REPLACEMENT PAGES, QUARTERLY PRE-REMEDY MONITORING AND SITE INVESTIGATION REPORT FOR JANUARY-MARCH 2011, BULK FUELS FACILITY SPILL, SOILID WASTE MANAGEMENT UNITS ST-106 AND SS-111, MAY 2011

Comments on Geophysical Logs

No.	NMED COMMENT	PROPOSED RESPONSE TO COMMENT
1	Geophysical logs will show results of induction logging (medium and deep) in milliohms per meter, neutron logging in American Petroleum Institute (API) neutron units, and gamma logging in API-calibrated counts per second. This indicates that geophysical logging tools are to be calibrated to known standards; thus, two different logging instruments should yield similar values for a particular geophysical parameter for the lithologic units encountered in a given well, provided conditions in that well have remained constant. The geophysical logs of the first mobilization (29 existing wells) were generated by the contractor Colog and were submitted in the report for the 4th Quarter of 20 10. A second series of logs were generated during the first quarter of2011 by Jet West Geophysical Services (Jet West) and submitted in the Replacement Pages. As indicated above, both sets of logs were to be calibrated well logs. NMED finds that this is not the case as discussed below in the following examples.	Shaw has reviewed the logs submitted by both contractors (Colog and Jet West) to verify instrument and log calibration, as well as to address the specific examples provided. After investigation into the methods employed by Colog, it was discovered that Colog did not record daily calibration values and therefore could not accurately calibrate the logs collected in the field. Additionally, Colog had made an error in calculating the API units reported in the logs reported in the 2010 QTR4 Report. After working with Colog, Shaw learned that Colog had calculated the API units using the pre-log and post-log functionality test values, not the calibration values. Shaw has received corrected logs from Colog but have not been able to resolve the issue of missing daily calibration data. It is not documented, or clear, that calibration was performed daily by Colog. As a result, Shaw does not feel that the logs can be used in the quantitative data evaluation for the BFF project. As part of a corrective measures, Shaw proposes the following path forward: 1. Shaw will relog the following wells that have been identified as being critical for understanding the geology and meeting the objectives of the RFI: KAFB-1065, -1066, -1067, -1068, -10610, -10611, -10612, and -10617. These wells were selected because there is no nearby well with a Jet West-geophysical log. 2. Review each corrected Colog well log individually to determine usability in qualitative evaluations.
	Example 1: The geology of one well, KAFB-l 0624 was logged by both Colog and Jet West; the long normal (deep) induction logs for KAFB-l 0624 are shown in Figure 4 of this letter. For about half of the well logs, the resistivity values in the Colog data are about 2 to 4 times higher in magnitude compared to the Jet West data. In other areas of the well logs, the Colog resistivity values are less than the Jet West resistivity values. Because the well environment did not change, these data show that at least one set, and possibly both sets, of the logging instruments that generated the logs were not properly calibrated to a known standard (ohmmeters).	After evaluation of the data and discussions with each contractor, Shaw determined that the API units in the Colog log of KAFB-10624 were calculated using the pre- and post-log functionality tests and therefore are not correct. Additionally, due to the lack of daily calibration documentation/data, the Colog wells cannot be used in a quantitative evaluation. Tool calibration was conducted both at the shop by Jet West, and in the field on a daily basis. The field documentation of daily calibration were included in the QTR2 report, in Appendix G. The Jet West log of KAFB-10624 can be used for both qualitative and quantitative evaluations. Colog has resubmitted the log for KAFB-10624, using API units calculated from the pre- and post-shop calibrations. These logs are being evaluated for use on a log-by-log basis for use in qualitative evaluations.
	Example 2: Both logging contractors produced two gamma logs each for KAFB-l0624; one each associated with the induction tool and one each associated with the neutron tool (see Figure 5). While 3 of the 4 logs match up reasonably well, the gamma log generated by Colog on the neutron tool is considerably different in magnitude (API units) than the other three logs suggesting that one or more of the logging tools was not properly calibrated.	After evaluation of the data and discussions with each contractor, Shaw determined that the API units in the Colog log of KAFB-10624 were calculated using the pre- and post-log functionality tests and therefore are not correct. Additionally, due to the lack of daily calibration documentation/data, the Colog wells cannot be used in a quantitative evaluation. The Jet West log of KAFB-10624 can be used for both qualitative and quantitative evaluations. Colog has resubmitted the log for KAFB-10624, using API units calculated from the pre- and post-shop calibrations. These logs are being evaluated for use on a log-by-log basis for use in qualitative evaluations.
