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Revision 0

Calculations in Support of the Low Hydraulic Gradient Evaluation Study for the 200 East Area Unconfined Aquifer

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

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J. P. McDonald
CH2M HILL Plateau Remediation Company

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Flannery, Lori K

From: Flannery, Lori K
Sent: Wednesday, July 17, 2013 1:30 PM
To: Flannery, Lori K
Subject: RE: Re: concurrence

From: Mehta, Sunil
Sent: Wednesday, June 26, 2013 2:13 PM
To: Flannery, Lori K
Subject: RE: Re: concurrence for ECF-200E-12-0086

Lori,

I concur.

--Sunil

From: Flannery, Lori K
Sent: Wednesday, June 26, 2013 11:53 AM
To: Mehta, Sunil
Subject: Re: concurrence

Mr. Mehta – Please send your concurrence via email. Thank you.

Lori Flannery
Secretary to the Director of Groundwater Analysis and Reporting
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Contents

1 Purpose 3
2 Background 3
3 Methodology 4
4 Assumptions and Inputs 11
5 Software Applications 12
6 Calculations 12
7 Results 22
8 References 31

Appendices

A Barometric Response Functions 33
B Trend-Surface Analysis Spreadsheet 71
C Hydraulic Head Calculations and Trend-Surface Analysis Results for LLWMA-1 77
D Hydraulic Head Calculations and Trend-Surface Analysis Results for IDF/PUREX 108
E Hydraulic Head Calculations and Trend-Surface Analysis Results for LLWMA-2 141
F Hydraulic Head Calculations and Trend-Surface Analysis Results for LERF 170
G Spreadsheet Calculations — Normalization of the Manual Water-Level Measurements to a Constant Barometric Pressure 189
H Spreadsheet Calculations — Estimate of Error in the Manual Hydraulic Head Measurements 233
I Hanford Information Systems Inventory Documentation for MRCX 253

1 Purpose

This document describes the calculations performed in support of a study to evaluate the hydraulic gradient in the 200 East Area unconfined aquifer for Low-Level Waste Management Area 1 (LLWMA-1), LLWMA-2, the Integrated Disposal Facility (IDF)/Plutonium-Uranium Extraction (PUREX) Cribs, and the Liquid Effluent Retention Facility (LERF). This document covers the time period from the beginning of data collection at LLWMA-1 in September 2005 through the end of fiscal year (FY) 2012. Several concurrent data sets within this time period were evaluated for each area. This document is limited to the mathematical calculations performed in support of the hydraulic gradient evaluation. A full description of this study and its results will be provided in a separate report (SGW-54165, *Evaluation of the Unconfined Aquifer Hydraulic Gradient Beneath the 200 East Area, Hanford Site*).

2 Background

From the 1940s until the 1980s, the Hanford Site produced plutonium for national defense purposes. During that time, operations used many chemical constituents that can potentially migrate to groundwater from disposal sites. The mission at Hanford changed to environmental cleanup in the 1990s, including remediation of groundwater contamination under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and groundwater monitoring under the *Resource Conservation and Recovery Act of 1976* (RCRA).

To meet the groundwater monitoring requirements of the RCRA regulations (specifically 40 CFR 265.91 and 265.92, as referenced by WAC 173-303-400 for interim status sites, as well as WAC 173-303-645 for final status sites), the owner/operator of a hazardous waste treatment, storage, or disposal facility must periodically determine the groundwater flow rate and direction beneath the facility. Normally, this is accomplished by measuring water levels in wells and determining the hydraulic gradient using either a water table map or by analytical calculation. However, the water table in the 200 East Area is very flat (due to the presence of high hydraulic conductivity sediments and a regional flow divide [prior to 2011]), and the error present in the water-level measurements exceeds the relief of the water table. For instance, the estimated regional hydraulic gradient magnitude is 1.8×10^{-5} m/m (DOE/RL-2011-118, *Hanford Site Groundwater Monitoring for 2011*), which equates to a change of 1.8 cm in water table elevation per kilometer horizontal distance. The distance from the northwest to the southeast corners of the 200 East Area is 4 km, so the water table elevation is expected to change no more than 7.2 cm within the 200 East Area if the hydraulic gradient was uniform. However, the actual water table elevation change is less (at least prior to 2011) because of the flow divide within this area. Most of the water-level measurements collected in the 200 East Area exhibit a range of approximately 10 cm. Thus, the water-level data have not been accurate enough to determine hydraulic gradients within the 200 East Area.

A study was performed to assess the feasibility of improving the accuracy of the water-level measurements so the hydraulic gradient could be determined at RCRA sites in the 200 East Area. The sources of error/variability in water-level measurements include the following:

- Accuracy of well casing elevation surveys
- Deviations of the well bores from vertical
- Barometric pressure fluctuations
- Measuring device accuracy
- Well construction

Measures were taken during this study to address each of these sources of error/variability. To address elevation survey accuracy, all of the monitoring wells used in this study were resurveyed to a higher degree of accuracy than is normally performed for geodetic surveys at the Hanford Site. Leveling surveys were performed for each well network using an infrared sighting device and a one-piece invar rod, and double runs were performed between wells and the results averaged. Each well network was referenced to a single benchmark. Well bore deviation was addressed by performing gyroscope surveys in all wells. A gyroscope survey maps the position of the well bore in three-dimensional space, which allows for the difference between the measured and true vertical depths to water to be determined. The water-level measurements collected for this study were normalized to a constant barometric pressure using the multiple regression/deconvolution method, as described in the next section. Water-level measurements were collected using measuring tapes dedicated to this study. The initial measuring tape used was calibrated by a standards laboratory and found to be accurate to within 0.001 m (1 mm) throughout its length. Finally, the wells used in this study were chosen to have relatively short screen lengths where possible. This minimized the chance that a vertical hydraulic gradient would occur within the screened interval, which would result in the well water-level elevation representing a composite head and not the water table elevation.

This environmental calculation documents the computation of the hydraulic heads and the normalization of those heads to a constant barometric pressure. It also documents the method of data analysis. The water-level measurements were analyzed by trend-surface analysis in which a plane is fit to a set of water-level measurements by least-squares regression. The interpreted hydraulic gradient direction corresponds to the dip direction of the fitted plane, and the amount of dip represents the hydraulic gradient magnitude. The degree to which the plane represented the data (i.e., the goodness of fit) was assessed by an analysis of variance statistical test (ANOVA), which is also documented in this environmental calculation.

This study was initially performed at LLWMA-1 and later expanded to include the IDF and the PUREX Cribs, LLWMA-2, and LERF. This environmental calculation only documents the mathematical computations performed for this study. A full description of this study and the results will be provided in a separate report (SGW-54165).

3 Methodology

Four types of calculations were performed as part of this study:

- Calculation of observed hydraulic heads (i.e., well water-level elevations) from water-level measurements.
- Normalization of the observed hydraulic heads to a constant barometric pressure.
- Trend-surface analyses to determine the hydraulic gradient and a statistical test (ANOVA) to assess the trend-surface analysis results.
- Estimation of the error in the hydraulic head values.

3.1 Calculation of Observed Hydraulic Heads

Well water-level elevations (i.e., observed hydraulic heads) were calculated according to the following equation:

$$h_o = RP - [DTW_{mp} - (MP - RP) + \omega] \qquad \textbf{(Equation 1)}$$

where:

h_o = observed hydraulic head (i.e., water-level elevation)[1]

RP = elevation of the reference point on the well

DTW_{mp} = depth to water from the measurement point on the well

$(MP - RP)$ = elevation difference between the measurement point and the reference point (i.e., the measurement point elevation less the reference point elevation)

ω = well bore verticality correction value (all units are meters)

The reference point elevations were obtained from the geodetic survey data reports for the casing elevation resurveys. The $MP - RP$ values were determined by careful measurement of the offset between the measurement point (e.g., top of pump plate) and reference point (e.g., top of casing) at each well by field personnel.

The verticality correction values were obtained by analysis of the gyroscope survey reports. The gyroscope survey results were specified as coefficients of a third degree polynomial regression equation describing the relationship between the measured depths and true vertical depths within the well bore as a function of measured depth:

$$\omega = C_1(DTW)^3 + C_2(DTW)^2 + C_3(DTW) + C_4 \qquad \textbf{(Equation 2)}$$

where:

DTW = measured depth to water

C_n = polynomial regression coefficients

The geodetic survey reports and gyroscope survey reports can be found in SGW-54165. The gyroscope survey reports also can be found in *Determination of Gyroscopic Correction Coefficients for the HydroDat Database* (ECF-HANFORD-0359, Rev. 1).

3.2 Normalization of Hydraulic Heads to a Constant Barometric Pressure

Within unconfined aquifers, changes in ambient barometric pressure can cause changes in well water-level elevations if the barometric change causes an imbalance of air pressure between the well and the adjacent vadose zone at the water table. This occurs in relatively deep wells because of the thick vadose zone, and in other wells where low-permeability units within the vadose zone inhibit the migration of air pressure pulses. Barometric pressure changes introduce variability into water-level measurements in two ways: (1) barometric pressure may change during the time period in which a set of water-level measurements is collected from a well network, and (2) different wells may respond differently to barometric pressure changes. To account for these sources of variability, the water-level measurements collected for this study were normalized to a constant barometric pressure using multiple regression/deconvolution (*Identifying and Removing Barometric Pressure Effects in Confined and Unconfined Aquifers* [Rasmussen and Crawford, 1997]; *Considering Barometric Pressure in Groundwater Flow Investigations* [Spane, 2002]).

Within each monitoring well, multiple regression was used to determine the quantitative relationship between barometric pressure and well water-level response (using time series data for both parameters). This relationship was then used to determine a barometric response function (BRF) describing how the well water level would change to an instantaneous unit change in barometric pressure.

[1] All elevations in this document are in the North American Vertical Datum of 1988 (NAVD88).

The multiple regression was performed using the MRCX software developed by Pacific Northwest National Laboratory (PNNL) (PNNL-19775, *Guide to Using Multiple Regression in Excel [MRCX v. 1.1] for Removal of River Stage Effects from Well Water Levels*), which is based on Microsoft[2] Excel. Although this software was specifically designed for assessing river stage effects, it can also be used for barometric pressure effects because the mathematical equations are identical. The water-level measurements and barometric pressure time series were detrended (using Excel) and then input into MRCX. The regression was performed using either the "original data" or "first differences" options in MRCX, whichever provided the best results. The "original data" option corresponds to the following regression equation from Rasmussen and Crawford (1997, Equation 7):

$$h_O(t) = \beta_0 + \beta_1 t + \Delta u_0 B(t) + \Delta u_1 B(t-1) + \ldots + \Delta u_n B(t-n) \qquad \textbf{(Equation 3)}$$

where:

h_O = observed well water-level elevation (m) as a function of time t (hr)

β_0 = offset coefficient (m)

β_1 = linear trend coefficient (m/hr) (which was determined to be zero during the regression analysis because the data were detrended beforehand)

Δu_n = fitted barometric response coefficient (i.e., regression coefficients) for time lags of 0 to n (m/m)

B = barometric pressure measurements (m of water) as a function of time

n = maximum time lag (hr)

The "first differences" option uses an equation of the same form, except that changes in the water levels are related to changes in barometric pressure:

$$\Delta h_O(t) = \beta_0 + \beta_1 t + \Delta u_0 \Delta B(t) + \Delta u_1 \Delta B(t-1) + \ldots + \Delta u_n \Delta B(t-n) \qquad \textbf{(Equation 4)}$$

where:

Δh_O and ΔB = change in observed well water-level elevation and change in barometric pressure, respectively, between successive times

When performing the multiple regression in MRCX, the maximum time lag (n) was increased to a value at which a good fit was achieved between the predicted and measured water levels and a further increase did not substantially improve the fit. The BRF was determined by MRCX from the regression coefficients as follows (Rasmussen and Crawford, 1997, Equation 5):

$$u(\tau) = \sum_{i=0}^{\tau} \Delta u_i \qquad \textbf{(Equation 5)}$$

where:

u = water-level response (m) to an instantaneous unit change in barometric pressure as a function of the time lag, τ (hr)

The BRFs for each well used in this study are plotted in Appendix A, and the coefficients are listed in Appendix G.

---

[2] The Microsoft® products identified in this calculation are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or in other countries.

Deconvolution was then used to normalize the water-level measurements to a constant barometric pressure using Excel. The net change in well water-level in response to a recent history of barometric pressure changes (n + 1 hourly measurements total) was computed using the following numerical approximation of a convolution integral (Rasmussen and Crawford, 1997, Equation 4):

$$\Delta h_B(t) = \sum_{\tau=0}^{n} u(\tau) \cdot \Delta B(t-\tau) \qquad \textbf{(Equation 6)}$$

where:

Δh_B = change in well water-level elevation (m) at some time t (hr) due to changes in barometric pressure for the previous n time lags

τ = time lag (hr) between a previous hourly barometric pressure change and the associated well water-level response at the current time

ΔB = change in barometric pressure (m of water) over the previous hourly time steps

Finally, the change in well water-level elevation was added to the observed well water-level elevation (i.e., deconvolved) to produce an adjusted well water-level elevation in which barometric pressure effects had been removed (i.e., normalized to a constant barometric pressure).

It should be noted that the equations presented in Rasmussen and Crawford (1997) are written in terms of total head (i.e., the sum of hydraulic head and barometric pressure head), whereas the equations presented in this section are in terms of hydraulic head (i.e., well water-level elevation). To normalize manual water-level measurements to a constant barometric pressure, well water-level response functions are needed instead of total head response functions. The use of well water-level elevations instead of total head is valid because convolution can be used on any pair of variables exhibiting a linear stress-response relationship (Olsthoorn, 2008, *Do a Bit More with Convolution*).

3.3 Trend-Surface Analyses

The water-level measurements were analyzed by trend-surface analysis in which a plane is fit to a set of measurements by least-squares regression. The regression equation used was (*Statistics and Data Analysis in Geology*, Equation 5.84 [Davis, 2002]):

$$z = b_0 + b_1 x + b_2 y \qquad \textbf{(Equation 7)}$$

where:

z = predicted water-level elevation (m) at a location x,y, in which x is the easting geographic coordinate (m) and y is the northing geographic coordinate (m)

b_0 = offset (m)

b_1 = slope in the x direction (m/m)

b_2 = slope in the y direction (m/m)

Equation 7 can be rearranged as shown in Equation 8:

$$b_1 x + b_2 y - z + b_0 = 0 \qquad \textbf{(Equation 8)}$$

This equation has the same form as Equation 9:

$$Ax + By + Cz + D = 0 \qquad \textbf{(Equation 9)}$$

(where C = -1), which is the familiar equation of a plane in standard form.

The least-squares regression for each set of water-level measurements was performed by solving the following matrix equation for the regression coefficients b_0, b_1, and b_2 (Davis, 2002, Equation 5.86):

$$\begin{bmatrix} k & \sum_{j=1}^{k} x_j & \sum_{j=1}^{k} y_j \\ \sum_{j=1}^{k} x_j & \sum_{j=1}^{k} x_j^2 & \sum_{j=1}^{k} x_j y_j \\ \sum_{j=1}^{k} y_j & \sum_{j=1}^{k} x_j y_j & \sum_{j=1}^{k} y_j^2 \end{bmatrix} \cdot \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix} = \begin{bmatrix} \sum_{j=1}^{k} z_j \\ \sum_{j=1}^{k} x_j z_j \\ \sum_{j=1}^{k} y_j z_j \end{bmatrix} \qquad \textbf{(Equation 10)}$$

where:

k = number of wells

x_j = easting geographic coordinate of the jth well (m)

y_j = northing geographic coordinate of the jth well (m)

z_j = hydraulic head in the jth well (m)

Equation 9 was solved in a spreadsheet modeled after *A Spreadsheet Method of Estimating Best-Fit Hydraulic Gradients Using Head Data from Multiple Wells* (Devlin, 2003) using the matrix math functions in Excel.

The hydraulic gradient magnitude is represented by the slope of the fitted plane. It follows from mathematics that vector $<A,B,C>$ is a normal vector to the plane (i.e., a vector perpendicular to the plane) in Equation 9, and therefore, vector $<b_1,b_2,-1>$ is a normal vector to the plane represented in Equation 8 (because C = -1 in Equation 8). The slope of the fitted plane, which is the gradient magnitude, was calculated from the deviation of vector $<b_1,b_2,-1>$ from the vertical (i.e., its "tilt") using the Pythagorean theorem as shown in Equation 11:

$$i = \left(b_1^2 + b_2^2\right)^{1/2} \qquad \textbf{(Equation 11)}$$

Vector $<b_1,b_2,-1>$ begins at the origin of the coordinate system and points in the negative z direction (i.e., downward), because $C = -1$. Thus, the vector $<-b_1,-b_2,1>$ is also a normal vector to the fitted plane pointing in the positive z direction (i.e., upward). This vector can be projected onto the x,y plane by setting $C = 0$, and the direction of the resulting vector, $< -b_1, -b_2,0>$, is the direction of the hydraulic gradient. This direction was calculated from $-b_1$ and $-b_2$ using trigonometric functions.

The degree to which the fitted plane represented the data (i.e., the goodness of fit) was assessed by an ANOVA statistical test. This test identifies whether the data exhibit a true spatially dependent trend to an acceptable probability of error (i.e., the level of significance), which was chosen to be 0.05 for this study (i.e., a 95 percent confidence level). The ANOVA was performed by constructing a standard ANOVA table as follows (Davis, 2002):

Table 1. Standard ANOVA Table

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	*F*-Test Statistic
Polynomial regression	SS_R	2	MS_R	MS_R / MS_D
Deviation from polynomial	SS_D	k - 3	MS_D	
Total variation	SS_T	k - 1		

In Table 1, SS_R is the sum of squares due to the regression and is given by (Davis, 2002, Equation 4.20):

$$SS_R = \sum_{j=1}^{k} (\hat{z}_j - \overline{Z})^2 \qquad \textbf{(Equation 12)}$$

where:

$\hat{z}_j$ = predicted water-level elevation in the jth well

$\overline{Z}$ = mean of all the water-level elevations (either the actual measurements or the predicted measurements because the mean will be the same for both sets)

SS_D is the sum of squares due to the deviations (i.e., the sum of squares of the residuals) and is given by Equation 13 (Davis, 2002, Equation 4.22):

$$SS_D = \sum_{j=1}^{k} (\hat{z}_j - z_j)^2 \qquad \textbf{(Equation 13)}$$

SS_T is the total sum of squares and is given by Equation 14 (Davis, 2002, Equation 4.18):

$$SS_T = \sum_{j=1}^{k} (z_j - \overline{Z})^2 \qquad \textbf{(Equation 14)}$$

The degrees of freedom associated with the regression is one less than the number of coefficients in the fitted equation (i.e., two degrees of freedom because Equation 7 has three coefficients: b_0, b_1, and b_2). The degrees of freedom associated with the total variation is one less than the number of measurements (k), and the degrees of freedom associated with the deviations is the degrees of freedom for the total variation less the degrees of freedom for the regression (i.e., $[k-1]-2$, or $k-3$). The mean squares, which are estimates of the variance, are the sums of squares divided by the associated degrees of freedom, and the test statistic is the ratio of the mean squares (or variance estimates).

The statistical test was performed using the *F* probability distribution. As stated in Davis (2002, p. 75), this distribution "...is the theoretical distribution of values that would be expected by randomly sampling from a normal population and calculating, for all possible pairs of sample variances, the ratios..." of those variances. The ANOVA was performed by comparing the test statistic in Table 1 with the *F*-distribution to determine the probability of obtaining the observed test statistic (or a larger test statistic) by random sampling from the same population. If that probability (i.e., *p*-value) was small (i.e., less than 0.05), then it was concluded that the two variances are from separate populations (i.e., there is a spatially dependent trend in the water-level measurements).

Two other parameters were calculated as part of the trend-surface analyses: the goodness of fit coefficient (R^2) and the correlation coefficient (R). The goodness of fit coefficient is the ratio of the sum of squares

due to the regression (SS_R, given by Equation 12) to the total sum of squares (SS_T, given by Equation 14), as follows (Davis, 2002, Equation 4.23):

$$R^2 = \frac{SS_R}{SS_T} \qquad \textbf{(Equation 15)}$$

If the measurements fit a plane closely, SS_R and SS_T will be approximately equal and their ratio, R^2, will be approximately 1. If the measurements do not fit a plane very well, the best fit plane will be nearly horizontal. In this case, SS_R will be small compared to SS_T and their ratio will be near zero. Thus, the more closely an R^2 value is to unity, the better the measurements fit a plane. The correlation coefficient is the square root of the goodness of fit coefficient.

As part of the trend-surface analyses, potential outliers in the hydraulic head measurements were identified using the interquartile range (IQR) approach described in EPA 530/R-09-007, *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*. With this approach, the 25th and 75th percentiles of the residuals (i.e., the observed hydraulic head less the predicted hydraulic head) are computed. The difference between these values is the IQR, and any residual less than the 25th percentile minus 1.5 times the IQR or greater than the 75th percentile plus 1.5 times the IQR was identified as a potential outlier. The evaluation of potential outliers is described in Section 6. The spreadsheet used for the trend-surface analyses is shown in Appendix B.

The results were summarized as mean values of the trend-surface analyses results. In most cases, uncertainties on these mean values were calculated as 1.65 times the standard error of the results (i.e., a 90 percent confidence interval). The standard error was used rather than the standard deviation, because each trend-surface result is itself a type of mean of the measurements collected on the given date. Thus, the mean of a set of trend-surface results is a mean of means and so the standard error is applicable to estimating confidence intervals (see the "Confidence Intervals" section in Davis [2002], pp. 66-68). The standard error is given by (Davis, 2002, Equation 2.38):

$$s_e = \sigma\sqrt{\frac{1}{n}} \qquad \textbf{(Equation 16)}$$

where:

s_e = standard error

σ = standard deviation of the trend-surface analyses results (either the magnitude or direction)

n = number of trend-surface analyses used to calculate the mean

Where only three wells were used in the trend-surface analyses (i.e., at the LERF), the uncertainty was expressed as 1.65 times the standard deviation of the results. When only three wells were used in the analysis, the fitted plane was considered to be an exact solution and not a type of mean.

3.4 Error Estimation

The regression equation for the trend-surface analyses (Equation 7) provides the expected value for hydraulic head at a given x,y location. Actual measurements of hydraulic head usually differ from the expected value. Thus, the model representing the field measurements is shown in Equation 17:

$$z_j = b_0 + b_1 x_j + b_2 y_j + \varepsilon_j \qquad \textbf{(Equation 17)}$$

where:

ε_j = error term quantifying the difference between the expected value of Equation 7 (z) and the actual measured value (z_j) in the jth well

This difference is known as the residual, and it "takes into account all unpredictable and unknown factors that are not included in the" regression equation (Ott and Mendenhall, 1985). These factors consist of the experimental error (i.e., all of the variation inherent in the depth to water measurements and hydraulic head calculations) and error due to the regression model itself (i.e., deviations of the true water table from a plane). These two components are combined into a single error term and they cannot be separated (i.e., they are confounded) because we can never know the true hydraulic head values exactly (Davis, 2002). Because of this, any estimate of measurement error must always involve an assumption regarding the true value being measured. The method of determining the assumed true hydraulic head values for each site in this study are discussed in Section 6.

A common assumption in statistics is that for multiple measurements of a physical parameter, the error term in Equation 17 is normally distributed with a mean of zero (Ott and Mendenhall, 1985). Thus, the standard deviation of the residuals is used to estimate measurement error as a confidence interval. For this work, estimates of the error in the hydraulic head measurements were made using a 90 percent confidence interval. This was calculated as shown in Equation 18:

$$\varepsilon = 1.65 \cdot \sigma \qquad \textbf{(Equation 18)}$$

where:

ε = error estimate (m)

σ = standard deviation (m) of all the differences between the measured hydraulic head and the assumed true hydraulic head for all of the measurements used in the error analysis

This equation was calculated after normalizing the hydraulic heads to a constant barometric pressure, so variability caused by barometric effects would not be included as part of the error. Thus, the error estimate indicated the accuracy of the water-level elevation determinations in the wells (i.e., in terms of relative elevation between the wells). However, because measurement error is confounded with error due to the regression assumption, the error estimates in this study should be considered as upper bounds on the measurement error.

4 Assumptions and Inputs

Input data to the calculations consisted of casing elevation survey results, horizontal coordinates of the wells, gyroscope survey results, barometric pressure measurements, manual water-level measurements, and automated water-level measurements. The manual water-level measurements, casing elevations resulting from the well resurveys, and the horizontal coordinates are listed on the spreadsheets in Appendix C for LLWMA-1, Appendix D for IDF/PUREX, Appendix E for LLWMA-2, and Appendix F for LERF. Horizontal coordinates were obtained from the Hanford Well Information System database and are state plane coordinates (in meters) for Washington State, south zone. It was assumed that the existing surveys of well locations (i.e., horizontal coordinates) obtained from the database were accurate enough for this work; the geodetic surveys performed specifically for this study were only for casing elevations.

The determination of the gyroscope correction coefficients (C_1, C_2, C_3, and C_4 in Equation 2) are described in Section 6. The coefficients for the wells used in this study are listed on the spreadsheets in Appendices C, D, E, and F. Gyroscope survey reports can be found in SGW-54165 and ECF-HANFORD-0359, Rev. 1.

To perform the barometric response analysis, time series measurements of both the well water level and barometric pressure were needed at the same measurement frequency. The automated water-level elevations were collected using absolute pressure transducers, which have been found to provide more accurate measurements than vented pressure transducers within Central Plateau wells screened across the

water table (SGW-49700, *Comparison of Vented and Absolute Pressure Transducers for Water-Level Monitoring in Hanford Site Central Plateau Wells*). The transducers used were the Model 3001 Levelogger® Gold and Model 3001 Barologger™ Gold, both manufactured by Solinst, Inc.[3]. The barometric pressure measurements were obtained from Hanford Site meteorology Station #6 located within the 200 East Area and Station #21 near the 200 West Area. The data from Station #21 were used to fill in data gaps in the Station #6 data by interpolation. These data were provided by PNNL and later by Mission Support Alliance.

Because the total number of barometric pressure measurements used to normalize a manual water-level measurement to a constant barometric pressure can be quite large, and the number of manual measurements collected for this study was large, the barometric pressure measurements are not listed in this document. However, an example of the normalization of manual water-level measurements to a constant barometric pressure is provided in Appendix G. Numerous automated water-level measurements were collected for this study and there are also too many to list in this document. However, the automated data used to determine the BRFs are plotted on the charts provided in Appendix A.

5 Software Applications

Microsoft Excel was used to perform all calculations for this study. With the exception of generating the BRFs, Excel was used as a desktop calculator and, therefore, is exempt from the requirements of PRC-PRO-IRM-309, *Controlled Software Management*. However, the MRCX software (Version 1.1) is an application developed in Excel and, as such, is subject to controlled management. It is registered in HISI (ID: 3385) as approved for use. MRCX is the correct application for determining BRFs, and the software was used within its limitations. The HISI documentation for MRCX is contained in Appendix I.

6 Calculations

The calculations performed for this study are documented in the appendices. In many of the appendices, an example spreadsheet is provided displaying the formula in each cell to show how the equations presented in Section 3 were implemented. This is typically followed by printouts of the spreadsheets used for the calculations showing the input data and the results. A description is also provided at the beginning of each appendix to help the reader understand the spreadsheets presented.

Appendix A contains the BRFs for all the wells used in this study, and Appendix B documents the spreadsheet used for the trend-surface analyses.

The input data and calculations for LLWMA-1 are shown in Appendix C. The well network for LLWMA-1 initially consisted of 10 wells (over an area of 1.0 km^2), but 4 additional wells were added beginning in June 2008 (for a network covering 1.8 km^2) (Figure 1). For each set of water-level measurements from the 10-well network, five trend-surface analyses were performed: (1) using water-level elevations with no corrections applied (i.e., calculated using the pre-existing reference point elevations), (2) using just the new reference point elevations but no other corrections, (3) with the gyroscope corrections only, (4) with both the new reference point elevations and the gyroscope corrections, and (5) with all corrections applied to the measurements including normalization of the water-level elevations to a constant barometric pressure. This was done so the effect of each source of variability on the results could be evaluated. Two sets of trend-surface analyses were performed for the 14-well network: the first with the new reference point elevations and gyroscope corrections, and another

[3] Model 3001 Levelogger® Gold is a registered trademark and the Model 3001 Barologger™ Gold is a trademark of Solinst Canada Ltd., Georgetown, Ontario, Canada.

with normalization to a constant barometric pressure. This provided additional information to assess the effect of barometric pressure fluctuations on the results.

The gyroscope correction factors for the LLWMA-1 wells were offset values determined by linear interpolation of the gyroscope depth stations above and below the initial depth to water measurements if the lowermost depth station was below the water level, or it was based on the lowermost depth station if the gyroscope survey did not extend below the water level. Thus, the C_1, C_2, and C_3 coefficients in Equation 2 were all set to zero, and the C_4 coefficient is the offset value. Calculation of the offset values for LLWMA-1 is also documented in Appendix C.

As described in Section 3.3, potential outlier measurements were identified during the trend-surface analyses using the IQR method on the residuals. This method identifies potential outliers spatially (i.e., compared to the measurements collected in the other wells at the same time). However, potential outliers were removed from the analyses only if they were also temporal outliers (i.e., off-trend for that particular well) and no reason could be identified for the off-trend measurement (e.g., river stage effects). Temporal outliers were identified by visual inspection of the well hydrographs (Figures 2, 3, 4, and 5). Potential outliers were identified only for the hydraulic head data sets with all corrections applied. Once confirmed, the outliers were removed from all of the trend-surface analyses. The outliers removed are shown with open symbols on Figures 2, 3, 4, and 5.

The input data and calculations for IDF/PUREX are shown in Appendix D, including the determination of gyroscope correction coefficients. The well network consisted of 11 wells over an area of 1.0 km^2 (Figure 6). A total of 22 hydraulic head data sets were analyzed for IDF/PUREX, however, all but 3 data sets yielded results that were not statistically significant using all of the wells in the analysis. This indicated that the variability remaining in the measurements after applying all of the corrections was still too large to allow for a statistically significant hydraulic gradient determination. This occurred because of two reasons: (1) the site is smaller than the 14-well network at LLWMA-1, so the signal to noise ratio was smaller (i.e., the water-level change due to the hydraulic gradient magnitude was small compared to the variability in the measurements); and (2) the accuracy of the water-level elevations was not as good (discussed below).

To reduce the variability in the data at IDF/PUREX, each data set was repeatedly analyzed by removing the measurement with the highest residual until the results converged on a statistically significant result. Specifically, the measurement with the highest residual was removed, and the trend-surface analysis was performed again, until (1) the result was statistically significant, (2) all residuals were less than 0.01 m, and (3) the removal of the measurement with the next highest residual still resulted in a statistically significant result with residuals less than 0.01 m and the dip direction of the fitted plane changed by less than 10 degrees. Note that this process automatically removes outliers, so there was no need to use the IQR method to identify outliers. However, outliers were identified and removed from the data sets used for the error estimations (Figures 7, 8, and 9). Because three points exactly define a plane, the trend-surface analyses were not performed on less than four wells. Also, because one additional trend-surface analysis was needed to confirm the results (i.e., criteria 3 above), no final trend-surface analysis result was based on less than five wells. This process produced a hydraulic gradient result for 18 of the 22 data sets. For the remaining four data sets, this method did not yield a result that converged, therefore no valid result was obtained. To determine the effect of including the barometric corrections, the trend-surface analyses were also performed on the hydraulic head data sets not normalized to a constant barometric pressure, and these results are also in Appendix D.

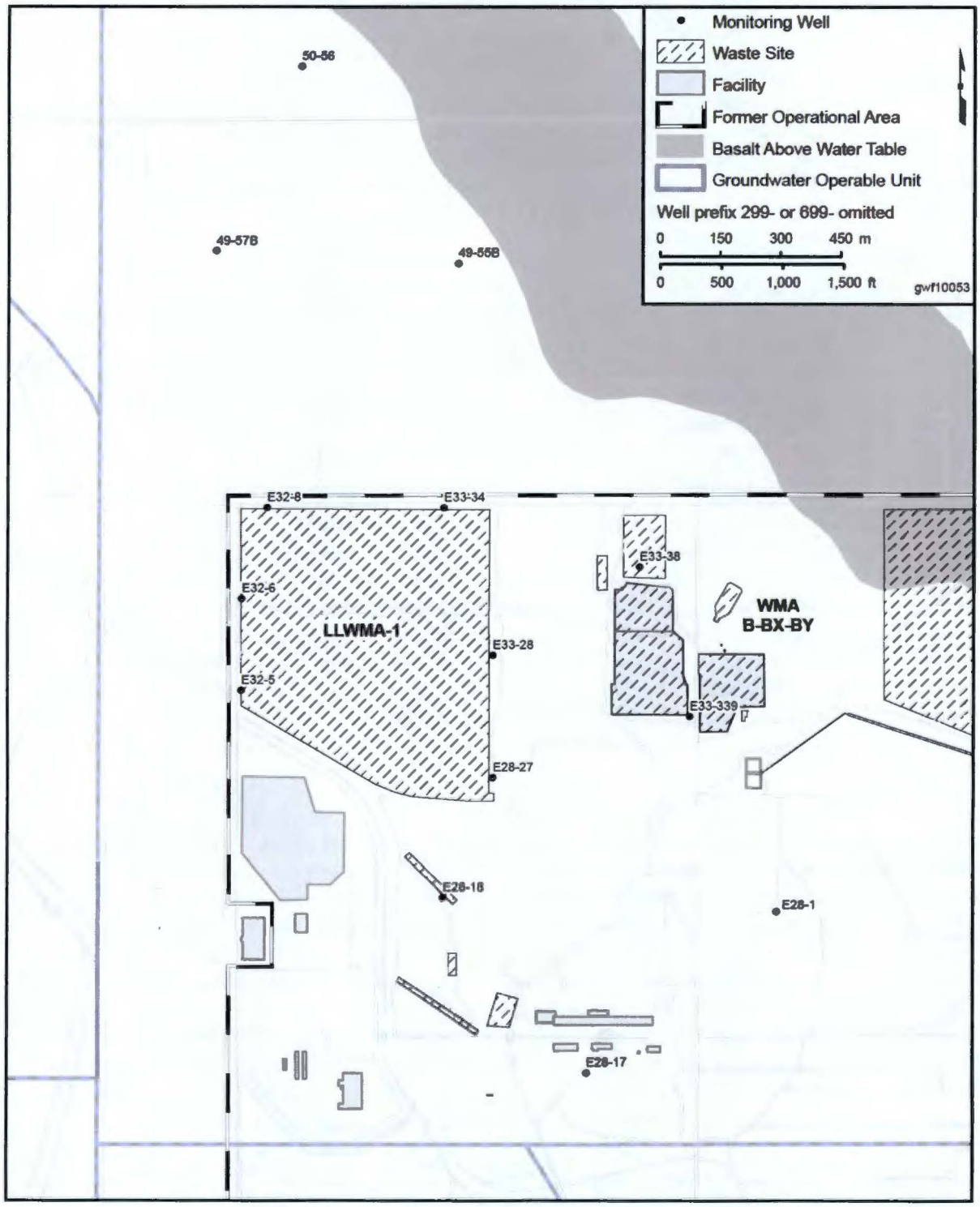

Figure 1. Well Location Map for LLWMA-1

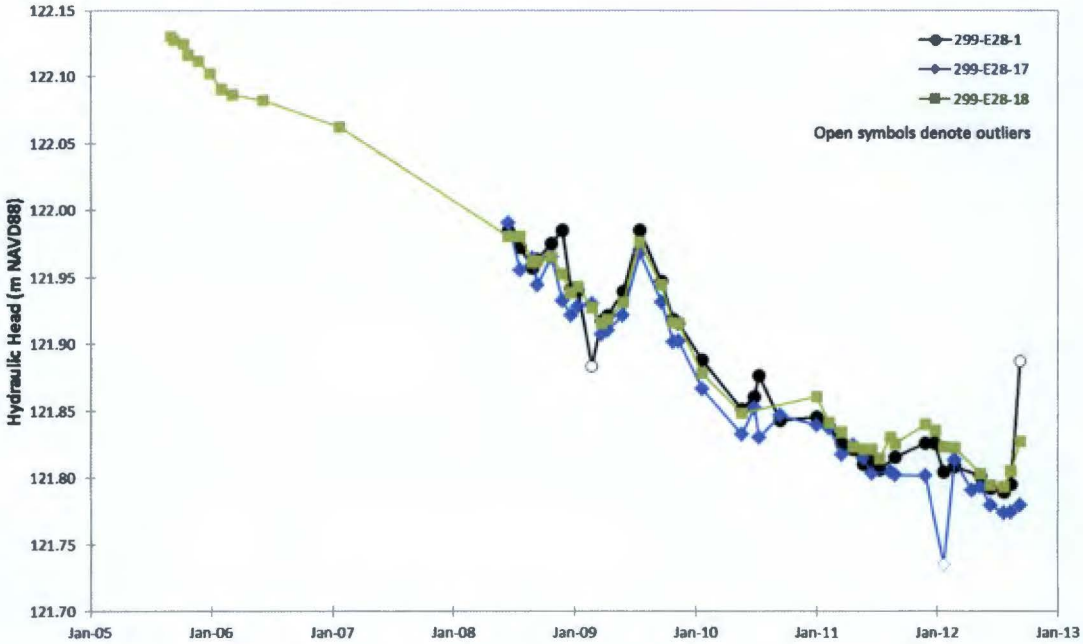

Figure 2. Hydraulic Head Trends for Wells 299-E28-1, 299-E28-17, and 299-E28-18 at LLWMA-1 Normalized to a Constant Barometric Pressure

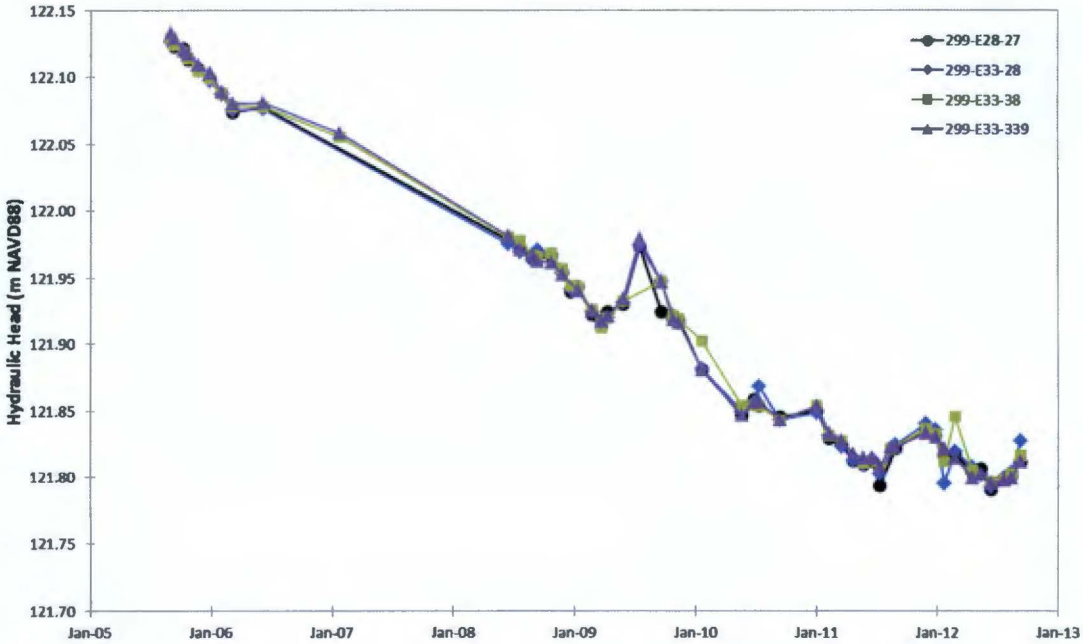

Figure 3. Hydraulic Head Trends for Wells 299-E28-27, 299-E33-28, 299-E33-38, and 299-E33-339 at LLWMA-1 Normalized to a Constant Barometric Pressure

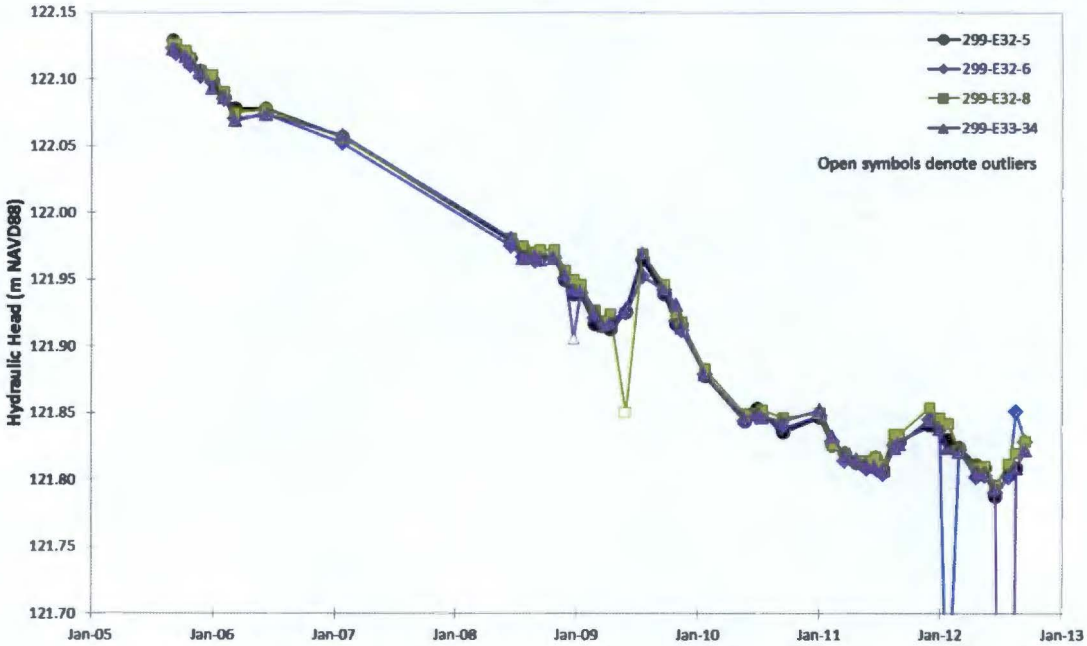

Figure 4. Hydraulic Head Trends for Wells 299-E32-5, 299-E32-6, 299-E32-8, and 299-E33-34 at LLWMA-1 Normalized to a Constant Barometric Pressure

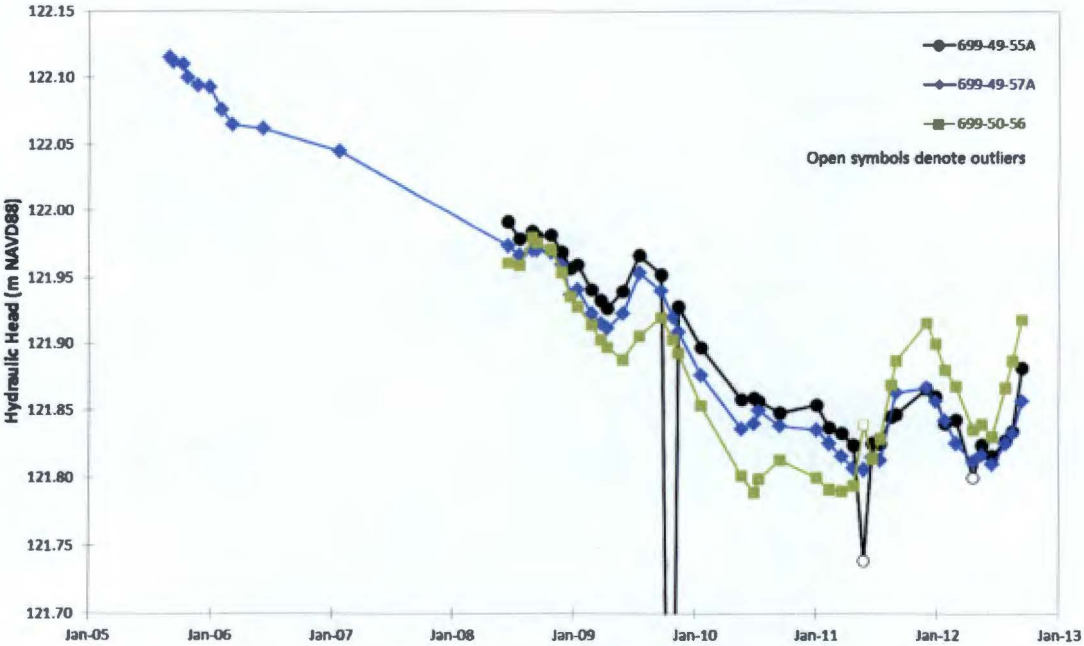

Figure 5. Hydraulic Head Trends for Wells 699-49-55A, 699-49-57A, and 699-50-56 at LLWMA-1 Normalized to a Constant Barometric Pressure

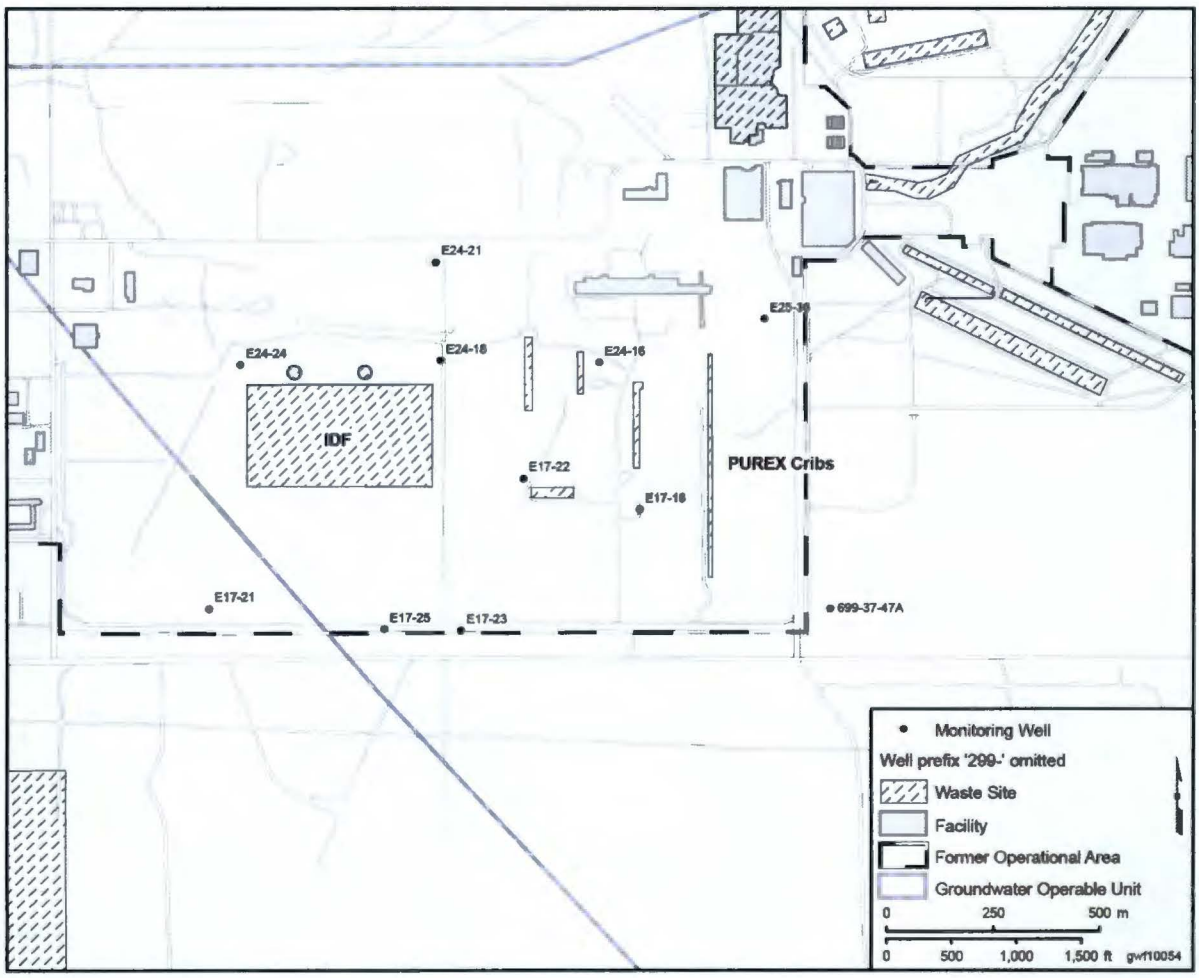

Figure 6. Well Location Map for IDF/PUREX

The input data and calculations for LLWMA-2 are shown in Appendix E, including the determination of the gyroscope correction coefficients. The well network consisted of 8 wells over an area of only 0.2 km^2. The LLWMA-2 wells are oriented along a west-northwest to east-southeast line, which is a poor geometry for trend-surface analyses and partly accounts for the small site area (Figure 10). However, these were the only wells available at this site. A total of 37 hydraulic head data sets were analyzed for LLWMA-2, but only 2 data sets yielded results that were statistically significant. Similar to the situation at IDF/PUREX, this indicated that the variability remaining in the measurements after applying all of the corrections was still too large to allow for a statistically significant hydraulic gradient determination.

