was originally planned to begin during commissioning of the temporary groundwater treatment system. Due to schedule, commissioning of the system began June 30th, 2015 and Aquifer Testing will not begin until July 27th, 2015. During commissioning, daily samples were taken for 1 week from the influent line, after the first and second carbon beds, and at final discharge point. Samples were analyzed for EDB, BTEX, and dissolved iron and manganese with 24-hour turnaround time by Hall Environmental Laboratory or Gulf Coast Analytical Laboratories. Only EDB was detected above regulatory limits, and was effectively removed from the water during treatment, all effluent samples were non-detect for EDB.

Section 4.1 of the Aquifer Testing Work Plan states "When aquifer testing commences, pre-treatment groundwater will be collected once per day during pumping. Pre-treatment samples will be collected from the temporary treatment system influent pipeline and analyzed for EDB by SW8011 with a 6-hour turn-around time (TAT). Field water quality parameters, including temperature, pH, conductivity, dissolved oxygen, oxidation-reduction potential, and alkalinity will be collected in the morning and in the afternoon during each day of pumping."

Section 4.1.1 Sampling of Treated Groundwater During Step-Drawdown Test also states "Samples will be collected from the respective outlets of the three carbon beds and submitted for analysis of EDB by Method SW8011 and metals by method SW6010B with a 72-hour TAT for both analyses. At the end of the step-drawdown test, the system will be shut down until the results of these analyses are received and it is confirmed that contaminants of concern (COCs) in the treated water are below regulatory criteria."

Section 4.1.2 Sampling of Treated Groundwater During Constant Rate Test states "During the constant rate test, daily influent samples will continue each morning. Samples will also be collected at the outlet of the primary, secondary and tertiary carbon beds and submitted for analysis of EDB by method SW8011. EDB samples will be analyzed by Hall Environmental Laboratory in Albuquerque, New Mexico and preliminary data will be available by the close of business the same day. These EDB samples will monitor for contaminant breakthrough of the carbon beds, allowing the treatment system to be shut down in a timely manner if breakthrough does occur."

Recommended solution:

Since commissioning of the system has already occurred, the rigorous sampling outlined in the Aquifer Testing Work Plan is no longer necessary. Sampling during the Step-Drawdown and Constant Rate aquifer tests will be performed in accordance with the NMED Groundwater Quality Bureau approved Monitoring and Contingency Plan for Discharge Permit DP-1770 Section 2 as initial operation. Weekly samples will be collected for EDB, benzene, toluene, ethylbenzene, and xylene; and metals (iron and manganese) at the inlet to the first carbon bed (untreated water), from the outlet of the first carbon bed, and at the effluent of the treatment system (treated water discharged to golf course pipeline) (Section 2.1).

Impact on present and completed work:

A request for the change to the sampling scheduled was e-mailed to Dennis McQuillan and members of the NMED GWQB on June 26, 2015. No impact on present and completed work.

Requested by: Jason Tarbert

Clarification ☐ Minor Change ☒ Major Change ☐

Signature _____ Date 7/20/15

Technical Reviewer

Field Work Variance No. KAFB-FWV-12

Page 2 of 2

FIELD WORK VARIANCE CONTINUATION SHEET

CB&I Federal Services LLC Approvals: *If Major Change:*

Signature _____ Date _____ Signature _____ Date _____

Project/Task Manager *Sr. Project Manager*

Signature _____ Date 7/23/15

Project QC System Manager

Continue FWV discussions below by noting section title(s) to be continued (i.e., Problem Description, Solution/disposition, Final Disposition, etc). Use additional continuation sheets as needed.

References:

UASCE, 2015, *Kirtland Air Force Base Bulk Fuel Facility – Groundwater Extraction Pilot Implementation and Additional Plume Characterization Letter Work Plan Addendum #3*, Bulk Fuels Facility Spill Solid Waste Management Units ST-106 and SS-111