	Example 3: Figure 6 (and Figure 5) illustrates the importance of having calibrated logs to evaluate the lateral characteristics of a given lithologic unit. Figure 6 shows the logs for the well cluster including wells KAFB-I0627, KAFB-106044, and KAFB-106045. The log for well KAFB-l0627 produced by Colog exhibits very different resistivity values compared to the logs for KAFB-l06044 and KAFB-l06045 that were generated by Jet West -- even though the wells are only a few tens of feet apart. These discrepancies are not	After discussions with Colog and review of field documentation, Shaw is not able to verify that daily calibration was conducted by Colog in the field. As a result, these logs cannot be used for quantitative evaluations. Additionally, API units were miscalculated, using the pre- and post-log functionality tests, which results in large differences between the logs generated by Colog and those generated by Jet West. We concur that the observed differences are not likely due to lithology. Tool calibration was

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	likely caused by changes in lithology, but instead, are caused by a lack of proper calibration of one or more of the logging tools. Furthermore, Figure 6 (and Figure 5) suggest both the Colog and Jet West logs were generated using instruments that were not properly calibrated.	conducted both at the shop by Jet West, and in the field on a daily basis. The field documentation of daily calibration were included in the QTR2 report, in Appendix G. The data collected by Jet West is usable for data analysis and interpretation.
	Example 4: The Section 5.2.5.4 of the Groundwater Investigation Work Plan for the Bulk Fuels Facility Spill states "Neutron logs map porosity by emitting high energy neutrons .. . The porosity can be calculated in real-time or post-logging." The Permittee has also argued in meetings with the NMED that neutron logs can be used and are to be used to measure porosity for the Bulk Fuels Facility Spill. Both contractors generated neutron logs from the logging of well KAFB-I0624. Colog produced both near and far neutron logs and Jet West produced a single neutron log for the well. There is a difference of an order of magnitude between the two sets of neutron logs produced by the two contractors (see Figure 7 of this letter). As demonstrated by these examples, the geophysical logs submitted to the NMED so far are not calibrated logs, and, thus have limits on their acceptable use. These logs allow for qualitative comparison within a given borehole and between nearby boreholes, but do not allow for quantitative comparisons across the site, the latter being the goal of a calibrated logging program. Uncalibrated geophysical logs cannot be used reliably to interpolate or extrapolate physical properties, such as hydraulic conductivity. The NMED also questions the reliability of estimating porosity values from neutron logs exhibiting such markedly different API counts as discussed in Example 4 above. NMED has no confidence in the accuracy of either the Co log or Jet West neutron logs based on the information presented in Figure 7 and the issues related to calibration of the other log types discussed in this letter. For this reason, the Permittee must respond in writing to this comment by stating how it will obtain porosity values from the logs, that it will repeat the neutron logging with properly calibrated tools, or propose another method to measure porosity for the Bulk Fuels Facility Spill project. Porosity data are needed both for saturated conditions throughout the project site and also for the vadose zone in the vicinity of the former fuel offloading rack and perhaps for other source areas that may be present at the Bulk Fuels Facility.	Tool calibration was conducted both at the shop by Jet West, and in the field on a daily basis. The field documentation of daily calibration were included in the QTR2 report, in Appendix G. After a review of the data and numerous conversations with the subcontractor, we have determined that the Jet West logging data is appropriate for use in both qualitative and quantitative data analysis. These logs will be used in the development of cross-plots to be used to estimate properties such as porosity. After reviewing the data and discussions with Colog, it was determined that the API units in the Colog wells were calculated using the pre- and post-log functionality tests, rather than calibration. The logs have been recalculated using the pre- and post-shop calibrations. However, since we are not able to determine definitively that daily calibrations were performed by Colog, the logs produced for the existing 29 wells cannot be used in quantitative analyses. Therefore, Shaw will re-log the following eight wells that have been identified as being key for characterization of the subsurface geology: KAFB-1065, -1066, -1067, -1068, -10610, -10611, -10612, and -10617. These wells will be relogged by Jet West. These wells were selected because there is no nearby well with a Jet West-geophysical log. As part of the quantitative analysis, Shaw will produce a series of cross plots that incorporate the geophysical log data, lithologic data, and laboratory measurements for grain size and porosity.