The same trend-surface analysis approach used at IDF/PUREX was also used for LLWMA-2; each data set was repeatedly analyzed by removing the measurement with the highest residual until the results converged on a statistically significant result. Specifically, the measurement with the highest residual was removed, and the trend-surface analysis was performed again, until (1) the result was statistically significant, (2) all residuals were less than 0.01 m, and (3) the removal of the measurement with the next highest residual still resulted in a statistically significant result with residuals less than 0.01 m and the dip direction of the fitted plane changed by less than 10 degrees. Note that this process automatically removes outliers, so there was no need to use the IQR method to identify outliers (however, there were some obvious outliers off trend by 1 m or more that were not included in the first iteration).

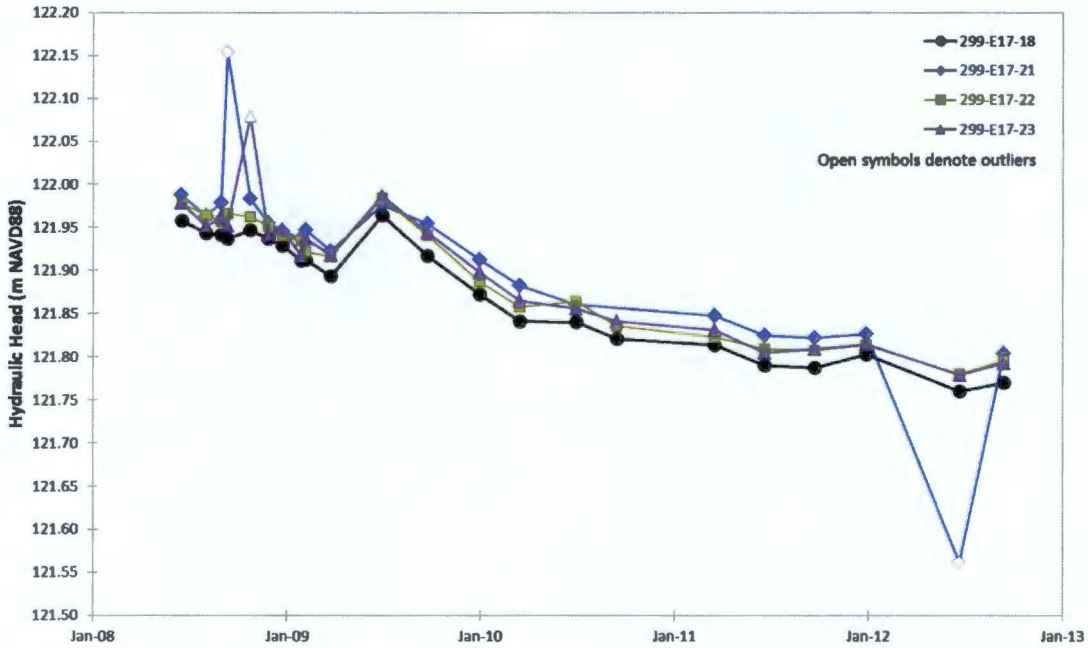

Figure 7. Hydraulic Head Trends for Wells 299-E17-18, 299-E17-21, 299-E17-22, and 299-E17-23 at IDF/PUREX Normalized to a Constant Barometric Pressure

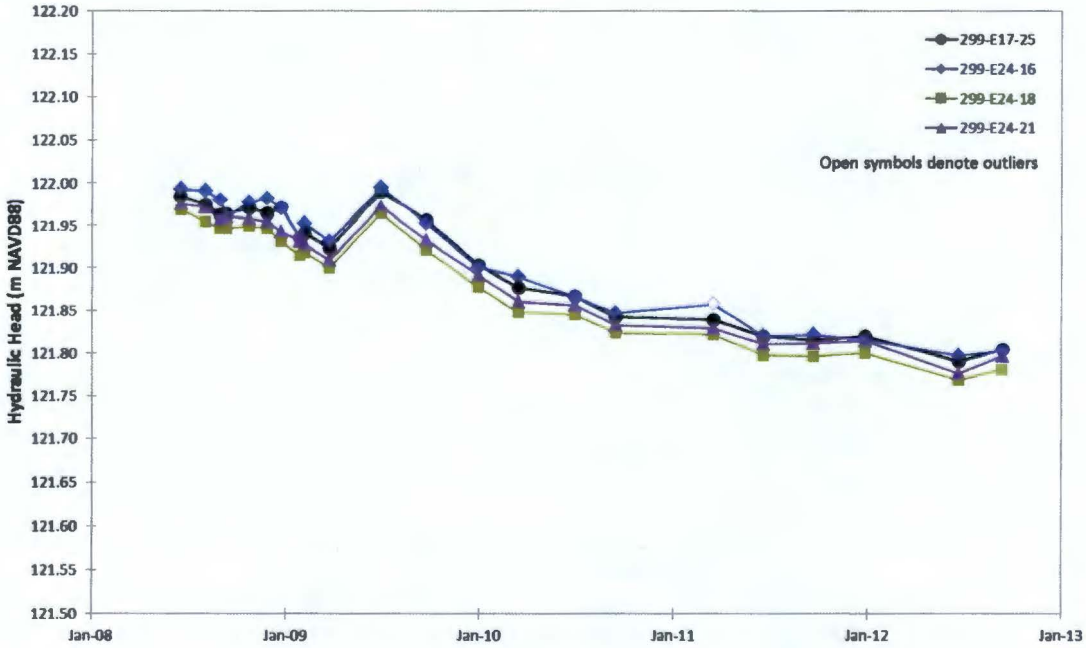

Figure 8. Hydraulic Head Trends for Wells 299-E17-25, 299-E24-16, 299-E24-18, and 299-E24-21 at IDF/PUREX Normalized to a Constant Barometric Pressure

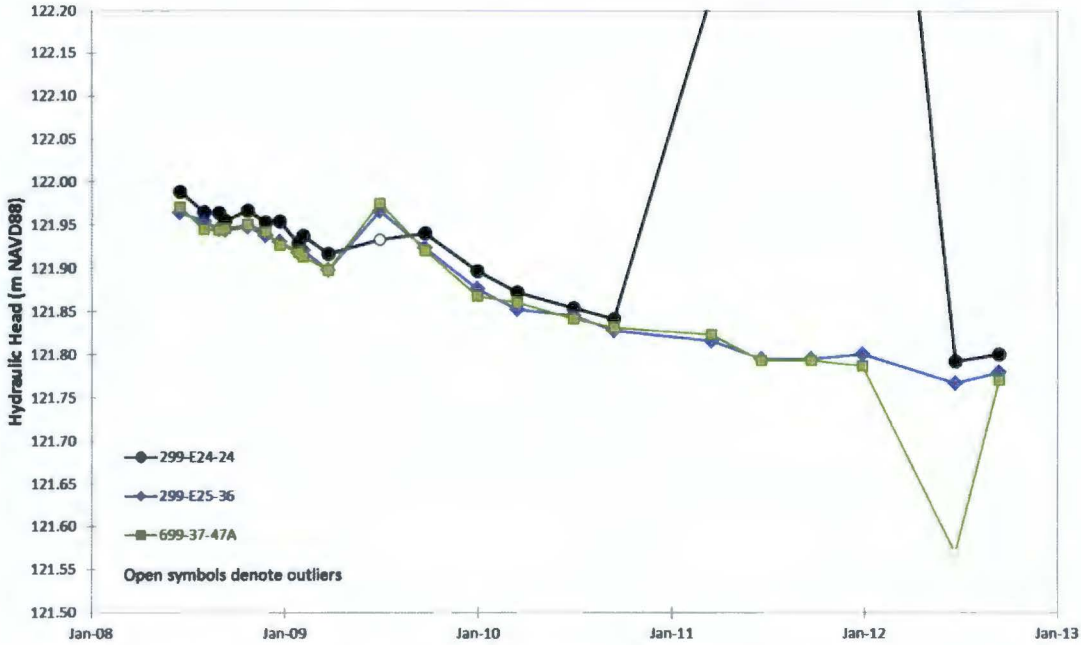

Figure 9. Hydraulic Head Trends for Wells 299-E24-24, 299-E25-36, and 699-37-47A at IDF/PUREX Normalized to a Constant Barometric Pressure

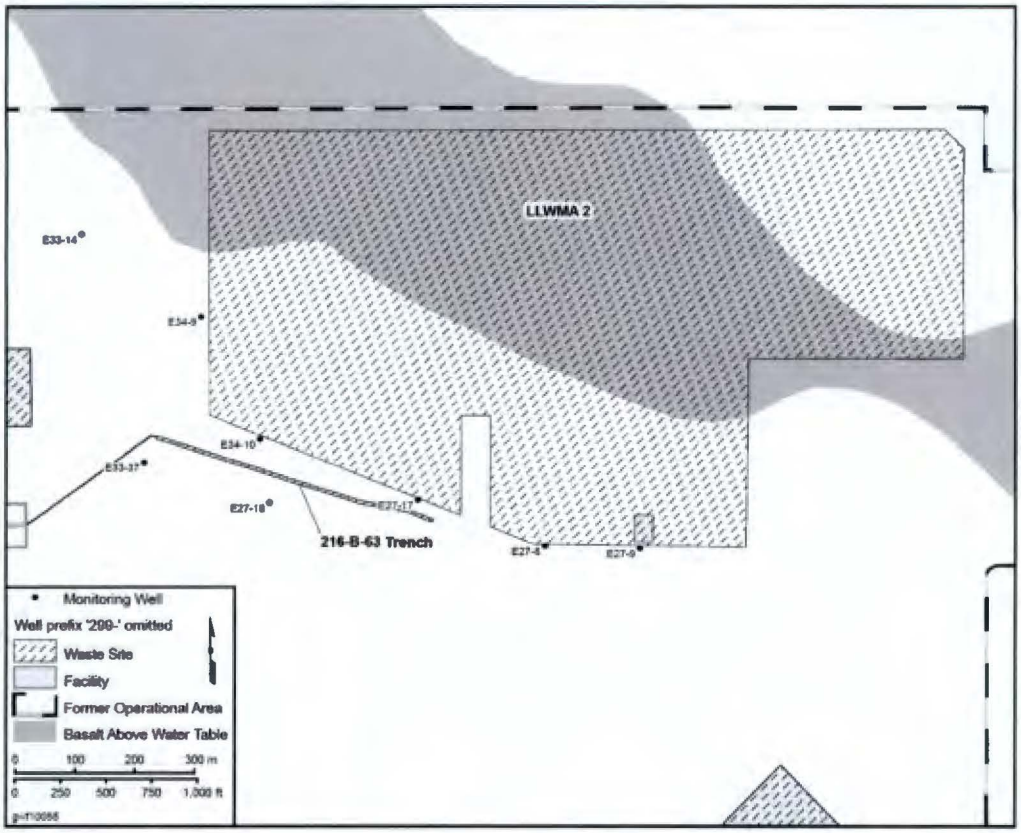

Figure 10. Well Location Map for LLWMA-2

Outliers were identified and removed from the data sets used for the error estimations (Figures 11 and 12). Because three points exactly define a plane, the trend-surface analyses were not performed on less than four wells. Also, because one additional trend-surface analysis was needed to confirm the results (i.e., criteria 3 above), no final trend-surface analysis result was based on less than five wells. This process resulted in a hydraulic gradient result for only 21 of the 37 data sets. For the remaining 16 data sets, this method did not yield a result that converged, therefore no valid result was obtained. As explained in the next section, it was concluded that the water table at LLWMA-2 is too flat to measure.

The input data and calculations for LERF are shown in Appendix F. The network initially consisted of three wells (299-E26-10, 299-E26-77, and 299-E26-79) until a fourth well (299-E26-14) was drilled and added to the network in December 2011. With only three wells available, the trend-surface analyses conducted on the data sets prior to December 2011 consist of exact solutions so the statistical test was not performed.

Estimates of the error remaining in the water-level measurements are shown in Appendix H. These estimates were made for LLWMA-1, LLWMA-2, and IDF/PUREX. An estimate was not made for LERF for two reasons:

- Only three wells were available for most of the trend-surface analyses and this did not allow for an uncertainty determination (i.e., the fitted plane was an exact solution with no residuals).
- The inclusion of a fourth well indicated that the magnitude of the hydraulic gradient changes across the study area. Thus, any estimate of the error calculated from deviations of the measurements from a plane would be too large because some proportion of the deviations can be attributed to the gradient magnitude change.

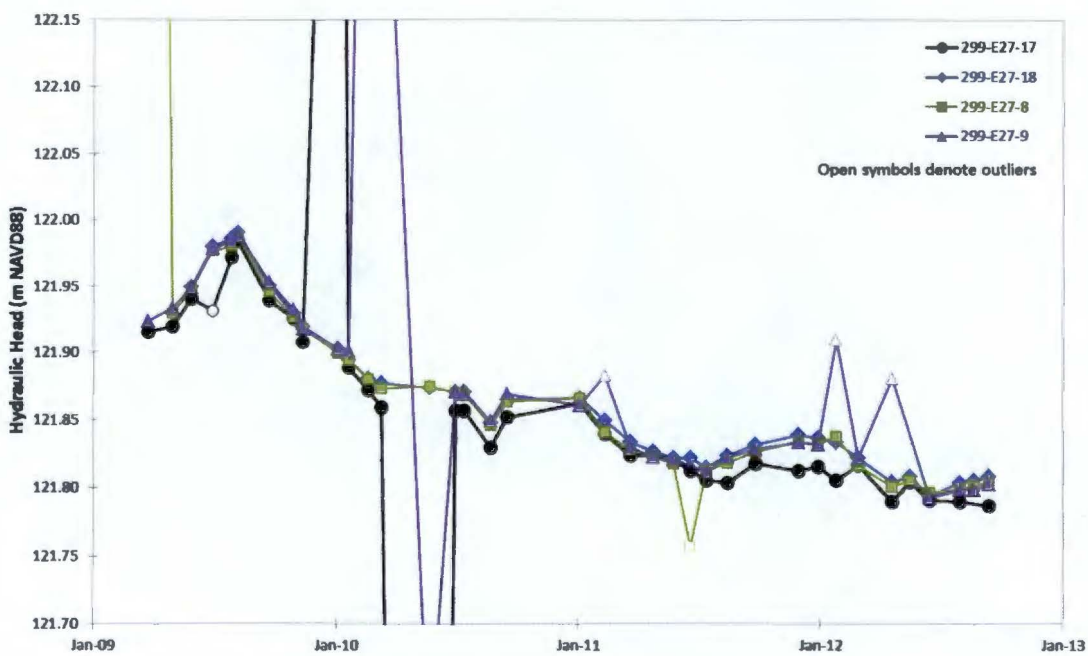

Figure 11. Hydraulic Head Trends for Wells 299-E27-17, 299-E27-18, 299-E27-8, and 299-E27-9 at LLWMA-2 Normalized to a Constant Barometric Pressure

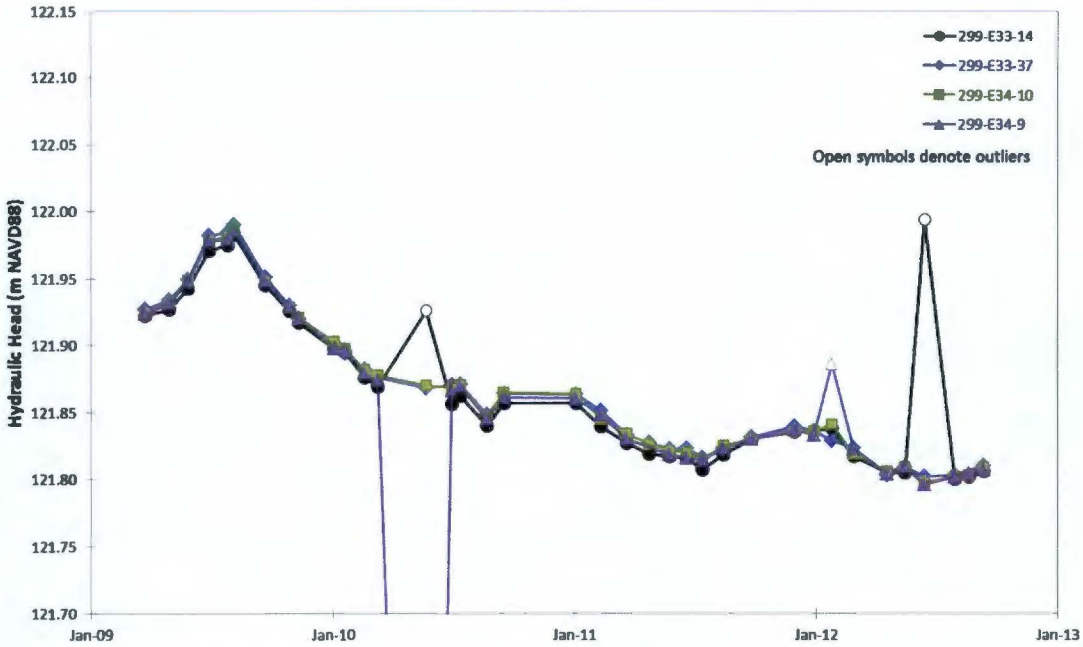

Figure 12. Hydraulic Head Trends for Wells 299-E33-14, 299-E33-37, 299-E34-10, and 299-E34-9 at LLWMA-2 Normalized to a Constant Barometric Pressure

As stated in Section 3.4, any estimate of measurement error cannot be made without an assumption regarding the true value being measured. Water-level measurements at LLWMA-1 indicated that the water table directly beneath the burial ground was very flat. Further, the results of the trend-surface analyses (presented in the next section) indicated that the water table across the entire LLWMA-1 network was too flat to measure between October 2008 and June 2011. This means that the plane fitted to the measurements by regression was not distinguishable from a horizontal plane. Thus, during the October 2008 through June 2011 time period, it was assumed that all of the variability in the water-level measurements in wells adjacent to the burial ground was entirely due to error remaining in the hydraulic head determinations. For each set of measurements between January 2009 and June 2011, the average hydraulic head in the wells surrounding the burial ground (299-E28-27, 299-E32-5, 299-E32-6, 299-E32-8, 299-E33-28, and 299-E33-34) was assumed to be the true water table elevation (i.e., the elevation of a horizontal plane fit by least-squares regression) and deviations from this average were assumed to be due to error (January 2009 was used as the start date instead of October 2008 to make sure that any residual gradient from the previous flow regime had dissipated). Months containing an outlier measurement, or for which one or more measurements were not collected, were excluded from the error calculations. This ensured that the same number of measurements was used from each well, which prevented introducing a bias into the error estimate by using more measurements from some wells than others.

Because the water table at LLWMA-2 was too flat to measure, it was assumed that all of the variability in the water-level measurements was due to error. Thus, the error estimation for LLWMA-2 was performed by the same method as for LLWMA-1: the average water-level was assumed to be the true value and the deviation of the measurements from this average was assumed to be due to error. All of the network wells were used in the LLWMA-2 error estimation. Outliers were omitted in the same manner as for LLWMA-1, and are identified in Figures 11 and 12.

At IDF/PUREX, the deviation of each measurement from the final trend surface (i.e., the residual) was assumed to be due to measurement error. Thus, the error was calculated as 1.65 times the standard deviation of the residuals. Outliers were also omitted in the same manner as for LLWMA-1 and LLWMA-2 so that the same number of measurements from each well was used in the error analysis. The outliers are identified in Figures 7, 8, and 9.

7 Results

Results of the trend-surface analyses for LLWMA-1, as shown on the spreadsheets in Appendix C, are listed in Table 2 (without barometric corrections) and Table 3 (with barometric corrections). The results can be divided into four periods: (1) a hydraulic gradient toward the northwest from 2005 and ending prior to mid-2008, (2) a temporary gradient reversal toward the south during the late summer and fall of 2008, (3) a period of indeterminate hydraulic gradient from winter of 2008/2009 until mid-2011, and (4) a gradient toward the south from mid-2011 through the end of the study period. Mean hydraulic gradients were calculated for the period when the gradient was toward the northwest (2005 until prior to mid-2008) and the period when the gradient was toward the south (mid-2011 through FY 2012) and are shown in Tables 2 and 3. When toward the north, the hydraulic gradient averaged 8.0×10^{-6} ($\pm 0.9 \times 10^{-6}$) m/m at 343 degrees (±5 degrees). When toward the south, the gradient averaged 2.0×10^{-5} ($\pm 0.4\ 4\ 10^{-5}$) m/m at 175 degrees (±8 degrees). The estimated error in the LLWMA--1 water-level measurements was ±0.006 m (see Appendix H).

Results of the trend-surface analyses for IDF/PUREX, as shown on the spreadsheets in Appendix D, are listed in Table 4 (without barometric corrections) and Table 5 (with barometric corrections). The interpreted mean hydraulic gradient was toward the east-northeast (shown at the end of Tables 4 and 5). The best value (with barometric corrections) was 2.2×10^{-5} ($\pm 0.2 \times 10^{-5}$) at 71 degrees (±11 degrees). The estimated error in the IDF/PUREX water-level measurements was ±0.019 m (see Appendix H). This error is larger than the error at LLWMA-1, and this is thought to be due to three reasons:

- The depth to water is greater at IDF/PUREX.
- The wells at IDF/PUREX are more deviated from vertical so the corrections for borehole deviation may not be as accurate.
- A lot of air movement occurs through the well bores at IDF/PUREX, which results in more condensation on the inside of the casings. This causes measuring tapes to frequently stick to the casing making it more difficult to obtain an accurate water-level measurement.

Results of the trend-surface analyses for LLWMA-2, as shown on the spreadsheets in Appendix E, are listed in Table 6 (with barometric corrections). A trend surface was successfully fit to only 21 of the 37 data sets analyzed. However, most yielded an interpreted flow direction toward the north-northeast directly toward a basalt subcrop above the water table, which does not make sense hydrologically. For this reason, and because a large number of data sets did not yield a valid result, it was concluded that the water table at LLWMA-2 is too flat to measure. The estimated error in the LLWMA-2 water-level measurements was ±0.008 m (see Appendix H).

Table 2. Results of Trend-Surface Analyses for LLWMA-1 (without Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
Ten-Well Network					
9/1/2005	7.7×10^{-6}	312	0.67	0.0202	Yes
9/12/2005	8.2×10^{-6}	329	0.69	0.0174	Yes
10/11/2005	8.0×10^{-6}	356	0.78	0.0047	Yes
10/25/2005	6.4×10^{-6}	320	0.55	0.0599	No
11/23/2005	6.9×10^{-6}	336	0.69	0.0168	Yes
12/29/2005	1.0×10^{-5}	13	0.70	0.0143	Yes
2/2/2006	9.7×10^{-6}	350	0.72	0.0109	Yes
3/8/2006	7.8×10^{-6}	332	0.53	0.0703	No
6/8/2006	1.0×10^{-5}	347	0.74	0.0085	Yes
1/25/2007	7.3×10^{-6}	336	0.81	0.0149	Yes
Mean for the Ten-Well Network	*8.3×10^{-6} ($\pm 0.7 \times 10^{-6}$)*	*339 (±9)*			
Fourteen-Well Network					
6/16/2008	8.8×10^{-6}	287	0.38	0.0744	No
7/21/2008	1.3×10^{-6}	97	0.01	0.9639	No
8/29/2008	1.3×10^{-5}	213	0.64	0.0036	Yes
9/11/2008	9.3×10^{-6}	156	0.73	0.0008	Yes
10/23/2008	1.1×10^{-5}	226	0.45	0.0376	Yes
11/26/2008	1.1×10^{-5}	225	0.31	0.1268	No
12/23/2008	5.7×10^{-6}	160	0.24	0.2892	No
1/12/2009	8.9×10^{-7}	130	0.01	0.9450	No
2/23/2009	9.9×10^{-6}	247	0.22	0.2966	No
3/24/2009	6.3×10^{-7}	106	0.00	0.9738	No
4/13/2009	4.7×10^{-6}	316	0.21	0.2708	No
5/28/2009	8.2×10^{-6}	310	0.25	0.2343	No
7/17/2009	2.0×10^{-5}	335	0.58	0.0127	Yes
9/21/2009	3.7×10^{-6}	8	0.10	0.5734	No
10/27/2009	6.0×10^{-6}	100	0.10	0.5781	No
11/12/2009	3.5×10^{-6}	259	0.02	0.8933	No
1/21/2010	1.1×10^{-5}	243	0.07	0.6749	No
5/23/2010	6.3×10^{-6}	358	0.12	0.5020	No

Table 2. Results of Trend-Surface Analyses for LLWMA-1 (without Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
6/30/2010	1.8×10^{-5}	353	0.54	0.0212	Yes
7/13/2010	1.0×10^{-5}	357	0.20	0.3377	No
9/15/2010	7.6×10^{-6}	315	0.42	0.0646	No
1/4/2011	1.1×10^{-5}	2	0.30	0.1439	No
2/11/2011	1.1×10^{-5}	316	0.41	0.0532	No
3/21/2011	7.6×10^{-6}	296	0.15	0.4063	No
4/25/2011	1.2×10^{-5}	275	0.36	0.1046	No
5/25/2011	5.7×10^{-6}	306	0.37	0.1274	No
6/20/2011	2.3×10^{-6}	212	0.06	0.7300	No
7/14/2011	1.1×10^{-5}	194	0.45	0.0519	No
Hydraulic gradient from 11/26/2008 through 7/14/2011 indeterminate					
8/15/2011	2.0×10^{-5}	154	0.75	0.0076	Yes
8/29/2011	2.8×10^{-5}	171	0.89	0.0000	Yes
11/30/2011	3.4×10^{-5}	153	0.82	0.0001	Yes
12/29/2011	2.7×10^{-5}	163	0.81	0.0002	Yes
1/25/2012	3.1×10^{-5}	129	0.67	0.0065	Yes
2/28/2012	2.5×10^{-5}	213	0.63	0.0040	Yes
4/18/2012	1.5×10^{-5}	176	0.80	0.0018	Yes
5/15/2012	1.9×10^{-5}	194	0.84	0.0001	Yes
6/14/2012	1.9×10^{-5}	193	0.81	0.0001	Yes
7/24/2012	3.0×10^{-5}	178	0.86	0.0001	Yes
8/16/2012	3.4×10^{-5}	142	0.76	0.0003	Yes
9/12/2012	4.2×10^{-5}	170	0.75	0.0018	Yes
Mean for 8/15/2011 through 9/12/2012	*2.7×10^{5} ($\pm 0.4 \times 10^{5}$)*	*170 (±11)*			

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

Table 3. Results of Trend-Surface Analyses for LLWMA-1 (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
Ten-Well Network					
9/1/2005	8.7×10^{-6}	332	0.76	0.0068	Yes
9/12/2005	7.6×10^{-6}	323	0.67	0.0212	Yes
10/11/2005	7.2×10^{-6}	356	0.78	0.0051	Yes
10/25/2005	7.9×10^{-6}	339	0.65	0.0260	Yes
11/23/2005	8.6×10^{-6}	348	0.79	0.0042	Yes
12/29/2005	4.9×10^{-6}	353	0.40	01718	No
2/2/2006	6.5×10^{-6}	341	0.62	0.0330	Yes
3/8/2006	1.0×10^{-5}	348	0.70	0.0147	Yes
6/8/2006	1.0×10^{-5}	344	0.80	0.0038	Yes
1/25/2007	8.7×10^{-6}	348	0.76	0.0269	Yes
Means for the Ten-Well Network	*8.0×10^{-6} ($\pm 0.9 \times 10^{-6}$)*	*343 (±5)*			
Fourteen-Well Network					
6/16/2008	5.9×10^{-6}	309	0.31	0.1321	No
7/21/2008	1.4×10^{-6}	265	0.01	0.9673	No
8/29/2008	9.1×10^{-6}	187	0.68	0.0018	Yes
9/11/2008	1.1×10^{-5}	180	0.69	0.0017	Yes
10/23/2008	5.9×10^{-6}	218	0.27	0.1803	No
11/26/2008	1.6×10^{-5}	237	0.24	0.2152	No
12/23/2008	7.6×10^{-6}	210	0.25	0.2794	No
1/12/2009	4.1×10^{-6}	219	0.06	0.7099	No
2/23/2009	7.5×10^{-6}	263	0.18	0.3812	No
3/24/2009	2.5×10^{-6}	224	0.03	0.8659	No
4/13/2009	4.8×10^{-6}	289	0.14	0.4408	No
5/28/2009	1.1×10^{-5}	300	0.30	0.1720	No
7/17/2009	1.9×10^{-5}	326	0.54	0.0198	Yes
9/21/2009	5.6×10^{-6}	262	0.06	0.7241	No
10/27/2009	1.2×10^{-6}	176	0.01	0.9437	No
11/12/2009	3.5×10^{-6}	276	0.04	0.7905	No
1/21/2010	1.2×10^{-5}	258	0.14	0.4252	No
5/23/2010	7.6×10^{-6}	318	0.16	0.3782	No
6/30/2010	1.6×10^{-5}	348	0.41	0.0693	No

Table 3. Results of Trend-Surface Analyses for LLWMA-1 (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
7/13/2010	1.2×10^{-5}	312	0.21	0.3140	No
9/15/2010	6.7×10^{-6}	338	0.31	0.1524	No
1/4/2011	1.1×10^{-5}	358	0.26	0.1841	No
2/11/2011	1.1×10^{-5}	339	0.48	0.0288	Yes
3/21/2011	8.1×10^{-6}	311	0.29	0.1573	No
4/25/2011	7.3×10^{-6}	326	0.49	0.0362	Yes
5/25/2011	4.7×10^{-6}	18	0.29	0.2147	No
6/20/2011	3.3×10^{-6}	191	0.16	0.4179	No
Hydraulic gradient from 10/23/2008 through 6/20/2011 indeterminate					
7/14/2011	1.2×10^{-5}	192	0.51	0.0278	Yes
8/15/2011	2.0×10^{-5}	161	0.79	0.0045	Yes
8/29/2011	2.8×10^{-5}	176	0.86	0.0001	Yes
11/30/2011	3.2×10^{-5}	171	0.83	0.0001	Yes
12/29/2011	2.6×10^{-5}	172	0.77	0.0006	Yes
1/25/2012	2.6×10^{-5}	144	0.68	0.0056	Yes
2/28/2012	2.0×10^{-5}	196	0.61	0.0056	Yes
4/18/2012	1.4×10^{-5}	172	0.79	0.0020	Yes
5/15/2012	1.6×10^{-5}	188	0.80	0.0003	Yes
6/14/2012	2.0×10^{-5}	200	0.82	0.0001	Yes
7/24/2012	3.0×10^{-5}	177	0.88	0.0000	Yes
8/16/2012	3.2×10^{-5}	151	0.75	0.0005	Yes
9/12/2012	4.5×10^{-5}	174	0.80	0.0007	Yes
Means for 7/14/2011 through 9/12/2012	*2.5×10^{5} ($\pm 0.4 \times 10^{5}$)*	*175 (±8)*			

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

Table 4. Results of Trend-Surface Analyses for IDF/PUREX Cribs (without Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Number of Measurements
6/16/2008	1.7×10^{-5}	61	0.77	0.0117	9
8/1/2008	2.7×10^{-5}	148	0.86	0.0029	9
8/29/2008	2.1×10^{-5}	59	0.87	0.0066	8
9/10/2008	2.7 x 10-5	173	0.94	0.0008	8
10/23/2008	No valid result				
11/26/2008	1.2×10^{-5}	95	0.97	0.0009	7
12/22/2008	No valid result				
1/26/2009	1.4×10^{-5}	108	0.82	0.0146	8
2/5/2009	2.0×10^{-5}	51	0.86	0.0077	8
3/24/2009	2.0×10^{-5}	46	0.82	0.0140	8
6/29/2009	2.4×10^{-5}	29	0.99	0.0097	5
9/22/2009	2.7×10^{-5}	54	0.84	0.0109	8
12/30/2009	4.2×10^{-5}	53	0.98	0.0001	8
3/16/2010	2.2×10^{-5}	41	0.87	0.0066	8
6/30/2010	1.3×10^{-5}	101	0.69	0.0291	9
9/14/2010	1.2×10^{-5}	68	0.92	0.0057	7
3/18/2011	2.2×10^{-5}	43	0.96	0.0012	7
6/20/2011	2.2×10^{-5}	78	0.92	0.0062	7
9/22/2011	2.3×10^{-5}	97	0.99	0.0002	7
12/29/2011	3.1×10^{-5}	121	0.78	0.0114	9
6/22/2012	No valid result				
9/12/2012	2.4×10^{-5}	105	0.87	0.0020	9
Mean Results	*2.2×10^{5} ($\pm 0.3 \times 10^{5}$)*	*80 (±15)*			

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

Table 5. Results of Trend-Surface Analyses for IDF/PUREX Cribs (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Number of Measurements
6/16/2008	1.8×10^{-5}	58	0.81	0.0064	9
8/1/2008	1.8×10^{-5}	138	0.65	0.0411	9
8/29/2008	2.3×10^{-5}	63	0.78	0.0047	10
9/10/2008	No valid result				
10/23/2008	2.5×10^{-5}	52	0.81	0.0065	9
11/26/2008	1.2×10^{-5}	55	0.91	0.0283	6
12/22/2008	1.7×10^{-5}	108	0.92	0.0072	7
1/26/2009	No valid result				
2/5/2009	3.8×10^{-5}	47	0.95	0.0006	8
3/24/2009	1.9×10^{-5}	59	0.89	0.0039	8
6/29/2009	2.2×10^{-5}	36	0.95	0.0108	6
9/22/2009	2.6×10^{-5}	52	0.86	0.0069	8
12/30/2009	2.8×10^{-5}	73	0.88	0.0015	9
3/16/2010	2.0×10^{-5}	49	0.86	0.0071	8
6/30/2010	No valid result				
9/14/2010	1.4×10^{-5}	49	0.99	0.0001	7
3/18/2011	2.2×10^{-5}	57	0.78	0.0110	9
6/20/2011	2.4×10^{-5}	89	0.84	0.0102	8
9/22/2011	2.1×10^{-5}	89	0.99	0.0001	7
12/29/2011	2.7×10^{-5}	104	0.90	0.0009	9
6/22/2012	No valid result				
9/12/2012	2.2×10^{-5}	101	0.91	0.0076	7
Mean Results	*2.2×10^{5} ($\pm 0.2 \times 10^{5}$)*	*71 (±11)*			

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

Table 6. Results of Trend-Surface Analyses for LLWMA-2 (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Number of Measurements
3/24/2009	No valid result				
4/30/2009	No valid result				
5/28/2009	1.8×10^{-5}	14	0.91	0.0272	6
6/29/2009	2.9×10^{-5}	18	0.89	0.0352	6
7/27/2009	2.5×10^{-5}	16	0.79	0.0459	7
8/6/2009	2.0×10^{-5}	18	0.85	0.0233	7
9/22/2009	1.2×10^{-5}	355	0.88	0.0412	6
10/29/2009	No valid result				
11/12/2009	No valid result				
1/4/2010	1.4×10^{-5}	7	0.89	0.0364	6
1/20/2010	1.2×10^{-5}	237	0.88	0.0424	6
2/18/2010	No valid result				
3/10/2010	No valid result				
5/23/2010	No valid result				
6/30/2010	3.0×10^{-5}	8	0.86	0.0210	7
7/13/2010	2.7×10^{-5}	17	0.91	0.0293	6
8/23/2010	1.7×10^{-5}	10	0.78	0.0472	7
9/17/2010	1.6×10^{-5}	347	0.97	0.0041	6
1/4/2011	2.1×10^{-5}	16	0.74	0.0348	8
2/11/2011	4.8×10^{-5}	33	0.94	0.0145	6
3/21/2011	No valid result				
4/25/2011	2.6×10^{-5}	23	0.92	0.0063	7
5/25/2011	1.5×10^{-5}	15	0.99	0.0001	7
6/20/2011	No valid result				
7/14/2011	2.7×10^{-5}	20	0.97	0.0043	6
8/15/2011	No valid result				
9/26/2011	No valid result				
11/30/2011	1.4×10^{-5}	38	0.80	0.0414	7
12/29/2011	No valid result				
1/25/2012	1.4×10^{-4}	237	0.97	0.0322	5
2/28/2012	2.5×10^{-5}	35	0.95	0.0098	6
4/18/2012	No valid result				

Table 6. Results of Trend-Surface Analyses for LLWMA-2 (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Number of Measurements
5/15/2012	No valid result				
6/14/2012	2.5×10^{-4}	189	1.00	0.0050	5
7/30/2012	No valid result				
8/20/2012	No valid result				
9/11/2012	1.7×10^{-5}	42	0.92	0.0061	7

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

Results of the trend-surface analyses for LERF, as shown on the spreadsheets in Appendix F, are listed in Table 7 (with barometric corrections). Results for the three-well network (March 2009 through November 2011) averaged 9.3×10^{-5} ($\pm 7.5 \times 10^{-5}$) m/m at 187 degrees (±34 degrees) (the standard deviation was used for the uncertainty estimates because a plane fit to only three measurements is an exact solution, not an average). The inclusion of the fourth well starting in December 2011 resulted in a larger gradient magnitude, but the direction was essentially the same. The average gradient for December 2012 through the end of FY 2012 was 2.8×10^{-4} ($\pm 0.4 \times 10^{-4}$) m/m at 188 degrees (±8 degrees) (the standard error was used for the uncertainty estimates because four wells were used in the trend-surface analysis).

Table 7. Results of Trend-Surface Analyses for LERF (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
Three-Well Network					
3/24/2009	1.5×10^{-4}	175	N/A	N/A	N/A
4/30/2009	3.3×10^{-5}	143	N/A	N/A	N/A
5/28/2009	2.5×10^{-5}	312	N/A	N/A	N/A
6/29/2009	5.5×10^{-5}	75	N/A	N/A	N/A
7/13/2009	2.0×10^{-5}	198	N/A	N/A	N/A
8/6/2009	5.7×10^{-5}	186	N/A	N/A	N/A
9/22/2009	9.4×10^{-5}	181	N/A	N/A	N/A
11/12/2009	9.1×10^{-5}	140	N/A	N/A	N/A
7/13/2010	4.9×10^{-5}	193	N/A	N/A	N/A
8/23/2010	1.1×10^{-4}	196	N/A	N/A	N/A
9/17/2010	8.5×10^{-5}	185	N/A	N/A	N/A

Table 7. Results of Trend-Surface Analyses for LERF (with Barometric Corrections)

Measurement Date	Gradient Magnitude (m/m)	Gradient Direction (Azimuth)[a]	R^2	*p*-Value[b]	Statistically Significant?
1/4/2011	8.1×10^{-5}	198	N/A	N/A	N/A
2/11/2011	1.6×10^{-4}	182	N/A	N/A	N/A
3/21/2011	1.7×10^{-4}	196	N/A	N/A	N/A
4/25/2011	1.5×10^{-4}	205	N/A	N/A	N/A
5/25/2011	6.7×10^{-5}	221	N/A	N/A	N/A
7/14/2011	4.8×10^{-5}	343	N/A	N/A	N/A
9/26/2011	8.1×10^{-5}	198	N/A	N/A	N/A
11/30/2011	9.0×10^{-5}	195	N/A	N/A	N/A
Means for the Three-Well Network	*9.3×10^{5} ($\pm 7.5 \times 10^{-5}$)*	*187 (±34)*			
Four-Well Network					
12/29/2011	2.8×10^{-4}	195	0.92	0.2858	No
2/28/2012	2.5×10^{-4}	186	0.93	0.2670	No
4/18/2012	3.0×10^{-4}	188	0.91	0.2928	No
5/15/2012	3.1×10^{-4}	181	N/A	N/A	N/A
8/20/2012	2.8×10^{-4}	188	0.94	0.2348	No
9/11/2012	2.7×10^{-4}	189	0.95	0.2132	No
Means for the Four-Well Network	*2.8×10^{-4} ($\pm 0.4 \times 10^{-4}$)*	*188 (±8)*			

a. Degrees clockwise from true north; 90 = east, 180 = south, 270 = west, 0 and/or 360 = north.

b. The probability that the degree of an apparent spatially dependent trend observed in the data (or a trend of even greater degree) would occur solely by random chance. If the *p*-value is less than 0.05, the fitted trend surface is deemed statistically significant.

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Appendix A

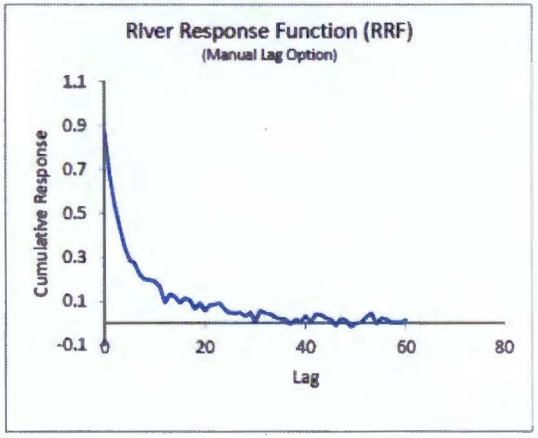
Barometric Response Functions

This appendix shows the BRFs for the wells used in this study, as determined using the MRCX software. The MRCX software was designed to correct well water-levels for river stage effects, but it can be used for corrections of barometric pressure effects because the mathematical equations and methods are identical.

The response function plots in the figures that follow are labeled "River Response Function," but they are actually BRFs. The plots labeled "Training Data Results" show the automated well water-level elevations (the "Observed Well Elev" data series in black), the predicted water-level elevations resulting from the multiple regression (the "Modeled [Predicted] Well Elev" data series in red), and the automated water levels normalized to a constant barometric pressure (the "Modeled [Corrected] Well Elev" data series in blue). The plots labeled "Correction Data Results" are blank because MRCX was only used in the training mode to determine BRFs. If the software had been used to correct measurements outside of the date range specified for the training, the results would have been shown on this plot. The following figures also show the data option used for the multiple regression (i.e., "Original Data" or "First Differences"), the number of time lags that yielded the best fit to the observed measurements, and the date range of the automated measurements used in the analysis. For documentation purposes, the coefficients comprising the BRFs for each well are listed in Appendix G.