2	I. Figure 8 of this letter shows the gamma logs from two groundwater monitoring wells (KAFB-1064 and KAFB-l0612) situated about 300 feet apart, with a soil-vapor monitoring well (KAFB-106139) located between them. There is a significant difference between the logs generated for the groundwater monitoring wells and that for the soil-vapor monitoring well. The soil-vapor well exhibits many gamma peaks and an overall higher background count than the nearby groundwater monitoring wells. Given the proximity of the three wells, these differences may be related to well construction and not to lithologic differences. However, the gamma peaks do not necessarily correspond to the well construction details. Similarly, the	The SVM wells are constructed with 6 nested wells. The deepest well casing is 3-inches in diameter and this well is surrounded by 5 0.75-inch diameter wells; only the deepest well was geophysically logged. The result is that there are several smaller holes filled with air in close proximity to the largest and deepest well. Based on a review of KAFB-106139, the natural gamma and neutron curves show responses that indicate more finer grained materials (relatively higher gamma counts, decreased neutron counts).

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	neutron logs also exhibit different characteristics between the groundwater monitoring wells and the soil-vapor well. Provide an explanation, if possible, as to why the logs differ.	
3	2. In addition, NMED notes that the short normal induction log for KAFB-10618 (see Figure 9 of this letter) is unusual in shape, suggesting a failure of the instrument or other error. While the Permittee's contractor verbally mentioned there was a problem inherent with that specific well at the July 12 meeting, the Permittee must provide a discussion of what the Permittee has done to identify the problem, correct the problem, and acquire reliable information from that well.	In Excel graphs, lines are connected between all points. However, only the continuous line segments between valid points (non-zero or non-negative) and the specific log in question has a number of intervals where the short-normal induction log has negative values. As such on a log plot as shown on Figure 9, Excel interpolates straight lines between positive points. The reasons for this highly negative induction response are unknown. Shaw has reviewed the soil boring log and well construction data for this well and no explanation is readily apparent on the well construction log. It is possible that there is a void space behind the casing of the well (e.g., collapse of completion materials), but this cannot be definitely determined. The log-normal induction log shows a normal response through these intervals.

Comments on Water-Level Maps

No.	NMED COMMENT	PROPOSED RESPONSE TO COMMENT
1	The U. S. Air Force (Permittee) submitted revisions of Figures 5-2 through 5-4 (Groundwater Level Contours) as part of the Replacement Pages without providing an explanation for the revisions. Table 5-2 (Historical Groundwater Level and Liquid Measurement Data) appears to be the same in both the original report and the Replacement Pages (other than a pagination change). However, not all data posted on the figures match their corresponding data in the table. For example, in March 201 1 the water-level elevation for monitoring well KAFB-10614 is shown as 4857.1 1 ft in Replacement Pages Figure 5-4, as 4856.91 ft in Figure 5-4 of the original report, and is listed as 4856.62 ft in Table 5-2 (the cited figures and table are reproduced here in part as Figures 1 and 2 and Table 1 of this letter). In fact, there are numerous other examples of such inconsistencies between the figures and the table, indicating that the water-level map shown in Figure 5-4 (of the original report and the Replacement Pages) and/or the data in Table 5-2 may be replete with errors, and thus, are unreliable. The Permittee must correct the figures or the table, or both, as necessary and resubmit the corrected information to the NMED. Also, Figures 5-2 and 5-3 must also be corrected, as they have problems similar to those described above for Figure 5-4. Furthermore, any changes in the figures or table would probably necessitate changes to Figure 5-5 (Groundwater Gradient March 201 l), also resubmitted in the Replacement Pages. If so, Figure 5.5 must also be corrected and must also be submitted to the NMED.	The figures were updated but unfortunately Table 5-2 was not updated. Corrected Table 5-2 is included with this submittal. Shaw is integrating process improvement for QC of the monthly water level measurements. Below is the process that Shaw is following to ensure that data meets data QC requirements: • Field technicians will record the serial number/ID of the water level meter used to collect the measurements on the field form for water level measurements. • Field technicians will measure water levels and do a field-check to verify that measurements within a given cluster are within ±0.5 feet. If no, then they will re-measure the water levels in the cluster. This QC evaluation will be documented on the water level measurement field form. • All field measurements will be submitted to the Field Sampling Coordinator for QC. S/he will check to make sure the measurements are within ±0.5 feet of each other, for a given cluster. If it is determined this is not the case, the wells will be flagged for remeasurement the following day. This QC evaluation will be documented on the water level measurement field form. • Additionally, the Field Sampling Coordinator will compare the measurements against the measurements from the preceding month. If any measurements fail a ±1.0 foot check, they will be marked for re-measurement the following day. This QC evaluation will be documented on the water level measurement field form. • The field QC check and Field Sampling Coordinator QC check will be repeated for all measurements collected, including re-measurement of wells. Once the Field Sample Coordinator believes the data collected meets the QC metrics, s/he will sign the form and submit for entry into the database. The Sample Coordinator will redline any measurements that should not be entered into the database. • All measurements (including re-measurements) will be entered into the database along with flags noting the QC checks that have been performed. The database entry form has an internal checking routine to flag any suspected data entry mistakes. • All QC forms are maintained in the project files for reference. • The quarterly report tables will report all liquid level measurements for the reporting period. The values used in creating contour maps will be identified in the table. In addition to QC process described above, Shaw will install three pressure transducers at the project site to define short-term water level trends resulting from barometric pressure changes and other external stresses on the aquifer. These data will be used in processing the monthly liquid levels.
2	As discussed with the Permittees and their contractor at a technical meeting held on July 12,2011, the Pennittees submitted a water-level map in the document *Stage 2 Abatement Program.for Nitrate Contaminated Groundwater (Site ST-105) Fourth Annual Groundwater Monitoring Report, June 2011* (this map is reproduced here in part as the lower map in Figure 3 of this letter). On this map, the water-level elevation near the intersection of Perimeter and Connor Streets is about 5 ft lower compared with that shown on Figures 5-2 through 5-4 of the Replacement Pages (and the same figures in the original report) for a similar time period. Taking into consideration the	The 5-foot groundwater elevation difference between the 2011 nitrate annual report and the March 2011 map in the area that was circled on the map is an area where we have no groundwater monitor wells; the comment is pertinent only to the interpolation of the groundwater levels in this area and the contour intervals used. The nitrate report appears uses a 10-foot contour interval while the March 2011 map used a 1-foot contour interval. The error of a contour is approximately ± 1/2 the contour interval, the 5-foot difference mentioned in the comment is within the uncertainty of the nitrate report figure. Additional, at least one well (KAFB-3392) on the nitrate map shows an estimated TOC elevation in the ERPIMS database. PGS-2 is not in the ERPIMS database so Shaw is unable to determine the casing elevation or total well depth. Shaw will include water levels from

	water-level elevation for KAFB-0510 (as presented in the nitrate report), the geometry of the water table on the east side of Bulk Fuels Facility could be considerably different from that presented in the Replacement Pages and other reports for the Bulk Fuels Facility Spill, and, as a consequence, the groundwater flow direction and gradient for this area could be markedly different from that previously determined. The Permittee must correct the figures for the Bulk Fuels Facility Spill quarterly report as necessary and submit the corrected figures to the NMED. The Permittee must also correct any figures that are erroneous in the aforementioned nitrate report and must submit the corrected figures to the NMED Ground Water Quality Bureau, with a copy to the NMED Hazardous Waste Bureau.	wells KAFB-3392 in the QTR4 report, following resurveying of TOC elevation and measuring of well depth. The well PGS-2 is a well owned by Sandia National Labs and therefore additional coordination and permission is required to sample this well.
3	NMED notes a water-level contour constructed with a bend at nearly a right angle, specifically the 4856.0-ft contour near KAFB-10619 on Figure 5-4 of the Replacement Pages (reproduced here in part as Figure 1 of this letter). Typically, such sharp angles would not be expected as a component of the contours that model the water table of an unconfined aquifer in an unconsolidated basin-fill environment. NMED also notes the odd, contorted 4857.0-ft contour that nearly completely surrounds KAFB-106062 (see Figure 1 of this letter) and questions whether this odd geometry is related to survey error or other error. The Permittee must justify such unusual components of the model of the water table, or revise the model to be consistent with that expected for natural conditions.	Shaw is utilizing objective and repeatable ordinary kriging with minimal data smoothing to generate water level contour maps for the quarterly reports. The kriging parameters are included as notes on the respective maps. At the site, water levels fluctuate several tenths of a foot over a period of several days or even portions of a day. For example, see the attached time-water level graph from KAFB-106038. The average depth to water is 463.55 feet with a min/max data range of 0.35 feet over a seven-day period. One-foot contour interval water level contours will reflect these fluctuations between close-spaced wells because water levels are measured over a period of time and not the contemporaneously. As a result, individual water level contours may exhibit variability that may not be expected if water levels were not fluctuating over short time periods or if larger contour intervals were used. The water levels provided in a quarterly report are a snap-shot of specific period of time. As with all quarterly data, trends will be discovered and outliers and anomalies to these trends will be noted and further investigated, if appropriate.