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	4/12/10 15:00	4/12/10 15:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	5/11/10 9:00	5/11/10 9:00	1/0/00 0:00	1/0/00 0:00

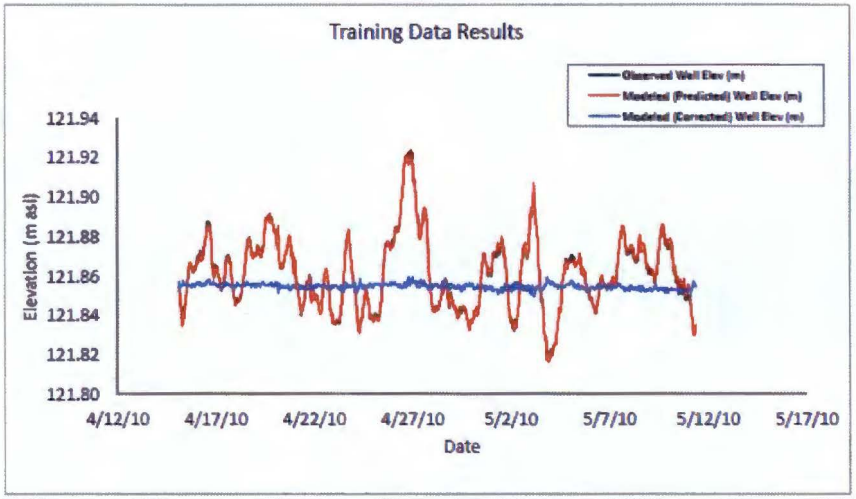
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	60	Yes



1.49508E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v. 1.1

3.11355E-07 sum of squares



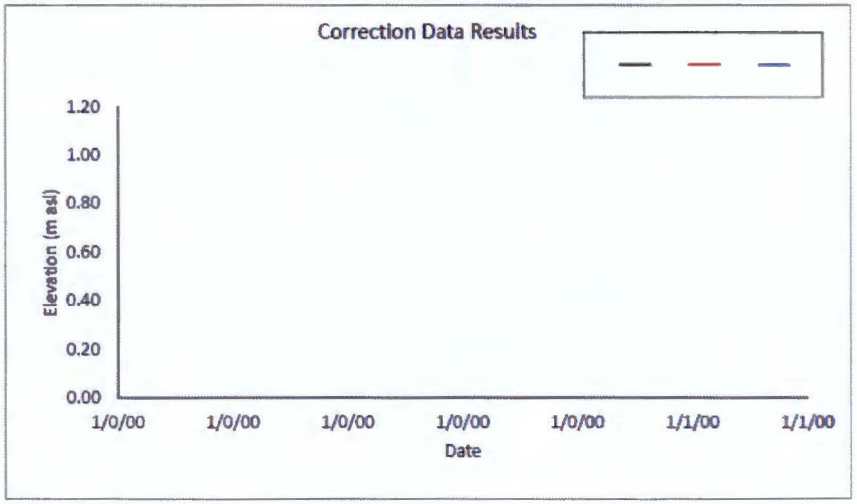
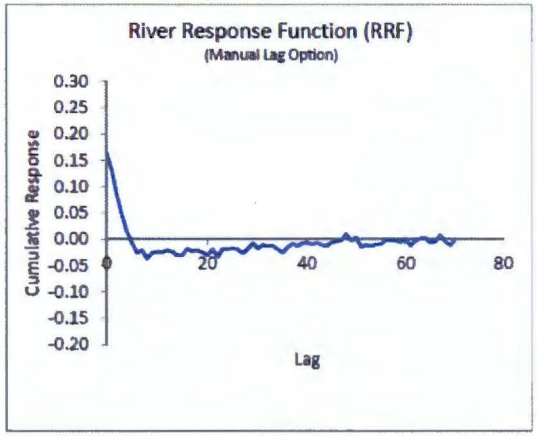


Figure A-1. Barometric Response Function for 299-E28-1 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/23/10 0:00	11/23/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	1/3/11 9:00	1/3/11 9:00	1/0/00 0:00	1/0/00 0:00

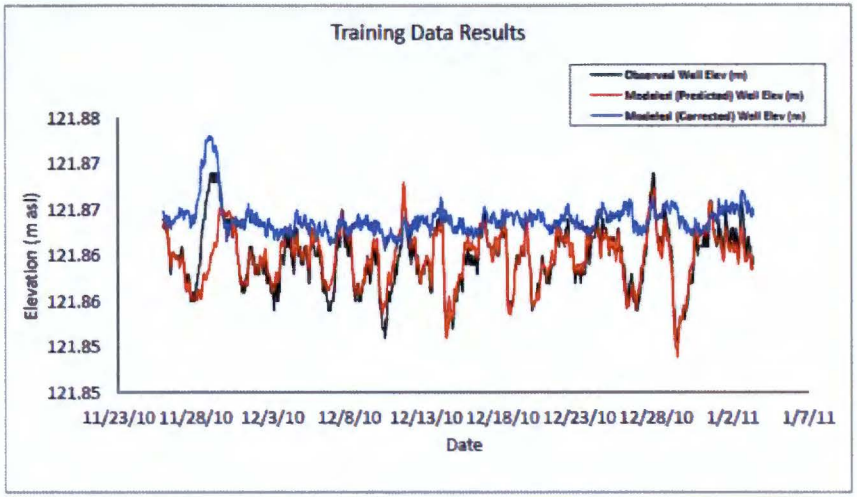
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	70	Yes



Multiple Regression Correction in Excel (MRCX) v.1.1

1.73243E-03 st dev of corrected

2.34587E-07 sum of squares



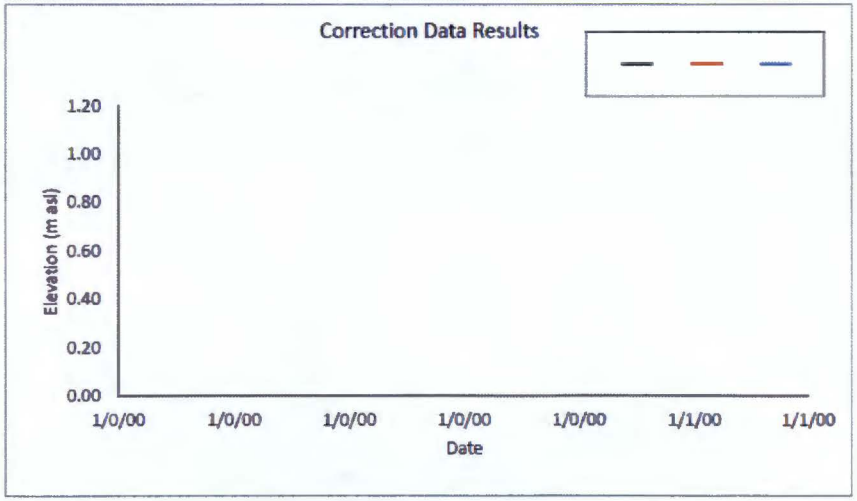
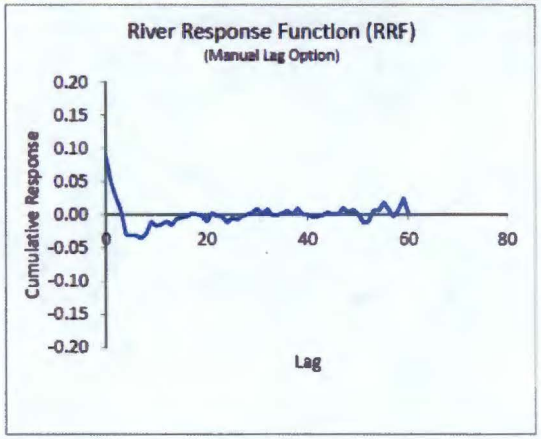


Figure A-2. Barometric Response Function for 299-E28-17 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/23/10 0:00	11/23/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/30/10 11:00	12/30/10 11:00	1/0/00 0:00	1/0/00 0:00

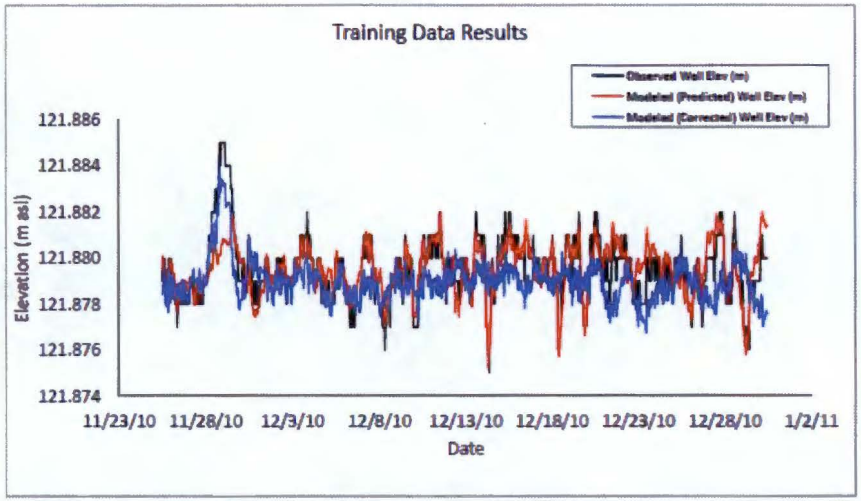
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	60	Yes



9.11662E-04 st dev of corrected

1.49505E-09 sum of squares

Multiple Regression Correction in Excel (MRCX) v.1.1



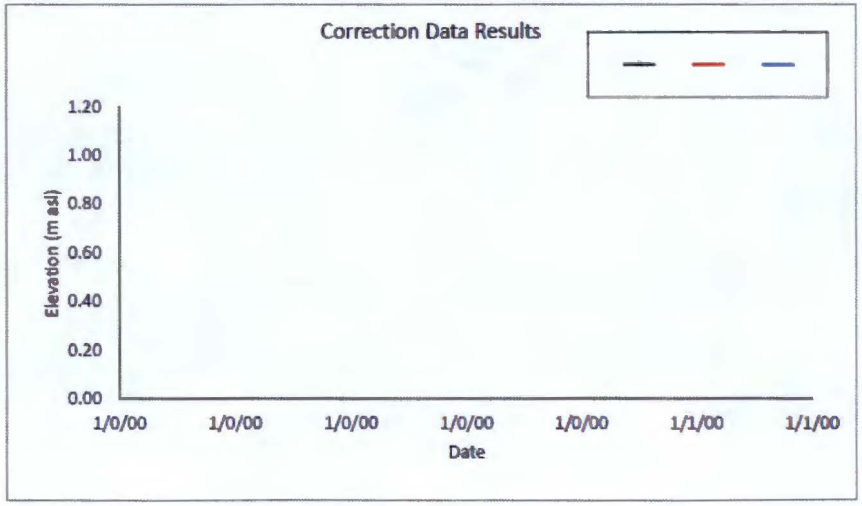
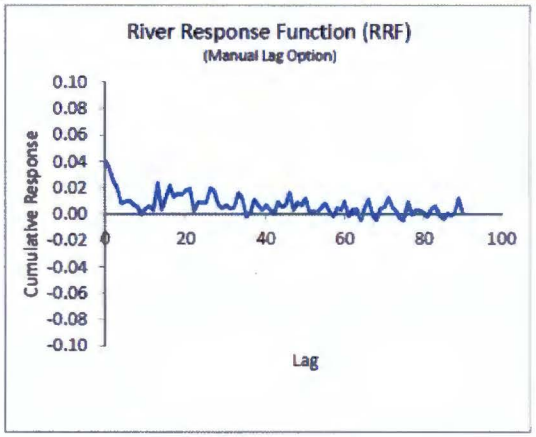


Figure A-3. Barometric Response Function for 299-E28-18 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/20/10 0:00	11/20/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	1/3/11 12:00	1/3/11 12:00	1/0/00 0:00	1/0/00 0:00

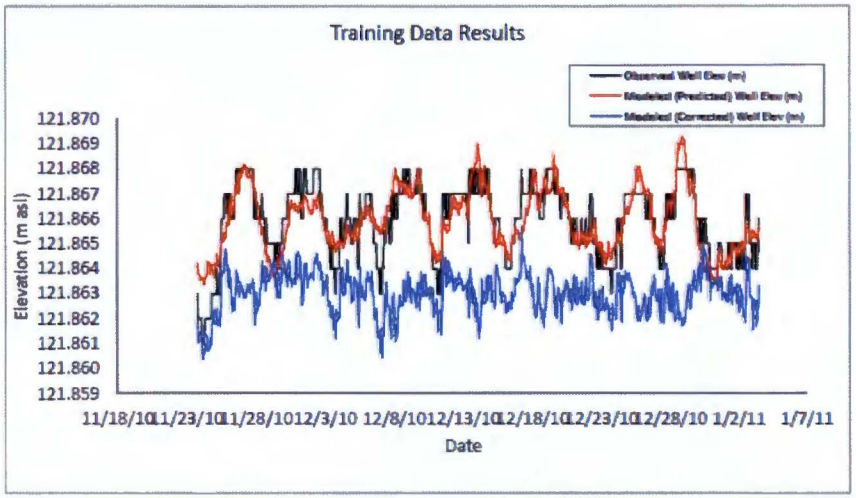
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	90	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1

8.30857E-04 st dev of corrected

1.42985E-06 sum of squares



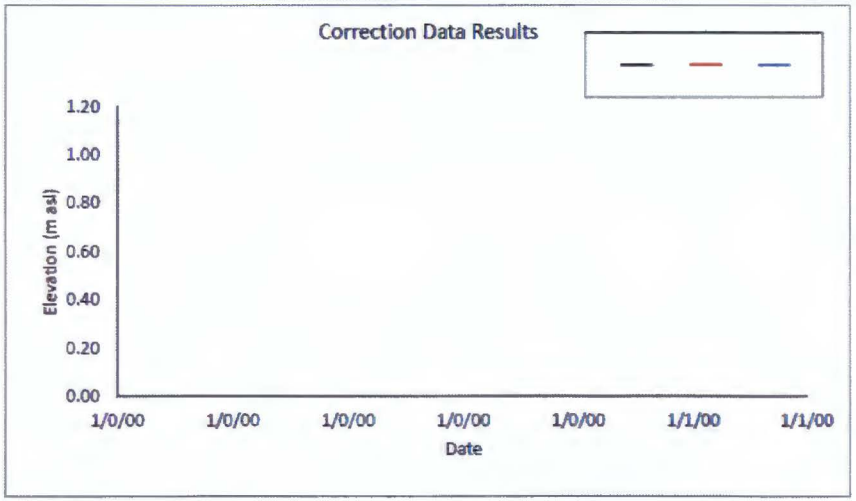
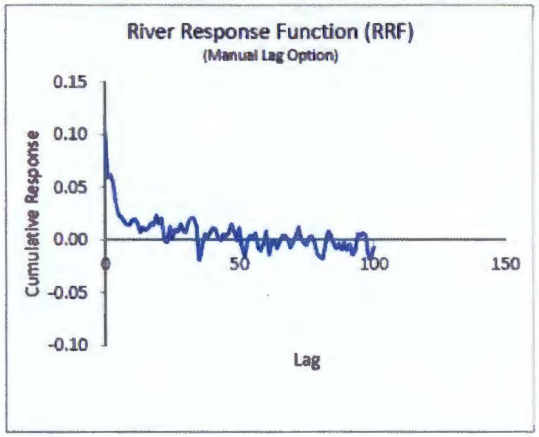


Figure A-4. Barometric Response Function for 299-E28-27 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/20/10 0:00	11/20/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/29/10 11:00	12/29/10 11:00	1/0/00 0:00	1/0/00 0:00

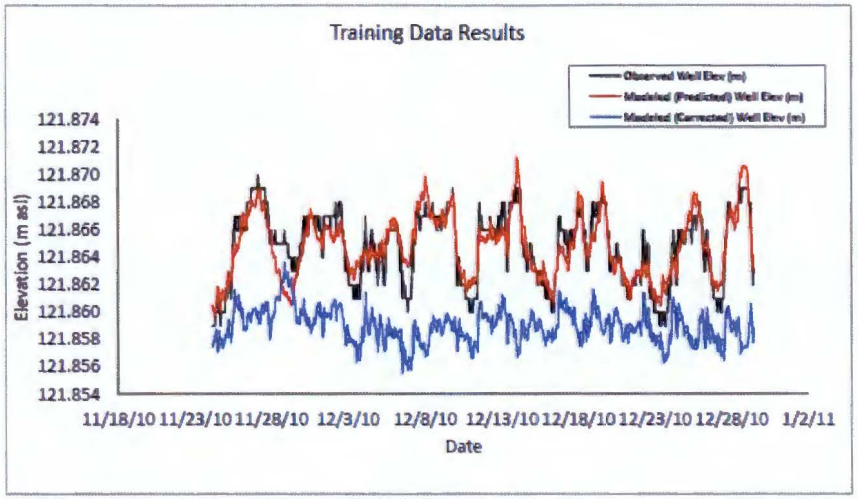
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	100	Yes



1.23844E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

4.66752E-09 sum of squares



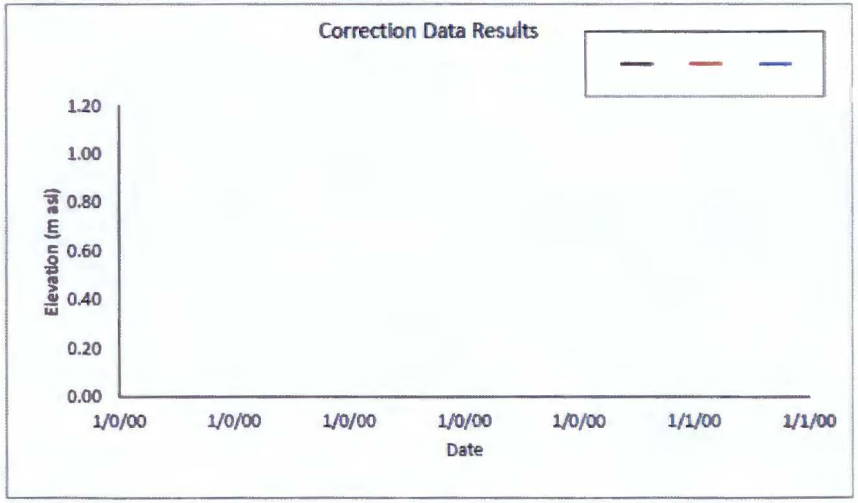
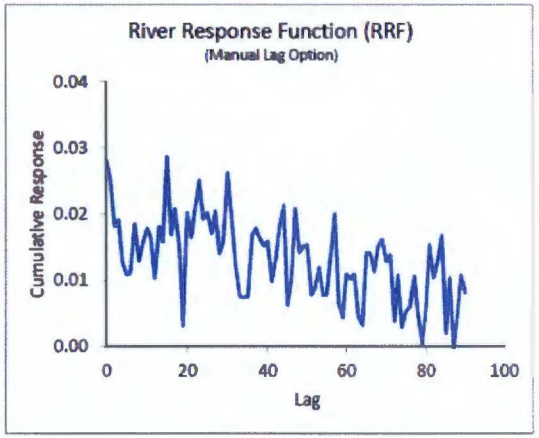


Figure A-5. Barometric Response Function for 299-E32-5 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	3/1/10 0:00	2/28/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	4/12/10 11:00	4/12/10 11:00	1/0/00 0:00	1/0/00 0:00

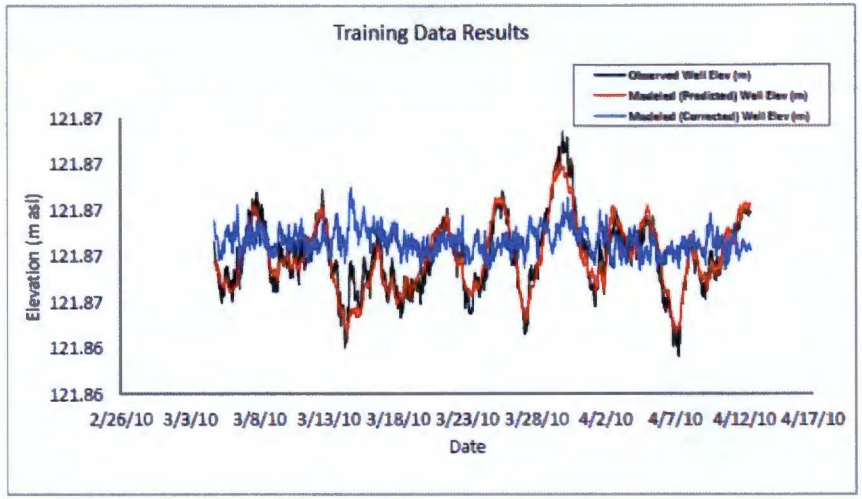
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	90	Yes



5.71546E-04 st dev of corrected

2.46933E-07 sum of squares

Multiple Regression Correction in Excel (MRCX) v. 1.1



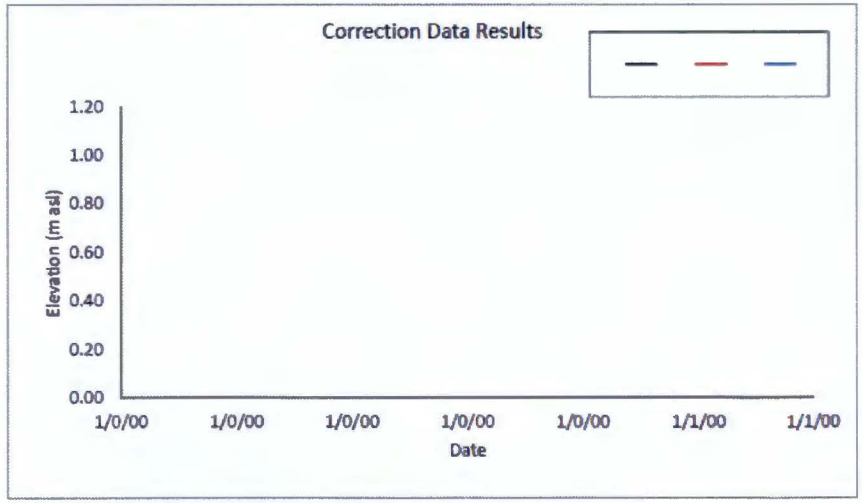
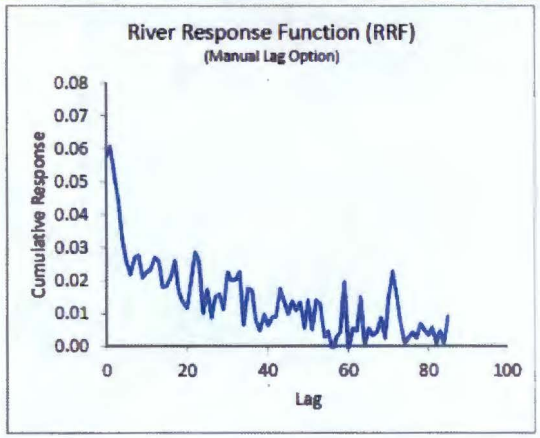


Figure A-6. Barometric Response Function for 299-E32-6 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	12/14/09 12:00	12/14/09 12:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	2/24/10 12:00	2/24/10 12:00	1/0/00 0:00	1/0/00 0:00

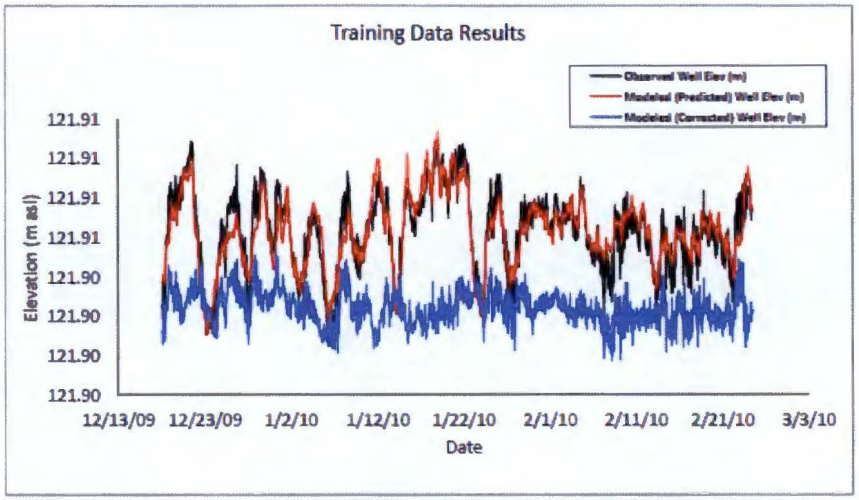
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	85	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1

9.27865E-04 st dev of corrected

1.06957E-07 sum of squares



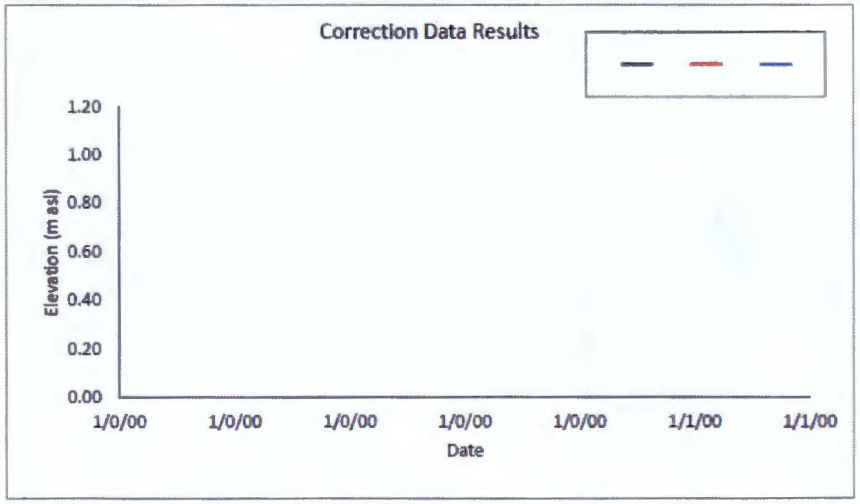
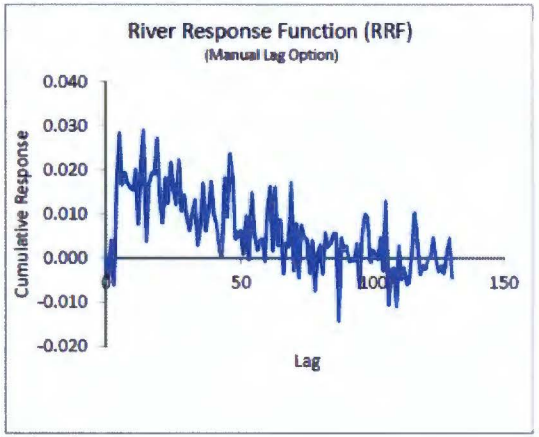


Figure A-7. Barometric Response Function for 299-E32-8 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	4/12/10 14:00	4/12/10 14:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	5/11/10 10:00	5/11/10 10:00	1/0/00 0:00	1/0/00 0:00

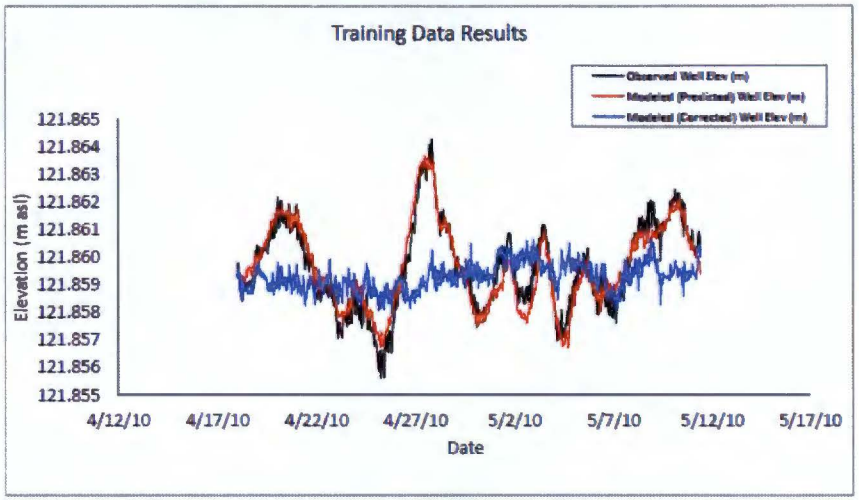
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	130	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1

5.10837E-04 st dev of corrected

2.55278E-08 sum of squares



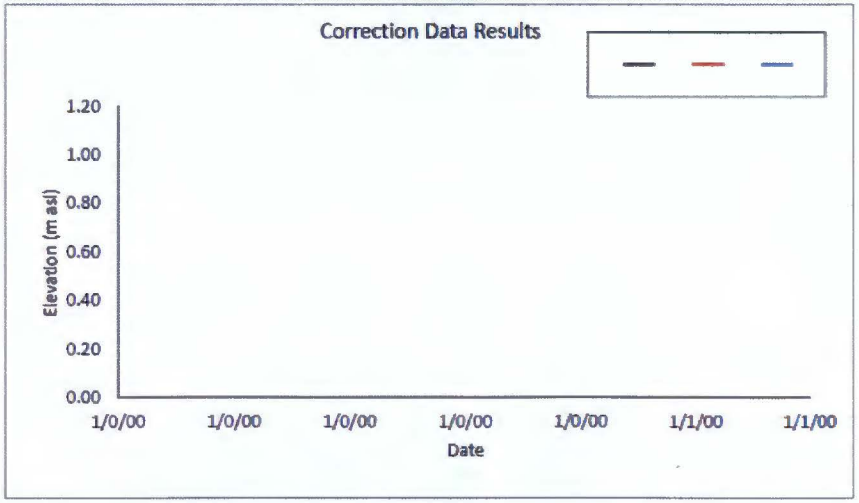
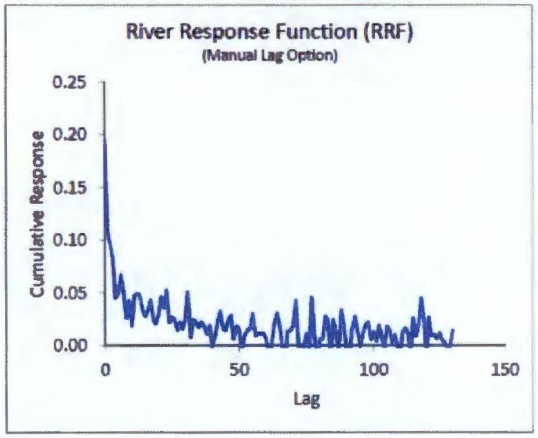


Figure A-8. Barometric Response Function for 299-E33-28 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/9/09 8:08	11/9/09 8:08	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/14/09 10:08	12/14/09 10:08	1/0/00 0:00	1/0/00 0:00

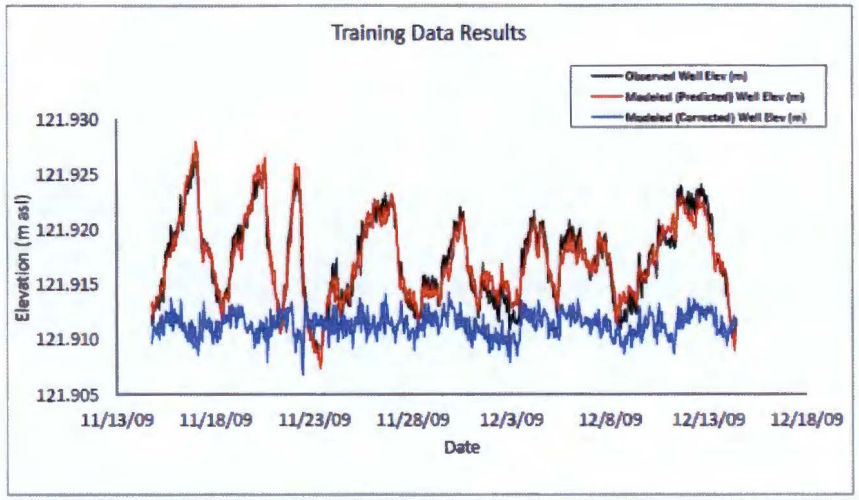
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	130	Yes



1.10972E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

2.36612E-08 sum of squares



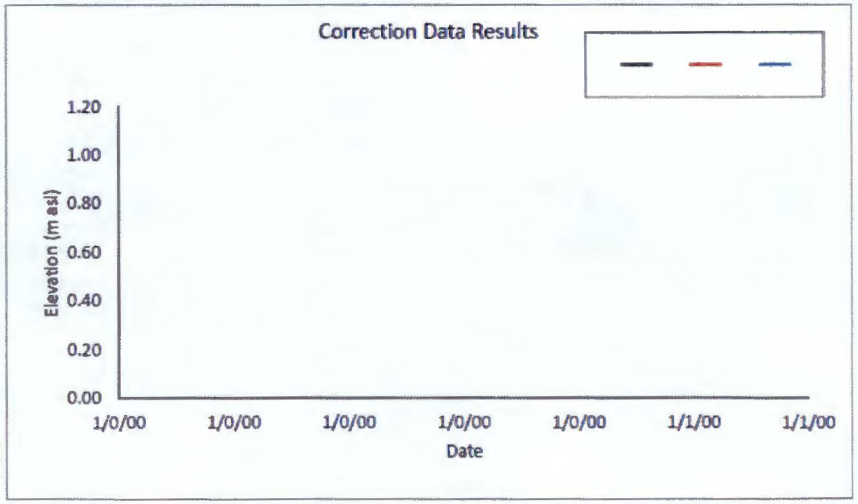
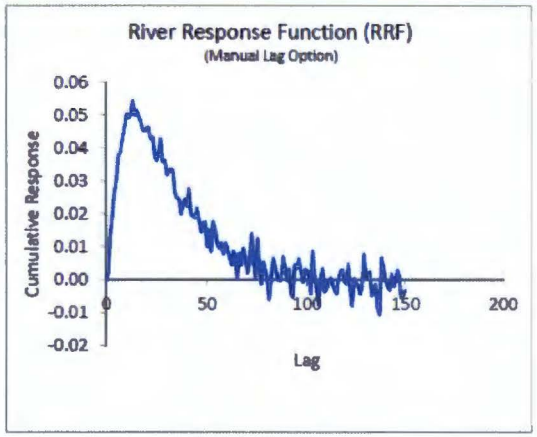


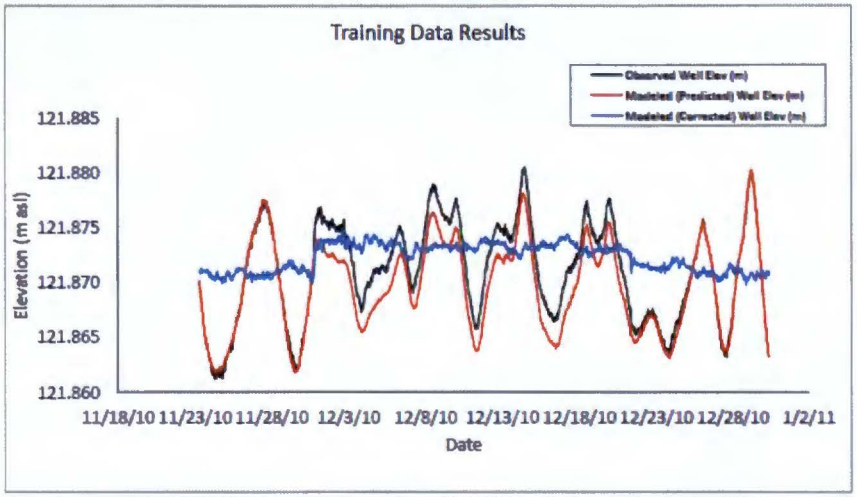
Figure A-9. Barometric Response Function for 299-E33-34 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/17/10 0:00	11/17/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/30/10 9:00	12/30/10 9:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	150	Yes



*Multiple Regression Correction in Excel (**MRCX**) v. 1.1*



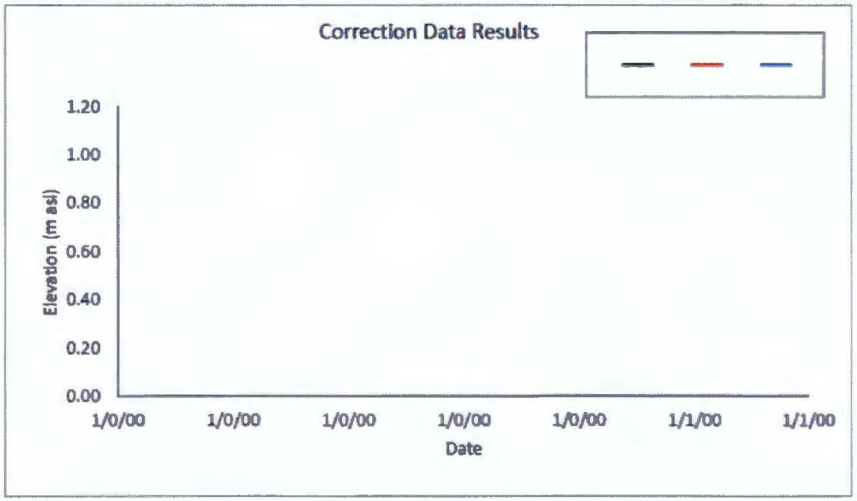
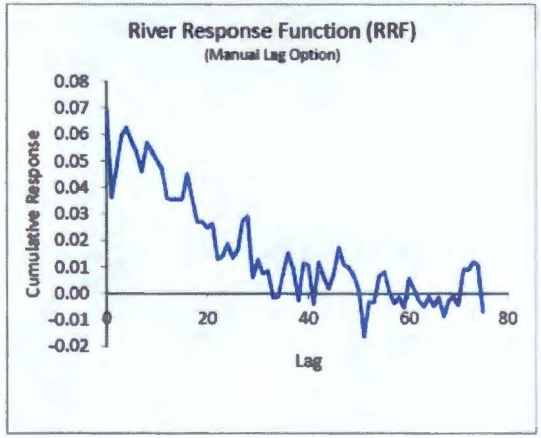


Figure A-10. Barometric Response Function for 299-E33-38 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/17/10 0:00	11/17/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/29/10 9:00	12/29/10 9:00	1/0/00 0:00	1/0/00 0:00

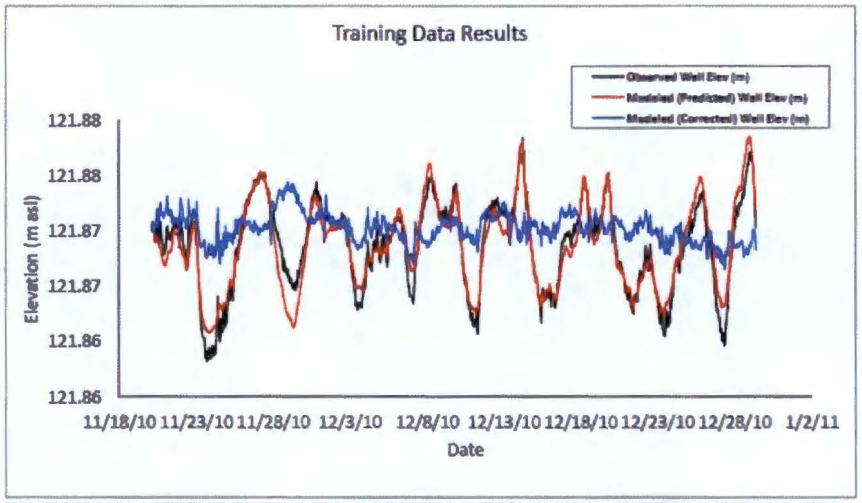
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	75	Yes



1.27486E-03 st dev of corrected

2.38488E-07 sum of squares

Multiple Regression Correction in Excel (MRCX) v.1.1



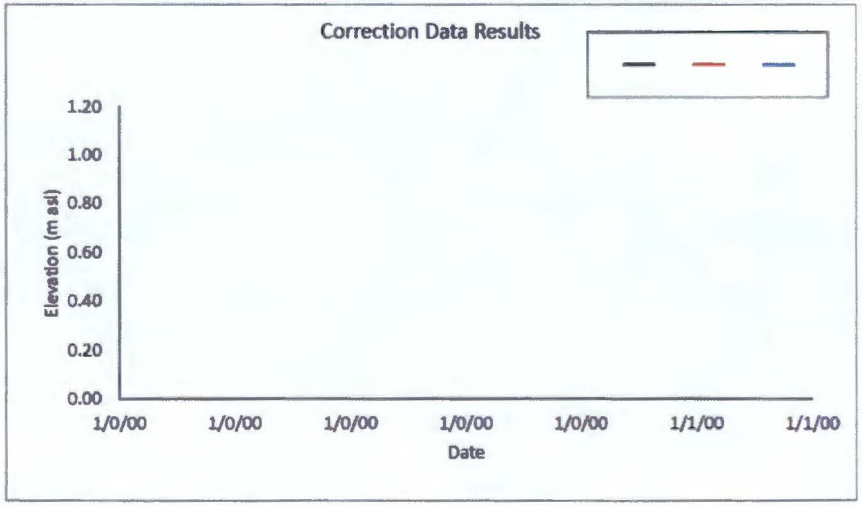
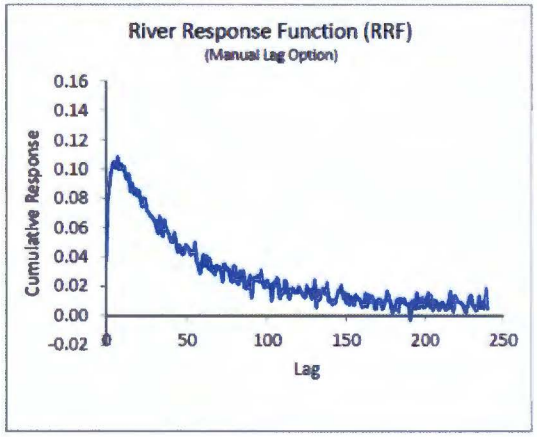


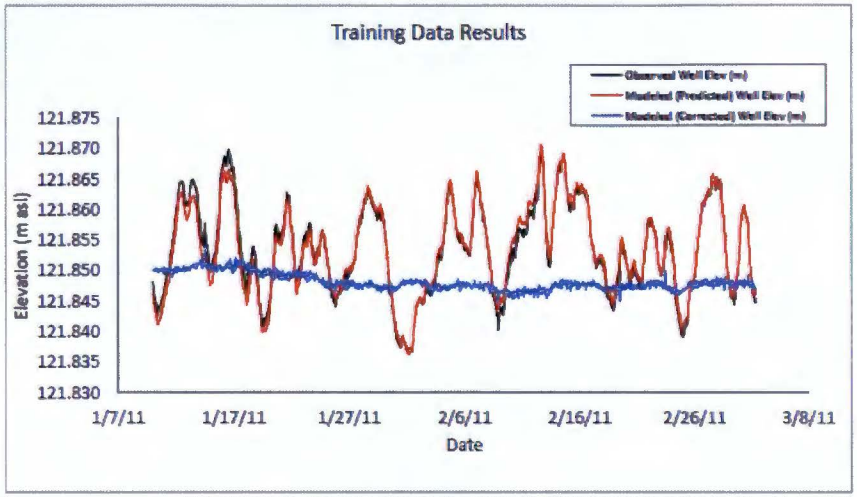
Figure A-11. Barometric Response Function for 299-E33-339 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	12/31/10 0:00	12/31/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/3/11 10:00	3/3/11 10:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	240	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1



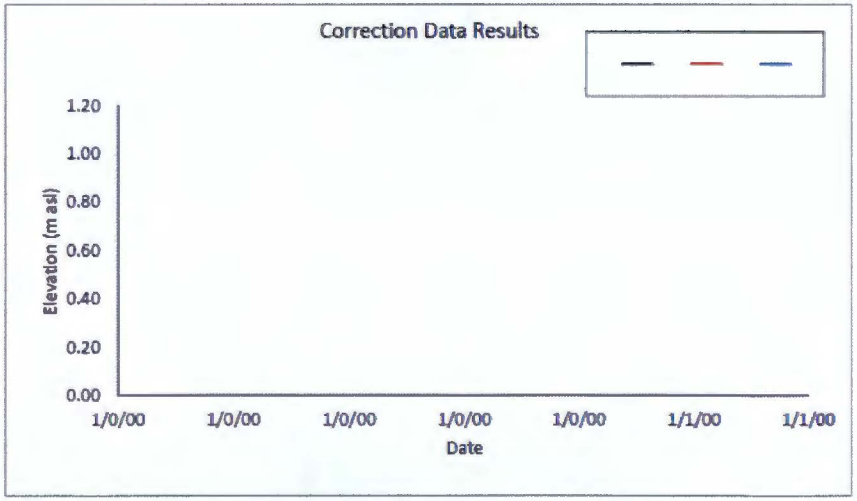
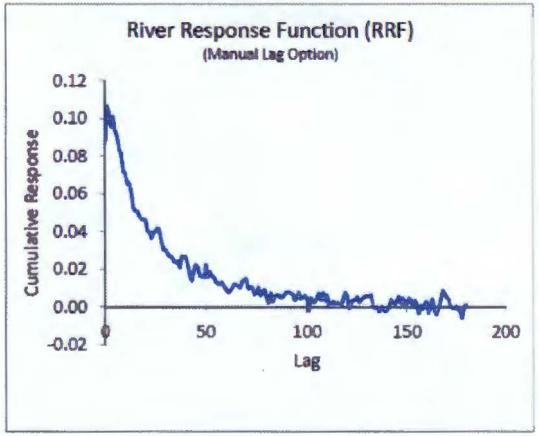


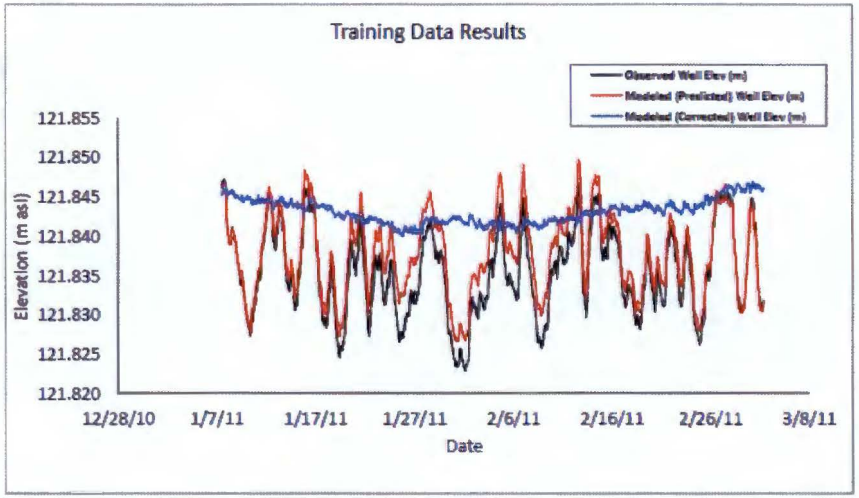
Figure A-12. Barometric Response Function for 699-49-55A (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	12/31/10 0:00	12/31/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/3/11 10:00	3/3/11 10:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	180	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1



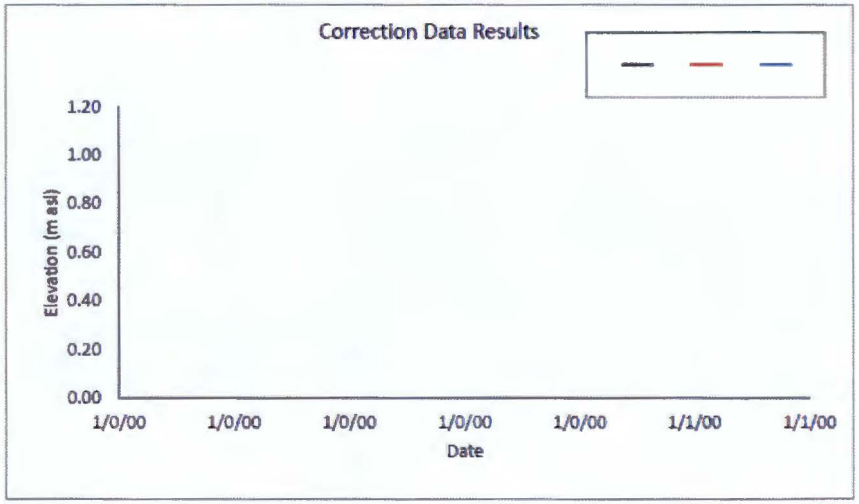
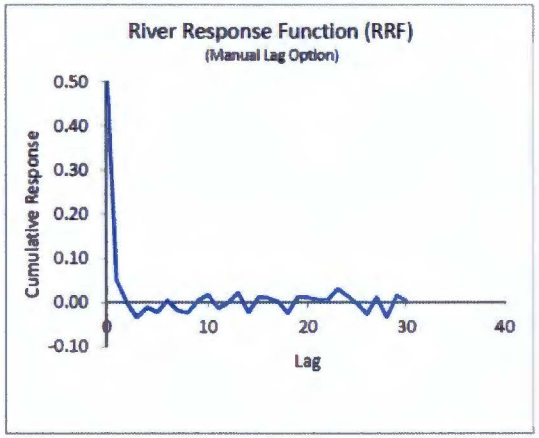


Figure A-13. Barometric Response Function for 699-49-57A (LLWMA-1)

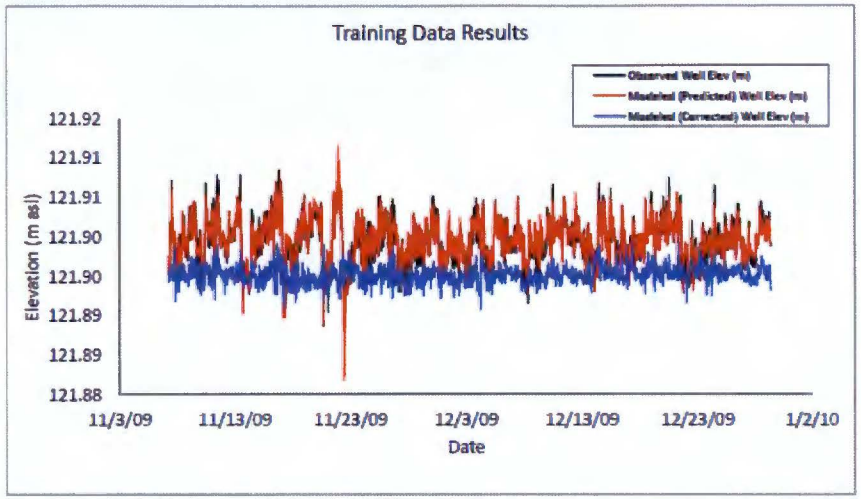
	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/6/09 0:00	11/6/09 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/29/09 10:00	12/29/09 10:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	30	Yes



1.191E-03

Multiple Regression Correction in Excel (MRCX) v. 1.1



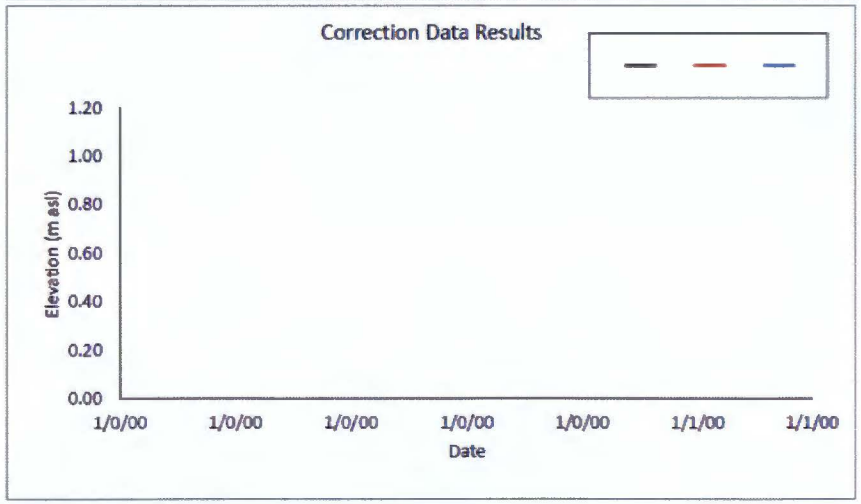
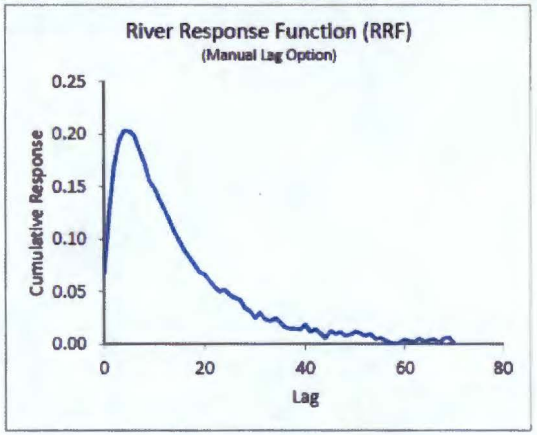


Figure A-14. Barometric Response Function for 699-50-56 (LLWMA-1)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/16/10 15:00	11/16/10 15:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/8/11 11:00	3/8/11 11:00	1/0/00 0:00	1/0/00 0:00

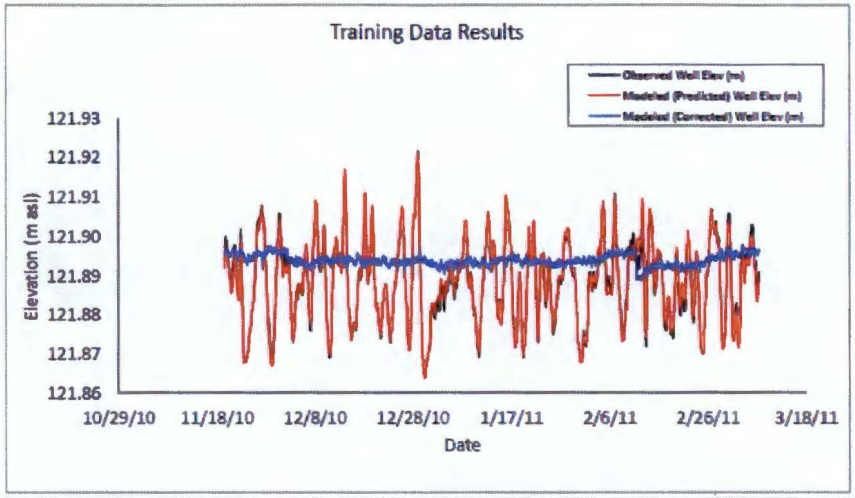
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	70	Yes



1.44430E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

1.56028E-06 sum of squares



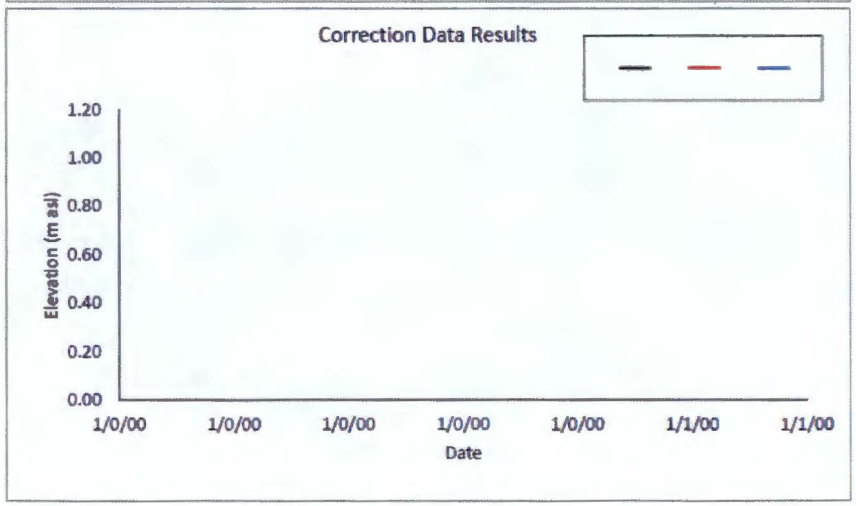
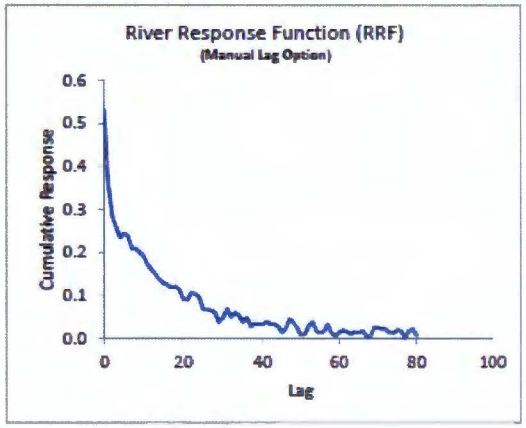


Figure A-15. Barometric Response Function for 299-E27-8 (LLWMA-2)

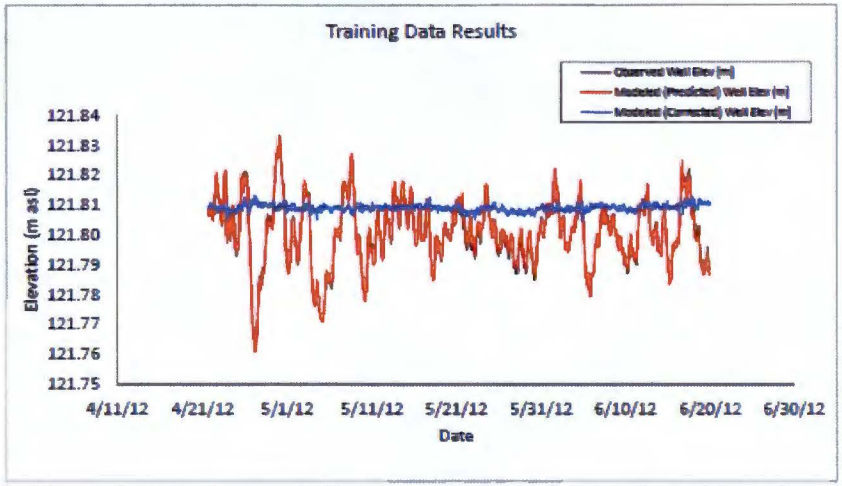
	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	4/18/12 11:00	4/18/12 11:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	6/19/12 23:00	6/19/12 23:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	80	Yes



0.001095418

Multiple Regression Correction in Excel (MRCX) v.1.1
Mackley et al., 2010 (PNNL-19775 Rev. 1)



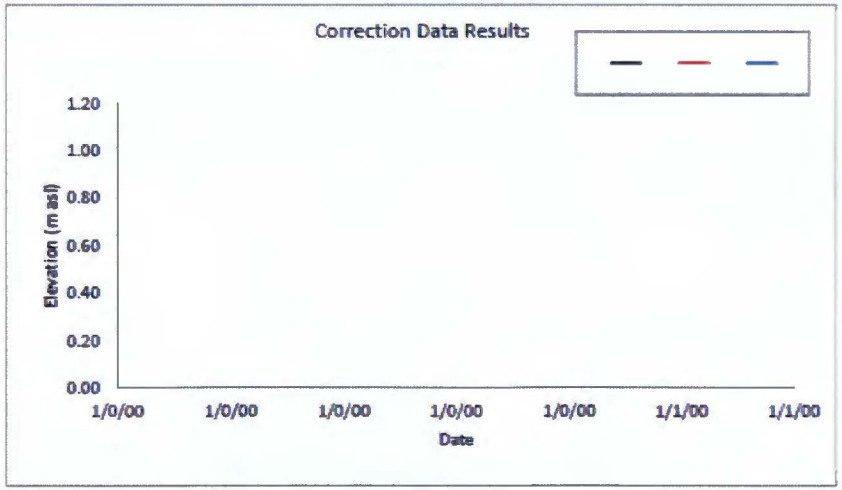
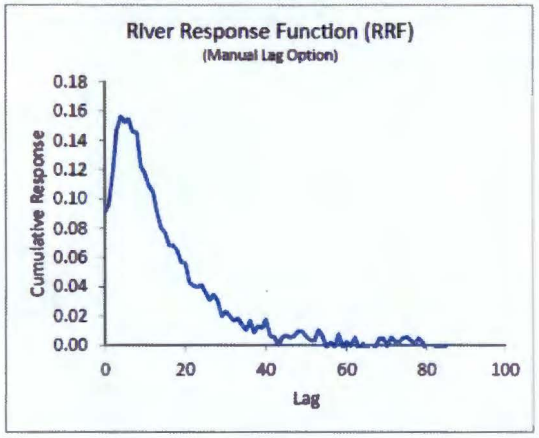


Figure A-16. Barometric Response Function for 299-E27-9 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	1/4/11 14:00	1/4/11 14:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/3/11 11:00	3/3/11 11:00	1/0/00 0:00	1/0/00 0:00

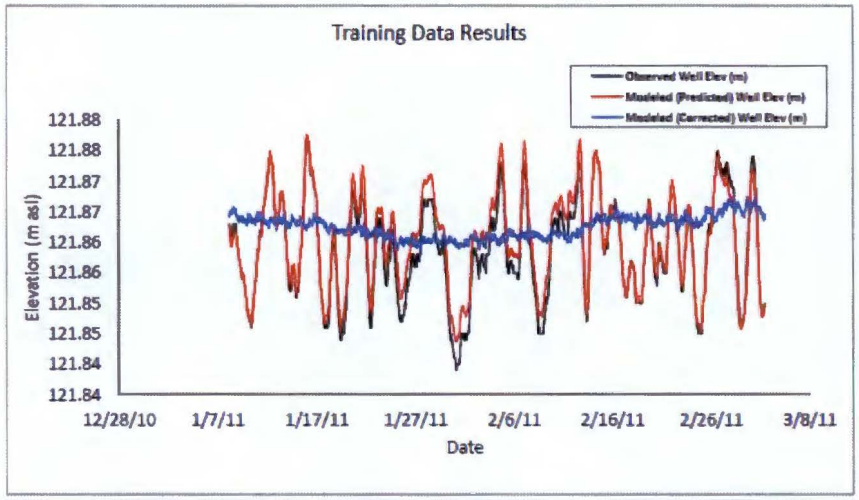
Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	85	Yes



1.82667E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

3.88095E-07 sum of squares



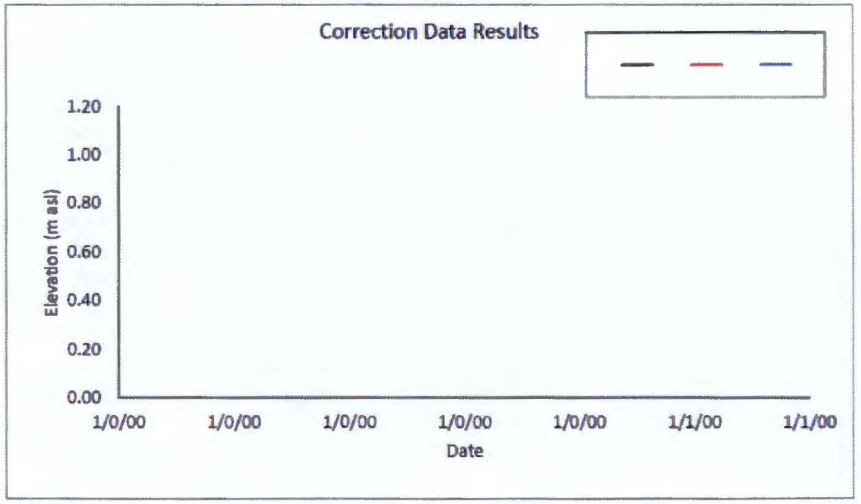
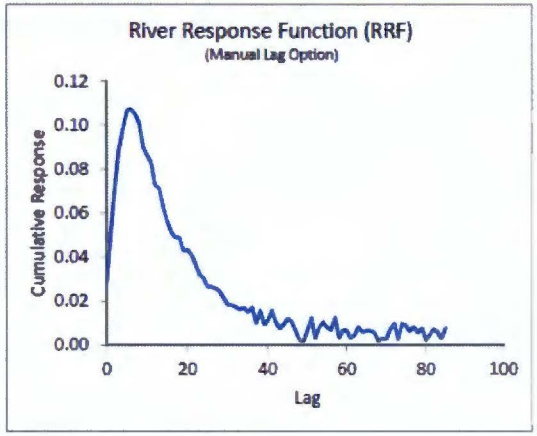


Figure A-17. Barometric Response Function for 299-E27-17 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	1/4/11 14:00	1/4/11 14:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/9/11 10:00	3/9/11 10:00	1/0/00 0:00	1/0/00 0:00

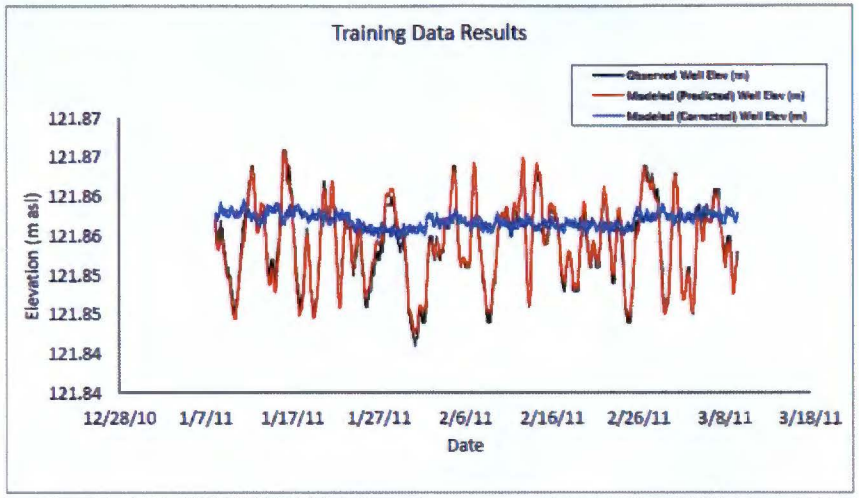
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	85	Yes



9.23530E-04 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v. 1.1

7.31407E-07 sum of squares



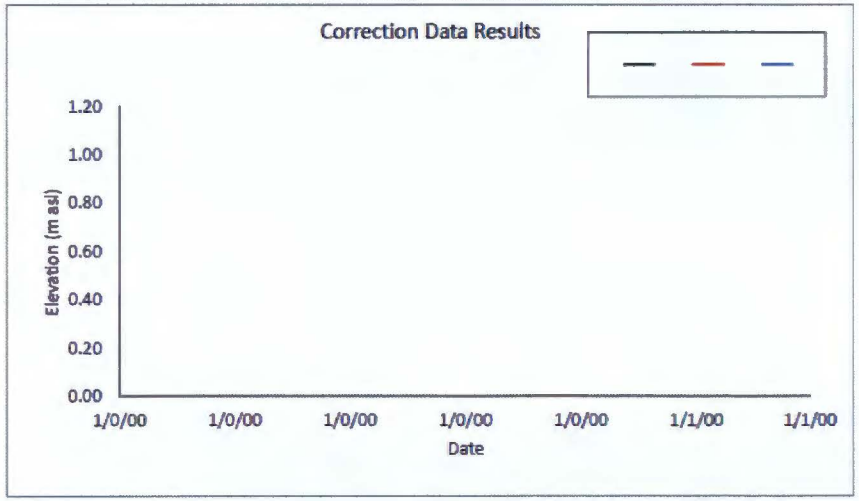
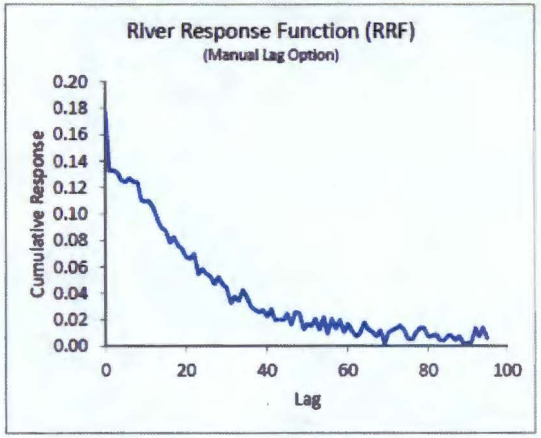


Figure A-18. Barometric Response Function for 299-E27-18 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	12/30/10 10:00	12/30/10 10:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/7/11 11:00	3/7/11 11:00	1/0/00 0:00	1/0/00 0:00

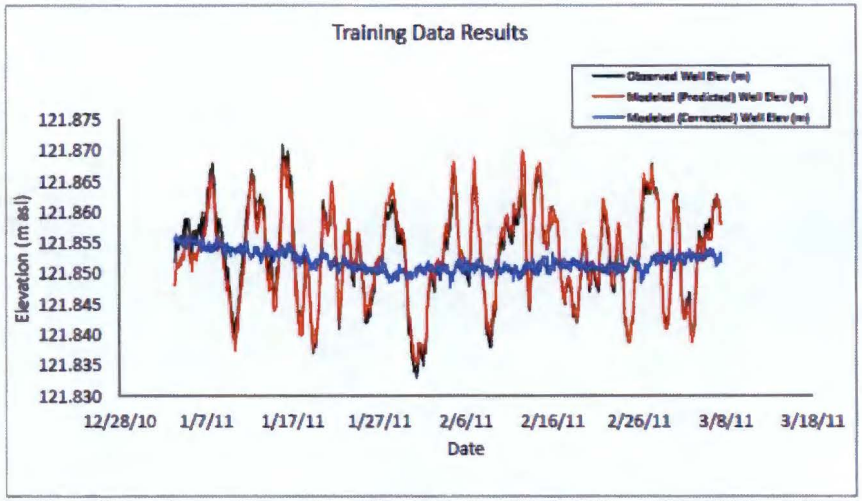
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	95	Yes



1.56542E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

4.35201E-06 sum of squares



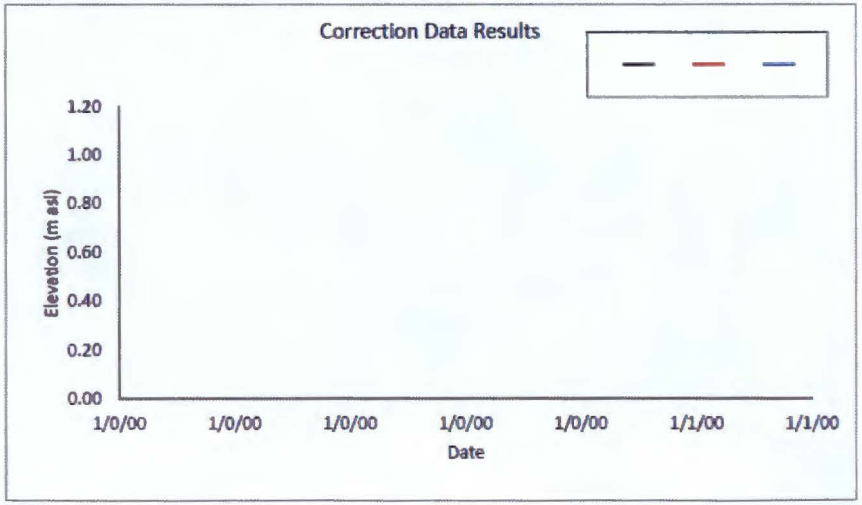
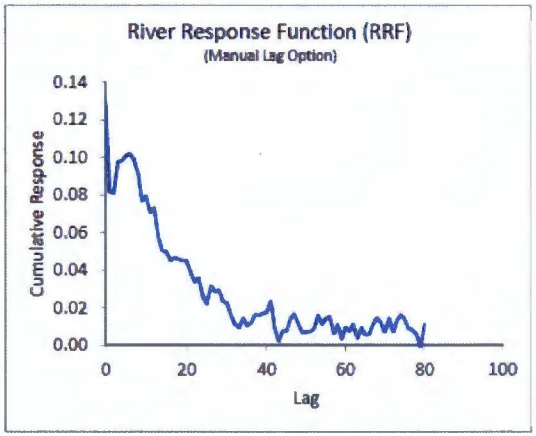


Figure A-19. Barometric Response Function for 299-E33-14 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	1/3/11 14:00	1/3/11 14:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/3/11 11:00	3/3/11 11:00	1/0/00 0:00	1/0/00 0:00

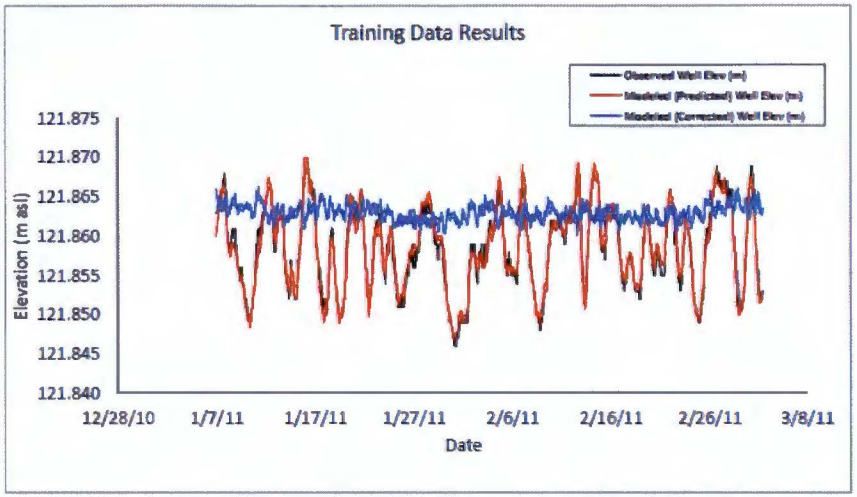
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	80	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1

1.01906E-03 st dev of corrected

2.85452E-08 sum of squares



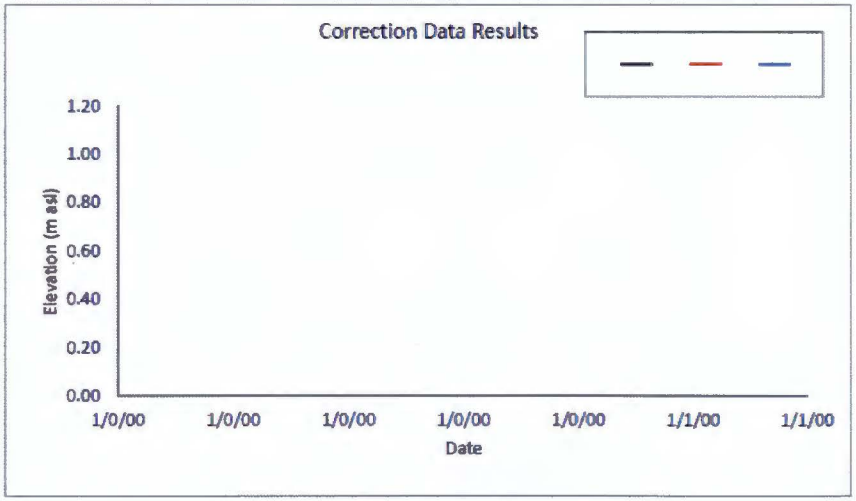
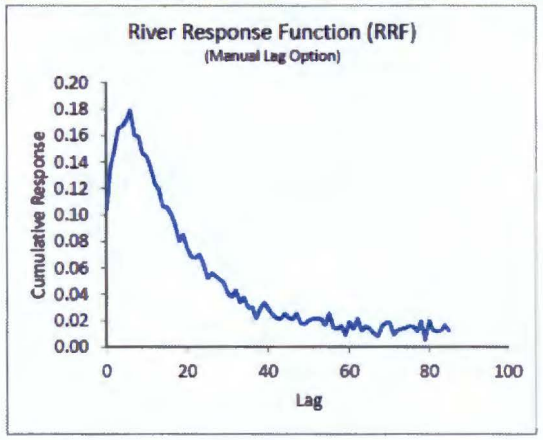
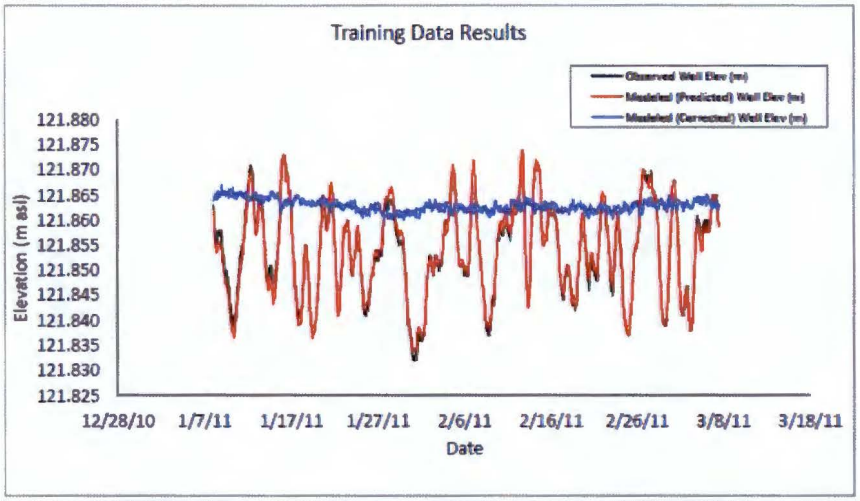


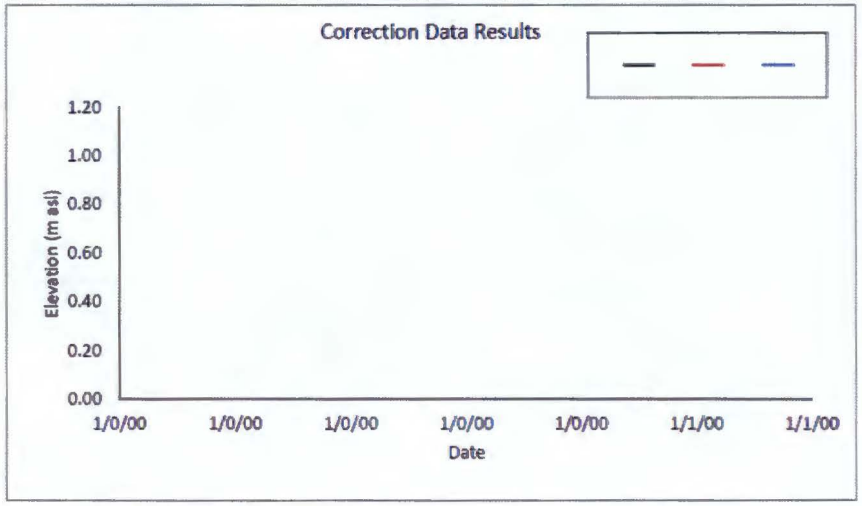
Figure A-20. Barometric Response Function for 299-E33-37 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	1/4/11 12:00	1/4/11 12:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/7/11 12:00	3/7/11 12:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	85	Yes







1.18034E-03 st dev of corrected

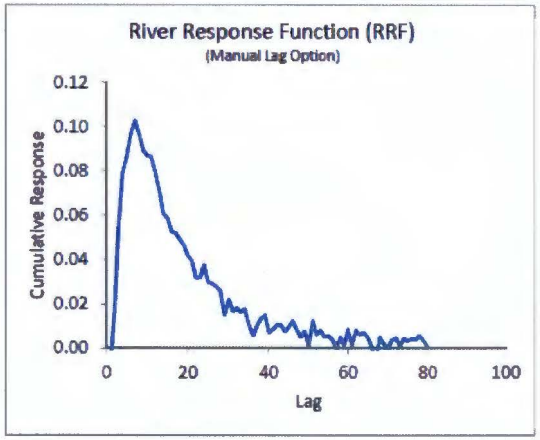
4.70434E-06 sum of squares

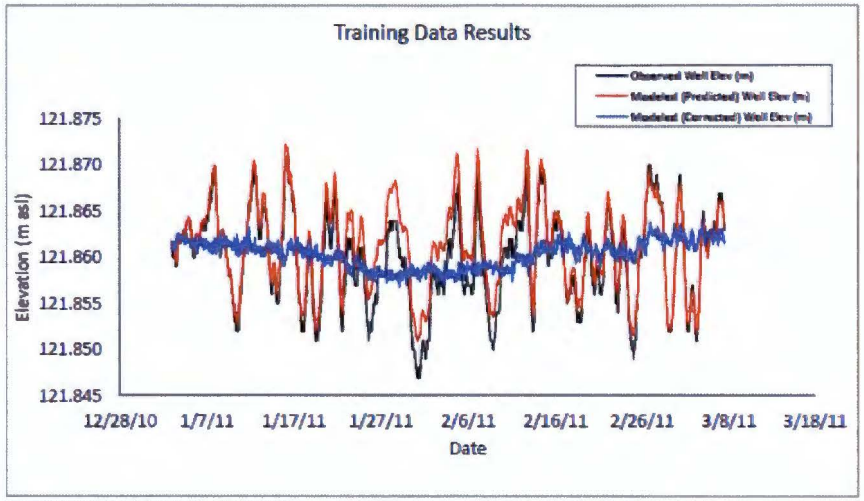
Multiple Regression Correction in Excel (MRCX) v. 1.1

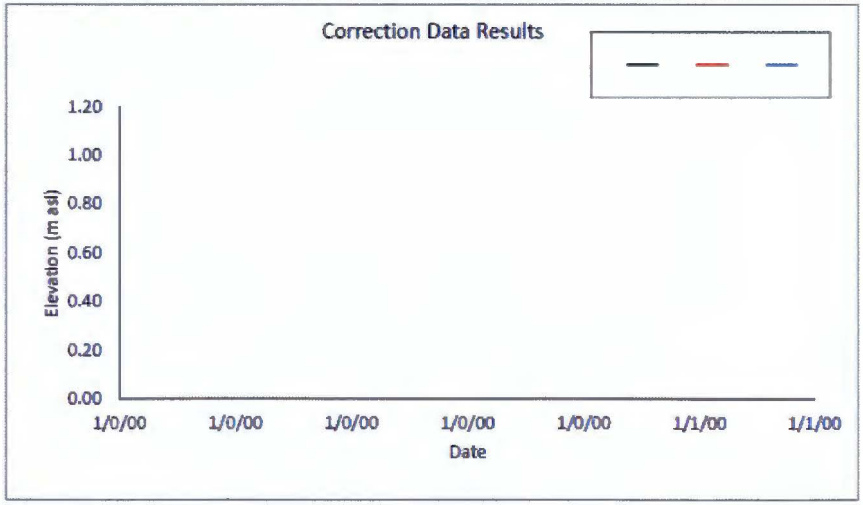
Figure A-21. Barometric Response Function for 299-E34-9 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	12/30/10 14:00	12/30/10 14:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	3/7/11 12:00	3/7/11 12:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	80	Yes







1.49166E-03 st dev of corrected

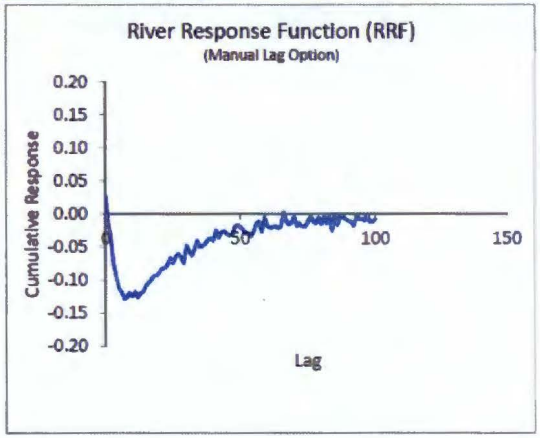
1.62952E-09 sum of squares

Multiple Regression Correction in Excel (MRCX) v. 1.1

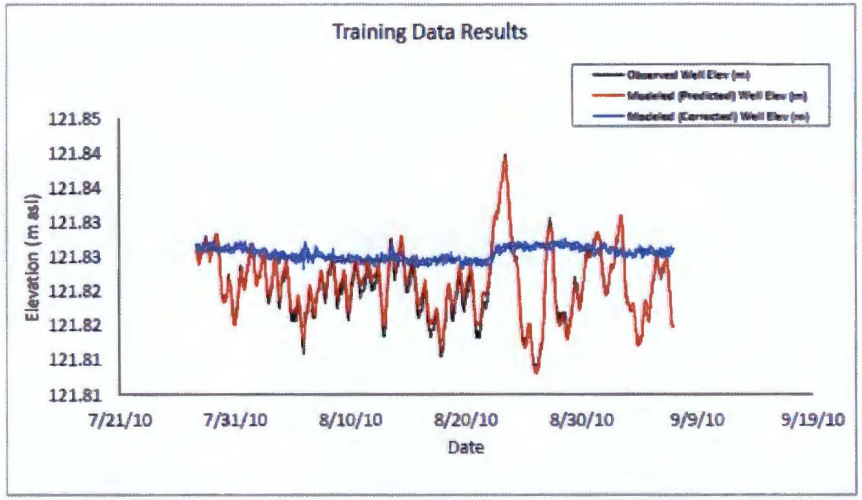
Figure A-22. Barometric Response Function for 299-E34-10 (LLWMA-2)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	7/23/10 11:00	7/23/10 11:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/6/10 23:00	9/6/10 23:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	100	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1



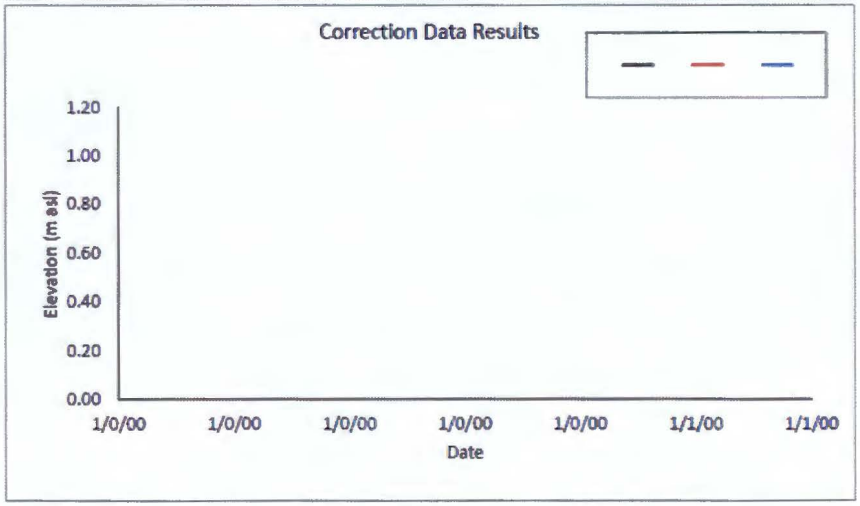
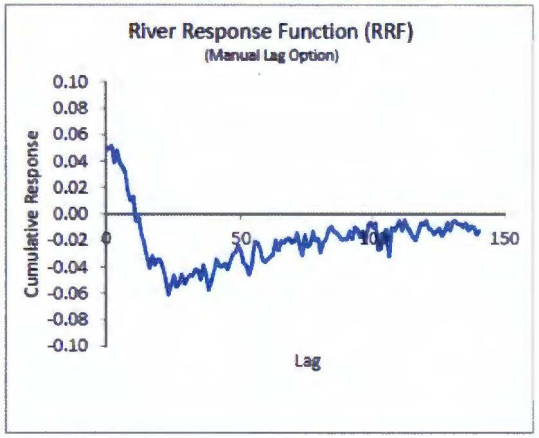


Figure A-23. Barometric Response Function for 299-E17-18 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	11/23/10 0:00	11/22/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	12/30/10 8:00	12/30/10 8:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	140	Yes



1.368E-03

121.8811482
121.8875765

Multiple Regression Correction in Excel (MRCX) v. 1.1

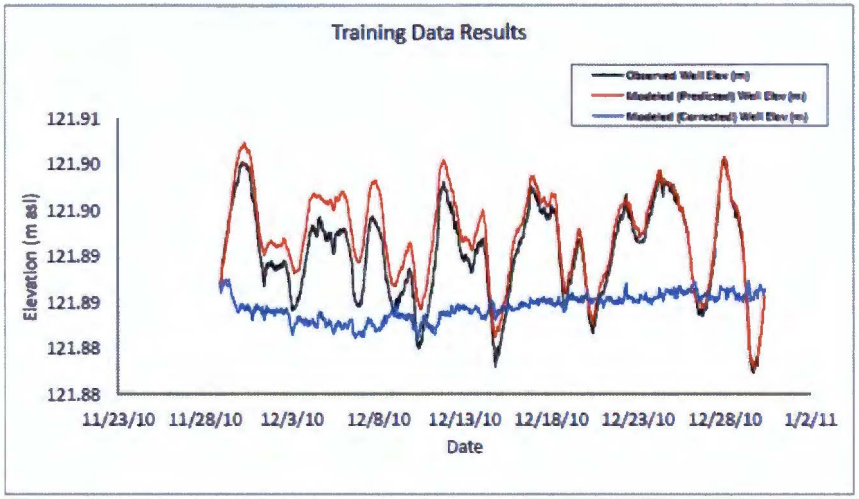
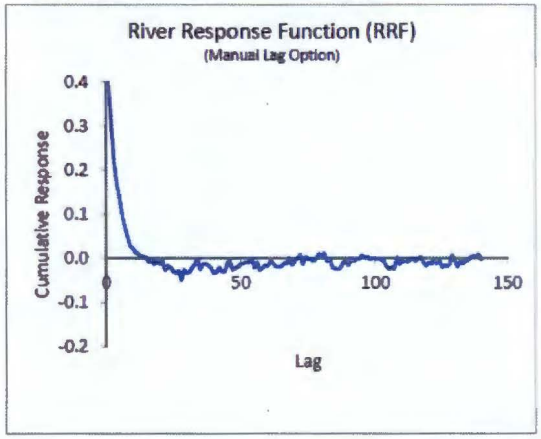


Figure A-24. Barometric Response Function for 299-E17-21 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	10/1/10 0:00	10/1/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	11/15/10 9:00	11/15/10 9:00	1/0/00 0:00	1/0/00 0:00

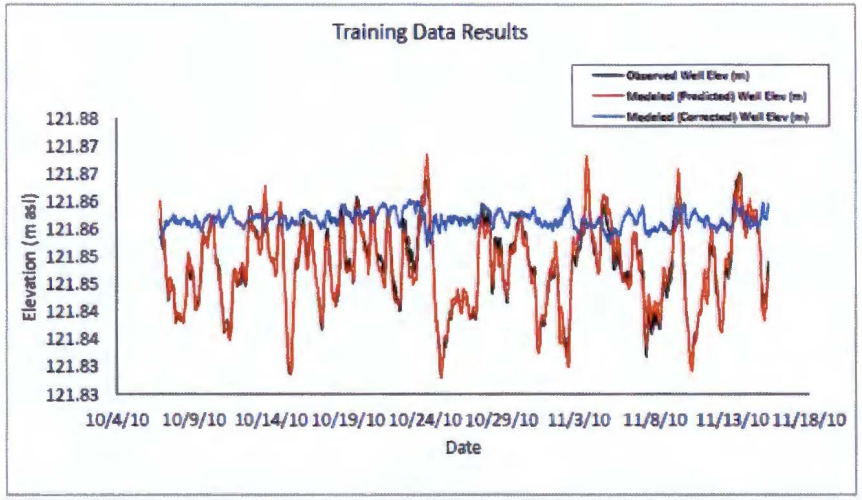
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	140	Yes



1.42992E-03 st dev of corrected

2.33096E-07 sum of squares

Multiple Regression Correction in Excel (MRCX) v. 1.1



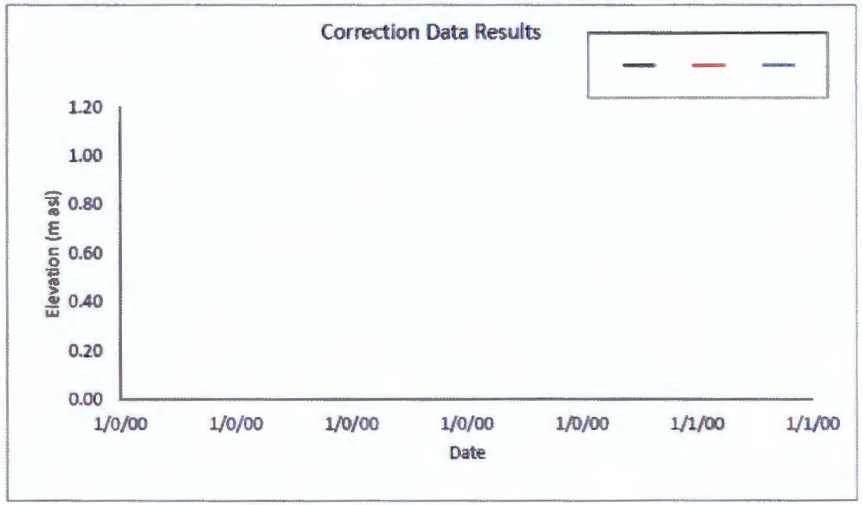
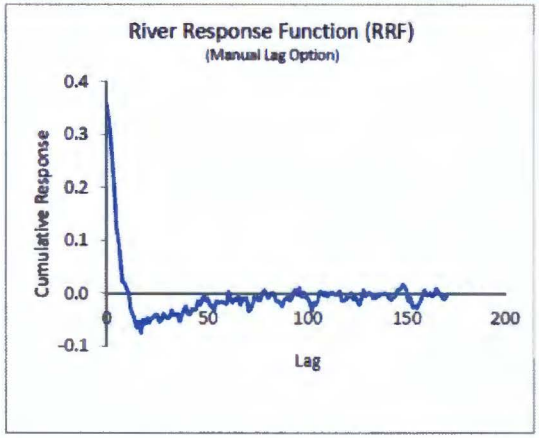


Figure A-25. Barometric Response Function for 299-E17-22 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	7/22/10 11:00	7/22/10 11:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/12/10 23:00	1/0/00 0:00	1/0/00 0:00

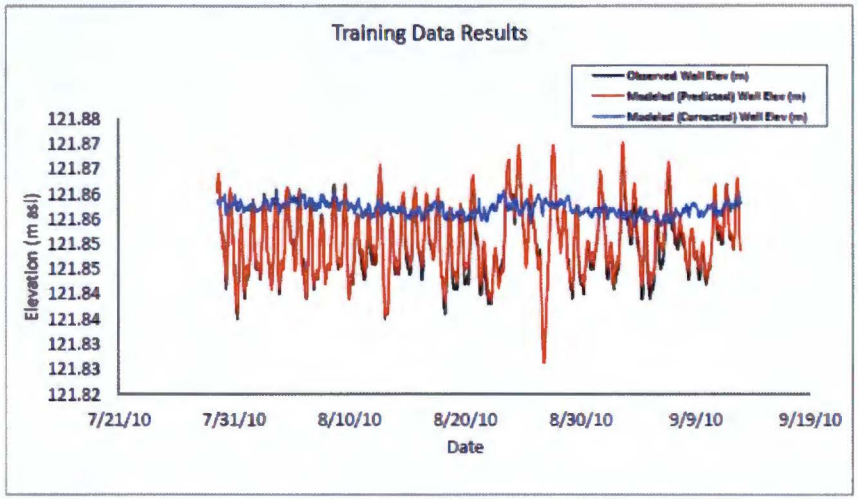
Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	170	Yes



1.26668E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v. 1.1

4.82506E-08 sum of squares



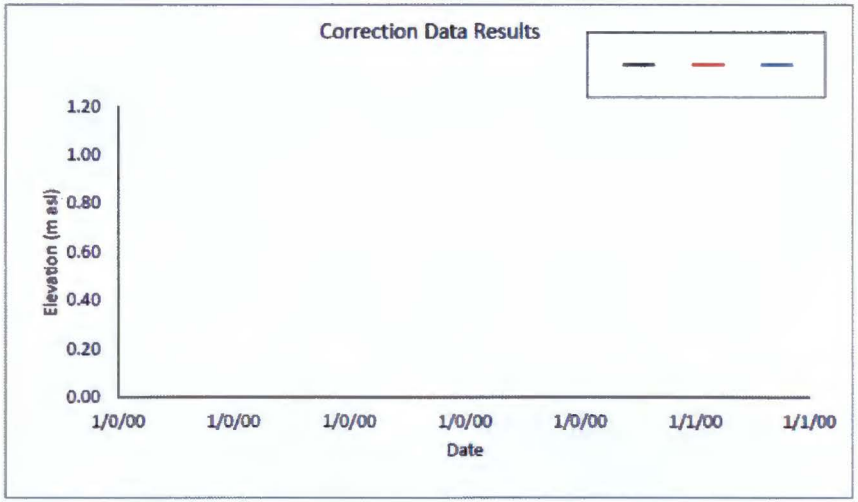
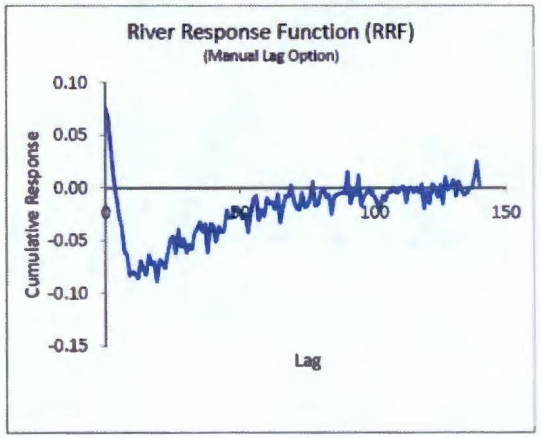


Figure A-26. Barometric Response Function for 299-E17-23 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	8/2/10 8:00	8/2/10 8:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/12/10 23:00	1/0/00 0:00	1/0/00 0:00

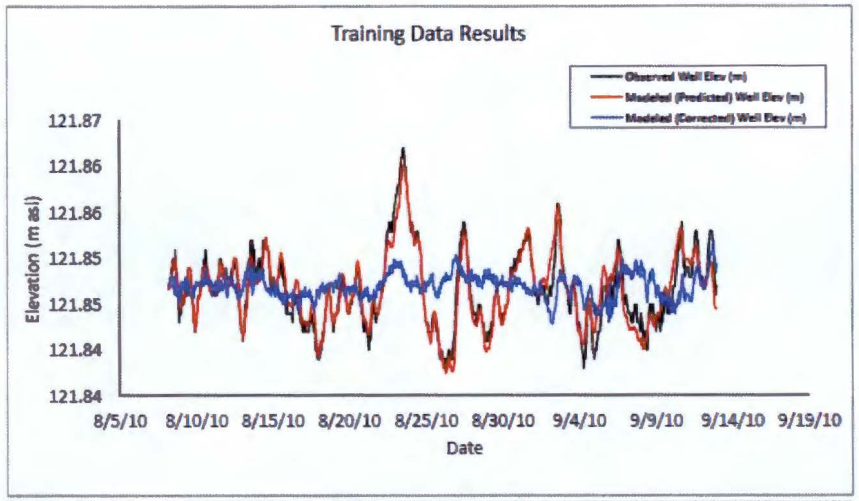
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	140	Yes



1.35566E-03 st dev of corrected

5.52198E-07 sum of squares

Multiple Regression Correction in Excel (MRCX) v. 1.1



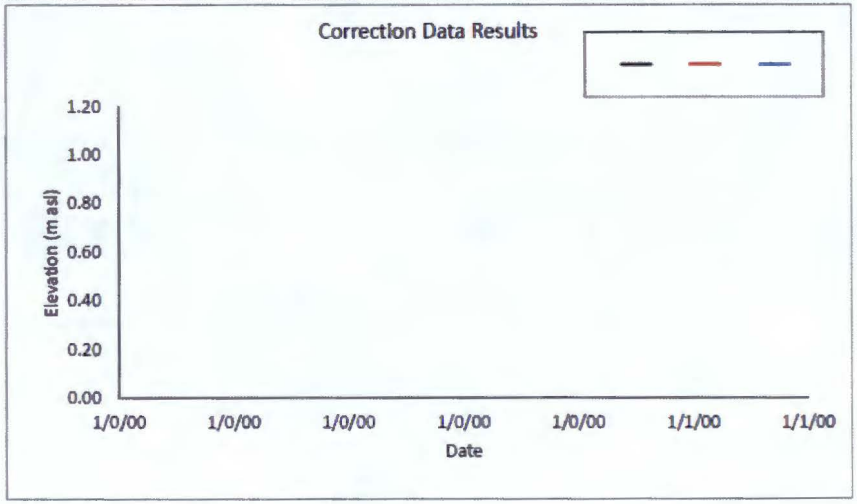
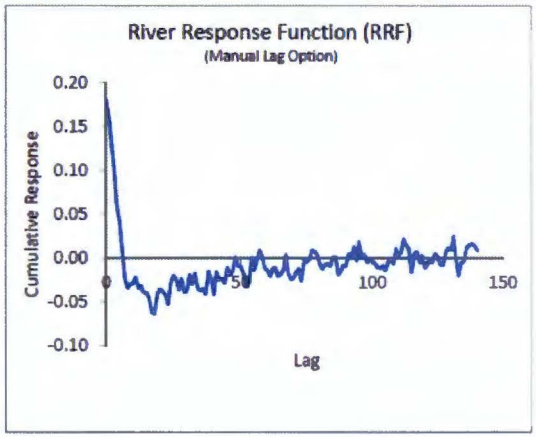


Figure A-27. Barometric Response Function for 299-E17-25 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	7/22/10 9:00	7/22/10 9:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/12/10 23:00	1/0/00 0:00	1/0/00 0:00