Table 5-2. Groundwater and NAPL Depths and Elevations
January - March 2011

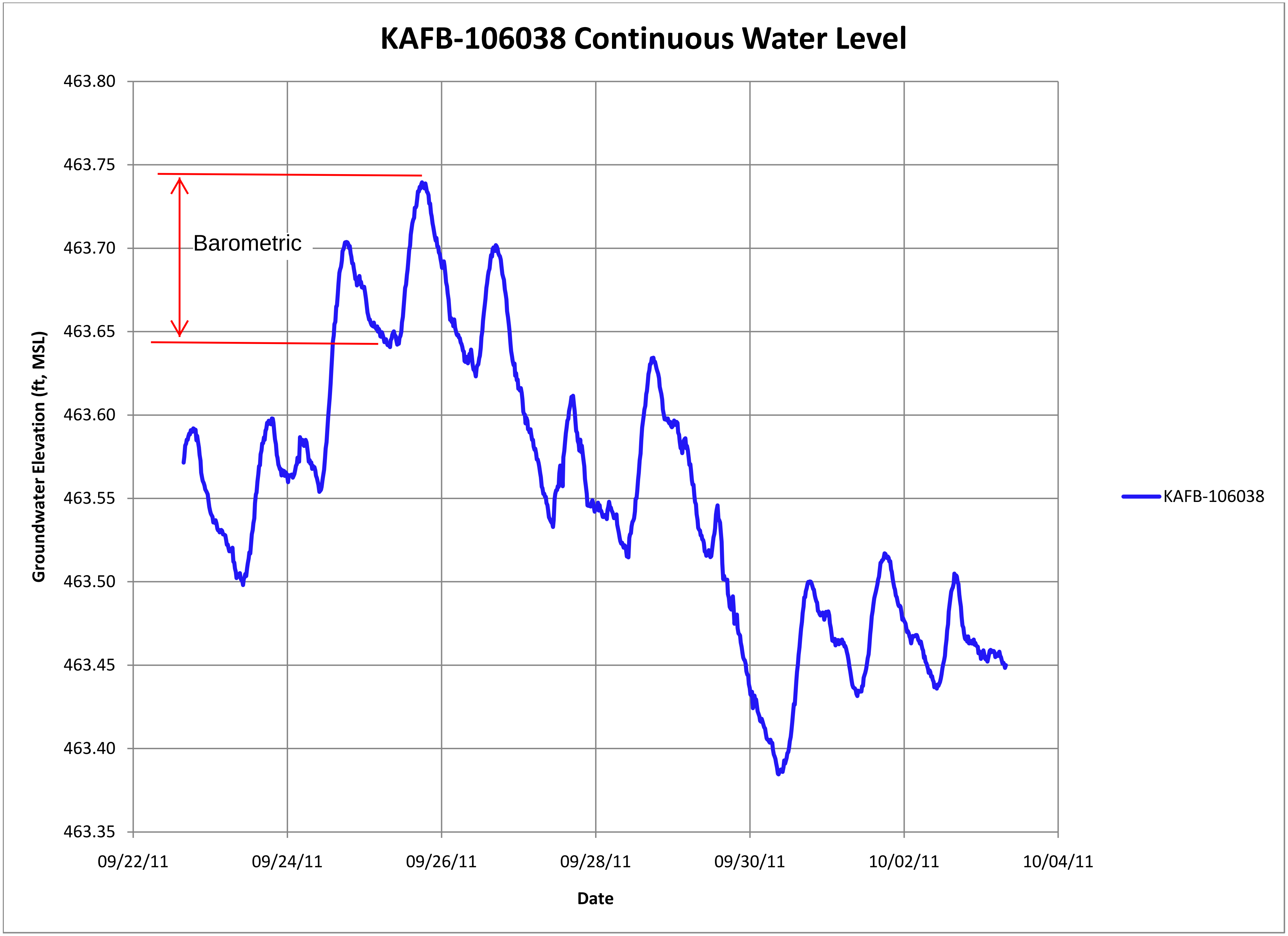
Well	AQUIFER ZONE	Date	Time	DEPTH TO PRODUCT	DEPTH TO WATER	MEASURED NAPL THICKNESS	TOP FLUID ELEV. (ft)[2]	GROUND WATER ELEV. (ft)	GW. ELEV. CORRECTED FOR NAPL (ft)[1]	NAPL ELEV. (ft)
KAFB-3	Regional	1/1/2011			548		4811.75	4811.75	4811.75	
KAFB-3	Regional	2/1/2011			546		4813.75	4813.75	4813.75	
KAFB-3	Regional	3/1/2011			549		4810.75	4810.75	4810.75	
KAFB-15	Regional	1/1/2011			488		4851.24	4851.24	4851.24	
KAFB-15	Regional	2/1/2011			482		4857.24	4857.24	4857.24	
KAFB-15	Regional	3/1/2011			490		4849.24	4849.24	4849.24	
KAFB-16	Regional	1/1/2011			525		4845.48	4845.48	4845.48	
KAFB-16	Regional	2/1/2011			519		4851.48	4851.48	4851.48	
KAFB-16	Regional	3/1/2011			522		4848.48	4848.48	4848.48	
KAFB-1061	Shallow	1/22/2011			488.01	0.00	4856.98	4856.98	4856.98	
KAFB-1061	Shallow	2/23/2011	836		487.72	0.00	4857.27	4857.27	4857.27	
KAFB-1061	Shallow	3/30/2011	1410		487.18	0.00	4857.81	4857.81	4857.81	
KAFB-1062	Shallow	1/21/2011			485.02	0.00	4857.23	4857.23	4857.23	
KAFB-1062	Shallow	2/23/2011	1345		484.96	0.00	4857.29	4857.29	4857.29	
KAFB-1062	Shallow	3/30/2011	1300		484.50	0.00	4857.75	4857.75	4857.75	
KAFB-1063	Shallow	1/21/2011			482.55	0.00	4857.67	4857.67	4857.67	
KAFB-1063	Shallow	2/23/2011	1322		482.45	0.00	4857.77	4857.77	4857.77	
KAFB-1063	Shallow	3/30/2011	1230		482.48	0.00	4857.74	4857.74	4857.74	
KAFB-1064	Shallow	1/21/2011			488.94	0.00	4856.84	4856.84	4856.84	
KAFB-1064	Shallow	2/23/2011	1220		488.85	0.00	4856.93	4856.93	4856.93	
KAFB-1064	Shallow	3/29/2011	1635		488.36	0.00	4857.42	4857.42	4857.42	
KAFB-1065	Shallow	1/22/2011		490.05	490.38	0.33	4856.98	4856.65	4856.93	4856.98
KAFB-1065	Shallow	2/24/2011	915	489.76	489.85	0.09	4857.27	4857.18	4857.26	4857.27
KAFB-1065	Shallow	3/30/2011	1200	489.53	489.55	0.02	4857.50	4857.48	4857.50	4857.50
KAFB-1066	Shallow	1/22/2011		494.70	495.25	0.55	4856.90	4856.35	4856.81	4856.90
KAFB-1066	Shallow	2/24/2011	755	493.99	495.00	1.01	4857.61	4856.60	4857.45	4857.61