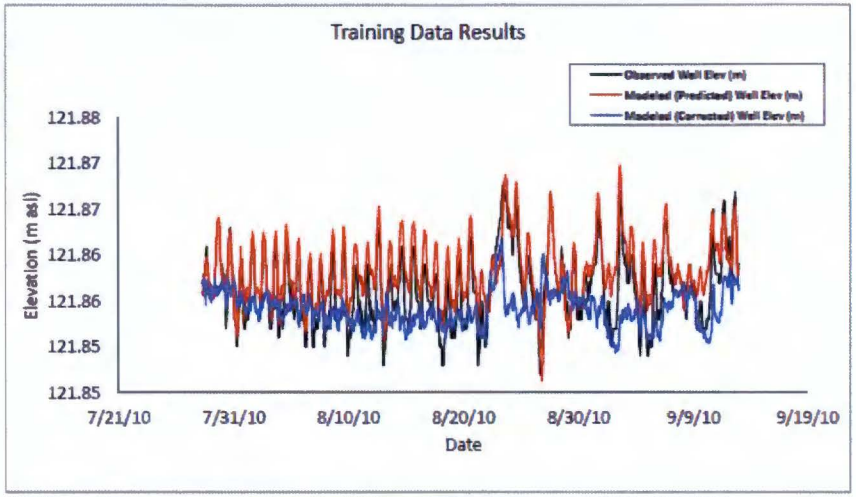
Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	140	Yes



1.86710E-03 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v. 1.1

1.44215E-07 sum of squares



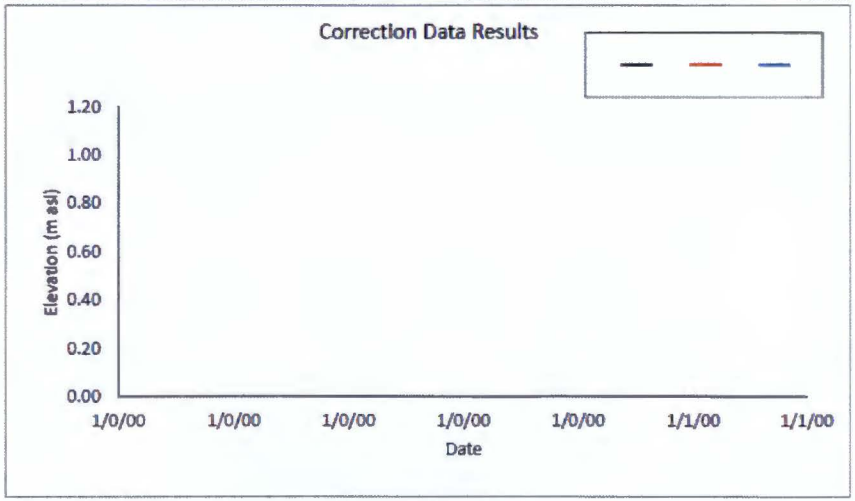
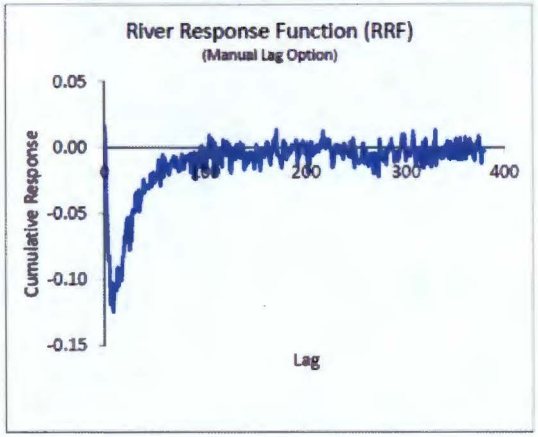


Figure A-28. Barometric Response Function for 299-E24-16 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	7/23/10 11:00	7/23/10 11:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/12/10 23:00	1/0/00 0:00	1/0/00 0:00

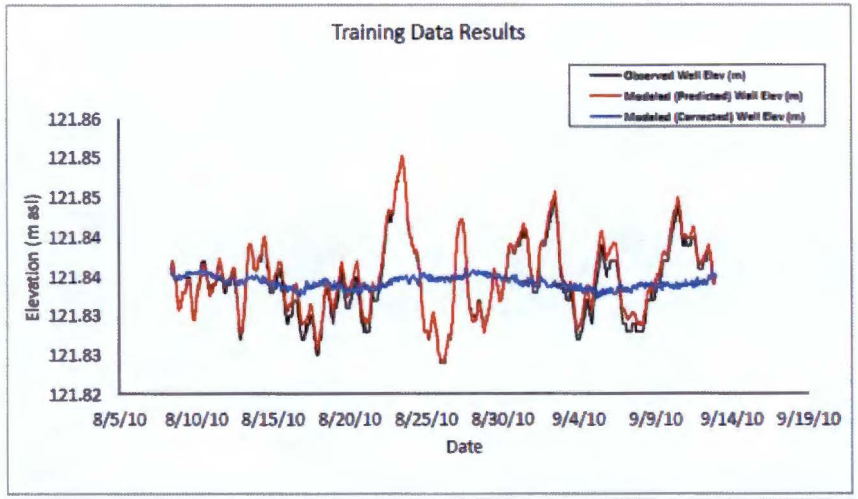
Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	380	Yes



7.53175E-04 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

3.90344E-07 sum of squares



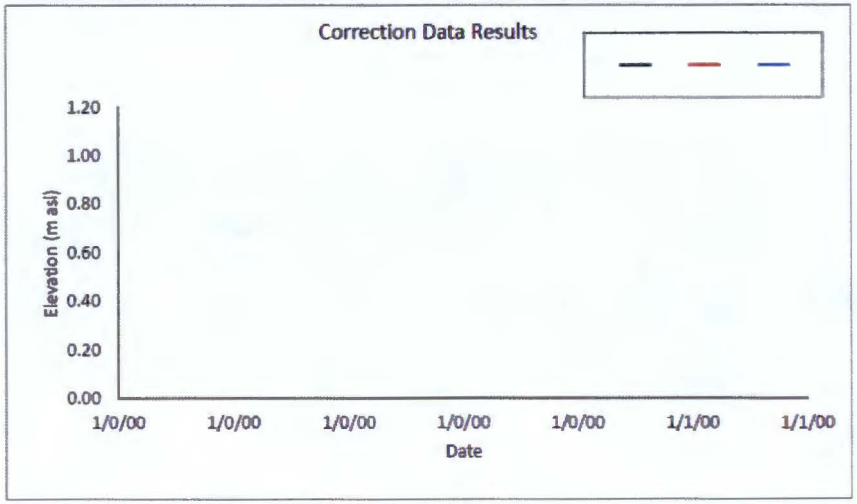
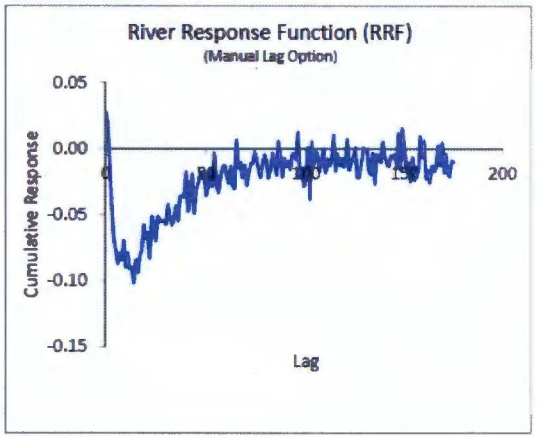


Figure A-29. Barometric Response Function for 299-E24-18 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	8/4/10 10:00	8/4/10 10:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/12/10 23:00	1/0/00 0:00	1/0/00 0:00

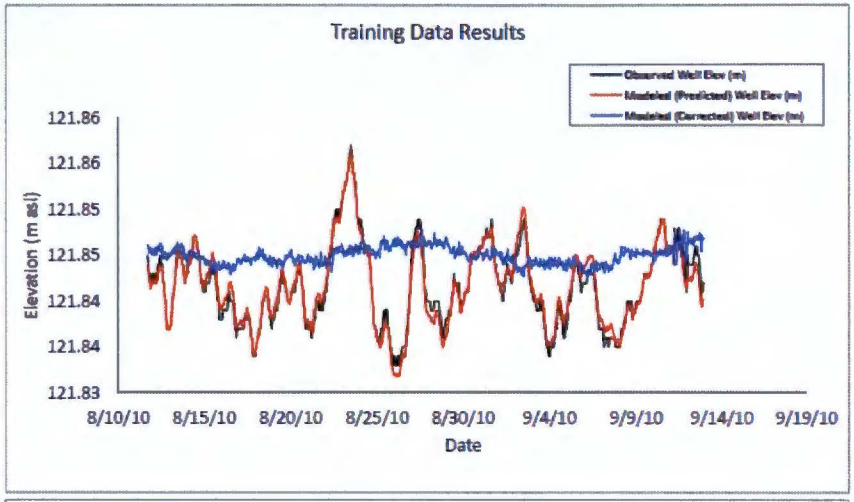
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	175	Yes



9.65896E-04 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

5.45784E-10 sum of squares



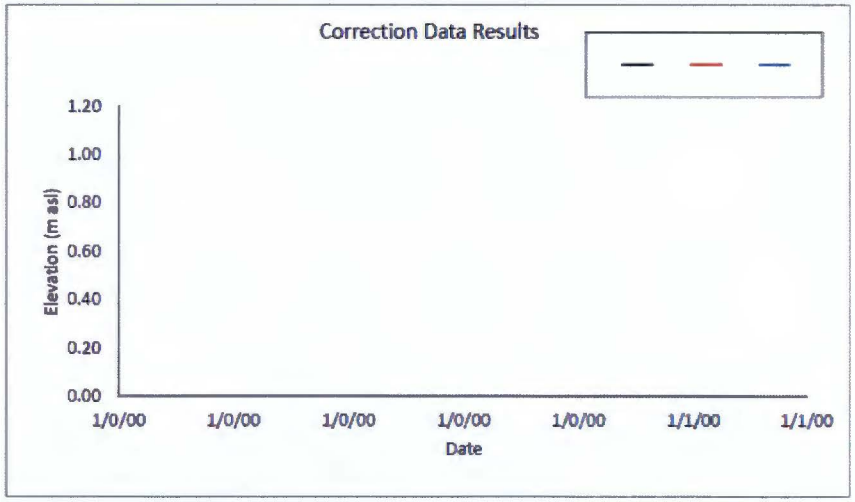
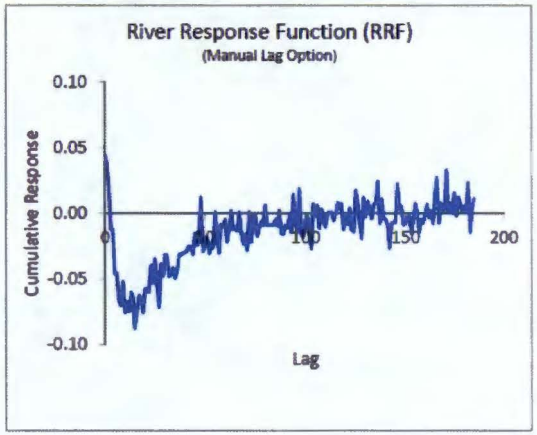


Figure A-30. Barometric Response Function for 299-E24-21 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	7/28/10 8:00	8/12/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/12/10 23:00	9/8/10 0:00	1/0/00 0:00	1/0/00 0:00

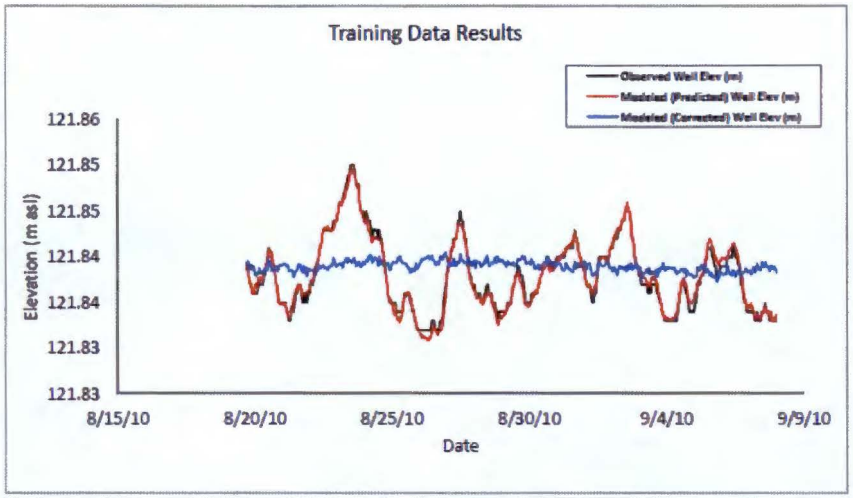
Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	185	Yes



Multiple Regression Correction in Excel (MRCX) v.1.1

5.72560E-04 st dev of corrected

3.97978E-09 sum of squares



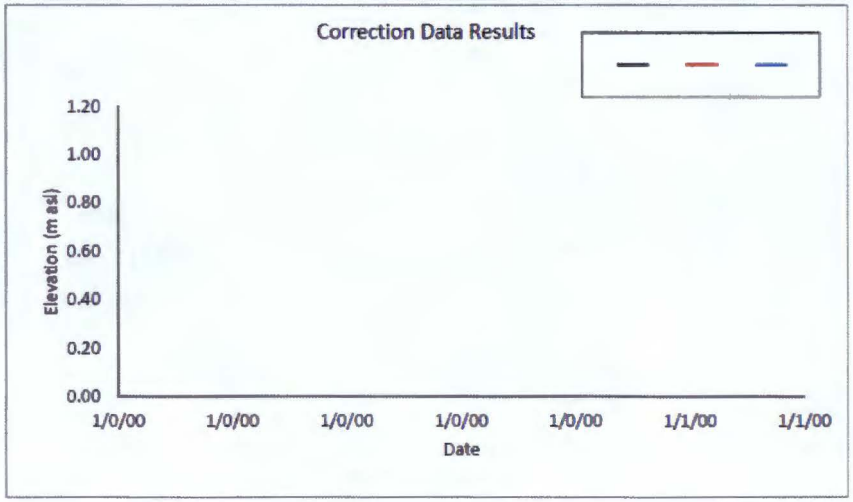
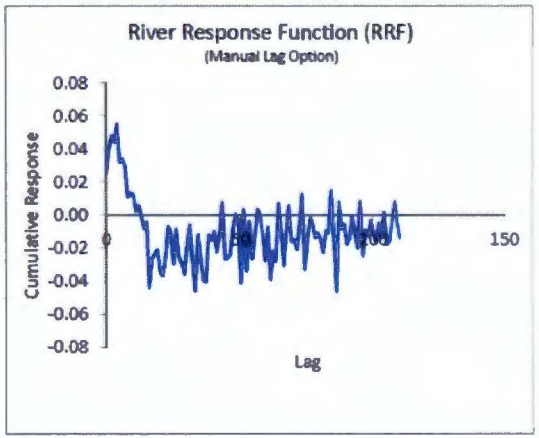


Figure A-31. Barometric Response Function for 299-E24-24 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	8/2/10 8:00	8/2/10 8:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	9/8/10 23:00	9/8/10 23:00	1/0/00 0:00	1/0/00 0:00

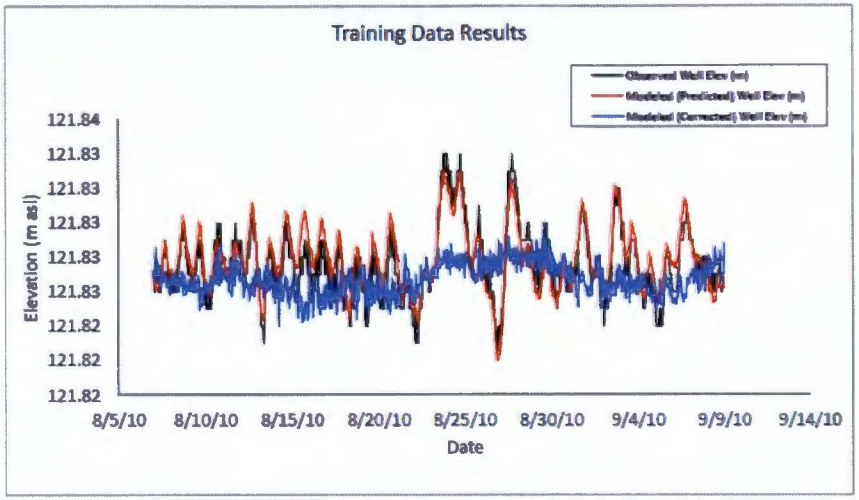
Data Option	Lag Option	Lags	Trend Adjust
First Differences	Manual	110	Yes



9.40537E-04 st dev of corrected

Multiple Regression Correction in Excel (MRCX) v.1.1

1.84837E-08 sum of squares



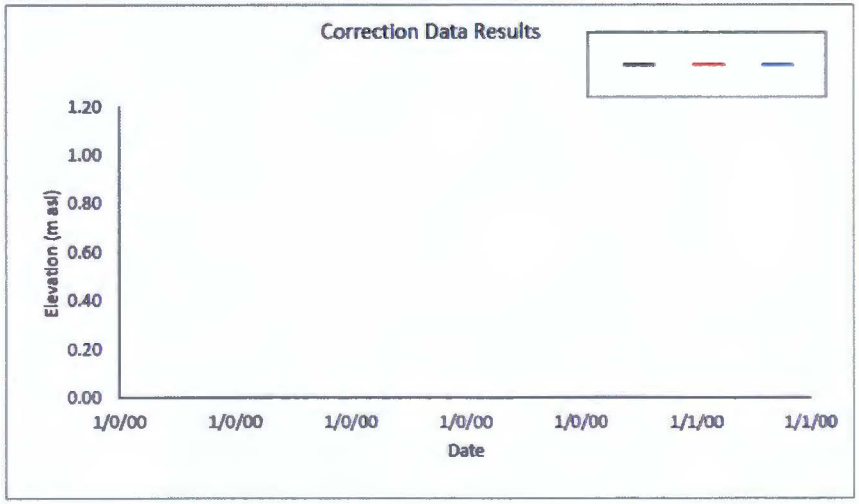
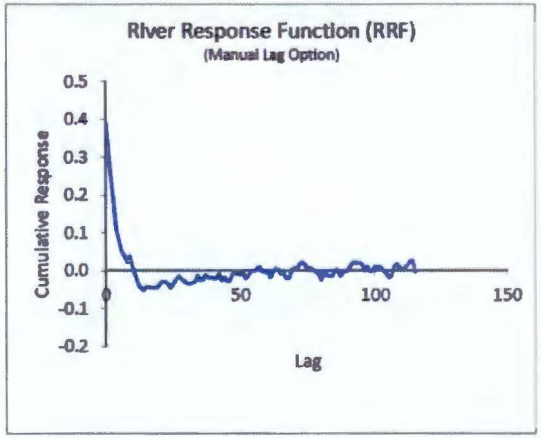
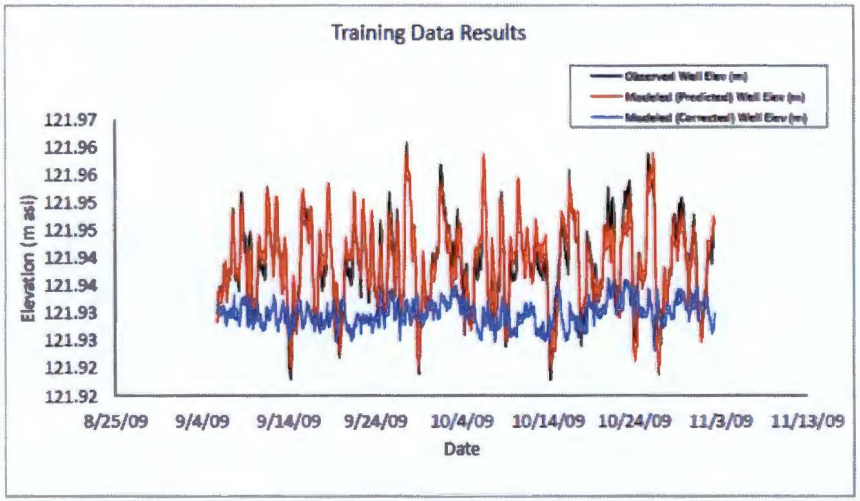


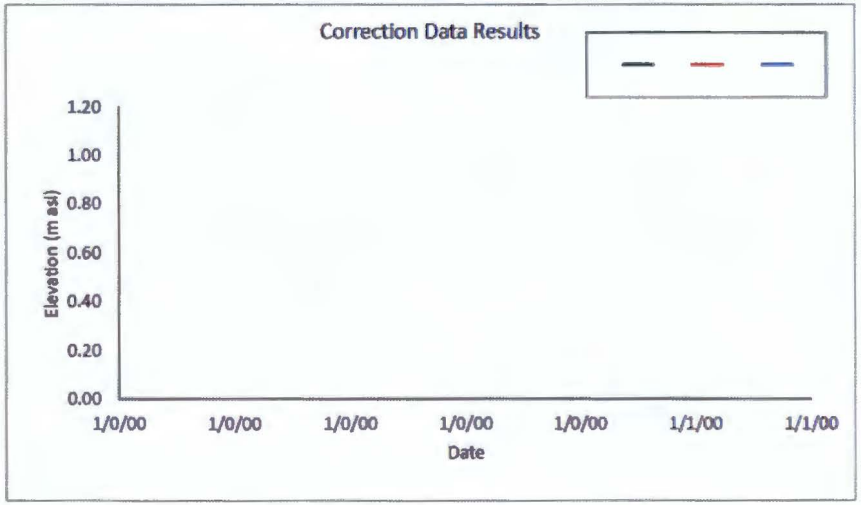
Figure A-32. Barometric Response Function for 299-E25-36 (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	9/1/09 0:00	9/1/09 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	11/2/09 8:00	11/2/09 8:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	115	Yes







2.00267E-03 st dev of corrected

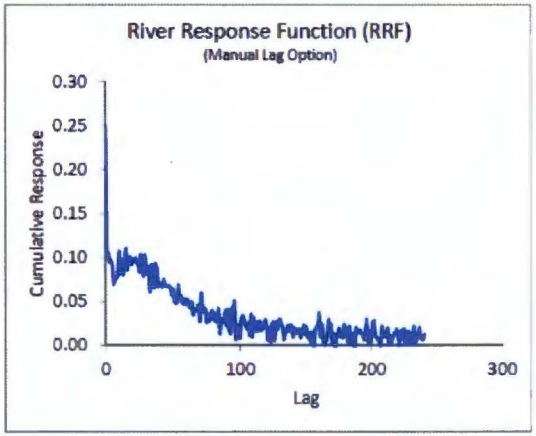
6.62262E-08 sum of squares

Multiple Regression Correction in Excel (MRCX) v.1.1

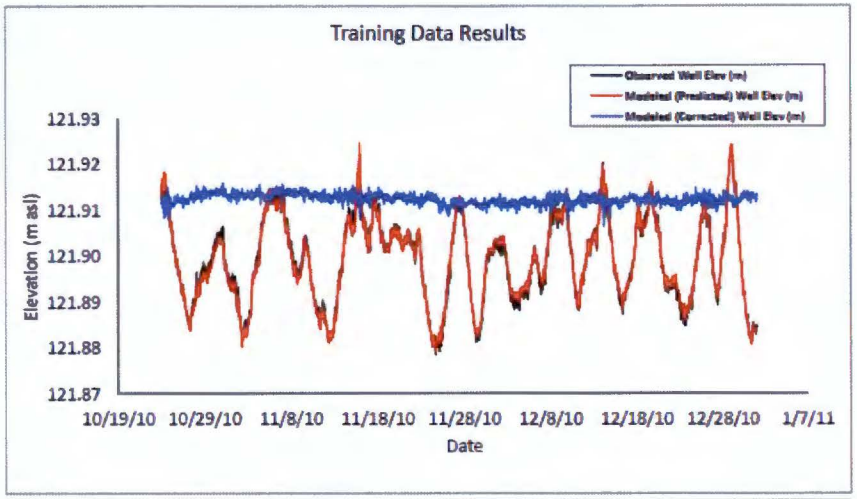
Figure A-33. Barometric Response Function for 699-37-47A (IDF/PUREX)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	10/14/10 0:00	10/14/10 0:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	1/1/11 0:00	1/1/11 0:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	240	Yes



Multiple Regression Correction in Excel (MRCX) v. 1.1



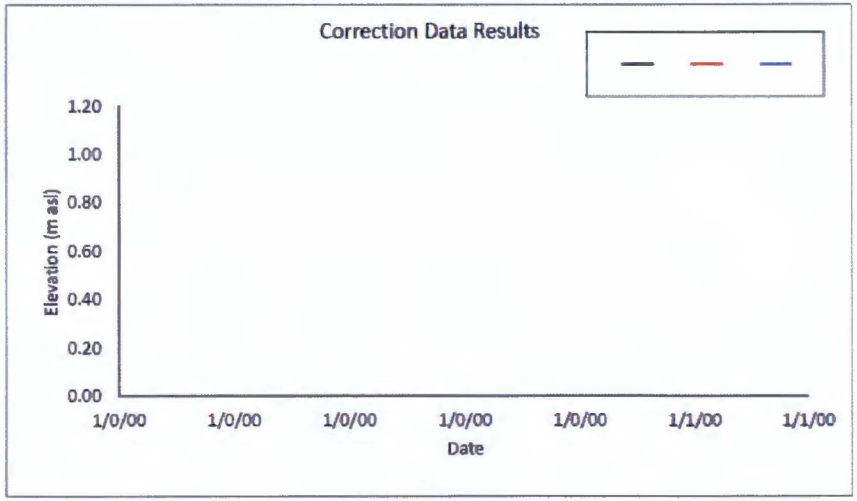
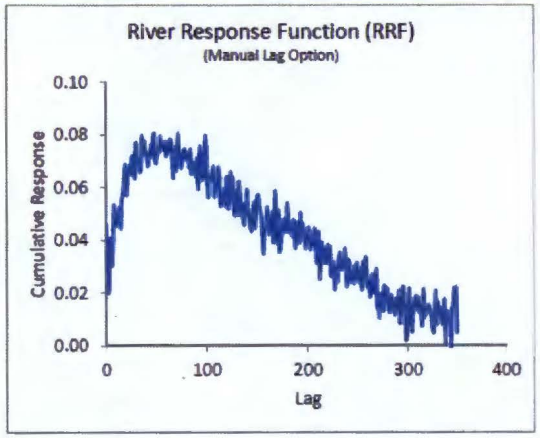


Figure A-34. Barometric Response Function for 299-E26-10 (LERF)

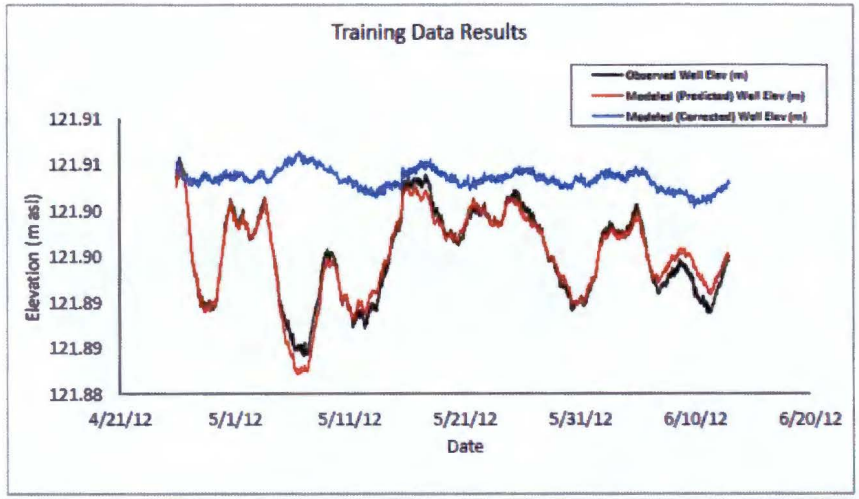
	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	4/11/12 8:00	4/11/12 8:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	6/12/12 23:00	6/12/12 23:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	350	Yes



8.792E-04

Multiple Regression Correction in Excel (MRCX) v.1.1



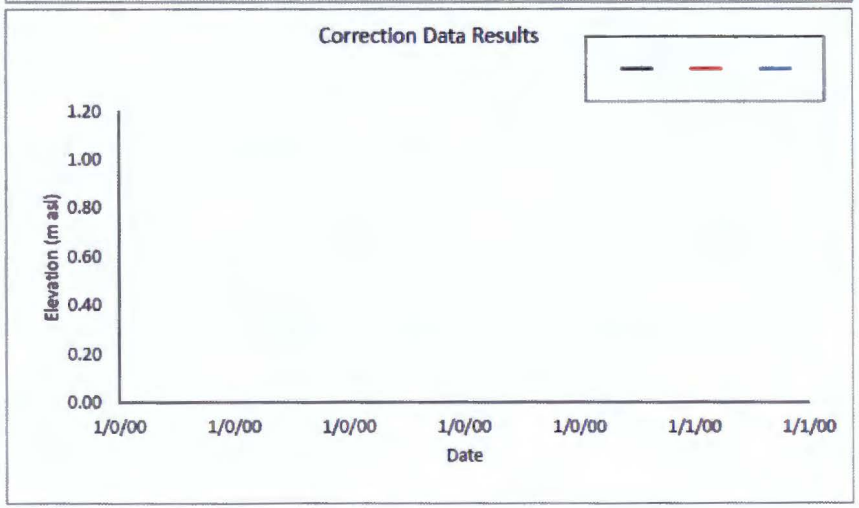
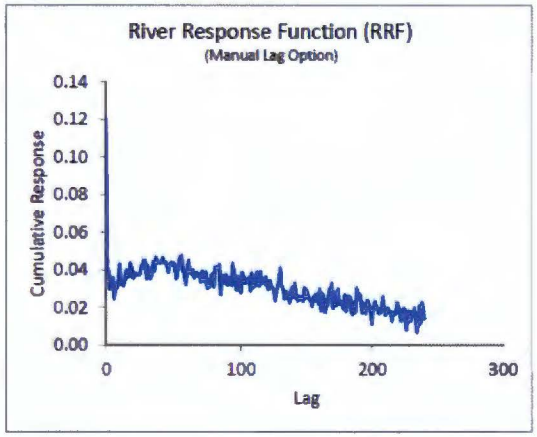


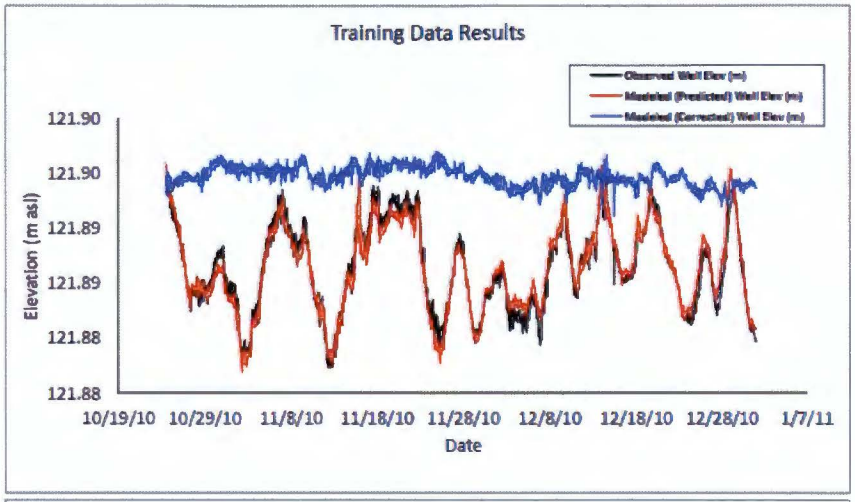
Figure A-35. Barometric Response Function for 299-E26-14 (LERF)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	10/14/10 13:00	10/14/10 13:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	1/1/11 0:00	1/1/11 0:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	240	Yes



Multiple Regression Correction in Excel (MRCX) v.1.1



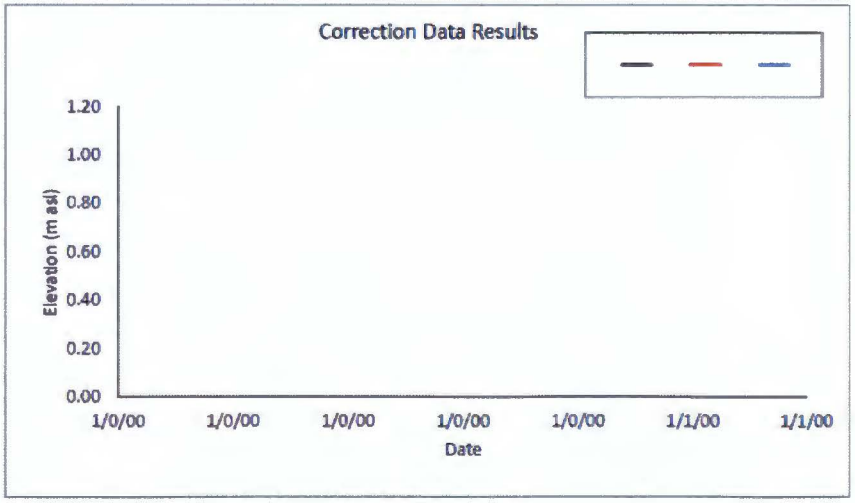
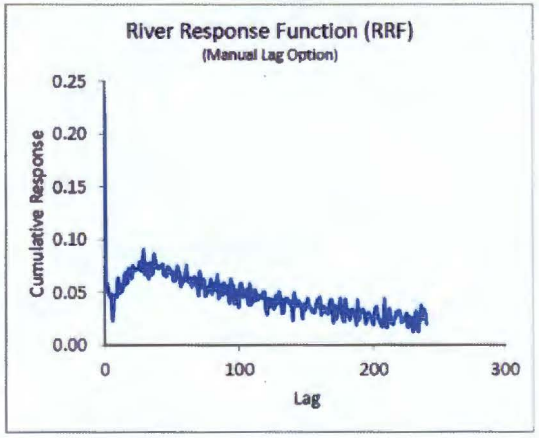


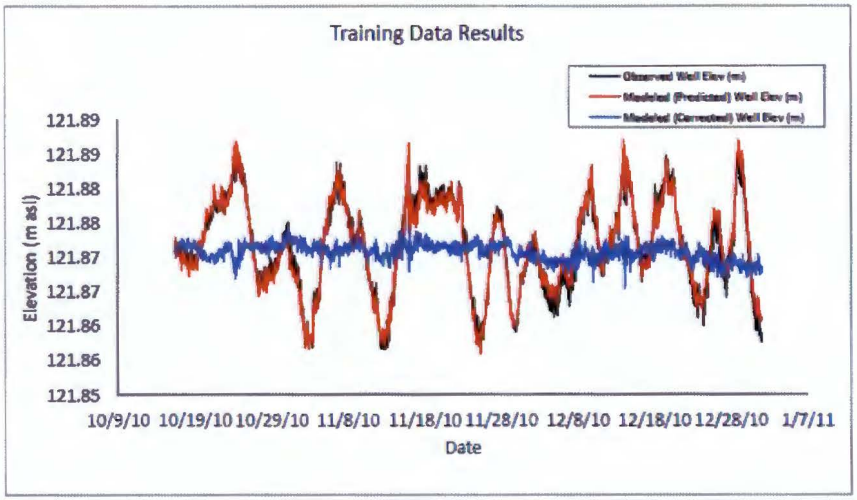
Figure A-36. Barometric Response Function for 299-E26-77 (LERF)

	Training		Correction	
	Available	Filtered	Available	Filtered
Start Date/Time	10/6/10 10:00	10/6/10 10:00	1/0/00 0:00	1/0/00 0:00
End Date/Time	1/1/11 0:00	1/1/11 0:00	1/0/00 0:00	1/0/00 0:00

Data Option	Lag Option	Lags	Trend Adjust
Original Data	Manual	240	Yes



Multiple Regression Correction in Excel (MRCX) v.1.1



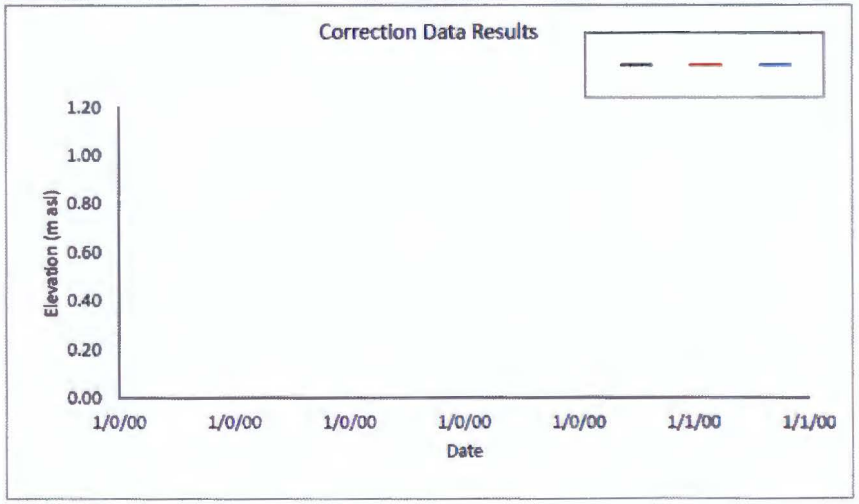


Figure A-37. Barometric Response Function for 299-E26-79 (LERF)

Appendix B

Trend-Surface Analysis Spreadsheet

The spreadsheet used for the trend-surface analyses, with formulas displayed, is shown in Figure B-1. The input data, consisting of the easting and northing well coordinates and the calculated hydraulic heads, are entered into columns C, D, and E. Intermediate computations needed to solve the matrix equation (i.e., Equation 10) are in the block from L23 through L36. The matrix equation is displayed in the block from K46 to O48, and it is solved using Microsoft Excel matrix functions in rows 46 to 54. The matrix functions are entered as array formulas (to enter an array formula in Excel, hold down the control and shift keys at the same time and press enter). The coefficients of the fitted plane are in L52 to L54. The normal vector to the fitted plane (pointing upward) is determined in cells L58 and L59. The gradient magnitude is calculated in L64 (Equation 11), and the gradient direction is determined in the block of cells from L69 to M77. To determine the gradient direction, the coefficients of the fitted plane are examined in a logic block from L69 to L77 such that only one of the series of "IF" functions will be true. The conditions being tested are listed in K69 to K77, and this is mainly to determine within which quadrant the fitted plane dips. The "IF" functions in column M identify which of the conditions is true, and then computes the dip direction of the fitted plane using the arctangent function in the appropriate manner for that quadrant. The gradient magnitude and direction are then echoed in L10 and L11 so the user can easily find the result.

Remaining calculations consist of the predicted hydraulic heads, identification of potential outliers, and the ANOVA statistical test. The coefficients of the fitted plane are used to calculate the predicted hydraulic heads for each well in column G. The difference of the predicted heads from their mean is computed in column H, and the residuals are calculated in column I. The predicted range of the measurements, using the IQR, is determined from the 25th and 75th percentiles in cells O23 to O30. The cells showing the residuals (i.e., in column I) are conditionally formatted to highlight yellow if a value is outside the range determined by the IQR, which allows for easy identification of the potential outliers. The ANOVA table is in the block of cells from N14 to S17. The test statistic is in R15 and the *p*-value is determined using the "FDIST" function in S15. The results of the statistics are in cells L15 to L19. In L19, the *p*-value (cell L18) is compared to the level of significance specified in L17 to determine if the trend surface is statistically significant.

In practice, only the template of the trend-surface analysis spreadsheet is saved because any of the trend-surface results in this study can be easily regenerated by copying the input data into the template spreadsheet. Use of this spreadsheet is demonstrated in Figure B-2 for the LLWMA-1 water-level measurements collected on August 29, 2008.

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	A	B	C	D	E	F	G	H	I	J
1	**Trend Surface Analysis of Hydraulic Gradient**									
2	(Least Squares Regression of a Plane to Points in 3-D Space)									
3	Reference: Davis, J. C. 2002. Statistics and Data Analysis in Geology, John Wiley & Sons									
4	Prepared by JP McDonald									
5										
6										
7		Input Data					Computed Data			
8		Well Name	Easting (x-coord)	Northing (y-coord)	Observed Hydraulic Head (z-coord)		Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)	
9		1					=IF(ISBLANK(E9),"",$L$52+$L$53*C9+$L$54*D9)	=IF(ISBLANK(E9),"",G9-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E9),"",E9-G9)	
10		2					=IF(ISBLANK(E10),"",$L$52+$L$53*C10+$L$54*D10)	=IF(ISBLANK(E10),"",G10-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E10),"",E10-G10)	
11		3					=IF(ISBLANK(E11),"",$L$52+$L$53*C11+$L$54*D11)	=IF(ISBLANK(E11),"",G11-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E11),"",E11-G11)	
12		4					=IF(ISBLANK(E12),"",$L$52+$L$53*C12+$L$54*D12)	=IF(ISBLANK(E12),"",G12-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E12),"",E12-G12)	
13		5					=IF(ISBLANK(E13),"",$L$52+$L$53*C13+$L$54*D13)	=IF(ISBLANK(E13),"",G13-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E13),"",E13-G13)	
14		6					=IF(ISBLANK(E14),"",$L$52+$L$53*C14+$L$54*D14)	=IF(ISBLANK(E14),"",G14-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E14),"",E14-G14)	
15		7					=IF(ISBLANK(E15),"",$L$52+$L$53*C15+$L$54*D15)	=IF(ISBLANK(E15),"",G15-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E15),"",E15-G15)	
16		8					=IF(ISBLANK(E16),"",$L$52+$L$53*C16+$L$54*D16)	=IF(ISBLANK(E16),"",G16-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E16),"",E16-G16)	
17		9					=IF(ISBLANK(E17),"",$L$52+$L$53*C17+$L$54*D17)	=IF(ISBLANK(E17),"",G17-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E17),"",E17-G17)	
18		10					=IF(ISBLANK(E18),"",$L$52+$L$53*C18+$L$54*D18)	=IF(ISBLANK(E18),"",G18-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E18),"",E18-G18)	
19		11					=IF(ISBLANK(E19),"",$L$52+$L$53*C19+$L$54*D19)	=IF(ISBLANK(E19),"",G19-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E19),"",E19-G19)	
20		12					=IF(ISBLANK(E20),"",$L$52+$L$53*C20+$L$54*D20)	=IF(ISBLANK(E20),"",G20-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E20),"",E20-G20)	
21		13					=IF(ISBLANK(E21),"",$L$52+$L$53*C21+$L$54*D21)	=IF(ISBLANK(E21),"",G21-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E21),"",E21-G21)	
22		14					=IF(ISBLANK(E22),"",$L$52+$L$53*C22+$L$54*D22)	=IF(ISBLANK(E22),"",G22-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E22),"",E22-G22)	
23		15					=IF(ISBLANK(E23),"",$L$52+$L$53*C23+$L$54*D23)	=IF(ISBLANK(E23),"",G23-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E23),"",E23-G23)	
24		16					=IF(ISBLANK(E24),"",$L$52+$L$53*C24+$L$54*D24)	=IF(ISBLANK(E24),"",G24-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E24),"",E24-G24)	
25		17					=IF(ISBLANK(E25),"",$L$52+$L$53*C25+$L$54*D25)	=IF(ISBLANK(E25),"",G25-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E25),"",E25-G25)	
26		18					=IF(ISBLANK(E26),"",$L$52+$L$53*C26+$L$54*D26)	=IF(ISBLANK(E26),"",G26-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E26),"",E26-G26)	
27		19					=IF(ISBLANK(E27),"",$L$52+$L$53*C27+$L$54*D27)	=IF(ISBLANK(E27),"",G27-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E27),"",E27-G27)	
28		20					=IF(ISBLANK(E28),"",$L$52+$L$53*C28+$L$54*D28)	=IF(ISBLANK(E28),"",G28-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E28),"",E28-G28)	
29										
30										

Figure B-1. Spreadsheet Used for the Trend-Surface Analysis with Formulas Displayed

	K	L	M	N	O	P	Q	R	S
8	**Hydraulic Gradient**								
9									
10	Gradient Magnitude:	=L64							
11	Gradient Direction (azimuth):	=INDEX(M69:M77,MATCH("Yes",L69:L77,0))							
12									
13	**Statistics**			**ANOVA**					
14				Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
15	Goodness of Fit (R^2):	=L36/L35		Regression	=SUMSQ(H9:H28)	2	=O15/P15	=Q15/Q16	=FDIST(R15,P15,P16)
16	Correlation Coefficient (R):	=SQRT(L15)		Deviation	=SUMSQ(I9:I28)	=L23-3	=O16/P16		
17	Level of Significance:	0.05		Total	=O15+O16	=L23-1			
18	P-Value:	=ROUND(S15,4)							
19	Statistically Significant Trend?:	=IF(L23=3,"N/A - 3 pts",IF(L18<=L17,"Yes","No"))							
20									
21	Intermediate Computations			Potential Outlier Range (on the Residuals):					
22									
23	# of Observations:	=COUNT(C9:C28)		25th Percentile:	=PERCENTILE(INDIRECT("I9:I"&L23+8),0.25)				
24	Sum of Easting:	=SUM(C9:C28)		75th Percentile:	=PERCENTILE(INDIRECT("I9:I"&L23+8),0.75)				
25	Sum of Northing:	=SUM(D9:D28)		Interquartile Range (IQR):	=$O$24-$O$23				
26	Sum of Easting*Northing:	=SUMPRODUCT(C9:C28,D9:D28)							
27	Sum of Easting^2:	=SUMSQ(C9:C28)		IQR Factor:	1.5				
28	Sum of Northing^2:	=SUMSQ(D9:D28)							
29	Sum of Observed Heads:	=SUM(E9:E28)		Lower Value:	=ROUND($O$23-$O$27*$O$25,3)				
30	Sum of Easting*Observed Heads:	=SUMPRODUCT(C9:C28,E9:E28)		Upper Value:	=ROUND($O$24+$O$27*$O$25,3)				
31	Sum of Northing*Observed Heads:	=SUMPRODUCT(D9:D28,E9:E28)							
32	Sum of Observed Heads^2:	=SUMSQ(E9:E28)							
33	Sum of Predicted Heads:	=SUM(G9:G28)							
34	Sum of Predicted Heads^2:	=SUMSQ(G9:G28)							
35	SSt:	=L32-(L29^2)/L23							
36	SSr:	=L34-(L33^2)/L23							
37									
38	Matrix Equation (Equation 5.86 in Davis, 2002)								
39									
40	=L23	=L24	=L25	b0	=L29				
41	=L24	=L27	=L26	b1	=L30				
42	=L25	=L26	=L28	b2	=L31				
43									
44	Inverse Matrix								
45									
46	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)						
47	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)						
48	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)	=MINVERSE(K40:M42)						
49									
50	Coefficients of the Fitted Plane (z = b0 + b1x + b2y)								
51									
52	b0=	=MMULT(K46:M48,O40:O42)							
53	b1=	=MMULT(K46:M48,O40:O42)							
54	b2=	=MMULT(K46:M48,O40:O42)							
55									
56	Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)								
57									
58	a:	=$L$53*(-1)							
59	b:	=$L$54*(-1)							
60	c:	1							
61									
62	Gradient Magnitude								
63									
64		=SQRT(L58^2+L59^2)							
65									
66	Gradient Direction								
67									
68			Azimuth:						
69	Horizontal Plane?:	=IF(AND($L$58=0,$L$59=0),"Yes","No")	n/a						
70	Due North?:	=IF(AND($L$58=0,$L$59>0),"Yes","No")	=IF(L70="Yes",0,"n/a")						
71	Due East?:	=IF(AND($L$58>0,$L$59=0),"Yes","No")	=IF(L71="Yes",90,"n/a")						
72	Due South?:	=IF(AND($L$58=0,$L$59<0),"Yes","No")	=IF(L72="Yes",180,"n/a")						
73	Due West?:	=IF(AND($L$58<0,$L$59=0),"Yes","No")	=IF(L73="Yes",270,"n/a")						
74	First Quadrant?:	=IF(AND($L$58>0,$L$59>0),"Yes","No")	=IF(L74="Yes",ATAN($L$58/$L$59)*180/PI(),"n/a")						
75	Second Quadrant?:	=IF(AND($L$58>0,$L$59<0),"Yes","No")	=IF(L75="Yes",90+ATAN(ABS($L$59)/$L$58)*180/PI(),"n/a")						
76	Third Quadrant?:	=IF(AND($L$58<0,$L$59<0),"Yes","No")	=IF(L76="Yes",180+ATAN($L$58/$L$59)*180/PI(),"n/a")						
77	Fourth Quadrant?:	=IF(AND($L$58<0,$L$59>0),"Yes","No")	=IF(L77="Yes",270+ATAN($L$59/ABS($L$58))*180/PI(),"n/a")						

Figure B.1. Spreadsheet Used for the Trend-Surface Analysis with Formulas Displayed (cont'd.)

Trend Surface Analysis of Hydraulic Gradient

(Least Squares Regression of a Plane to Points in 3-D Space)

Reference: Davis, J. C. 2002. Statistics and Data Analysis in Geology, John Wiley & Sons

Prepared by JP McDonald

	Input Data				Computed Data		
	Well Name	Easting (x-coord)	Northing (y-coord)	Observed Hydraulic Head (z-coord)	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
9	299-E28-1	573933.5	136732.609	121.957	121.962	-0.006	-0.005
10	299-E28-17	573492.03	136331.778	121.964	121.958	-0.010	0.006
11	299-E28-18	573104.076	136767.778	121.961	121.961	-0.007	0.000
12	299-E28-27	573226.784	137070.063	121.964	121.964	-0.004	0.000
13	299-E32-5	572599.697	137285.125	121.968	121.965	-0.002	0.003
14	299-E32-6	572600.4	137515.1	121.964	121.967	0.000	-0.003
15	299-E32-8	572663.39	137741.47	121.97	121.969	0.002	0.001
16	299-E33-28	573226.365	137375.019	121.963	121.967	-0.001	-0.004
17	299-E33-339	573716.86	137221.51	121.967	121.966	-0.002	0.001
18	299-E33-34	573104.458	137740.427	121.968	121.970	0.002	-0.002
19	299-E33-38	573591.158	137594.489	121.966	121.969	0.001	-0.003
20	699-49-55A	573146.301	138351.781	121.965	121.975	0.008	0.010
21	699-49-57A	572544.276	138389.24	121.971	121.975	0.007	-0.004
22	699-50-56	572748.21	138841.55	121.98	121.980	0.012	0.000
23	15						
24	16						
25	17						
26	18						
27	19						
28	20						

Hydraulic Gradient

Gradient Magnitude:	9.13E-06
Gradient Direction (azimuth):	186.7

Statistics

Goodness of Fit (R^2):	0.68
Correlation Coefficient (R):	0.83
Level of Significance:	0.05
P-Value:	0.0018
Statistically Significant Trend?:	Yes

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	0.000473975	2	0.000236987	11.9098818	0.001768552
Deviation	0.000218882	11	1.98984E-05		
Total	0.000692857	13			

Intermediate Computations

# of Observations:	14
Sum of Easting:	8023697.505
Sum of Northing:	1924957.939
Sum of Easting*Northing:	1.10323E+12
Sum of Easting^2:	4.59855E+12
Sum of Northing^2:	2.64682E+11
Sum of Observed Heads:	1707.548
Sum of Easting*Observed Heads:	978632027.4
Sum of Northing*Observed Heads:	234782774.2
Sum of Observed Heads^2:	208265.7273
Sum of Predicted Heads:	1707.548
Sum of Predicted Heads^2:	208265.727
SSt:	0.000692857
SSr:	0.000473975

Potential Outlier Range (on the Residuals):

25th Percentile:	-0.003267909
75th Percentile:	0.001001364
Interquartile Range (IQR):	0.004269273
IQR Factor:	1.5
Lower Value:	-0.010
Upper Value:	0.007

Matrix Equation (Equation 5.86 in Davis, 2002)

14	8023697.505	1924958	b0	1707.548
8023697.505	4.59855E+12	1.1E+12	b1	978632027.4
1924957.939	1.10323E+12	2.65E+11	b2	234782774.2

Inverse Matrix

214626.4625	-0.340165653	-0.14306
-0.340165653	5.46836E-07	1.95E-07
-0.14305932	1.9464E-07	2.29E-07

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)

b0=	120.1122143
b1=	1.06296E-06
b2=	9.06415E-06

Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)

a:	-1.06296E-06
b:	-9.06415E-06
c:	1

Gradient Magnitude

9.12627E-06

Gradient Direction

		Azimuth:
Horizontal Plane?:	No	n/a
Due North?:	No	n/a
Due East?:	No	n/a
Due South?:	No	n/a
Due West?:	No	n/a
First Quadrant?:	No	n/a
Second Quadrant?:	No	n/a
Third Quadrant?:	Yes	186.6886
Fourth Quadrant?:	No	n/a

Figure B-2. Example Trend-Surface Analysis Spreadsheet with the Water-Level Measurements Collected on 8/29/2008 for LLWMA-1

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Appendix C

Hydraulic Head Calculations and Trend-Surface Analysis Results for LLWMA-1

Three spreadsheets are presented in this appendix for LLWMA-1: one with well characteristics, one documenting the determination of the gyroscope correction factors, and one with the hydraulic head calculations and trend-surface analysis results. Well characteristics are shown on the "Wells" spreadsheet in Figure C-1. This spreadsheet lists, for each well, the default MP – RP values, horizontal coordinates, old reference point elevations, new reference point elevations resulting from the resurveys, and gyroscope correction factors. No formulas are used on this sheet.

Determination of the gyroscope correction factors are shown on the spreadsheet in Figure C-2. For each well, this sheet lists the initial depth to water measured for this study, the gyroscope depth stations (measured depth and true vertical depth) that bound the depth to water (i.e., columns E and F for the station above the depth to water, and columns G and H for the station below the depth to water), and the correction factor interpolated from the depth to water and gyroscope measurements. Where the lowermost gyroscope depth station was above the water level, only data for the lowermost station is shown (in columns G and H). The formula used in column I to interpolate the correction factors is shown (in text form) at the bottom of the sheet. Where only the lowermost gyroscope depth station is provided, the difference between the measured depth and true vertical depth at that station was used as the correction factor.

Figure C-3 shows a portion of the spreadsheet, with formulas displayed, that was used to calculate the hydraulic heads and display the trend-surface analysis results. The water-level measurements are in columns C through F (measurement date & time, depth to water, measurement point description, and MP – RP). In column G, the hydraulic head values are calculated (Equation 1) with no corrections (i.e., using the old reference points with no corrections for well bore deviation or barometric pressure). The reference point elevations for each well are obtained from the 'Wells' sheet (Figure C-1) using the "VLOOKUP" function. This function matches the well name in column B to the well names in the first column of the specified array on the "Wells" sheet (B6 to O19) and returns a value from the specified column of the array (column 7 for the old reference point values) in the same row as the matched well name. In column H, the hydraulic head values are calculated using the new reference point elevations (column 9 from the specified array on the 'Wells' sheet). In column I, hydraulic heads are calculated using the old reference point elevations but with the gyroscope correction factors. These factors are also obtained from the 'Wells' sheet using the "VLOOKUP" function. The full formula is entered for all four coefficients, even though the first three coefficients were zero for the LLWMA-1 wells. The same calculation is performed in column J, except that the new reference point elevations are used. Column K is reserved for the column J measurements normalized to a constant barometric pressure. These calculations were performed in a separate spreadsheet (see Appendix G for an example) and then copied into this spreadsheet.

Once the hydraulic heads were calculated, they were copied into the trend-surface analysis spreadsheet (Appendix B) along with the horizontal coordinates for the wells, and the trend-surface results were then copied into this sheet (rows 21 through 25 in Figure C-3). Figure C-4 lists the entire spreadsheet with all of the water-level measurements collected for this study and the results of the hydraulic head calculations and trend-surface analyses. Measurements that were identified as potential outliers (by the IQR method) but retained are highlighted yellow, and those excluded are highlighted red. The identification of outliers was made only for the hydraulic heads that were normalized to a constant barometric pressure.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**200 East Area Low Gradient Evaluation Study**														
2	LLWMA-1 Well Information (Wells worksheet)														
3															
4		Well Name	MP Desc.	MP-RP (m)	Horizontal Coordinates (m NAD83)			Old RP Elev (m NAVD88)		New RP Elev (m NAVD88)		Gyro Correction Coefficients			
5					East (m)	North (m)	Source	Value	Source	Value	Source	C1	C2	C3	C4
6		299-E28-1	TOPP	0.013	573933.500	136732.609	Unknown	209.850	KEH	209.848	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-3.00000E-02
7		299-E28-17	TOPP	0.010	573492.030	136331.778	Unknown	216.697	USACE(JECA)	216.690	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-1.00000E-01
8		299-E28-18	TOPP	0.010	573104.076	136767.778	USACE(JECA)	212.111	USACE(JECA)	212.104	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-4.00000E-02
9		299-E28-27	TOPP	0.005	573226.784	137070.063	USACE(JECA)	208.473	USACE(JECA)	208.463	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-1.20000E-01
10		299-E32-5	TOPP	0.005	572599.697	137285.125	USACE(JECA)	209.013	USACE(JECA)	209.005	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-7.00000E-02
11		299-E32-6	TOPP	0.005	572600.400	137515.100	KEH	204.447	KEH	204.452	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-5.00000E-02
12		299-E32-8	TOPP	0.005	572663.390	137741.470	KEH	197.790	KEH	197.795	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-1.30000E-01
13		299-E33-28	TOPP	0.013	573226.365	137375.019	USACE(JECA)	203.535	KEH	203.548	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-2.00000E-02
14		299-E33-339	TOPP	0.005	573716.860	137221.510	Rogers	203.027	Rogers	203.029	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-2.00000E-02
15		299-E33-34	TOPP	0.005	573104.458	137740.427	USACE(JECA)	194.133	KEH	194.141	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-2.00000E-02
16		299-E33-38	TOPP	0.005	573591.158	137594.489	USACE(JECA)	193.629	KEH	193.626	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-2.50000E-01
17		699-49-55A	TOC	0.000	573146.301	138351.781	USACE(JECA)	162.864	USACE(JECA)	162.866	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-3.00000E-02
18		699-49-57A	TOPP	0.010	572544.276	138389.240	USACE(JECA)	169.721	USACE(JECA)	169.723	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
19		699-50-56	TOPP	0.009	572748.210	138841.550	Fluor	168.896	Fluor	168.899	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-5.50000E-01
20															
21		TOPP = Top of Pump Plate													
22		TOC = Top of Casing													
23		TOT = Top of Discharge Tee													

Figure C-1. Spreadsheet of Well Information for LLWMA-1 (i.e., "Wells" Sheet)

	A	B	C	D	E	F	G	H	I
1	**200 East Area Low Gradient Evaluation Study**								
2	LLWMA-1 Gyroscope Correction Factors								
3									
4		Well Name	Initial Depth to Water (m)	Initial Depth to Water (ft)	Gyroscope Depth Stations				Correction Factor (ft)
5					Measured Depth (ft)	True Vertical Depth (ft)	Measured Depth (ft)	True Vertical Depth (ft)	
6		299-E28-1	87.862	288.26	260	259.98	300	299.97	-0.03
7		299-E28-17	94.728	310.79	300	299.91	320	319.89	-0.10
8		299-E28-18	89.995	295.26	280	279.97	300	299.96	-0.04
9		299-E28-27	86.376	283.39			281.6	281.48	-0.12
10		299-E32-5	86.902	285.11			284.3	284.23	-0.07
11		299-E32-6	82.349	270.17			266	265.95	-0.05
12		299-E32-8	75.711	248.40			248.2	248.07	-0.13
13		299-E33-28	81.441	267.19			266.7	266.68	-0.02
14		299-E33-339	80.904	265.43	260	259.98	271.4	271.38	-0.02
15		299-E33-34	72.023	236.30			231.7	231.68	-0.02
16		299-E33-38	71.577	234.83			230.4	230.15	-0.25
17		699-49-55A	40.884	134.13	120	119.99	138	137.96	-0.03
18		699-49-57A	47.615	156.22			153.2	153.20	0.00
19		699-50-56	47.111	154.56	140	139.57	160	159.40	-0.55
20									
21		Formula used in Colum I: =IF(ISBLANK(E6),H6-G6,ROUND((D6-E6)/(G6-E6)*((H6-G6)-(F6-E6))+(F6-E6),2))							

Figure C-2. Spreadsheet of Gyroscope Correction Factors for LLWMA-1

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	A	B	C	D	E	F	G	H	I	J	K
1	200 East Area Low Gradient Evaluation Study										
2	LLWMA-1 Hydraulic Head Calculations and Trend-Surface Analysis Res							Potential outlier retained			
3								Outlier removed			
4		*Ten-Well Net*									
5											
6											
7							Hydraulic Head (m NAVD88)				
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
9											
10		299-E28-18					=VLOOKUP($B10,Wells!$B$6:$O$19,7)-($D10-$F10)	=VLOOKUP($B10,Wells!$B$6:$O$19,9)-($D10-$F10)	=ROUND(VLOOKUP($B10,Wells!$B$6:$O$19,7)-($D10-$F10+(VLOOKUP($B10,Wells!$B$6:$O$19,11)*($D10-$F10)^3+VLOOKUP($B10,Wells!$B$6:$O$19,12)*($D10-$F10)^2+VLOOKUP($B10,Wells!$B$6:$O$19,13)*($D10-$F10)+VLOOKUP($B10,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B10,Wells!$B$6:$O$19,9)-($D10-$F10+(VLOOKUP($B10,Wells!$B$6:$O$19,11)*($D10-$F10)^3+VLOOKUP($B10,Wells!$B$6:$O$19,12)*($D10-$F10)^2+VLOOKUP($B10,Wells!$B$6:$O$19,13)*($D10-$F10)+VLOOKUP($B10,Wells!$B$6:$O$19,14))*0.3048),3)	
11		299-E28-27					=VLOOKUP($B11,Wells!$B$6:$O$19,7)-($D11-$F11)	=VLOOKUP($B11,Wells!$B$6:$O$19,9)-($D11-$F11)	=ROUND(VLOOKUP($B11,Wells!$B$6:$O$19,7)-($D11-$F11+(VLOOKUP($B11,Wells!$B$6:$O$19,11)*($D11-$F11)^3+VLOOKUP($B11,Wells!$B$6:$O$19,12)*($D11-$F11)^2+VLOOKUP($B11,Wells!$B$6:$O$19,13)*($D11-$F11)+VLOOKUP($B11,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B11,Wells!$B$6:$O$19,9)-($D11-$F11+(VLOOKUP($B11,Wells!$B$6:$O$19,11)*($D11-$F11)^3+VLOOKUP($B11,Wells!$B$6:$O$19,12)*($D11-$F11)^2+VLOOKUP($B11,Wells!$B$6:$O$19,13)*($D11-$F11)+VLOOKUP($B11,Wells!$B$6:$O$19,14))*0.3048),3)	
12		299-E32-5					=VLOOKUP($B12,Wells!$B$6:$O$19,7)-($D12-$F12)	=VLOOKUP($B12,Wells!$B$6:$O$19,9)-($D12-$F12)	=ROUND(VLOOKUP($B12,Wells!$B$6:$O$19,7)-($D12-$F12+(VLOOKUP($B12,Wells!$B$6:$O$19,11)*($D12-$F12)^3+VLOOKUP($B12,Wells!$B$6:$O$19,12)*($D12-$F12)^2+VLOOKUP($B12,Wells!$B$6:$O$19,13)*($D12-$F12)+VLOOKUP($B12,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B12,Wells!$B$6:$O$19,9)-($D12-$F12+(VLOOKUP($B12,Wells!$B$6:$O$19,11)*($D12-$F12)^3+VLOOKUP($B12,Wells!$B$6:$O$19,12)*($D12-$F12)^2+VLOOKUP($B12,Wells!$B$6:$O$19,13)*($D12-$F12)+VLOOKUP($B12,Wells!$B$6:$O$19,14))*0.3048),3)	
13		299-E32-6					=VLOOKUP($B13,Wells!$B$6:$O$19,7)-($D13-$F13)	=VLOOKUP($B13,Wells!$B$6:$O$19,9)-($D13-$F13)	=ROUND(VLOOKUP($B13,Wells!$B$6:$O$19,7)-($D13-$F13+(VLOOKUP($B13,Wells!$B$6:$O$19,11)*($D13-$F13)^3+VLOOKUP($B13,Wells!$B$6:$O$19,12)*($D13-$F13)^2+VLOOKUP($B13,Wells!$B$6:$O$19,13)*($D13-$F13)+VLOOKUP($B13,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B13,Wells!$B$6:$O$19,9)-($D13-$F13+(VLOOKUP($B13,Wells!$B$6:$O$19,11)*($D13-$F13)^3+VLOOKUP($B13,Wells!$B$6:$O$19,12)*($D13-$F13)^2+VLOOKUP($B13,Wells!$B$6:$O$19,13)*($D13-$F13)+VLOOKUP($B13,Wells!$B$6:$O$19,14))*0.3048),3)	
14		299-E32-8					=VLOOKUP($B14,Wells!$B$6:$O$19,7)-($D14-$F14)	=VLOOKUP($B14,Wells!$B$6:$O$19,9)-($D14-$F14)	=ROUND(VLOOKUP($B14,Wells!$B$6:$O$19,7)-($D14-$F14+(VLOOKUP($B14,Wells!$B$6:$O$19,11)*($D14-$F14)^3+VLOOKUP($B14,Wells!$B$6:$O$19,12)*($D14-$F14)^2+VLOOKUP($B14,Wells!$B$6:$O$19,13)*($D14-$F14)+VLOOKUP($B14,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B14,Wells!$B$6:$O$19,9)-($D14-$F14+(VLOOKUP($B14,Wells!$B$6:$O$19,11)*($D14-$F14)^3+VLOOKUP($B14,Wells!$B$6:$O$19,12)*($D14-$F14)^2+VLOOKUP($B14,Wells!$B$6:$O$19,13)*($D14-$F14)+VLOOKUP($B14,Wells!$B$6:$O$19,14))*0.3048),3)	
15		299-E33-28					=VLOOKUP($B15,Wells!$B$6:$O$19,7)-($D15-$F15)	=VLOOKUP($B15,Wells!$B$6:$O$19,9)-($D15-$F15)	=ROUND(VLOOKUP($B15,Wells!$B$6:$O$19,7)-($D15-$F15+(VLOOKUP($B15,Wells!$B$6:$O$19,11)*($D15-$F15)^3+VLOOKUP($B15,Wells!$B$6:$O$19,12)*($D15-$F15)^2+VLOOKUP($B15,Wells!$B$6:$O$19,13)*($D15-$F15)+VLOOKUP($B15,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B15,Wells!$B$6:$O$19,9)-($D15-$F15+(VLOOKUP($B15,Wells!$B$6:$O$19,11)*($D15-$F15)^3+VLOOKUP($B15,Wells!$B$6:$O$19,12)*($D15-$F15)^2+VLOOKUP($B15,Wells!$B$6:$O$19,13)*($D15-$F15)+VLOOKUP($B15,Wells!$B$6:$O$19,14))*0.3048),3)	
16		299-E33-339					=VLOOKUP($B16,Wells!$B$6:$O$19,7)-($D16-$F16)	=VLOOKUP($B16,Wells!$B$6:$O$19,9)-($D16-$F16)	=ROUND(VLOOKUP($B16,Wells!$B$6:$O$19,7)-($D16-$F16+(VLOOKUP($B16,Wells!$B$6:$O$19,11)*($D16-$F16)^3+VLOOKUP($B16,Wells!$B$6:$O$19,12)*($D16-$F16)^2+VLOOKUP($B16,Wells!$B$6:$O$19,13)*($D16-$F16)+VLOOKUP($B16,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B16,Wells!$B$6:$O$19,9)-($D16-$F16+(VLOOKUP($B16,Wells!$B$6:$O$19,11)*($D16-$F16)^3+VLOOKUP($B16,Wells!$B$6:$O$19,12)*($D16-$F16)^2+VLOOKUP($B16,Wells!$B$6:$O$19,13)*($D16-$F16)+VLOOKUP($B16,Wells!$B$6:$O$19,14))*0.3048),3)	
17		299-E33-34					=VLOOKUP($B17,Wells!$B$6:$O$19,7)-($D17-$F17)	=VLOOKUP($B17,Wells!$B$6:$O$19,9)-($D17-$F17)	=ROUND(VLOOKUP($B17,Wells!$B$6:$O$19,7)-($D17-$F17+(VLOOKUP($B17,Wells!$B$6:$O$19,11)*($D17-$F17)^3+VLOOKUP($B17,Wells!$B$6:$O$19,12)*($D17-$F17)^2+VLOOKUP($B17,Wells!$B$6:$O$19,13)*($D17-$F17)+VLOOKUP($B17,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B17,Wells!$B$6:$O$19,9)-($D17-$F17+(VLOOKUP($B17,Wells!$B$6:$O$19,11)*($D17-$F17)^3+VLOOKUP($B17,Wells!$B$6:$O$19,12)*($D17-$F17)^2+VLOOKUP($B17,Wells!$B$6:$O$19,13)*($D17-$F17)+VLOOKUP($B17,Wells!$B$6:$O$19,14))*0.3048),3)	
18		299-E33-38					=VLOOKUP($B18,Wells!$B$6:$O$19,7)-($D18-$F18)	=VLOOKUP($B18,Wells!$B$6:$O$19,9)-($D18-$F18)	=ROUND(VLOOKUP($B18,Wells!$B$6:$O$19,7)-($D18-$F18+(VLOOKUP($B18,Wells!$B$6:$O$19,11)*($D18-$F18)^3+VLOOKUP($B18,Wells!$B$6:$O$19,12)*($D18-$F18)^2+VLOOKUP($B18,Wells!$B$6:$O$19,13)*($D18-$F18)+VLOOKUP($B18,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B18,Wells!$B$6:$O$19,9)-($D18-$F18+(VLOOKUP($B18,Wells!$B$6:$O$19,11)*($D18-$F18)^3+VLOOKUP($B18,Wells!$B$6:$O$19,12)*($D18-$F18)^2+VLOOKUP($B18,Wells!$B$6:$O$19,13)*($D18-$F18)+VLOOKUP($B18,Wells!$B$6:$O$19,14))*0.3048),3)	
19		699-49-57A					=VLOOKUP($B19,Wells!$B$6:$O$19,7)-($D19-$F19)	=VLOOKUP($B19,Wells!$B$6:$O$19,9)-($D19-$F19)	=ROUND(VLOOKUP($B19,Wells!$B$6:$O$19,7)-($D19-$F19+(VLOOKUP($B19,Wells!$B$6:$O$19,11)*($D19-$F19)^3+VLOOKUP($B19,Wells!$B$6:$O$19,12)*($D19-$F19)^2+VLOOKUP($B19,Wells!$B$6:$O$19,13)*($D19-$F19)+VLOOKUP($B19,Wells!$B$6:$O$19,14))*0.3048),3)	=ROUND(VLOOKUP($B19,Wells!$B$6:$O$19,9)-($D19-$F19+(VLOOKUP($B19,Wells!$B$6:$O$19,11)*($D19-$F19)^3+VLOOKUP($B19,Wells!$B$6:$O$19,12)*($D19-$F19)^2+VLOOKUP($B19,Wells!$B$6:$O$19,13)*($D19-$F19)+VLOOKUP($B19,Wells!$B$6:$O$19,14))*0.3048),3)	
20						Range (m):	=MAX(G10:G19)-MIN(G10:G19)	=MAX(H10:H19)-MIN(H10:H19)	=MAX(I10:I19)-MIN(I10:I19)	=MAX(J10:J19)-MIN(J10:J19)	=MAX(K10:K19)-MIN(K10:K19)
21						Gradient Magnitude (m/m):					
22						Direction (azimuth):					
23						R^2:					
24						p-Value:					
25						Statistically Significant?:					

Figure C-3. Example Spreadsheet of Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 with Formulas Displayed

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	A	B	C	D	E	F	G	H	I	J	K
1	**200 East Area Low Gradient Evaluation Study**										
2	LLWMA-1 Hydraulic Head Calculations and Trend-Surface Analysis Results							Potential outlier retained			
3								Outlier removed			
4		***Ten-Well Network***									
5											
6											
7							Hydraulic Head (m NAVD88)				
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP
9											
10		299-E28-18	9/1/2005 16:00	89.995	TOPP	0.010	122.126	122.119	122.138	122.131	122.130
11		299-E28-27	9/1/2005 15:10	86.376	TOPP	0.005	122.102	122.092	122.139	122.129	122.128
12		299-E32-5	9/1/2005 13:06	86.902	TOPP	0.005	122.116	122.108	122.137	122.129	122.129
13		299-E32-6	9/1/2005 13:22	82.349	TOPP	0.005	122.103	122.108	122.118	122.123	122.123
14		299-E32-8	9/1/2005 13:38	75.711	TOPP	0.005	122.084	122.089	122.124	122.129	122.127
15		299-E33-28	9/1/2005 15:25	81.441	TOPP	0.013	122.107	122.120	122.113	122.126	122.126
16		299-E33-339	9/1/2005 14:51	80.904	TOPP	0.005	122.128	122.130	122.134	122.136	122.133
17		299-E33-34	9/1/2005 13:54	72.023	TOPP	0.005	122.115	122.123	122.121	122.129	122.123
18		299-E33-38	9/1/2005 14:12	71.577	TOPP	0.005	122.057	122.054	122.133	122.130	122.129
19		699-49-57A	9/1/2005 12:44	47.615	TOPP	0.010	122.116	122.118	122.116	122.118	122.115
20						Range (m):	0.071	0.076	0.026	0.018	0.018
21						Gradient Magnitude (m/m):	2.24E-05	1.36E-05	1.45E-05	7.68E-06	8.60E-06
22						Direction (azimuth):	39	53	350	312	332
23						R^2:	0.12	0.04	0.47	0.67	0.76
24						p-Value:	0.6292	0.8673	0.1079	0.0202	0.0068
25						Statistically Significant?:	No	No	No	Yes	Yes
26											
27											
28											
29							Hydraulic Head (m NAVD88)				
30		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP
31											
32		299-E28-18	9/12/2005 10:20	89.999	TOPP	0.010	122.122	122.115	122.134	122.127	122.127
33		299-E28-27	9/12/2005 12:15	86.382	TOPP	0.005	122.096	122.086	122.133	122.123	122.123
34		299-E32-5	9/12/2005 11:45	86.909	TOPP	0.005	122.109	122.101	122.130	122.122	122.122
35		299-E32-6	9/12/2005 11:35	82.354	TOPP	0.005	122.098	122.103	122.113	122.118	122.119
36		299-E32-8	9/12/2005 11:15	75.715	TOPP	0.005	122.080	122.085	122.120	122.125	122.126
37		299-E33-28	9/12/2005 12:00	81.444	TOPP	0.013	122.104	122.117	122.110	122.123	122.124
38		299-E33-339	9/12/2005 10:40	80.912	TOPP	0.005	122.120	122.122	122.126	122.128	122.129
39		299-E33-34	9/12/2005 11:05	72.029	TOPP	0.005	122.109	122.117	122.115	122.123	122.122
40		299-E33-38	9/12/2005 10:55	71.584	TOPP	0.005	122.050	122.047	122.126	122.123	122.124
41		699-49-57A	9/12/2005 9:45	47.623	TOPP	0.010	122.108	122.110	122.108	122.110	122.112
42						Range (m):	0.072	0.075	0.026	0.018	0.017
43						Gradient Magnitude (m/m):	2.49E-05	1.60E-05	1.63E-05	8.24E-06	7.49E-06
44						Direction (azimuth):	39	51	357	329	323
45						R^2:	0.15	0.05	0.59	0.69	0.67
46						p-Value:	0.5578	0.8245	0.0450	0.0174	0.0212
47						Statistically Significant?:	No	No	Yes	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1