KAFB-1066	Shallow	3/30/2011	1200	493.87	494.47	0.60	4857.73	4857.13	4857.63	4857.73
KAFB-1067	Shallow	1/22/2011			492.61	0.00	4856.96	4856.96	4856.96	
KAFB-1067	Shallow	2/23/2011	944		492.21	0.00	4857.36	4857.36	4857.36	
KAFB-1067	Shallow	3/29/2011	1027		491.70	0.00	4857.87	4857.87	4857.87	
KAFB-1068	Shallow	1/22/2011		494.99	495.82	0.83	4856.91	4856.08	4856.78	4856.91
KAFB-1068	Shallow	2/24/2011	837	494.67	495.26	0.59	4857.23	4856.64	4857.14	4857.23
KAFB-1068	Shallow	3/30/2011	1200	494.49	494.91	0.42	4857.41	4856.99	4857.34	4857.41
KAFB-1069	Shallow	1/21/2011		488.08	488.50	0.42	4856.80	4856.38	4856.73	4856.80
KAFB-1069	Shallow	2/24/2011	1034		487.70	0.00	4857.18	4857.18	4857.18	
KAFB-10610	Shallow	1/21/2011			487.91	0.00	4855.38	4855.38	4855.38	
KAFB-10610	Shallow	2/24/2011	1113		487.30	0.00	4855.99	4855.99	4855.99	
KAFB-10610	Shallow	3/30/2011	1035		486.79	0.00	4856.50	4856.50	4856.50	
KAFB-10611	Shallow	1/21/2011			497.30	0.00	4855.89	4855.89	4855.89	
KAFB-10611	Shallow	2/23/2011	1500		496.67	0.00	4856.52	4856.52	4856.52	
KAFB-10611	Shallow	3/30/2011	1345		496.19	0.00	4857.00	4857.00	4857.00	
KAFB-10612	Shallow	1/22/2011			489.70	0.00	4855.70	4855.70	4855.70	
KAFB-10612	Shallow	2/23/2011	1402		489.28	0.00	4856.12	4856.12	4856.12	
KAFB-10612	Shallow	3/30/2011	1330		488.88	0.00	4856.52	4856.52	4856.52	
KAFB-10613	Shallow	1/21/2011			494.52	0.00	4856.22	4856.22	4856.22	
KAFB-10613	Shallow	2/23/2011	1140		493.98	0.00	4856.76	4856.76	4856.76	
KAFB-10613	Shallow	3/29/2011	1608		493.95	0.00	4856.79	4856.79	4856.79	
KAFB-10614	Shallow	1/21/2011			493.86	0.00	4856.43	4856.43	4856.43	
KAFB-10614	Shallow	2/24/2011	1015		493.31	0.00	4856.98	4856.98	4856.98	
KAFB-10614	Shallow	3/30/2011	1400		493.18	0.00	4857.11	4857.11	4857.11	
KAFB-10615	Shallow	1/21/2011			489.41	0.00	4853.17	4853.17	4853.17	
KAFB-10615	Shallow	2/23/2011	1304		488.56	0.00	4854.02	4854.02	4854.02	
KAFB-10615	Shallow	3/29/2011	1145		488.08	0.00	4854.50	4854.50	4854.50	
KAFB-10616	Shallow	1/22/2011			485.18	0.00	4857.33	4857.33	4857.33	