	B	C	D	E	F	G	H	I	J	K
51						Hydraulic Head (m NAVD88)				
52	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
53										
54	299-E28-18	10/11/2005 13:18	90.002	TOPP	0.010	122.119	122.112	122.131	122.124	122.124
55	299-E28-27	10/11/2005 12:53	86.384	TOPP	0.005	122.094	122.084	122.131	122.121	122.121
56	299-E32-5	10/11/2005 12:10	86.912	TOPP	0.005	122.106	122.098	122.127	122.119	122.119
57	299-E32-6	10/11/2005 12:18	82.355	TOPP	0.005	122.097	122.102	122.112	122.117	122.117
58	299-E32-8	10/11/2005 12:29	75.720	TOPP	0.005	122.075	122.080	122.115	122.120	122.121
59	299-E33-28	10/11/2005 12:46	81.448	TOPP	0.013	122.100	122.113	122.106	122.119	122.120
60	299-E33-339	10/11/2005 13:00	80.921	TOPP	0.005	122.111	122.113	122.117	122.119	122.120
61	299-E33-34	10/11/2005 12:39	72.034	TOPP	0.005	122.104	122.112	122.110	122.118	122.117
62	299-E33-38	10/11/2005 13:09	71.588	TOPP	0.005	122.046	122.043	122.122	122.119	122.119
63	699-49-57A	10/11/2005 11:45	47.625	TOPP	0.010	122.106	122.108	122.106	122.108	122.110
64					Range (m):	0.073	0.070	0.025	0.016	0.014
65					Gradient Magnitude (m/m):	2.81E-05	1.96E-05	1.74E-05	8.02E-06	7.16E-06
66					Direction (azimuth):	44	56	9	356	356
67					R^2:	0.19	0.08	0.56	0.78	0.78
68					p-Value:	0.4703	0.7328	0.0563	0.0047	0.0051
69					Statistically Significant?:	No	No	No	Yes	Yes
70										
71										
72										
73						Hydraulic Head (m NAVD88)				
74	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
75										
76	299-E28-18	10/25/2005 8:58	90.010	TOPP	0.010	122.111	122.104	122.123	122.116	122.116
77	299-E28-27	10/25/2005 9:35	86.391	TOPP	0.005	122.087	122.077	122.124	122.114	122.113
78	299-E32-5	10/25/2005 11:10	86.916	TOPP	0.005	122.102	122.094	122.123	122.115	122.115
79	299-E32-6	10/25/2005 11:00	82.361	TOPP	0.005	122.091	122.096	122.106	122.111	122.110
80	299-E32-8	10/25/2005 10:46	75.723	TOPP	0.005	122.072	122.077	122.112	122.117	122.115
81	299-E33-28	10/25/2005 10:09	81.452	TOPP	0.013	122.096	122.109	122.102	122.115	122.114
82	299-E33-339	10/25/2005 9:16	80.921	TOPP	0.005	122.111	122.113	122.117	122.119	122.117
83	299-E33-34	10/25/2005 10:34	72.036	TOPP	0.005	122.102	122.110	122.108	122.116	122.113
84	299-E33-38	10/25/2005 10:22	71.591	TOPP	0.005	122.043	122.040	122.119	122.116	122.114
85	699-49-57A	10/25/2005 8:31	47.630	TOPP	0.010	122.101	122.103	122.101	122.103	122.100
86					Range (m):	0.068	0.073	0.023	0.016	0.017
87					Gradient Magnitude (m/m):	2.33E-05	1.48E-05	1.41E-05	6.38E-06	7.86E-06
88					Direction (azimuth):	43	58	357	320	339
89					R^2:	0.14	0.05	0.52	0.55	0.65
90					p-Value:	0.5914	0.8369	0.0785	0.0599	0.0260
91					Statistically Significant?:	No	No	No	No	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	B	C	D	E	F	G	H	I	J	K
95						Hydraulic Head (m NAVD88)				
96	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
97										
98	299-E28-18	11/23/2005 13:40	90.014	TOPP	0.010	122.107	122.100	122.119	122.112	122.111
99	299-E28-27	11/23/2005 14:45	86.398	TOPP	0.005	122.080	122.070	122.117	122.107	122.106
100	299-E32-5	11/23/2005 15:11	86.925	TOPP	0.005	122.093	122.085	122.114	122.106	122.106
101	299-E32-6	11/23/2005 15:22	82.369	TOPP	0.005	122.083	122.088	122.098	122.103	122.102
102	299-E32-8	11/23/2005 15:41	75.732	TOPP	0.005	122.063	122.068	122.103	122.108	122.106
103	299-E33-28	11/23/2005 15:00	81.461	TOPP	0.013	122.087	122.100	122.093	122.106	122.105
104	299-E33-339	11/23/2005 14:33	80.929	TOPP	0.005	122.103	122.105	122.109	122.111	122.109
105	299-E33-34	11/23/2005 15:48	72.044	TOPP	0.005	122.094	122.102	122.100	122.108	122.105
106	299-E33-38	11/23/2005 14:15	71.601	TOPP	0.005	122.033	122.030	122.109	122.106	122.104
107	699-49-57A	11/23/2005 13:03	47.636	TOPP	0.010	122.095	122.097	122.095	122.097	122.094
108					Range (m):	0.074	0.075	0.026	0.015	0.017
109					Gradient Magnitude (m/m):	2.52E-05	1.67E-05	1.55E-05	6.92E-06	8.48E-06
110					Direction (azimuth):	43	56	2	336	348
111					R^2:	0.15	0.06	0.54	0.69	0.79
112					p-Value:	0.5729	0.8130	0.0670	0.0168	0.0042
113					Statistically Significant?:	No	No	No	Yes	Yes
114										
115										
116										
117						Hydraulic Head (m NAVD88)				
118	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
119										
120	299-E28-18	12/29/2005 9:41	90.023	TOPP	0.010	122.098	122.091	122.110	122.103	122.102
121	299-E28-27	12/29/2005 10:13	86.407	TOPP	0.005	122.071	122.061	122.108	122.098	122.099
122	299-E32-5	12/29/2005 11:21	86.932	TOPP	0.005	122.086	122.078	122.107	122.099	122.099
123	299-E32-6	12/29/2005 11:09	82.377	TOPP	0.005	122.075	122.080	122.090	122.095	122.097
124	299-E32-8	12/29/2005 10:59	75.739	TOPP	0.005	122.056	122.061	122.096	122.101	122.103
125	299-E33-28	12/29/2005 10:24	81.472	TOPP	0.013	122.076	122.089	122.082	122.095	122.097
126	299-E33-339	12/29/2005 9:58	80.942	TOPP	0.005	122.090	122.092	122.096	122.098	122.103
127	299-E33-34	12/29/2005 10:46	72.060	TOPP	0.005	122.078	122.086	122.084	122.092	122.093
128	299-E33-38	12/29/2005 10:37	71.612	TOPP	0.005	122.022	122.019	122.098	122.095	122.099
129	699-49-57A	12/29/2005 9:30	47.647	TOPP	0.010	122.084	122.086	122.084	122.086	122.093
130					Range (m):	0.076	0.073	0.028	0.017	0.010
131					Gradient Magnitude (m/m):	3.13E-05	2.29E-05	1.98E-05	1.01E-05	4.91E-06
132					Direction (azimuth):	45	56	16	13	353
133					R^2:	0.23	0.12	0.55	0.70	0.40
134					p-Value:	0.3975	0.6518	0.0621	0.0143	0.1718
135					Statistically Significant?:	No	No	No	Yes	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	B	C	D	E	F	G	H	I	J	K
139						Hydraulic Head (m NAVD88)				
140	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
141										
142	299-E28-18	2/2/2006 10:35	90.036	TOPP	0.010	122.085	122.078	122.097	122.090	122.090
143	299-E28-27	2/2/2006 11:40	86.417	TOPP	0.005	122.061	122.051	122.098	122.088	122.088
144	299-E32-5	2/2/2006 13:14	86.945	TOPP	0.005	122.073	122.065	122.094	122.086	122.086
145	299-E32-6	2/2/2006 12:58	82.388	TOPP	0.005	122.064	122.069	122.079	122.084	122.085
146	299-E32-8	2/2/2006 12:43	75.752	TOPP	0.005	122.043	122.048	122.083	122.088	122.090
147	299-E33-28	2/2/2006 12:10	81.480	TOPP	0.013	122.068	122.081	122.074	122.087	122.087
148	299-E33-339	2/2/2006 11:23	80.953	TOPP	0.005	122.079	122.081	122.085	122.087	122.089
149	299-E33-34	2/2/2006 12:30	72.069	TOPP	0.005	122.069	122.077	122.075	122.083	122.086
150	299-E33-38	2/2/2006 11:00	71.620	TOPP	0.005	122.014	122.011	122.090	122.087	122.088
151	699-49-57A	2/2/2006 9:57	47.662	TOPP	0.010	122.069	122.071	122.069	122.071	122.076
152					Range (m):	0.071	0.070	0.029	0.019	0.014
153					Gradient Magnitude (m/m):	2.85E-05	1.96E-05	1.88E-05	9.66E-06	6.48E-06
154					Direction (azimuth):	40	50	5	350	341
155					R^2:	0.22	0.09	0.62	0.72	0.62
156					p-Value:	0.4255	0.7238	0.0339	0.0109	0.0330
157					Statistically Significant?:	No	No	Yes	Yes	Yes
158										
159										
160										
161						Hydraulic Head (m NAVD88)				
162	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
163										
164	299-E28-18	3/8/2006 13:27	90.038	TOPP	0.010	122.083	122.076	122.095	122.088	122.086
165	299-E28-27	3/8/2006 13:53	86.429	TOPP	0.005	122.049	122.039	122.086	122.076	122.074
166	299-E32-5	3/8/2006 14:46	86.953	TOPP	0.005	122.065	122.057	122.086	122.078	122.078
167	299-E32-6	3/8/2006 14:34	82.400	TOPP	0.005	122.052	122.057	122.067	122.072	122.070
168	299-E32-8	3/8/2006 14:26	75.761	TOPP	0.005	122.034	122.039	122.074	122.079	122.075
169	299-E33-28	3/8/2006 14:02	81.492	TOPP	0.013	122.056	122.069	122.062	122.075	122.075
170	299-E33-339	3/8/2006 13:43	80.955	TOPP	0.005	122.077	122.079	122.083	122.085	122.080
171	299-E33-34	3/8/2006 14:12	72.073	TOPP	0.005	122.065	122.073	122.071	122.079	122.069
172	299-E33-38	3/8/2006 15:14	71.629	TOPP	0.005	122.005	122.002	122.081	122.078	122.078
173	699-49-57A	3/8/2006 12:43	47.663	TOPP	0.010	122.068	122.070	122.068	122.070	122.065
174					Range (m):	0.078	0.077	0.033	0.018	0.021
175					Gradient Magnitude (m/m):	2.52E-05	1.64E-05	1.61E-05	7.78E-06	1.05E-05
176					Direction (azimuth):	41	53	359	332	348
177					R^2:	0.14	0.05	0.47	0.53	0.70
178					p-Value:	0.5978	0.8294	0.1087	0.0703	0.0147
179					Statistically Significant?:	No	No	No	No	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	B	C	D	E	F	G	H	I	J	K
183						Hydraulic Head (m NAVD88)				
184	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
185										
186	299-E28-18	6/8/2006 12:13	90.043	TOPP	0.010	122.078	122.071	122.090	122.083	122.082
187	299-E28-27	6/8/2006 12:52	86.428	TOPP	0.005	122.050	122.040	122.087	122.077	122.077
188	299-E32-5	6/8/2006 13:51	86.953	TOPP	0.005	122.065	122.057	122.086	122.078	122.078
189	299-E32-6	6/8/2006 13:38	82.398	TOPP	0.005	122.054	122.059	122.069	122.074	122.074
190	299-E32-8	6/8/2006 14:00	75.762	TOPP	0.005	122.033	122.038	122.073	122.078	122.077
191	299-E33-28	6/8/2006 13:20	81.491	TOPP	0.013	122.057	122.070	122.063	122.076	122.076
192	299-E33-339	6/8/2006 12:30	80.960	TOPP	0.005	122.072	122.074	122.078	122.080	122.081
193	299-E33-34	6/8/2006 14:14	72.076	TOPP	0.005	122.062	122.070	122.068	122.076	122.074
194	299-E33-38	6/8/2006 14:31	71.629	TOPP	0.005	122.005	122.002	122.081	122.078	122.078
195	699-49-57A	6/8/2006 11:36	47.672	TOPP	0.010	122.059	122.061	122.059	122.061	122.062
196					Range (m):	0.073	0.072	0.031	0.022	0.020
197					Gradient Magnitude (m/m):	2.86E-05	1.95E-05	1.95E-05	1.05E-05	1.01E-05
198					Direction (azimuth):	38	47	3	347	344
199					R^2:	0.21	0.08	0.63	0.74	0.80
200					p-Value:	0.4420	0.7376	0.0316	0.0085	0.0038
201					Statistically Significant?:	No	No	Yes	Yes	Yes
202										
203										
204										
205						Hydraulic Head (m NAVD88)				
206	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	No Corrections	New RP Only	Gyro Correction Only	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
207										
208	299-E28-18	1/25/2007 15:57	90.064	TOPP	0.010	122.057	122.050	122.069	122.062	122.062
209	299-E28-27	NM	NM	NM	NM	NM	NM	NM	NM	NM
210	299-E32-5	1/25/2007 16:59	86.974	TOPP	0.005	122.044	122.036	122.065	122.057	122.057
211	299-E32-6	1/25/2007 16:49	82.419	TOPP	0.005	122.033	122.038	122.048	122.053	122.052
212	299-E32-8	1/25/2007 16:39	75.783	TOPP	0.005	122.012	122.017	122.052	122.057	122.056
213	299-E33-28	NM	NM	NM	NM	NM	NM	NM	NM	NM
214	299-E33-339	1/25/2007 16:08	80.980	TOPP	0.005	122.052	122.054	122.058	122.060	122.058
215	299-E33-34	1/25/2007 16:31	72.094	TOPP	0.005	122.044	122.052	122.050	122.058	122.058
216	299-E33-38	1/25/2007 16:21	71.650	TOPP	0.005	121.984	121.981	122.060	122.057	122.055
217	699-49-57A	1/25/2007 15:37	47.685	TOPP	0.010	122.046	122.048	122.046	122.048	122.045
218					Range (m):	0.073	0.073	0.023	0.014	0.017
219					Gradient Magnitude (m/m):	2.68E-05	2.00E-05	1.44E-05	7.27E-06	8.73E-06
220					Direction (azimuth):	41	52	356	336	348
221					R^2:	0.16	0.09	0.70	0.81	0.76
222					p-Value:	0.6393	0.7910	0.0494	0.0149	0.0269
223					Statistically Significant?:	No	No	Yes	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
4	***Fourteen-Well Network***						
5							
6							
7	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
8						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
9							
10	299-E28-1	6/16/2008 11:30	87.862	TOC	0.000	121.995	121.984
11	299-E28-17	6/16/2008 12:57	94.728	TOC	0.000	121.992	121.990
12	299-E28-18	6/16/2008 11:45	90.145	TOPP	0.010	121.981	121.980
13	299-E28-27	6/16/2008 12:30	86.526	TOPP	0.005	121.979	121.978
14	299-E32-5	6/16/2008 12:00	87.052	TOPP	0.005	121.979	121.979
15	299-E32-6	6/16/2008 12:05	82.496	TOPP	0.005	121.976	121.975
16	299-E32-8	6/16/2008 12:10	75.858	TOPP	0.005	121.982	121.981
17	299-E33-28	6/16/2008 12:24	81.591	TOPP	0.013	121.976	121.975
18	299-E33-339	6/16/2008 12:49	81.057	TOPP	0.005	121.983	121.981
19	299-E33-34	6/16/2008 12:15	72.168	TOPP	0.005	121.984	121.981
20	299-E33-38	6/16/2008 12:43	71.726	TOPP	0.005	121.981	121.980
21	699-49-55A	6/16/2008 13:30	40.884	TOPP	0.004	121.995	121.992
22	699-49-57A	6/16/2008 13:17	47.756	TOPP	0.010	121.977	121.974
23	699-50-56	6/16/2008 14:10	47.111	TOPP	0.009	121.965	121.961
24					Range (m):	0.030	0.031
25					Gradient Magnitude (m/m):	8.80E-06	5.91E-06
26					Direction (azimuth):	287	309
27					R^2:	0.38	0.31
28					p-Value:	0.0744	0.1321
29					Statistically Significant?:	No	No
30							
31							
32							
33	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
34						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
35							
36	299-E28-1	7/21/2008 8:41	87.893	TOC	0.000	121.964	121.972
37	299-E28-17	7/21/2008 8:12	94.777	TOPP	0.010	121.953	121.955
38	299-E28-18	7/21/2008 8:22	90.146	TOPP	0.010	121.980	121.980
39	299-E28-27	7/21/2008 8:50	86.533	TOPP	0.005	121.972	121.972
40	299-E32-5	7/21/2008 9:31	87.057	TOPP	0.005	121.974	121.974
41	299-E32-6	7/21/2008 9:36	82.504	TOPP	0.005	121.968	121.967
42	299-E32-8	7/21/2008 9:43	75.865	TOPP	0.005	121.975	121.975
43	299-E33-28	7/21/2008 8:57	81.598	TOPP	0.013	121.969	121.969
44	299-E33-339	7/21/2008 9:05	81.070	TOPP	0.005	121.970	121.971
45	299-E33-34	7/21/2008 9:51	72.185	TOPP	0.005	121.967	121.966
46	299-E33-38	7/21/2008 9:15	71.730	TOPP	0.005	121.977	121.977
47	699-49-55A	7/21/2008 7:50	40.896	TOC	0.000	121.979	121.979
48	699-49-57A	7/21/2008 7:58	47.768	TOPP	0.010	121.965	121.967
49	699-50-56	7/21/2008 7:41	47.109	TOC	0.000	121.958	121.959
50					Range (m):	0.027	0.025
51					Gradient Magnitude (m/m):	1.27E-06	1.35E-06
52					Direction (azimuth):	97	264
53					R^2:	0.01	0.01
54					p-Value:	0.9639	0.9673
55					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
59	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
60						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
61							
62	299-E28-1	8/29/2008 9:47	87.882	TOC	0.000	121.975	121.957
63	299-E28-17	8/29/2008 9:37	94.754	TOC	0.000	121.966	121.964
64	299-E28-18	8/29/2008 10:32	90.164	TOPP	0.010	121.962	121.961
65	299-E28-27	8/29/2008 11:10	86.540	TOPP	0.005	121.965	121.964
66	299-E32-5	8/29/2008 10:24	87.063	TOPP	0.005	121.968	121.968
67	299-E32-6	8/29/2008 10:19	82.508	TOPP	0.005	121.964	121.964
68	299-E32-8	8/29/2008 10:14	75.868	TOPP	0.005	121.972	121.970
69	299-E33-28	8/29/2008 11:05	81.604	TOPP	0.013	121.963	121.963
70	299-E33-339	8/29/2008 9:54	81.071	TOPP	0.005	121.969	121.967
71	299-E33-34	8/29/2008 10:09	72.180	TOPP	0.005	121.972	121.968
72	299-E33-38	8/29/2008 10:02	71.740	TOPP	0.005	121.967	121.966
73	699-49-55A	8/29/2008 10:52	40.887	TOC	0.000	121.988	121.985
74	699-49-57A	8/29/2008 10:43	47.758	TOPP	0.010	121.975	121.971
75	699-50-56	8/29/2008 10:57	47.080	TOC	0.000	121.987	121.980
76					Range (m):	0.026	0.028
77					Gradient Magnitude (m/m):	1.32E-05	9.13E-06
78					Direction (azimuth):	213	187
79					R^2:	0.64	0.68
80					p-Value:	0.0036	0.0018
81					Statistically Significant?:	Yes	Yes
82							
83							
84							
85	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
86						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
87							
88	299-E28-1	9/11/2008 9:40	87.914	TOPP	0.013	121.956	121.963
89	299-E28-17	9/11/2008 9:12	94.785	TOPP	0.010	121.945	121.944
90	299-E28-18	9/11/2008 9:21	90.164	TOPP	0.010	121.962	121.962
91	299-E28-27	9/11/2008 11:05	86.540	TOPP	0.005	121.965	121.965
92	299-E32-5	9/11/2008 11:17	87.063	TOPP	0.005	121.968	121.968
93	299-E32-6	9/11/2008 11:23	82.507	TOPP	0.005	121.965	121.965
94	299-E32-8	9/11/2008 11:31	75.868	TOPP	0.005	121.972	121.972
95	299-E33-28	9/11/2008 10:58	81.598	TOPP	0.013	121.969	121.970
96	299-E33-339	9/11/2008 9:51	81.080	TOPP	0.005	121.960	121.962
97	299-E33-34	9/11/2008 11:36	72.186	TOPP	0.005	121.966	121.965
98	299-E33-38	9/11/2008 10:04	71.745	TOPP	0.005	121.962	121.965
99	699-49-55A	9/11/2008 9:56	40.899	TOC	0.000	121.976	121.981
100	699-49-57A	9/11/2008 8:25	47.766	TOPP	0.010	121.967	121.971
101	699-50-56	9/11/2008 8:47	47.099	TOPP	0.009	121.977	121.976
102					Range (m):	0.032	0.037
103					Gradient Magnitude (m/m):	9.30E-06	1.01E-05
104					Direction (azimuth):	156	180
105					R^2:	0.73	0.69
106					p-Value:	0.0008	0.0017
107					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
111						Hydraulic Head (m NAVD88)	
112	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
113							
114	299-E28-1	10/23/2008 12:44	87.889	TOPP	0.013	121.981	121.975
115	299-E28-17	10/23/2008 12:54	94.767	TOPP	0.010	121.963	121.965
116	299-E28-18	10/23/2008 12:50	90.162	TOPP	0.010	121.964	121.965
117	299-E28-27	10/23/2008 12:32	86.538	TOPP	0.005	121.967	121.966
118	299-E32-5	10/23/2008 12:06	87.065	TOPP	0.005	121.966	121.966
119	299-E32-6	10/23/2008 12:10	82.505	TOPP	0.005	121.967	121.966
120	299-E32-8	10/23/2008 12:05	75.867	TOPP	0.005	121.973	121.972
121	299-E33-28	10/23/2008 12:36	81.599	TOPP	0.013	121.968	121.967
122	299-E33-339	10/23/2008 12:26	81.075	TOPP	0.005	121.965	121.961
123	299-E33-34	10/23/2008 12:18	72.183	TOPP	0.005	121.969	121.966
124	299-E33-38	10/23/2008 12:22	71.735	TOPP	0.005	121.972	121.968
125	699-49-55A	10/23/2008 11:54	40.888	TOC	0.000	121.987	121.982
126	699-49-57A	10/23/2008 12:00	47.761	TOPP	0.010	121.972	121.969
127	699-50-56	10/23/2008 11:50	47.102	TOPP	0.009	121.974	121.971
128					Range (m):	0.024	0.021
129					Gradient Magnitude (m/m):	1.11E-05	5.86E-06
130					Direction (azimuth):	226	218
131					R^2:	0.45	0.27
132					p-Value:	0.0376	0.1803
133					Statistically Significant?:	Yes	No
134							
135							
136							
137						Hydraulic Head (m NAVD88)	
138	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
139							
140	299-E28-1	11/26/2008 10:38	87.901	TOPP	0.013	121.969	121.985
141	299-E28-17	11/26/2008 10:48	94.798	TOPP	0.010	121.932	121.932
142	299-E28-18	11/26/2008 9:52	90.173	TOPP	0.010	121.953	121.952
143	299-E28-27	11/26/2008 10:09	86.551	TOPP	0.005	121.954	121.954
144	299-E32-5	11/26/2008 9:40	87.081	TOPP	0.005	121.950	121.950
145	299-E32-6	11/26/2008 9:35	82.522	TOPP	0.005	121.950	121.951
146	299-E32-8	11/26/2008 9:28	75.884	TOPP	0.005	121.956	121.957
147	299-E33-28	11/26/2008 10:17	81.614	TOPP	0.013	121.953	121.953
148	299-E33-339	11/26/2008 8:48	81.091	TOPP	0.005	121.949	121.952
149	299-E33-34	11/26/2008 9:18	72.201	TOPP	0.005	121.951	121.954
150	299-E33-38	11/26/2008 8:59	71.752	TOPP	0.005	121.955	121.956
151	699-49-55A	11/26/2008 11:04	40.910	TOC	0.000	121.965	121.969
152	699-49-57A	11/26/2008 11:20	47.778	TOPP	0.010	121.955	121.960
153	699-50-56	11/26/2008 11:36	47.118	TOPP	0.009	121.958	121.954
154					Range (m):	0.037	0.053
155					Gradient Magnitude (m/m):	1.13E-05	1.59E-05
156					Direction (azimuth):	225	237
157					R^2:	0.31	0.24
158					p-Value:	0.1268	0.2152
159					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
163						Hydraulic Head (m NAVD88)	
164	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
165							
166	299-E28-1	12/23/2008 9:39	87.942	TOPP	0.013	121.928	121.941
167	299-E28-17	12/23/2008 9:29	94.810	TOPP	0.010	121.920	121.921
168	299-E28-18	12/23/2008 9:19	90.187	TOPP	0.010	121.939	121.938
169	299-E28-27	12/23/2008 8:58	86.566	TOPP	0.005	121.939	121.939
170	299-E32-5	12/23/2008 9:09	87.092	TOPP	0.005	121.939	121.939
171	299-E32-6	12/23/2008 9:05	82.530	TOPP	0.005	121.942	121.941
172	299-E32-8	12/23/2008 8:41	75.890	TOPP	0.005	121.950	121.950
173	299-E33-28	12/23/2008 8:54	81.625	TOPP	0.013	121.942	121.941
174	299-E33-339	NM	NM	TOPP	0.005	NM	NM
175	299-E33-34	12/23/2008 8:48	72.249	TOPP	0.005	121.903	121.906
176	299-E33-38	12/23/2008 9:53	71.763	TOPP	0.005	121.944	121.944
177	699-49-55A	12/23/2008 10:03	40.920	TOC	0.000	121.955	121.957
178	699-49-57A	12/23/2008 10:10	47.798	TOPP	0.010	121.935	121.937
179	699-50-56	12/23/2008 10:20	47.142	TOPP	0.009	121.934	121.936
180					Range (m):	0.052	0.051
181					Gradient Magnitude (m/m):	5.70E-06	7.65E-06
182					Direction (azimuth):	160	210
183					R^2:	0.24	0.25
184					p-Value:	0.2892	0.2794
185					Statistically Significant?:	No	No
186							
187							
188							
189						Hydraulic Head (m NAVD88)	
190	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
191							
192	299-E28-1	1/12/2009 10:06	87.936	TOPP	0.013	121.934	121.940
193	299-E28-17	1/12/2009 10:13	94.802	TOPP	0.010	121.928	121.928
194	299-E28-18	1/12/2009 10:21	90.183	TOPP	0.010	121.943	121.943
195	299-E28-27	1/12/2009 10:33	86.563	TOPP	0.005	121.942	121.943
196	299-E32-5	1/12/2009 9:16	87.092	TOPP	0.005	121.939	121.939
197	299-E32-6	1/12/2009 9:24	82.534	TOPP	0.005	121.938	121.940
198	299-E32-8	1/12/2009 9:31	75.895	TOPP	0.005	121.945	121.946
199	299-E33-28	1/12/2009 10:39	81.626	TOPP	0.013	121.941	121.942
200	299-E33-339	1/12/2009 9:58	81.101	TOPP	0.005	121.939	121.940
201	299-E33-34	1/12/2009 9:37	72.214	TOPP	0.005	121.938	121.941
202	299-E33-38	1/12/2009 9:42	71.766	TOPP	0.005	121.941	121.943
203	699-49-55A	1/12/2009 9:02	40.925	TOC	0.000	121.950	121.960
204	699-49-57A	1/12/2009 9:08	47.796	TOPP	0.010	121.937	121.941
205	699-50-56	1/12/2009 8:56	47.149	TOPP	0.009	121.927	121.928
206					Range (m):	0.023	0.032
207					Gradient Magnitude (m/m):	8.86E-07	4.11E-06
208					Direction (azimuth):	130	219
209					R^2:	0.01	0.06
210					p-Value:	0.9450	0.7099
211					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
215						Hydraulic Head (m NAVD88)	
216	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
217							
218	299-E28-1	2/23/2009 10:27	87.978	TOPP	0.013	121.892	121.883
219	299-E28-17	2/23/2009 12:01	94.799	TOPP	0.010	121.931	121.930
220	299-E28-18	2/23/2009 11:50	90.198	TOPP	0.010	121.928	121.927
221	299-E28-27	2/23/2009 11:16	86.582	TOPP	0.005	121.923	121.922
222	299-E32-5	2/23/2009 11:41	87.114	TOPP	0.005	121.917	121.917
223	299-E32-6	2/23/2009 11:25	82.549	TOPP	0.005	121.923	121.921
224	299-E32-8	2/23/2009 11:34	75.911	TOPP	0.005	121.929	121.927
225	299-E33-28	2/23/2009 11:10	81.642	TOPP	0.013	121.925	121.924
226	299-E33-339	2/23/2009 10:15	81.113	TOPP	0.005	121.927	121.925
227	299-E33-34	2/23/2009 10:55	72.223	TOPP	0.005	121.929	121.926
228	299-E33-38	2/23/2009 10:46	71.778	TOPP	0.005	121.929	121.926
229	699-49-55A	2/23/2009 12:40	40.928	TOC	0.000	121.947	121.941
230	699-49-57A	2/23/2009 12:12	47.806	TOPP	0.010	121.927	121.923
231	699-50-56	2/23/2009 12:30	47.156	TOPP	0.009	121.920	121.914
232					Range (m):	0.055	0.058
233					Gradient Magnitude (m/m):	9.88E-06	7.50E-06
234					Direction (azimuth):	247	263
235					R^2:	0.22	0.18
236					p-Value:	0.2966	0.3812
237					Statistically Significant?:	No	No
238							
239							
240							
241						Hydraulic Head (m NAVD88)	
242	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
243							
244	299-E28-1	3/24/2009 7:43	87.957	TOPP	0.013	121.913	121.917
245	299-E28-17	3/24/2009 7:54	94.822	TOPP	0.010	121.908	121.907
246	299-E28-18	3/24/2009 7:48	90.212	TOPP	0.010	121.914	121.915
247	299-E28-27	3/24/2009 7:33	86.593	TOPP	0.005	121.912	121.913
248	299-E32-5	3/24/2009 7:06	87.115	TOPP	0.005	121.916	121.916
249	299-E32-6	3/24/2009 7:10	82.558	TOPP	0.005	121.914	121.916
250	299-E32-8	3/24/2009 7:13	75.923	TOPP	0.005	121.917	121.919
251	299-E33-28	3/24/2009 7:37	81.652	TOPP	0.013	121.915	121.917
252	299-E33-339	3/24/2009 7:26	81.124	TOPP	0.005	121.916	121.917
253	299-E33-34	3/24/2009 7:16	72.239	TOPP	0.005	121.913	121.915
254	299-E33-38	3/24/2009 7:21	71.799	TOPP	0.005	121.908	121.912
255	699-49-55A	3/24/2009 6:56	40.949	TOC	0.000	121.926	121.933
256	699-49-57A	3/24/2009 6:59	47.821	TOPP	0.010	121.912	121.915
257	699-50-56	3/24/2009 6:52	47.172	TOPP	0.009	121.904	121.903
258					Range (m):	0.022	0.030
259					Gradient Magnitude (m/m):	6.34E-07	2.53E-06
260					Direction (azimuth):	106	224
261					R^2:	0.00	0.03
262					p-Value:	0.9738	0.8659
263					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
267						Hydraulic Head (m NAVD88)	
268	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
269							
270	299-E28-1	4/13/2009 8:35	87.951	TOPP	0.013	121.919	121.921
271	299-E28-17	4/13/2009 8:44	94.819	TOPP	0.010	121.911	121.910
272	299-E28-18	4/13/2009 8:51	90.207	TOPP	0.010	121.919	121.918
273	299-E28-27	4/13/2009 9:01	86.581	TOPP	0.005	121.924	121.924
274	299-E32-5	4/13/2009 7:48	87.118	TOPP	0.005	121.913	121.913
275	299-E32-6	4/13/2009 7:56	82.557	TOPP	0.005	121.915	121.916
276	299-E32-8	4/13/2009 8:05	75.917	TOPP	0.005	121.923	121.924
277	299-E33-28	4/13/2009 9:07	81.647	TOPP	0.013	121.920	121.920
278	299-E33-339	4/13/2009 8:28	81.120	TOPP	0.005	121.920	121.921
279	299-E33-34	4/13/2009 8:11	72.237	TOPP	0.005	121.915	121.917
280	299-E33-38	4/13/2009 8:17	71.788	TOPP	0.005	121.919	121.920
281	699-49-55A	4/13/2009 7:28	40.952	TOC	0.000	121.923	121.927
282	699-49-57A	4/13/2009 7:38	47.824	TOPP	0.010	121.909	121.912
283	699-50-56	4/13/2009 7:13	47.180	TOPP	0.009	121.896	121.897
284					Range (m):	0.015	0.015
285					Gradient Magnitude (m/m):	4.72E-06	4.83E-06
286					Direction (azimuth):	316	289
287					R^2:	0.21	0.14
288					p-Value:	0.2708	0.4408
289					Statistically Significant?:	No	No
290							
291							
292							
293						Hydraulic Head (m NAVD88)	
294	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
295							
296	299-E28-1	5/28/2009 7:22	87.940	TOPP	0.013	121.930	121.939
297	299-E28-17	5/28/2009 6:55	94.810	TOPP	0.010	121.920	121.921
298	299-E28-18	5/28/2009 7:06	90.196	TOPP	0.010	121.930	121.931
299	299-E28-27	5/28/2009 8:00	86.575	TOPP	0.005	121.930	121.930
300	299-E32-5	5/28/2009 8:36	87.105	TOPP	0.005	121.926	121.926
301	299-E32-6	5/28/2009 8:30	82.547	TOPP	0.005	121.925	121.925
302	299-E32-8	5/28/2009 8:20	75.991	TOPP	0.005	121.849	121.850
303	299-E33-28	5/28/2009 7:52	81.636	TOPP	0.013	121.931	121.931
304	299-E33-339	5/28/2009 7:33	81.107	TOPP	0.005	121.933	121.934
305	299-E33-34	5/28/2009 8:10	72.226	TOPP	0.005	121.926	121.928
306	299-E33-38	5/28/2009 7:44	71.775	TOPP	0.005	121.932	121.932
307	699-49-55A	5/28/2009 8:57	40.938	TOC	0.000	121.937	121.940
308	699-49-57A	5/28/2009 8:47	47.812	TOPP	0.010	121.921	121.923
309	699-50-56	5/28/2009 9:05	47.186	TOPP	0.009	121.890	121.888
310					Range (m):	0.088	0.090
311					Gradient Magnitude (m/m):	8.23E-06	1.07E-05
312					Direction (azimuth):	310	300
313					R^2:	0.25	0.30
314					p-Value:	0.2343	0.1720
315					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
319						Hydraulic Head (m NAVD88)	
320	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
321							
322	299-E28-1	7/17/2009 10:49	87.888	TOPP	0.013	121.982	121.985
323	299-E28-17	7/17/2009 10:41	94.761	TOPP	0.010	121.969	121.968
324	299-E28-18	7/17/2009 10:33	90.149	TOPP	0.010	121.977	121.976
325	299-E28-27	7/17/2009 10:09	86.532	TOPP	0.005	121.973	121.973
326	299-E32-5	7/17/2009 9:50	87.066	TOPP	0.005	121.965	121.965
327	299-E32-6	7/17/2009 9:42	82.520	TOPP	0.005	121.952	121.952
328	299-E32-8	7/17/2009 9:31	75.872	TOPP	0.005	121.968	121.969
329	299-E33-28	7/17/2009 10:04	81.593	TOPP	0.013	121.974	121.974
330	299-E33-339	7/17/2009 10:24	81.062	TOPP	0.005	121.978	121.979
331	299-E33-34	7/17/2009 7:29	72.186	TOPP	0.005	121.966	121.969
332	299-E33-38	NM	NM	TOPP	0.005	NM	NM
333	699-49-55A	7/17/2009 6:44	40.911	TOC	0.000	121.964	121.967
334	699-49-57A	7/17/2009 7:12	47.783	TOPP	0.010	121.950	121.953
335	699-50-56	7/17/2009 6:52	47.172	TOPP	0.009	121.904	121.906
336					Range (m):	0.078	0.079
337					Gradient Magnitude (m/m):	1.97E-05	1.89E-05
338					Direction (azimuth):	335	326
339					R^2:	0.58	0.54
340					p-Value:	0.0127	0.0198
341					Statistically Significant?:	Yes	Yes
342							
343							
344							
345						Hydraulic Head (m NAVD88)	
346		Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
347							
348	299-E28-1	9/21/2009 9:35	87.933	TOPP	0.013	121.937	121.947
349	299-E28-17	9/21/2009 9:45	94.796	TOPP	0.010	121.934	121.931
350	299-E28-18	9/21/2009 9:49	90.181	TOPP	0.010	121.945	121.944
351	299-E28-27	9/21/2009 8:51	86.582	TOPP	0.005	121.923	121.924
352	299-E32-5	9/21/2009 8:27	87.092	TOPP	0.005	121.939	121.939
353	299-E32-6	9/21/2009 8:22	82.532	TOPP	0.005	121.940	121.942
354	299-E32-8	9/21/2009 8:18	75.897	TOPP	0.005	121.943	121.946
355	299-E33-28	9/21/2009 8:43	81.622	TOPP	0.013	121.945	121.947
356	299-E33-339	9/21/2009 9:11	81.098	TOPP	0.005	121.942	121.946
357	299-E33-34	9/21/2009 8:13	72.215	TOPP	0.005	121.937	121.942
358	299-E33-38	9/21/2009 9:03	71.766	TOPP	0.005	121.941	121.947
359	699-49-55A	9/21/2009 7:35	40.934	TOC	0.000	121.941	121.952
360	699-49-57A	9/21/2009 7:45	47.800	TOPP	0.010	121.933	121.940
361	699-50-56	9/21/2009 8:02	47.157	TOPP	0.009	121.919	121.920
362					Range (m):	0.026	0.032
363					Gradient Magnitude (m/m):	3.67E-06	5.57E-06
364					Direction (azimuth):	8	262
365					R^2:	0.10	0.06
366					p-Value:	0.5734	0.7241
367					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
371						Hydraulic Head (m NAVD88)	
372	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
373							
374	299-E28-1	10/27/2009 7:49	87.971	TOPP	0.013	121.899	121.918
375	299-E28-17	10/27/2009 7:00	94.833	TOPP	0.010	121.897	121.901
376	299-E28-18	10/27/2009 8:55	90.210	TOPP	0.010	121.916	121.916
377	299-E28-27	10/27/2009 8:42	86.586	TOPP	0.005	121.919	121.919
378	299-E32-5	10/27/2009 8:26	87.114	TOPP	0.005	121.917	121.917
379	299-E32-6	10/27/2009 8:21	82.553	TOPP	0.005	121.919	121.919
380	299-E32-8	10/27/2009 8:15	75.917	TOPP	0.005	121.923	121.924
381	299-E33-28	10/27/2009 8:36	81.645	TOPP	0.013	121.922	121.921
382	299-E33-339	10/27/2009 7:55	81.125	TOPP	0.005	121.915	121.918
383	299-E33-34	10/27/2009 8:10	72.223	TOPP	0.005	121.929	121.931
384	299-E33-38	10/27/2009 8:02	71.784	TOPP	0.005	121.923	121.921
385	699-49-55A	10/27/2009 10:22	41.500	TOC	0.000	121.375	121.377
386	699-49-57A	10/27/2009 10:14	47.816	TOPP	0.010	121.917	121.920
387	699-50-56	10/27/2009 10:30	47.175	TOPP	0.009	121.901	121.903
388					Range (m):	0.554	0.554
389					Gradient Magnitude (m/m):	5.98E-06	1.22E-06
390					Direction (azimuth):	100	176
391					R^2:	0.10	0.01
392					p-Value:	0.5781	0.9437
393					Statistically Significant?:	No	No
394							
395							
396							
397						Hydraulic Head (m NAVD88)	
398	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
399							
400	299-E28-1	11/12/2009 8:43	87.958	TOPP	0.013	121.912	121.915
401	299-E28-17	11/12/2009 8:52	94.830	TOPP	0.010	121.900	121.902
402	299-E28-18	11/12/2009 9:21	90.212	TOPP	0.010	121.914	121.915
403	299-E28-27	11/12/2009 10:08	86.587	TOPP	0.005	121.918	121.918
404	299-E32-5	11/12/2009 9:33	87.115	TOPP	0.005	121.916	121.916
405	299-E32-6	11/12/2009 9:37	82.559	TOPP	0.005	121.913	121.912
406	299-E32-8	11/12/2009 9:41	75.921	TOPP	0.005	121.919	121.918
407	299-E33-28	11/12/2009 10:12	81.650	TOPP	0.013	121.917	121.916
408	299-E33-339	11/12/2009 9:57	81.123	TOPP	0.005	121.917	121.916
409	299-E33-34	11/12/2009 9:45	72.238	TOPP	0.005	121.914	121.914
410	299-E33-38	11/12/2009 9:52	71.786	TOPP	0.005	121.921	121.919
411	699-49-55A	11/12/2009 8:19	40.944	TOC	0.000	121.931	121.928
412	699-49-57A	11/12/2009 8:25	47.823	TOPP	0.010	121.910	121.909
413	699-50-56	11/12/2009 8:15	47.185	TOPP	0.009	121.891	121.893
414					Range (m):	0.040	0.035
415					Gradient Magnitude (m/m):	3.47E-06	3.46E-06
416					Direction (azimuth):	259	276
417					R^2:	0.02	0.04
418					p-Value:	0.8933	0.7905
419					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
423						Hydraulic Head (m NAVD88)	
424	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
425							
426	299-E28-1	1/21/2010 10:21	87.994	TOPP	0.013	121.876	121.888
427	299-E28-17	1/21/2010 10:01	94.958	TOT	0.100	121.862	121.866
428	299-E28-18	1/21/2010 10:08	90.249	TOPP	0.010	121.877	121.878
429	299-E28-27	1/21/2010 9:37	86.625	TOPP	0.005	121.880	121.880
430	299-E32-5	1/21/2010 8:43	87.153	TOPP	0.005	121.878	121.878
431	299-E32-6	1/21/2010 8:51	82.592	TOPP	0.005	121.880	121.879
432	299-E32-8	1/21/2010 9:13	75.957	TOPP	0.005	121.883	121.883
433	299-E33-28	1/21/2010 9:28	81.684	TOPP	0.013	121.883	121.881
434	299-E33-339	1/21/2010 10:31	81.155	TOC	0.000	121.880	121.880
435	299-E33-34	1/21/2010 9:22	72.272	TOPP	0.005	121.880	121.879
436	299-E33-38	1/21/2010 10:42	71.803	TOPP	0.005	121.904	121.902
437	699-49-55A	1/21/2010 8:33	40.969	TOC	0.000	121.906	121.897
438	699-49-57A	1/21/2010 8:17	47.854	TOPP	0.010	121.879	121.876
439	699-50-56	1/21/2010 8:25	47.218	TOC	0.000	121.849	121.853
440					Range (m):	0.057	0.049
441					Gradient Magnitude (m/m):	1.07E-05	1.17E-05
442					Direction (azimuth):	243	258
443					R^2:	0.07	0.14
444					p-Value:	0.6749	0.4252
445					Statistically Significant?:	No	No
446							
447							
448							
449						Hydraulic Head (m NAVD88)	
450	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
451							
452	299-E28-1	5/23/2010 7:30	88.032	TOPP	0.013	121.838	121.851
453	299-E28-17	5/23/2010 7:18	94.898	TOPP	0.010	121.832	121.832
454	299-E28-18	5/23/2010 7:59	90.277	TOPP	0.010	121.849	121.848
455	299-E28-27	5/23/2010 8:48	86.659	TOPP	0.005	121.846	121.846
456	299-E32-5	5/23/2010 8:13	87.187	TOPP	0.005	121.844	121.844
457	299-E32-6	5/23/2010 8:20	82.628	TOPP	0.005	121.844	121.844
458	299-E32-8	5/23/2010 8:27	75.992	TOPP	0.005	121.848	121.849
459	299-E33-28	5/23/2010 8:42	81.718	TOPP	0.013	121.849	121.849
460	299-E33-339	5/23/2010 7:40	81.192	TOC	0.000	121.843	121.846
461	299-E33-34	5/23/2010 8:34	72.307	TOPP	0.005	121.845	121.846
462	299-E33-38	5/23/2010 8:58	71.855	TOPP	0.005	121.852	121.853
463	699-49-55A	5/23/2010 9:15	41.020	TOC	0.000	121.855	121.858
464	699-49-57A	5/23/2010 9:29	47.900	TOPP	0.010	121.833	121.836
465	699-50-56	5/23/2010 9:22	47.264	TOC	0.000	121.803	121.801
466					Range (m):	0.052	0.057
467					Gradient Magnitude (m/m):	6.29E-06	7.63E-06
468					Direction (azimuth):	358	318
469					R^2:	0.12	0.16
470					p-Value:	0.5020	0.3782
471					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
475						Hydraulic Head (m NAVD88)	
476	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
477							
478	299-E28-1	6/30/2010 13:05	88.008	TOPP	0.013	121.862	121.860
479	299-E28-17	6/30/2010 13:14	94.874	TOPP	0.010	121.856	121.852
480	299-E28-18	NM	NM	TOPP	0.010	NM	NM
481	299-E28-27	6/30/2010 13:40	86.647	TOPP	0.005	121.858	121.858
482	299-E32-5	6/30/2010 12:26	87.178	TOPP	0.005	121.853	121.853
483	299-E32-6	6/30/2010 12:30	82.626	TOPP	0.005	121.846	121.847
484	299-E32-8	6/30/2010 12:36	75.990	TOPP	0.005	121.850	121.850
485	299-E33-28	6/30/2010 13:44	81.712	TOPP	0.013	121.855	121.856
486	299-E33-339	6/30/2010 12:53	81.181	TOC	0.000	121.854	121.856
487	299-E33-34	6/30/2010 12:41	72.302	TOPP	0.005	121.850	121.850
488	299-E33-38	6/30/2010 12:46	71.856	TOPP	0.005	121.851	121.854
489	699-49-55A	6/30/2010 12:17	41.022	TOC	0.000	121.853	121.859
490	699-49-57A	6/30/2010 12:07	47.896	TOPP	0.010	121.837	121.840
491	699-50-56	6/30/2010 12:12	47.275	TOC	0.000	121.792	121.789
492					Range (m):	0.070	0.071
493					Gradient Magnitude (m/m):	1.81E-05	1.62E-05
494					Direction (azimuth):	353	348
495					R^2:	0.54	0.41
496					p-Value:	0.0212	0.0693
497					Statistically Significant?:	Yes	No
498							
499							
500							
501						Hydraulic Head (m NAVD88)	
502	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
503							
504	299-E28-1	7/13/2010 8:20	88.015	TOPP	0.013	121.855	121.876
505	299-E28-17	7/13/2010 8:10	94.899	TOPP	0.010	121.831	121.830
506	299-E28-18	NM	NM	TOPP	0.010	NM	NM
507	299-E28-27	7/13/2010 9:19	86.652	TOPP	0.005	121.853	121.853
508	299-E32-5	7/13/2010 10:36	87.181	TOPP	0.005	121.850	121.850
509	299-E32-6	7/13/2010 10:41	82.624	TOPP	0.005	121.848	121.849
510	299-E32-8	7/13/2010 10:46	75.990	TOPP	0.005	121.850	121.852
511	299-E33-28	7/13/2010 9:14	81.701	TOPP	0.013	121.866	121.868
512	299-E33-339	7/13/2010 8:42	81.182	TOC	0.000	121.853	121.857
513	299-E33-34	7/13/2010 9:06	72.308	TOPP	0.005	121.844	121.847
514	299-E33-38	7/13/2010 8:58	71.858	TOPP	0.005	121.849	121.853
515	699-49-55A	7/13/2010 10:10	41.025	TOC	0.000	121.850	121.857
516	699-49-57A	7/13/2010 10:17	47.889	TOPP	0.010	121.844	121.850
517	699-50-56	7/13/2010 10:25	47.269	TOC	0.000	121.798	121.799
518					Range (m):	0.068	0.077
519					Gradient Magnitude (m/m):	1.02E-05	1.17E-05
520					Direction (azimuth):	357	312
521					R^2:	0.20	0.21
522					p-Value:	0.3377	0.3140
523					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
527						Hydraulic Head (m NAVD88)	
528	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
529							
530	299-E28-1	9/15/2010 10:42	88.018	TOPP	0.013	121.852	121.843
531	299-E28-17	9/15/2010 11:02	94.882	TOPP	0.010	121.848	121.846
532	299-E28-18	NM	NM	TOPP	0.010	NM	NM
533	299-E28-27	9/15/2010 10:18	86.659	TOPP	0.005	121.846	121.845
534	299-E32-5	9/15/2010 9:45	87.195	TOPP	0.005	121.836	121.836
535	299-E32-6	9/15/2010 9:51	82.633	TOPP	0.005	121.839	121.838
536	299-E32-8	9/15/2010 9:58	75.993	TOPP	0.005	121.847	121.846
537	299-E33-28	9/15/2010 10:13	81.724	TOPP	0.013	121.843	121.843
538	299-E33-339	9/15/2010 10:32	81.191	TOC	0.000	121.844	121.843
539	299-E33-34	9/15/2010 10:04	72.306	TOPP	0.005	121.846	121.844
540	299-E33-38	9/15/2010 10:25	71.863	TOPP	0.005	121.844	121.843
541	699-49-55A	9/15/2010 11:18	41.026	TOC	0.000	121.849	121.848
542	699-49-57A	9/15/2010 11:12	47.894	TOPP	0.010	121.839	121.838
543	699-50-56	9/15/2010 11:23	47.258	TOPP	0.009	121.818	121.813
544					Range (m):	0.034	0.035
545					Gradient Magnitude (m/m):	7.62E-06	6.66E-06
546					Direction (azimuth):	315	338
547					R^2:	0.42	0.31
548					p-Value:	0.0646	0.1524
549					Statistically Significant?:	No	No
550							
551							
552							
553						Hydraulic Head (m NAVD88)	
554	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
555							
556	299-E28-1	1/4/2011 9:56	88.026	TOPP	0.013	121.844	121.845
557	299-E28-17	1/4/2011 9:41	94.882	TOC	0.000	121.838	121.839
558	299-E28-18	1/4/2011 9:48	90.267	TOPP	0.010	121.859	121.860
559	299-E28-27	1/4/2011 10:51	86.655	TOPP	0.005	121.850	121.850
560	299-E32-5	1/4/2011 10:38	87.184	TOPP	0.005	121.847	121.847
561	299-E32-6	1/4/2011 10:32	82.624	TOPP	0.005	121.848	121.848
562	299-E32-8	1/4/2011 10:25	75.990	TOPP	0.005	121.850	121.850
563	299-E33-28	1/4/2011 10:45	81.719	TOPP	0.013	121.848	121.848
564	299-E33-339	1/4/2011 10:04	81.187	TOPP	0.005	121.853	121.853
565	299-E33-34	1/4/2011 10:20	72.302	TOPP	0.005	121.850	121.852
566	299-E33-38	1/4/2011 10:14	71.854	TOPP	0.005	121.853	121.853
567	699-49-55A	1/4/2011 9:23	41.026	TOC	0.000	121.849	121.854
568	699-49-57A	1/4/2011 9:28	47.899	TOPP	0.010	121.834	121.835
569	699-50-56	1/4/2011 9:17	47.275	TOPP	0.009	121.801	121.800
570					Range (m):	0.058	0.060
571					Gradient Magnitude (m/m):	1.12E-05	1.06E-05
572					Direction (azimuth):	2	358
573					R^2:	0.30	0.26
574					p-Value:	0.1439	0.1841
575					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
579						Hydraulic Head (m NAVD88)	
580	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
581							
582	299-E28-1	2/11/2011 10:02	88.025	TOPP	0.013	121.845	121.838
583	299-E28-17	2/11/2011 10:24	94.895	TOPP	0.010	121.835	121.837
584	299-E28-18	2/11/2011 10:13	90.285	TOPP	0.010	121.841	121.841
585	299-E28-27	2/11/2011 9:23	86.675	TOPP	0.005	121.830	121.829
586	299-E32-5	2/11/2011 8:42	87.205	TOPP	0.005	121.826	121.826
587	299-E32-6	2/11/2011 8:53	82.643	TOPP	0.005	121.829	121.829
588	299-E32-8	2/11/2011 9:01	76.013	TOPP	0.005	121.827	121.826
589	299-E33-28	2/11/2011 9:15	81.735	TOPP	0.013	121.832	121.831
590	299-E33-339	2/11/2011 9:50	81.205	TOPP	0.005	121.835	121.833
591	299-E33-34	2/11/2011 9:08	72.317	TOPP	0.005	121.835	121.832
592	299-E33-38	2/11/2011 9:34	71.873	TOPP	0.005	121.834	121.831
593	699-49-55A	2/11/2011 8:22	41.033	TOC	0.000	121.842	121.837
594	699-49-57A	2/11/2011 8:32	47.905	TOPP	0.010	121.828	121.825
595	699-50-56	2/11/2011 8:12	47.275	TOC	0.000	121.792	121.791
596					Range (m):	0.053	0.050
597					Gradient Magnitude (m/m):	1.12E-05	1.10E-05
598					Direction (azimuth):	316	339
599					R^2:	0.41	0.48
600					p-Value:	0.0532	0.0288
601					Statistically Significant?:	No	Yes
602							
603							
604							
605						Hydraulic Head (m NAVD88)	
606	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
607							
608	299-E28-1	3/21/2011 9:33	88.047	TOPP	0.013	121.823	121.825
609	299-E28-17	3/21/2011 9:40	94.916	TOPP	0.010	121.814	121.817
610	299-E28-18	3/21/2011 9:44	90.292	TOPP	0.010	121.834	121.834
611	299-E28-27	3/21/2011 10:20	86.680	TOPP	0.005	121.825	121.824
612	299-E32-5	3/21/2011 9:52	87.211	TOPP	0.005	121.820	121.820
613	299-E32-6	3/21/2011 9:56	82.656	TOPP	0.005	121.816	121.814
614	299-E32-8	3/21/2011 10:00	76.019	TOPP	0.005	121.821	121.820
615	299-E33-28	3/21/2011 10:25	81.743	TOPP	0.013	121.824	121.822
616	299-E33-339	3/21/2011 10:15	81.212	TOPP	0.005	121.828	121.827
617	299-E33-34	3/21/2011 10:04	72.331	TOPP	0.005	121.821	121.819
618	299-E33-38	3/21/2011 10:10	71.877	TOPP	0.005	121.830	121.827
619	699-49-55A	3/21/2011 7:44	41.034	TOC	0.000	121.841	121.833
620	699-49-57A	3/21/2011 7:34	47.914	TOPP	0.010	121.819	121.816
621	699-50-56	3/21/2011 7:41	47.280	TOC	0.000	121.787	121.790
622					Range (m):	0.054	0.044
623					Gradient Magnitude (m/m):	7.62E-06	8.07E-06
624					Direction (azimuth):	296	311
625					R^2:	0.15	0.29
626					p-Value:	0.4063	0.1573
627					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
631						Hydraulic Head (m NAVD88)	
632	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
633							
634	299-E28-1	4/25/2011 11:35	88.034	TOPP	0.013	121.836	121.821
635	299-E28-17	4/25/2011 11:41	94.908	TOPP	0.010	121.822	121.824
636	299-E28-18	4/25/2011 11:48	90.305	TOPP	0.010	121.821	121.823
637	299-E28-27	4/25/2011 12:16	86.692	TOPP	0.005	121.813	121.812
638	299-E32-5	4/25/2011 12:42	87.218	TOPP	0.005	121.813	121.813
639	299-E32-6	4/25/2011 12:36	82.657	TOPP	0.005	121.815	121.813
640	299-E32-8	4/25/2011 12:28	76.023	TOPP	0.005	121.817	121.814
641	299-E33-28	4/25/2011 12:11	81.753	TOPP	0.013	121.814	121.812
642	299-E33-339	4/25/2011 11:56	81.220	TOPP	0.005	121.820	121.817
643	299-E33-34	4/25/2011 12:23	72.334	TOPP	0.005	121.818	121.815
644	299-E33-38	NM	NM	TOPP	0.005	NM	NM
645	699-49-55A	4/25/2011 9:49	41.041	TOC	0.000	121.834	121.824
646	699-49-57A	4/25/2011 9:47	47.918	TOPP	0.010	121.815	121.807
647	699-50-56	4/25/2011 9:48	47.269	TOC	0.000	121.798	121.794
648					Range (m):	0.038	0.030
649					Gradient Magnitude (m/m):	1.18E-05	7.34E-06
650					Direction (azimuth):	275	326
651					R^2:	0.36	0.49
652					p-Value:	0.1046	0.0362
653					Statistically Significant?:	No	Yes
654							
655							
656							
657						Hydraulic Head (m NAVD88)	
658	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
659							
660	299-E28-1	5/25/2011 7:28	88.041	TOPP	0.013	121.829	121.810
661	299-E28-17	5/25/2011 7:38	94.914	TOPP	0.010	121.816	121.814
662	299-E28-18	5/25/2011 7:46	90.305	TOPP	0.010	121.821	121.821
663	299-E28-27	5/25/2011 8:20	86.695	TOPP	0.005	121.810	121.809
664	299-E32-5	5/25/2011 8:45	87.220	TOPP	0.005	121.811	121.811
665	299-E32-6	5/25/2011 8:40	82.663	TOPP	0.005	121.809	121.808
666	299-E32-8	5/25/2011 8:35	76.024	TOPP	0.005	121.816	121.814
667	299-E33-28	5/25/2011 8:14	81.758	TOPP	0.013	121.809	121.809
668	299-E33-339	5/25/2011 7:55	81.224	TOPP	0.005	121.816	121.814
669	299-E33-34	5/25/2011 8:29	72.337	TOPP	0.005	121.815	121.812
670	299-E33-38	5/25/2011 8:05	71.896	TOPP	0.005	121.811	121.810
671	699-49-55A	5/25/2011 9:06	41.133	TOC	0.000	121.742	121.739
672	699-49-57A	5/25/2011 8:54	47.923	TOPP	0.010	121.810	121.806
673	699-50-56	5/25/2011 9:00	47.226	TOC	0.000	121.841	121.839
674					Range (m):	0.099	0.100
675					Gradient Magnitude (m/m):	5.70E-06	4.67E-06
676					Direction (azimuth):	306	18
677					R^2:	0.37	0.29
678					p-Value:	0.1274	0.2147
679					Statistically Significant?:	No	No