KAFB-10616	Shallow	2/23/2011	803		484.89	0.00	4857.62	4857.62	4857.62	
KAFB-10616	Shallow	3/29/2011	1030		484.40	0.00	4858.11	4858.11	4858.11	
KAFB-10617	Shallow	3/30/2011	945		486.70	0.00	4855.82	4855.82	4855.82	
KAFB-10618	Shallow	1/21/2011			480.83	0.00	4855.45	4855.45	4855.45	
KAFB-10618	Shallow	2/23/2011	1556		480.05	0.00	4856.23	4856.23	4856.23	
KAFB-10618	Shallow	3/30/2011	850		480.22	0.00	4856.06	4856.06	4856.06	
KAFB-10619	Shallow	1/22/2011			499.31	0.00	4855.32	4855.32	4855.32	
KAFB-10619	Shallow	2/23/2011	1617		498.61	0.00	4856.02	4856.02	4856.02	
KAFB-10619	Shallow	3/30/2011	917		498.63	0.00	4856.00	4856.00	4856.00	
KAFB-10620	Shallow	1/21/2011			485.65	0.00	4855.43	4855.43	4855.43	
KAFB-10620	Shallow	2/22/2011	1548		485.07	0.00	4856.01	4856.01	4856.01	
KAFB-10620	Shallow	3/29/2011	1534		484.84	0.00	4856.24	4856.24	4856.24	
KAFB-10621	Shallow	1/21/2011			459.63	0.00	4854.77	4854.77	4854.77	
KAFB-10621	Shallow	2/23/2011	1525		458.82	0.00	4855.58	4855.58	4855.58	
KAFB-10621	Shallow	3/30/2011	827		458.44	0.00	4855.96	4855.96	4855.96	
KAFB-10622	Shallow	1/21/2011			464.16	0.00	4853.85	4853.85	4853.85	
KAFB-10622	Shallow	2/22/2011	1522		463.41	0.00	4854.60	4854.60	4854.60	
KAFB-10622	Shallow	3/29/2011	1330		462.84	0.00	4855.17	4855.17	4855.17	
KAFB-10623	Shallow	1/21/2011			474.24	0.00	4854.57	4854.57	4854.57	
KAFB-10623	Shallow	2/22/2011	1539		473.43	0.00	4855.38	4855.38	4855.38	
KAFB-10623	Shallow	3/29/2011	1300		472.97	0.00	4855.84	4855.84	4855.84	
KAFB-10624	Shallow	1/22/2011			486.50	0.00	4856.97	4856.97	4856.97	
KAFB-10624	Shallow	2/23/2011	917		486.20	0.00	4857.27	4857.27	4857.27	
KAFB-10625	Shallow	1/21/2011			463.98	0.00	4853.32	4853.32	4853.32	

Table 5-2. Groundwater and NAPL Depths and Elevations
January - March 2011

Well	AQUIFER ZONE	Date	Time	DEPTH TO PRODUCT	DEPTH TO WATER	MEASURED NAPL THICKNESS	TOP FLUID ELEV. (ft)[2]	GROUND WATER ELEV. (ft)	GW. ELEV. CORRECTED FOR NAPL (ft)[1]	NAPL ELEV. (ft)
KAFB-10625	Shallow	2/22/2011	1440		463.21	0.00	4854.09	4854.09	4854.09	
KAFB-10625	Shallow	3/29/2011	1445		462.59	0.00	4854.71	4854.71	4854.71	
KAFB-10626	Shallow	1/21/2011			470.26	0.00	4852.41	4852.41	4852.41	
KAFB-10626	Shallow	2/22/2011	1456		469.44	0.00	4853.23	4853.23	4853.23	
KAFB-10626	Shallow	3/29/2011	1421		468.82	0.00	4853.85	4853.85	4853.85	
KAFB-10627	Shallow	1/22/2011			490.52	0.00	4858.02	4858.02	4858.02	
KAFB-10627	Shallow	2/23/2011	1015		490.21	0.00	4858.33	4858.33	4858.33	
KAFB-10627	Shallow	3/29/2011	945		490.17	0.00	4858.37	4858.37	4858.37	
KAFB-10628-51	Shallow	1/21/2011	1210	493.06	493.15	0.09	4856.00	4855.91	4855.99	4856.00
KAFB-10628-51	Shallow	2/24/2011	1125		492.46	0.00	4856.60	4856.60	4856.60	
KAFB-10628-51	Shallow	3/30/2011	1012		492.04	0.00	4857.02	4857.02	4857.02	
KAFB-106044	Intermediate	1/22/2011			490.70	0.00	4858.14	4858.14	4858.14	
KAFB-106044	Intermediate	2/23/2011	1008		490.42	0.00	4858.42	4858.42	4858.42	
KAFB-106044	Intermediate	3/29/2011	805		490.03	0.00	4858.81	4858.81	4858.81	
KAFB-106045	Deep	1/21/2011			490.72	0.00	4857.76	4857.76	4857.76	
KAFB-106045	Deep	2/23/2011	954		490.06	0.00	4858.42	4858.42	4858.42	
KAFB-106045	Deep	3/29/2011	857		489.69	0.00	4858.79	4858.79	4858.79	
KAFB-106062	Shallow	3/30/2011	1423		494.45	0.00	4856.76	4856.76	4856.76	
KAFB-106101	Intermediate	3/30/2011	1145		482.32	0.00	4858.01	4858.01	4858.01	
KAFB-106102	Deep	3/30/2011	1120		482.48	0.00	4857.80	4857.80	4857.80	
KAFB-3411	Shallow	1/22/2011	1055		486.73	0.00	4856.93	4856.93	4856.93	
KAFB-3411	Shallow	2/23/2011	902		486.40	0.00	4857.26	4857.26	4857.26	
KAFB-3411	Shallow	3/29/2011	1115		485.96	0.00	4857.70	4857.70	4857.70	

Notes:

1. $H_{gw} = r_r Z_{an} + (1-r_r)Z_{nw}$, where r_r = density ratio (r_n/r_w), Z_{an} = Elev. Air/NAPL interface, Z_{nw} = Elev. NAPL/water interface, Charbeneau, 2007, Eq. 2.21
2. Locations without elevations waiting on survey data.


KAFB-106038 Continuous Water Level
Groundwater Elevation (ft, MSL)
463.80
463.75
463.70
463.65
463.60
463.55
463.50
463.45
463.40
463.35
09/22/11
09/24/11
09/26/11
09/28/11
09/30/11
10/02/11
10/04/11
Date
Barometric
KAFB-106038