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
683	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
684						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
685							
686	299-E28-1	6/20/2011 11:50	88.054	TOPP	0.013	121.816	121.813
687	299-E28-17	6/20/2011 11:29	94.925	TOPP	0.010	121.805	121.803
688	299-E28-18	6/20/2011 11:22	90.304	TOPP	0.010	121.822	121.821
689	299-E28-27	6/20/2011 11:12	86.693	TOPP	0.005	121.812	121.812
690	299-E32-5	6/20/2011 11:58	87.214	TOPP	0.005	121.817	121.817
691	299-E32-6	6/20/2011 8:56	82.663	TOPP	0.005	121.809	121.809
692	299-E32-8	6/20/2011 9:00	76.024	TOPP	0.005	121.816	121.817
693	299-E33-28	6/20/2011 11:07	81.754	TOPP	0.013	121.813	121.813
694	299-E33-339	6/20/2011 10:59	81.227	TOPP	0.005	121.813	121.814
695	299-E33-34	6/20/2011 9:05	72.342	TOPP	0.005	121.810	121.810
696	299-E33-38	NM	NM	TOPP	0.005	NM	NM
697	699-49-55A	6/20/2011 8:42	41.053	TOC	0.000	121.822	121.825
698	699-49-57A	6/20/2011 8:32	47.921	TOPP	0.010	121.812	121.815
699	699-50-56	6/20/2011 8:37	47.252	TOC	0.000	121.815	121.814
700					Range (m):	0.017	0.022
701					Gradient Magnitude (m/m):	2.32E-06	3.30E-06
702					Direction (azimuth):	212	191
703					R^2:	0.06	0.16
704					p-Value:	0.7300	0.4179
705					Statistically Significant?:	No	No
706							
707							
708							
709	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
710						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
711							
712	299-E28-1	7/14/2011 10:44	88.062	TOPP	0.013	121.808	121.806
713	299-E28-17	NM	NM	TOPP	0.010	NM	NM
714	299-E28-18	7/14/2011 10:57	90.311	TOPP	0.010	121.815	121.814
715	299-E28-27	7/14/2011 11:50	86.712	TOPP	0.005	121.793	121.793
716	299-E32-5	7/14/2011 11:24	87.223	TOPP	0.005	121.808	121.808
717	299-E32-6	7/14/2011 11:30	82.668	TOPP	0.005	121.804	121.804
718	299-E32-8	7/14/2011 11:36	76.029	TOPP	0.005	121.811	121.811
719	299-E33-28	7/14/2011 11:43	81.765	TOPP	0.013	121.802	121.802
720	299-E33-339	7/14/2011 11:08	81.233	TOPP	0.005	121.807	121.807
721	299-E33-34	7/14/2011 8:03	72.345	TOPP	0.005	121.807	121.807
722	299-E33-38	7/14/2011 8:11	71.901	TOPP	0.005	121.806	121.807
723	699-49-55A	7/14/2011 7:50	41.051	TOC	0.000	121.824	121.825
724	699-49-57A	7/14/2011 7:37	47.921	TOPP	0.010	121.812	121.813
725	699-50-56	7/14/2011 7:43	47.238	TOC	0.000	121.829	121.829
726					Range (m):	0.036	0.036
727					Gradient Magnitude (m/m):	1.08E-05	1.16E-05
728					Direction (azimuth):	194	192
729					R^2:	0.45	0.51
730					p-Value:	0.0519	0.0278
731					Statistically Significant?:	No	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
735	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
736						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
737							
738	299-E28-1		NM	TOPP	0.013	NM	NM
739	299-E28-17	8/15/2011 11:14	94.926	TOPP	0.010	121.804	121.804
740	299-E28-18	8/15/2011 11:06	90.295	TOPP	0.010	121.831	121.830
741	299-E28-27		NM	TOPP	0.005	NM	NM
742	299-E32-5	8/15/2011 9:21	87.205	TOPP	0.005	121.826	121.826
743	299-E32-6	8/15/2011 9:27	82.646	TOPP	0.005	121.826	121.826
744	299-E32-8	8/15/2011 9:33	76.007	TOPP	0.005	121.833	121.834
745	299-E33-28		NM	TOPP	0.013	NM	NM
746	299-E33-339	8/15/2011 10:47	81.220	TOPP	0.005	121.820	121.822
747	299-E33-34	8/15/2011 9:39	72.330	TOPP	0.005	121.822	121.824
748	299-E33-38	8/15/2011 11:33	71.887	TOPP	0.005	121.820	121.821
749	699-49-55A	8/15/2011 8:59	41.034	TOC	0.000	121.841	121.845
750	699-49-57A		NM	TOPP	0.010	NM	NM
751	699-50-56	8/15/2011 8:51	47.199	TOC	0.000	121.868	121.869
752					Range (m):	0.064	0.065
753					Gradient Magnitude (m/m):	1.98E-05	2.05E-05
754					Direction (azimuth):	154	161
755					R^2:	0.75	0.79
756					p-Value:	0.0076	0.0045
757					Statistically Significant?:	Yes	Yes
758							
759							
760							
761	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	Hydraulic Head (m NAVD88)	
762						New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
763							
764	299-E28-1	8/29/2011 7:56	88.062	TOPP	0.013	121.808	121.815
765	299-E28-17	8/29/2011 7:40	94.931	TOPP	0.010	121.799	121.802
766	299-E28-18	8/29/2011 8:06	90.302	TOPP	0.010	121.824	121.825
767	299-E28-27	8/29/2011 8:18	86.684	TOPP	0.005	121.821	121.821
768	299-E32-5	8/29/2011 8:18	87.202	TOPP	0.005	121.829	121.829
769	299-E32-6	8/29/2011 8:23	82.644	TOPP	0.005	121.828	121.827
770	299-E32-8	8/29/2011 8:28	76.006	TOPP	0.005	121.834	121.834
771	299-E33-28	8/29/2011 8:48	81.742	TOPP	0.013	121.825	121.824
772	299-E33-339	8/29/2011 9:10	81.218	TOPP	0.005	121.822	121.822
773	299-E33-34	8/29/2011 8:36	72.325	TOPP	0.005	121.827	121.827
774	299-E33-38	NM	NM	TOPP	0.005	NM	NM
775	699-49-55A	8/29/2011 9:38	41.026	TOC	0.000	121.849	121.847
776	699-49-57A	8/29/2011 9:46	47.870	TOPP	0.010	121.863	121.863
777	699-50-56	8/29/2011 9:27	47.181	TOC	0.000	121.886	121.887
778					Range (m):	0.087	0.085
779					Gradient Magnitude (m/m):	2.85E-05	2.75E-05
780					Direction (azimuth):	171	176
781					R^2:	0.89	0.86
782					p-Value:	0.0000	0.0001
783					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
787						Hydraulic Head (m NAVD88)	
788	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
789							
790	299-E28-1	11/30/2011 11:41	88.076	TOPP	0.013	121.794	121.826
791	299-E28-17	11/30/2011 11:51	94.932	TOPP	0.010	121.798	121.801
792	299-E28-18	11/30/2011 11:58	90.286	TOPP	0.010	121.840	121.840
793	299-E28-27	11/30/2011 12:08	86.670	TOPP	0.005	121.835	121.836
794	299-E32-5	11/30/2011 11:14	87.190	TOPP	0.005	121.841	121.841
795	299-E32-6	11/30/2011 11:19	82.628	TOPP	0.005	121.844	121.845
796	299-E32-8	11/30/2011 11:24	75.988	TOPP	0.005	121.852	121.854
797	299-E33-28	11/30/2011 12:13	81.728	TOPP	0.013	121.839	121.840
798	299-E33-339	11/30/2011 11:36	81.211	TOPP	0.005	121.829	121.833
799	299-E33-34	11/30/2011 11:30	72.314	TOPP	0.005	121.838	121.844
800	299-E33-38	11/30/2011 8:52	71.870	TOPP	0.005	121.837	121.836
801	699-49-55A	11/30/2011 11:00	41.016	TOC	0.000	121.859	121.866
802	699-49-57A	11/30/2011 11:06	47.874	TOPP	0.010	121.859	121.867
803	699-50-56	11/30/2011 10:55	47.154	TOC	0.000	121.913	121.916
804					Range (m):	0.119	0.115
805					Gradient Magnitude (m/m):	3.38E-05	3.25E-05
806					Direction (azimuth):	153	171
807					R^2:	0.82	0.83
808					p-Value:	0.0001	0.0001
809					Statistically Significant?:	Yes	Yes
810							
811							
812							
813						Hydraulic Head (m NAVD88)	
814	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
815							
816	299-E28-1	12/29/2011 11:38	88.057	TOPP	0.013	121.813	121.826
817	299-E28-17	NM	NM	TOPP	0.010	NM	NM
818	299-E28-18	12/29/2011 12:16	90.288	TOPP	0.010	121.838	121.835
819	299-E28-27	12/29/2011 12:33	86.673	TOPP	0.005	121.832	121.831
820	299-E32-5	12/29/2011 12:53	87.192	TOPP	0.005	121.839	121.839
821	299-E32-6	12/29/2011 13:00	82.631	TOPP	0.005	121.841	121.839
822	299-E32-8	12/29/2011 13:08	75.994	TOPP	0.005	121.846	121.846
823	299-E33-28	12/29/2011 12:44	81.732	TOPP	0.013	121.835	121.835
824	299-E33-339	12/29/2011 13:46	81.213	TOPP	0.005	121.827	121.830
825	299-E33-34	12/29/2011 13:14	72.312	TOPP	0.005	121.840	121.838
826	299-E33-38	12/29/2011 13:41	71.875	TOPP	0.005	121.832	121.832
827	699-49-55A	12/29/2011 8:11	41.010	TOC	0.000	121.865	121.860
828	699-49-57A	12/29/2011 8:19	47.878	TOPP	0.010	121.855	121.857
829	699-50-56	12/29/2011 8:05	47.170	TOC	0.000	121.897	121.900
830					Range (m):	0.084	0.074
831					Gradient Magnitude (m/m):	2.71E-05	2.62E-05
832					Direction (azimuth):	163	172
833					R^2:	0.81	0.77
834					p-Value:	0.0002	0.0006
835					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
839						Hydraulic Head (m NAVD88)	
840	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
841							
842	299-E28-1	1/25/2012 13:05	88.089	TOPP	0.013	121.781	121.804
843	299-E28-17	1/25/2012 13:15	94.994	TOPP	0.010	121.736	121.735
844	299-E28-18	1/25/2012 13:22	90.301	TOPP	0.010	121.825	121.823
845	299-E28-27	1/25/2012 13:31	86.689	TOPP	0.005	121.816	121.816
846	299-E32-5	1/25/2012 12:33	87.201	TOPP	0.005	121.830	121.830
847	299-E32-6	1/25/2012 12:38	82.864	TOPP	0.005	121.608	121.610
848	299-E32-8	1/25/2012 12:45	76.000	TOPP	0.005	121.840	121.842
849	299-E33-28	1/25/2012 13:36	81.774	TOPP	0.013	121.793	121.795
850	299-E33-339	1/25/2012 12:56	81.223	TOPP	0.005	121.817	121.821
851	299-E33-34	1/25/2012 12:50	72.332	TOPP	0.005	121.820	121.824
852	299-E33-38	1/25/2012 8:44	71.897	TOPP	0.005	121.810	121.811
853	699-49-55A	1/25/2012 12:17	41.045	TOC	0.000	121.830	121.840
854	699-49-57A	1/25/2012 12:23	47.899	TOPP	0.010	121.834	121.842
855	699-50-56	1/25/2012 12:12	47.185	TOC	0.000	121.882	121.880
856					Range (m):	0.274	0.270
857					Gradient Magnitude (m/m):	3.06E-05	2.57E-05
858					Direction (azimuth):	129	144
859					R^2:	0.67	0.68
860					p-Value:	0.0065	0.0056
861					Statistically Significant?:	Yes	Yes
862							
863							
864							
865						Hydraulic Head (m NAVD88)	
866	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
867							
868	299-E28-1	2/28/2012 12:46	88.038	TOPP	0.013	121.832	121.808
869	299-E28-17	2/28/2012 12:53	94.915	TOPP	0.010	121.815	121.813
870	299-E28-18	2/28/2012 12:58	90.303	TOPP	0.010	121.823	121.822
871	299-E28-27	2/28/2012 13:07	86.687	TOPP	0.005	121.818	121.817
872	299-E32-5	2/28/2012 12:24	87.207	TOPP	0.005	121.824	121.824
873	299-E32-6	2/28/2012 12:28	82.650	TOPP	0.005	121.822	121.822
874	299-E32-8	2/28/2012 12:32	76.017	TOPP	0.005	121.823	121.822
875	299-E33-28	2/28/2012 13:10	81.747	TOPP	0.013	121.820	121.819
876	299-E33-339	2/28/2012 12:40	81.223	TOPP	0.005	121.817	121.814
877	299-E33-34	2/28/2012 12:35	72.325	TOPP	0.005	121.827	121.821
878	299-E33-38	2/28/2012 8:22	71.861	TOPP	0.005	121.846	121.845
879	699-49-55A	2/28/2012 12:12	41.028	TOC	0.000	121.847	121.843
880	699-49-57A	2/28/2012 12:17	47.904	TOPP	0.010	121.829	121.825
881	699-50-56	2/28/2012 12:08	47.195	TOC	0.000	121.872	121.868
882					Range (m):	0.057	0.060
883					Gradient Magnitude (m/m):	2.54E-05	2.04E-05
884					Direction (azimuth):	213	196
885					R^2:	0.63	0.61
886					p-Value:	0.0040	0.0056
887					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
891						Hydraulic Head (m NAVD88)	
892	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
893							
894	299-E28-1	NM	NM	TOPP	0.013	NM	NM
895	299-E28-17	4/18/2012 10:30	94.940	TOPP	0.010	121.790	121.790
896	299-E28-18	NM	NM	TOPP	0.010	NM	NM
897	299-E28-27	4/18/2012 10:40	86.701	TOPP	0.005	121.804	121.803
898	299-E32-5	4/18/2012 9:52	87.220	TOPP	0.005	121.811	121.811
899	299-E32-6	4/18/2012 9:58	82.670	TOPP	0.005	121.802	121.802
900	299-E32-8	4/18/2012 10:06	76.030	TOPP	0.005	121.810	121.810
901	299-E33-28	4/18/2012 10:44	81.760	TOPP	0.013	121.807	121.807
902	299-E33-339	4/18/2012 10:17	81.240	TOPP	0.005	121.800	121.799
903	299-E33-34	4/18/2012 10:11	72.345	TOPP	0.005	121.807	121.806
904	299-E33-38	4/18/2012 7:56	71.901	TOPP	0.005	121.806	121.805
905	699-49-55A	4/18/2012 9:38	41.075	TOC	0.000	121.800	121.800
906	699-49-57A	4/18/2012 9:43	47.920	TOPP	0.010	121.813	121.812
907	699-50-56	4/18/2012 9:33	47.230	TOC	0.000	121.837	121.835
908					Range (m):	0.047	0.045
909					Gradient Magnitude (m/m):	1.52E-05	1.43E-05
910					Direction (azimuth):	176	172
911					R^2:	0.80	0.79
912					p-Value:	0.0018	0.0020
913					Statistically Significant?:	Yes	Yes
914							
915							
916							
917						Hydraulic Head (m NAVD88)	
918	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
919							
920	299-E28-1	5/15/2012 10:20	88.065	TOPP	0.013	121.805	121.801
921	299-E28-17	5/15/2012 10:07	95.028	TOT	0.100	121.792	121.793
922	299-E28-18	5/15/2012 8:49	90.323	TOPP	0.010	121.803	121.803
923	299-E28-27	5/15/2012 9:23	86.698	TOPP	0.005	121.807	121.806
924	299-E32-5	5/15/2012 9:08	87.222	TOPP	0.005	121.809	121.809
925	299-E32-6	5/15/2012 9:13	82.667	TOPP	0.005	121.805	121.803
926	299-E32-8	5/15/2012 9:37	76.028	TOPP	0.005	121.812	121.810
927	299-E33-28	5/15/2012 9:44	81.765	TOPP	0.013	121.802	121.801
928	299-E33-339	5/15/2012 9:54	81.237	TOPP	0.005	121.803	121.802
929	299-E33-34	5/15/2012 9:30	72.345	TOPP	0.005	121.807	121.804
930	299-E33-38	NM	NM	TOPP	0.005	NM	NM
931	699-49-55A	5/15/2012 12:18	41.044	TOC	0.000	121.831	121.824
932	699-49-57A	5/15/2012 12:25	47.912	TOPP	0.010	121.821	121.817
933	699-50-56	5/15/2012 12:30	47.224	TOC	0.000	121.843	121.839
934					Range (m):	0.051	0.046
935					Gradient Magnitude (m/m):	1.93E-05	1.57E-05
936					Direction (azimuth):	194	188
937					R^2:	0.84	0.80
938					p-Value:	0.0001	0.0003
939					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
943						Hydraulic Head (m NAVD88)	
944	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
945							
946	299-E28-1	6/14/2012 8:27	88.085	TOPP	0.013	121.785	121.792
947	299-E28-17	6/14/2012 8:06	94.951	TOPP	0.010	121.779	121.779
948	299-E28-18	6/14/2012 8:14	90.332	TOPP	0.010	121.794	121.794
949	299-E28-27	6/14/2012 8:44	86.715	TOPP	0.005	121.790	121.790
950	299-E32-5	6/14/2012 7:54	87.243	TOPP	0.005	121.788	121.788
951	299-E32-6	6/14/2012 7:47	82.682	TOPP	0.005	121.790	121.790
952	299-E32-8	6/14/2012 7:42	76.045	TOPP	0.005	121.795	121.796
953	299-E33-28	6/14/2012 8:52	81.775	TOPP	0.013	121.792	121.792
954	299-E33-339	6/14/2012 8:35	81.246	TOPP	0.005	121.794	121.795
955	299-E33-34	6/14/2012 7:38	72.361	TOPP	0.005	121.791	121.793
956	299-E33-38	6/14/2012 7:31	71.912	TOPP	0.005	121.795	121.796
957	699-49-55A	6/14/2012 9:11	41.062	TOC	0.000	121.813	121.816
958	699-49-57A	6/14/2012 9:03	47.924	TOPP	0.010	121.809	121.810
959	699-50-56	6/14/2012 9:15	47.235	TOC	0.000	121.832	121.830
960					Range (m):	0.053	0.051
961					Gradient Magnitude (m/m):	1.92E-05	2.04E-05
962					Direction (azimuth):	193	200
963					R^2:	0.81	0.82
964					p-Value:	0.0001	0.0001
965					Statistically Significant?:	Yes	Yes
966							
967							
968							
969						Hydraulic Head (m NAVD88)	
970	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
971							
972	299-E28-1	7/24/2012 8:55	88.079	TOPP	0.013	121.791	121.789
973	299-E28-17	7/24/2012 8:39	94.956	TOPP	0.010	121.774	121.773
974	299-E28-18	7/24/2012 8:30	90.333	TOPP	0.010	121.793	121.793
975	299-E28-27	7/24/2012 9:10	86.708	TOPP	0.005	121.797	121.797
976	299-E32-5	7/24/2012 9:30	87.227	TOPP	0.005	121.804	121.804
977	299-E32-6	7/24/2012 9:40	82.670	TOPP	0.005	121.802	121.802
978	299-E32-8	7/24/2012 10:00	76.028	TOPP	0.005	121.812	121.812
979	299-E33-28	7/24/2012 9:16	81.768	TOPP	0.013	121.799	121.799
980	299-E33-339	7/24/2012 9:02	81.243	TOPP	0.005	121.797	121.797
981	299-E33-34	7/24/2012 11:56	73.354	TOPP	0.005	120.798	120.795
982	299-E33-38	7/24/2012 12:07	71.909	TOPP	0.005	121.798	121.798
983	699-49-55A	7/24/2012 12:47	41.048	TOC	0.000	121.827	121.827
984	699-49-57A	7/24/2012 12:53	47.906	TOPP	0.010	121.827	121.825
985	699-50-56	7/24/2012 12:41	47.196	TOC	0.000	121.871	121.867
986					Range (m):	1.073	1.072
987					Gradient Magnitude (m/m):	3.05E-05	2.96E-05
988					Direction (azimuth):	178	177
989					R^2:	0.86	0.88
990					p-Value:	0.0001	0.0000
991					Statistically Significant?:	Yes	Yes
992	Note for 7/24/2012 measurements - 3 different e-tapes used.						

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

	M	N	O	P	Q	R	S
995						Hydraulic Head (m NAVD88)	
996	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
997							
998	299-E28-1	8/16/2012 7:50	88.089	TOPP	0.013	121.781	121.795
999	299-E28-17	8/16/2012 7:21	94.957	TOPP	0.010	121.773	121.774
1000	299-E28-18	8/16/2012 7:30	90.321	TOPP	0.010	121.805	121.805
1001	299-E28-27	8/16/2012 9:33	86.705	TOPP	0.005	121.800	121.800
1002	299-E32-5	8/16/2012 8:56	87.222	TOPP	0.005	121.809	121.809
1003	299-E32-6	8/16/2012 9:04	82.622	TOPP	0.005	121.850	121.851
1004	299-E32-8	8/16/2012 9:12	76.022	TOPP	0.005	121.818	121.820
1005	299-E33-28	8/16/2012 9:45	81.765	TOPP	0.013	121.802	121.803
1006	299-E33-339	8/16/2012 8:00	81.243	TOPP	0.005	121.797	121.799
1007	299-E33-34	8/16/2012 9:20	72.345	TOPP	0.005	121.807	121.809
1008	299-E33-38	8/16/2012 8:18	71.907	TOPP	0.005	121.800	121.802
1009	699-49-55A	8/16/2012 7:01	41.045	TOC	0.000	121.830	121.834
1010	699-49-57A	8/16/2012 6:42	47.904	TOPP	0.010	121.829	121.833
1011	699-50-56	8/16/2012 6:52	47.182	TOC	0.000	121.885	121.887
1012					Range (m):	0.112	0.113
1013					Gradient Magnitude (m/m):	3.39E-05	3.24E-05
1014					Direction (azimuth):	142	151
1015					R^2:	0.76	0.75
1016					p-Value:	0.0003	0.0005
1017					Statistically Significant?:	Yes	Yes
1018							
1019							
1020							
1021						Hydraulic Head (m NAVD88)	
1022	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
1023							
1024	299-E28-1	9/12/2012 8:52	88.008	TOPP	0.013	121.862	121.887
1025	299-E28-17	9/12/2012 9:02	94.952	TOPP	0.010	121.778	121.779
1026	299-E28-18	9/12/2012 9:10	90.299	TOPP	0.010	121.827	121.827
1027	299-E28-27	9/12/2012 8:36	86.696	TOPP	0.005	121.809	121.811
1028	299-E32-5	NM	NM	TOPP	0.005	NM	NM
1029	299-E32-6	9/12/2012 8:08	82.646	TOPP	0.005	121.826	121.828
1030	299-E32-8	9/12/2012 8:00	76.015	TOPP	0.005	121.825	121.829
1031	299-E33-28	9/12/2012 8:24	81.742	TOPP	0.013	121.825	121.827
1032	299-E33-339	9/12/2012 8:42	81.233	TOPP	0.005	121.807	121.811
1033	299-E33-34	9/12/2012 7:55	72.337	TOPP	0.005	121.815	121.822
1034	299-E33-38	9/12/2012 7:43	71.895	TOPP	0.005	121.812	121.816
1035	699-49-55A	9/12/2012 9:25	41.004	TOC	0.000	121.871	121.882
1036	699-49-57A	9/12/2012 9:33	47.884	TOPP	0.010	121.849	121.857
1037	699-50-56	9/12/2012 9:42	47.148	TOC	0.000	121.919	121.918
1038					Range (m):	0.141	0.139
1039					Gradient Magnitude (m/m):	4.23E-05	4.47E-05
1040					Direction (azimuth):	170	174
1041					R^2:	0.75	0.80
1042					p-Value:	0.0018	0.0007
1043					Statistically Significant?:	Yes	Yes

Figure C-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-1 (cont'd.)

Appendix D

Hydraulic Head Calculations and Trend-Surface Analysis Results for IDF/PUREX

Four spreadsheets are presented in this appendix for IDF/PUREX: one with well characteristics, one showing the determination of the gyroscope correction coefficients, one with the hydraulic head calculations and trend-surface analysis results that includes normalization of the measurements to a constant barometric pressure, and one that does not include the normalization to a constant barometric pressure. Well characteristics are shown on the 'Wells' spreadsheet in Figure D-1. This spreadsheet lists, for each well, the default MP – RP values, horizontal coordinates, old reference point elevations, new reference point elevations resulting from the resurveys, and gyroscope correction coefficients. No formulas are used on this sheet.

The graphing feature of Microsoft Excel was used to determine the gyroscope correction coefficients for the IDF/PUREX wells. For each well, the measured depth to water in meters was plotted against the difference between the measured depth to water and the true vertical depth to water in feet (using an x-y scatter plot) for the lowermost gyroscope depth stations bracketing the water level. Then, the trend line feature of Excel was used to add a third degree polynomial trend line to the plots. The equation of the trend line was displayed on the chart, and the coefficients were copied from this equation into the spreadsheet. Figure D-2 shows the gyroscope data used, graphs of the data, the fitted equations, and the coefficients for each well. One well, 699-37-47A, had a constant correction value of -0.01 ft for all of the lowermost depth stations in the well, so a polynomial equation was not needed. The correction value for this well was specified as C_4 = -0.01 with the other coefficients equal to zero.

Figure D-3 shows a portion of the spreadsheet, with formulas displayed, that was used to calculate the hydraulic head values and display the trend-surface analysis results. It is nearly the same as the LLWMA-1 spreadsheet (Appendix B), except it is designed to show the results of the repeated trend-surface analyses performed for IDF/PUREX (see Section 6). The water-level measurements are in columns C through F (measurement date & time, depth to water, measurement point description, and MP – RP). In column G, the hydraulic head values are calculated (Equation 1) using the new reference point elevations and correcting for borehole deviation. The reference point elevations for each well are obtained from the 'Wells' sheet (Figure D-1) using the "VLOOKUP" function. This function matches the well name in column B to the well names in the first column of the specified array on the "Wells" sheet (B6 to O16) and returns a value from the specified column of the array (column 9 for the new reference point values) in the same row as the matched well name. The gyroscope correction coefficients were obtained using the "VLOOKUP" function in the same manner. In column H, the hydraulic head values normalized to a constant barometric pressure are displayed. This normalization was performed in a separate spreadsheet (see Appendix G for an example) and the results were copied into this spreadsheet.

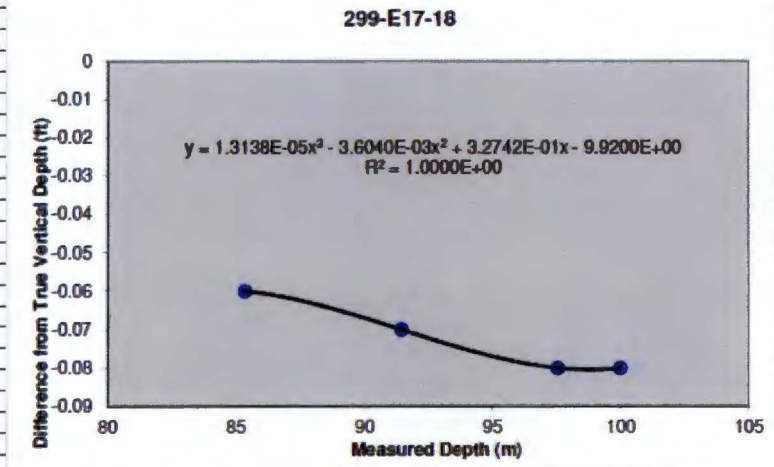
Once the hydraulic heads were calculated, they were copied into the trend-surface analysis spreadsheet (Appendix B) along with the horizontal coordinates for the wells, and the trend-surface results were then copied into this sheet (rows 22 through 26 in Figure D-3). The residuals for each iteration of the trend-surface analysis were copied into columns I through P, as needed, and the highest residual was highlighted red to identify the corresponding measurement that was removed from the next trend-surface analysis iteration. The final trend-surface analysis results, that met the criteria specified in Section 6 (i.e., statistically significant, all residuals were less than 0.01 m, and the removal of the measurement with the next highest residual still resulted in a statistically significant trend surface with all residuals less than 0.01 m and the dip direction changed by less than 10 degrees) are shown in bold text. Figure D-4 lists the entire spreadsheet with all of the water-level measurements collected for this study and the results of the hydraulic head calculations (normalized to a constant barometric pressure) and trend-surface analyses.

Figure D-5 shows the spreadsheet for the trend-surface analysis results using the measurements that were not normalized to a constant barometric pressure. This was done so the effect of correcting for barometric pressure could be determined.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**200 East Area Low Gradient Evaluation Study**														
2	IDF/PUREX Well Information (Wells worksheet)														
3															
4		Well Name	MP Desc.	MP-RP (m)	Horizontal Coordinates (m NAD83)			Old RP Elev (m NAVD88)		New RP Elev (m NAVD88)		Gyro Correction Coefficients			
5					East (m)	North (m)	Source	Value	Source	Value	Source	C1	C2	C3	C4
6		299-E17-18	TOPP	0.003	575112.433	135123.586	USACE	220.758	USACE	220.759	Fluor	1.31380E-05	-3.60400E-03	3.27420E-01	-9.92000E+00
7		299-E17-21	TOPP	0.000	574106.801	134893.429	Unknown	225.300	Rogers	225.302	Fluor	-1.25000E-05	3.38850E-03	-3.15280E-01	9.78340E+00
8		299-E17-22	TOPP	0.007	574841.090	135195.537	Rogers	221.458	Rogers	221.451	Fluor	-2.38610E-05	7.11640E-03	-7.07160E-01	2.33140E+01
9		299-E17-23	TOPP	0.005	574694.483	134842.439	Rogers	224.659	Rogers	224.656	Fluor	6.68840E-06	-1.94480E-03	1.84900E-01	-5.84820E+00
10		299-E17-25	TOPP	0.006	574515.185	134845.567	Rogers	225.791	Rogers	225.787	Fluor	-1.44520E-05	4.89660E-03	-5.69250E-01	2.12990E+01
11		299-E24-16	TOPP	0.016	575017.622	135464.364	USACE	220.023	USACE	220.020	Fluor	-4.70860E-05	1.29170E-02	-1.18100E+00	3.59400E+01
12		299-E24-18	TOPP	0.005	574647.088	135469.764	USACE	220.349	USACE	220.349	Fluor	1.67210E-05	-4.58690E-03	4.17160E-01	-1.26370E+01
13		299-E24-21	TOPP	0.004	574635.761	135698.200	Unknown	218.643	Rogers	218.645	Fluor	2.23340E-05	-6.26130E-03	5.83190E-01	-1.81000E+01
14		299-E24-24	TOPP	0.006	574179.770	135459.300	Fluor	221.217	Fluor	221.220	Fluor	-9.19650E-06	2.65730E-03	-2.57410E-01	8.14000E+00
15		299-E25-36	TOPP	0.004	575403.611	135566.372	USACE	216.735	USACE	216.732	Fluor	-1.75940E-05	4.63930E-03	-4.07580E-01	1.19110E+01
16		699-37-47A	TOPP	0.004	575556.970	134893.260	FDNW	219.495	FDNW	219.492	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-1.00000E-02
17															
18															
19															
20															
21		TOPP = Top of Pump Plate													
22		TOC = Top of Casing													
23		TOT = Top of Discharge Tee													

Figure D-1. Spreadsheet of Well Information for IDF/PUREX (i.e., "Wells" Sheet)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E17-18	280	85.344	279.94	-0.06	1.3138E-05	-3.6040E-03	3.2742E-01	-9.9200E+00
	300	91.44	299.93	-0.07				
	320	97.536	319.92	-0.08				
	328	99.9744	327.92	-0.08				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E17-21	300	91.44	299.73	-0.27	-1.2500E-05	3.3885E-03	-3.1528E-01	9.7834E+00
	320	97.536	319.67	-0.33				
	340	103.632	339.59	-0.41				
	359	109.4232	358.48	-0.52				

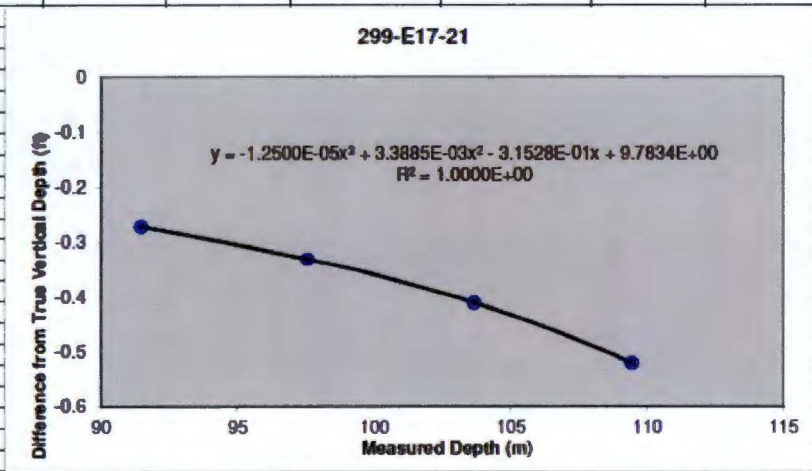
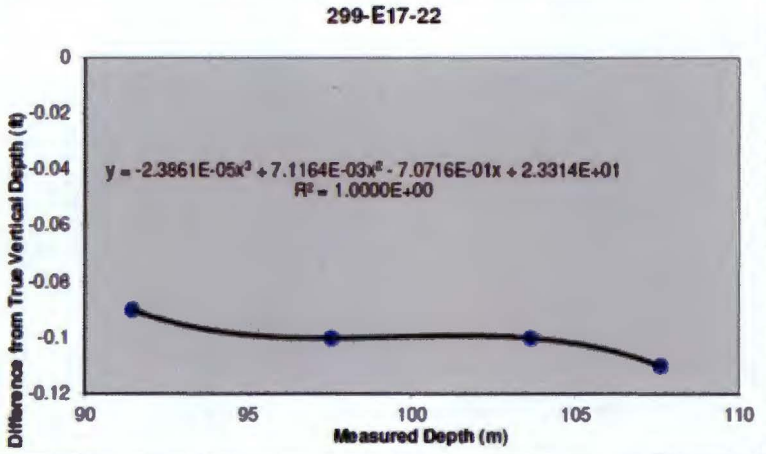


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E17-22	300	91.44	299.91	-0.09	-2.3861E-05	7.1164E-03	-7.0716E-01	2.3314E+01
	320	97.536	319.9	-0.1				
	340	103.632	339.9	-0.1				
	353	107.5944	352.89	-0.11				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E17-23	320	97.536	319.89	-0.11	6.6884E-06	-1.9448E-03	1.8490E-01	-5.8482E+00
	340	103.632	339.87	-0.13				
	360	109.728	359.86	-0.14				
	364	110.9472	363.86	-0.14				

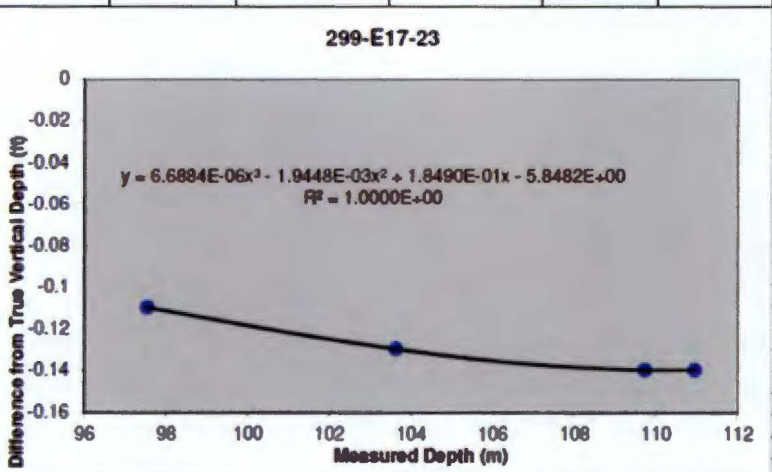
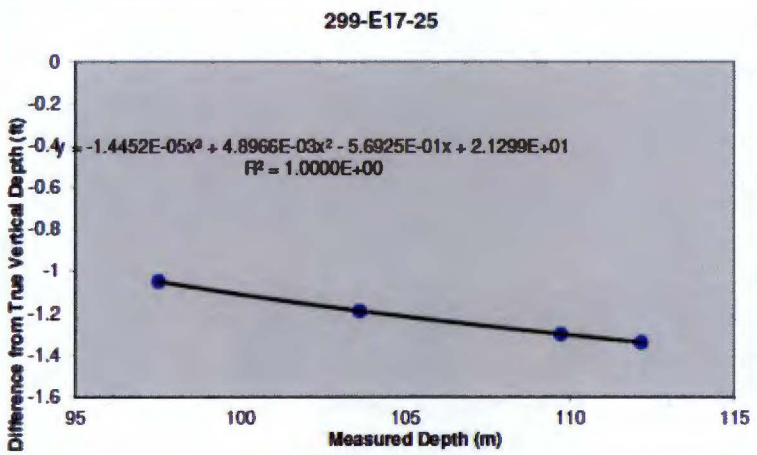


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells (cont'd.)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E17-25	320	97.536	318.95	-1.05	-1.4452E-05	4.8966E-03	-5.6925E-01	2.1299E+01
	340	103.632	338.81	-1.19				
	360	109.728	358.7	-1.3				
	368	112.1664	366.66	-1.34				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E24-16	280	85.344	279.96	-0.04	-4.7086E-05	1.2917E-02	-1.1810E+00	3.5940E+01
	300	91.44	299.95	-0.05				
	320	97.536	319.94	-0.06				
	325	99.06	324.93	-0.07				

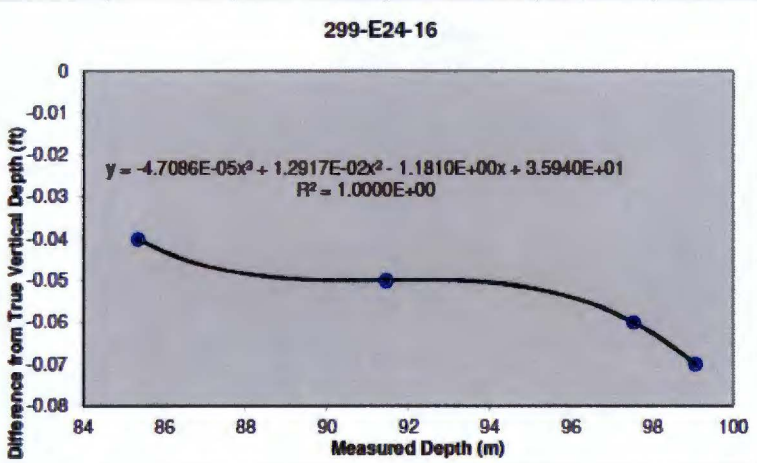
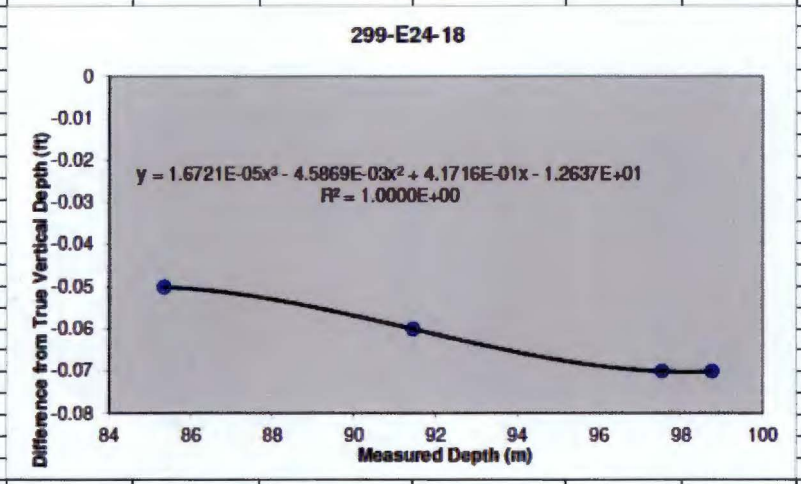


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells (cont'd.)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E24-18	280	85.344	279.95	-0.05	1.6721E-05	-4.5869E-03	4.1716E-01	-1.2637E+01
	300	91.44	299.94	-0.06				
	320	97.536	319.93	-0.07				
	324	98.7552	323.93	-0.07				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E24-21	280	85.344	279.95	-0.05	2.2334E-05	-6.2613E-03	5.8319E-01	-1.8100E+01
	300	91.44	299.95	-0.05				
	320	97.536	319.94	-0.06				
	328	99.9744	327.94	-0.06				

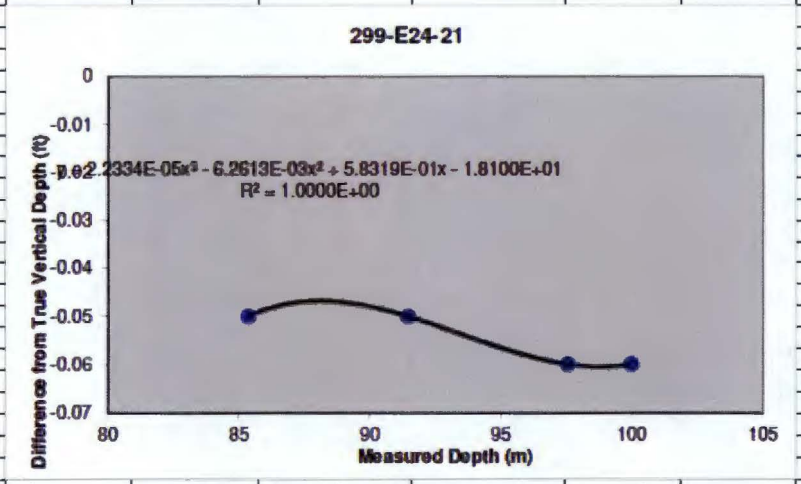
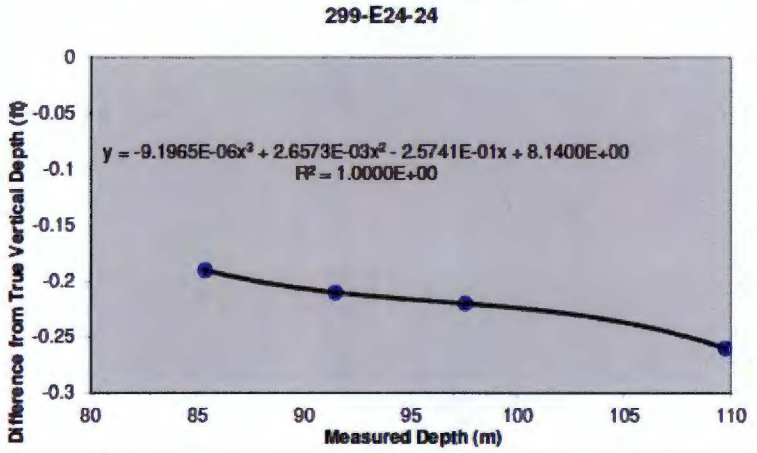


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells (cont'd.)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E24-24	280	85.344	279.81	-0.19	-9.1965E-06	2.6573E-03	-2.5741E-01	8.1400E+00
	300	91.44	299.79	-0.21				
	320	97.536	319.78	-0.22				
	360	109.728	359.74	-0.26				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E25-36	260	79.248	259.99	-0.01	-1.7594E-05	4.6393E-03	-4.0758E-01	1.1911E+01
	280	85.344	279.98	-0.02				
	300	91.44	299.98	-0.02				
	317	96.6216	316.97	-0.03				

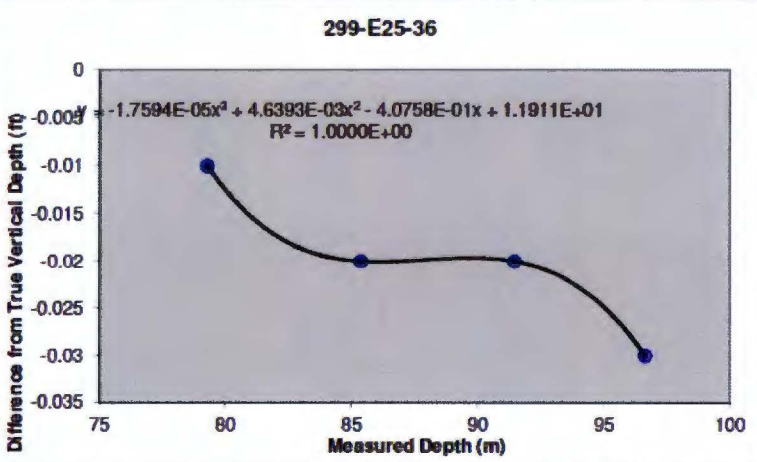


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells (cont'd.)

	B	C	D	E	F	G	H	I	J
315									
316	Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients			
317						C1	C2	C3	C4
318	699-37-47A	280	85.344	279.99	-0.01	0.0000E+00	0.0000E+00	0.0000E+00	-1.0000E-02
319		300	91.44	299.99	-0.01				
320		320	97.536	319.99	-0.01				
321		338	103.0224	337.99	-0.01				

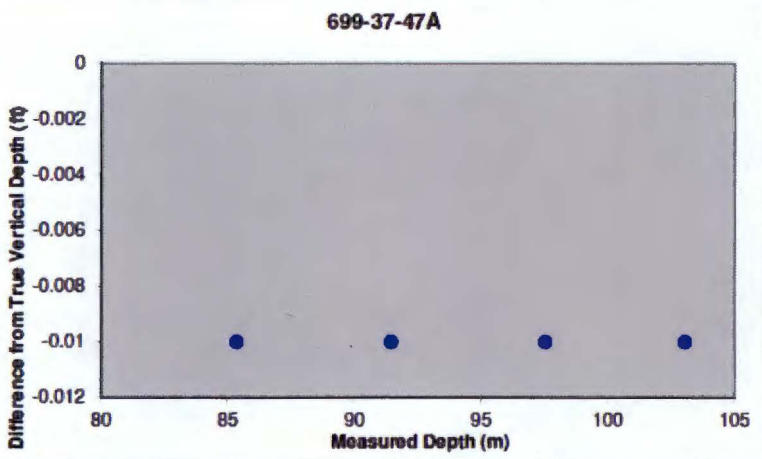


Figure D-2. Determination of Gyroscopic Correction Coefficients for the IDF/PUREX Wells (cont'd.)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	**200 East Area Low Gradient Evaluation Study**															
2	IDF/PUREX Hydraulic Head Calculations and Trend-Surface Analysis Results															
3																
4									Highest (magnitude) residual removed from the next iteration							
5									**Bold indicates final trend-surface analysis result**							
6																
7							Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP			1st	2nd	3rd	4th	5th	6th	7th	8th
9							New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment	Iteration	Iteration	Iteration	Iteration	Iteration	Iteration	Iteration	Iteration
10		299-E17-18					=ROUND(VLOOKUP($B10,Wells!$B$6:$O$16,9)-($D10-$F10+(VLOOKUP($B10,Wells!$B$6:$O$16,11)*$D10^3+VLOOKUP($B10,Wells!$B$6:$O$16,12)*$D10^2+VLOOKUP($B10,Wells!$B$6:$O$16,13)*$D10+VLOOKUP($B10,Wells!$B$6:$O$16,14))*0.3048),3)									
11		299-E17-21					=ROUND(VLOOKUP($B11,Wells!$B$6:$O$16,9)-($D11-$F11+(VLOOKUP($B11,Wells!$B$6:$O$16,11)*$D11^3+VLOOKUP($B11,Wells!$B$6:$O$16,12)*$D11^2+VLOOKUP($B11,Wells!$B$6:$O$16,13)*$D11+VLOOKUP($B11,Wells!$B$6:$O$16,14))*0.3048),3)									
12		299-E17-22					=ROUND(VLOOKUP($B12,Wells!$B$6:$O$16,9)-($D12-$F12+(VLOOKUP($B12,Wells!$B$6:$O$16,11)*$D12^3+VLOOKUP($B12,Wells!$B$6:$O$16,12)*$D12^2+VLOOKUP($B12,Wells!$B$6:$O$16,13)*$D12+VLOOKUP($B12,Wells!$B$6:$O$16,14))*0.3048),3)									
13		299-E17-23					=ROUND(VLOOKUP($B13,Wells!$B$6:$O$16,9)-($D13-$F13+(VLOOKUP($B13,Wells!$B$6:$O$16,11)*$D13^3+VLOOKUP($B13,Wells!$B$6:$O$16,12)*$D13^2+VLOOKUP($B13,Wells!$B$6:$O$16,13)*$D13+VLOOKUP($B13,Wells!$B$6:$O$16,14))*0.3048),3)									
14		299-E17-25					=ROUND(VLOOKUP($B14,Wells!$B$6:$O$16,9)-($D14-$F14+(VLOOKUP($B14,Wells!$B$6:$O$16,11)*$D14^3+VLOOKUP($B14,Wells!$B$6:$O$16,12)*$D14^2+VLOOKUP($B14,Wells!$B$6:$O$16,13)*$D14+VLOOKUP($B14,Wells!$B$6:$O$16,14))*0.3048),3)									
15		299-E24-16					=ROUND(VLOOKUP($B15,Wells!$B$6:$O$16,9)-($D15-$F15+(VLOOKUP($B15,Wells!$B$6:$O$16,11)*$D15^3+VLOOKUP($B15,Wells!$B$6:$O$16,12)*$D15^2+VLOOKUP($B15,Wells!$B$6:$O$16,13)*$D15+VLOOKUP($B15,Wells!$B$6:$O$16,14))*0.3048),3)									
16		299-E24-18					=ROUND(VLOOKUP($B16,Wells!$B$6:$O$16,9)-($D16-$F16+(VLOOKUP($B16,Wells!$B$6:$O$16,11)*$D16^3+VLOOKUP($B16,Wells!$B$6:$O$16,12)*$D16^2+VLOOKUP($B16,Wells!$B$6:$O$16,13)*$D16+VLOOKUP($B16,Wells!$B$6:$O$16,14))*0.3048),3)									
17		299-E24-21					=ROUND(VLOOKUP($B17,Wells!$B$6:$O$16,9)-($D17-$F17+(VLOOKUP($B17,Wells!$B$6:$O$16,11)*$D17^3+VLOOKUP($B17,Wells!$B$6:$O$16,12)*$D17^2+VLOOKUP($B17,Wells!$B$6:$O$16,13)*$D17+VLOOKUP($B17,Wells!$B$6:$O$16,14))*0.3048),3)									
18		299-E24-24					=ROUND(VLOOKUP($B18,Wells!$B$6:$O$16,9)-($D18-$F18+(VLOOKUP($B18,Wells!$B$6:$O$16,11)*$D18^3+VLOOKUP($B18,Wells!$B$6:$O$16,12)*$D18^2+VLOOKUP($B18,Wells!$B$6:$O$16,13)*$D18+VLOOKUP($B18,Wells!$B$6:$O$16,14))*0.3048),3)									
19		299-E25-36					=ROUND(VLOOKUP($B19,Wells!$B$6:$O$16,9)-($D19-$F19+(VLOOKUP($B19,Wells!$B$6:$O$16,11)*$D19^3+VLOOKUP($B19,Wells!$B$6:$O$16,12)*$D19^2+VLOOKUP($B19,Wells!$B$6:$O$16,13)*$D19+VLOOKUP($B19,Wells!$B$6:$O$16,14))*0.3048),3)									
20		699-37-47A					=ROUND(VLOOKUP($B20,Wells!$B$6:$O$16,9)-($D20-$F20+(VLOOKUP($B20,Wells!$B$6:$O$16,11)*$D20^3+VLOOKUP($B20,Wells!$B$6:$O$16,12)*$D20^2+VLOOKUP($B20,Wells!$B$6:$O$16,13)*$D20+VLOOKUP($B20,Wells!$B$6:$O$16,14))*0.3048),3)									
21						Range (m):	=MAX(G10:G20)-MIN(G10:G20)	=MAX(H10:H20)-MIN(H10:H20								
22						Gradient Magnitude (m/m):										
23						Direction (azimuth):										
24						R^2:										
25						p-Value:										
26						Statistically Significant?:										

Figure D-3. Example Spreadsheet of Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Formulas Displayed

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1		**200 East Area Low Gradient Evaluation Study**														
2		IDF/PUREX Hydraulic Head Calculations and Trend-Surface Analysis Results														
3																
4									Highest (magnitude) residual removed from the next iteration							
5		***Including Barometric Pressure Adjustments***							**Bold indicates final trend-surface analysis result**							
6																
7							Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
9																
10		299-E17-18	6/16/2008 9:13	98.831	TOPP	0.003	121.956	121.958	-0.0145	-0.0121						
11		299-E17-21	6/16/2008 8:38	103.439	TOC	0.000	121.987	121.988	-0.0001	-0.0013	-0.0015	-0.0021				
12		299-E17-22	6/16/2008 9:25	99.512	TOPP	0.007	121.976	121.978	0.0017	0.0038	0.0022	0.0012				
13		299-E17-23	6/16/2008 9:00	102.724	TOPP	0.005	121.976	121.979	-0.0005	-0.0006	-0.0023	-0.0024				
14		299-E17-25	6/16/2008 8:48	104.176	TOPP	0.006	121.983	121.985	0.0029	0.0023	0.0011	0.0009				
15		299-E24-16	6/16/2008 9:35	98.062	TOPP	0.016	121.992	121.993	0.0200							
16		299-E24-18	6/16/2008 10:50	98.408	TOPP	0.005	121.967	121.968	-0.0105	-0.0073	-0.0081					
17		299-E24-21	6/16/2008 11:07	96.693	?	0.004	121.974	121.975	-0.0030	0.0014	0.0008	-0.0017				
18		299-E24-24	6/16/2008 10:27	99.299	TOC	0.000	121.989	121.989	0.0035	0.0055	0.0059	0.0038				
19		299-E25-36	6/16/2008 10:10	94.780	TOPP	0.004	121.963	121.964	-0.0030	0.0025	0.0000	-0.0018				
20		699-37-47A	6/16/2008 9:53	97.529	TOPP	0.004	121.970	121.970	0.0035	0.0057	0.0020	0.0022				
21						Range (m):	0.036	0.035								
22						Gradient Magnitude (m/m):			1.51E-05	1.91E-05	**1.75E-05**	1.67E-05				
23						Direction (azimuth):			80	65	**58**	67				
24						R^2:			0.38	0.70	**0.81**	0.93				
25						p-Value:			0.1456	0.0151	**0.0064**	0.0012				
26						Statistically Significant?:			No	Yes	**Yes**	Yes				
27																
28																
29							Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
30		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
31																
32		299-E17-18	8/1/2008 8:03	98.846	TOPP	0.003	121.941	121.943	-0.0134	-0.0099	-0.0082	-0.0070				
33		299-E17-21	8/1/2008 7:30	103.468	TOC	0.000	121.958	121.963	-0.0016	-0.0033	0.0025	0.0036				
34		299-E17-22	8/1/2008 8:12	99.534	TOPP	0.007	121.954	121.964	0.0035	0.0066	0.0085					
35		299-E17-23	8/1/2008 7:40	102.762	TOPP	0.005	121.938	121.951	-0.0062	-0.0063	-0.0015	-0.0003				
36		299-E17-25	8/1/2008 7:21	104.189	TOPP	0.006	121.970	121.975	0.0157	0.0150						
37		299-E24-16	8/1/2008 8:37	98.068	TOPP	0.016	121.986	121.991	0.0287							
38		299-E24-18	8/1/2008 8:52	98.422	TOPP	0.005	121.953	121.954	-0.0126	-0.0081	-0.0077	-0.0068				
39		299-E24-21	8/1/2008 8:47	96.698	TOPP	0.004	121.969	121.971	0.0010	0.0073	0.0060	0.0068				
40		299-E24-24	8/1/2008 9:08	99.331	TOPP	0.006	121.963	121.965	-0.0068	-0.0039	-0.0024	-0.0015				
41		299-E25-36	8/1/2008 8:24	94.793	TOPP	0.004	121.950	121.954	-0.0053	0.0025	0.0003	0.0014				
42		699-37-47A	8/1/2008 7:51	97.564	TOPP	0.004	121.935	121.945	-0.0030	0.0002	0.0025	0.0039				
43						Range (m):	0.051	0.048								
44						Gradient Magnitude (m/m):			1.83E-05	1.62E-05	**1.85E-05**	1.90E-05				
45						Direction (azimuth):			141	114	**138**	138				
46						R^2:			0.23	0.46	**0.65**	0.74				
47						p-Value:			0.3578	0.1132	**0.0411**	0.0334				
48						Statistically Significant?:			No	No	**Yes**	Yes				

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
51						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
52	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
53															
54	299-E17-18	8/29/2008 9:03	98.848	TOPP	0.003	121.939	121.941	-0.0116	-0.0084	-0.0090					
55	299-E17-21	8/29/2008 7:36	103.446	TOC	0.000	121.980	121.979	0.0081	0.0065	0.0058					
56	299-E17-22	8/29/2008 9:10	99.525	TOPP	0.007	121.963	121.957	-0.0001	0.0027	0.0017					
57	299-E17-23	8/29/2008 8:03	102.735	TOPP	0.005	121.965	121.962	0.0012	0.0011	0.0010					
58	299-E17-25	8/29/2008 7:48	104.197	TOPP	0.006	121.962	121.962	-0.0019	-0.0026	-0.0028					
59	299-E24-16	8/29/2008 8:55	98.072	TOPP	0.016	121.982	121.980	0.0268							
60	299-E24-18	8/29/2008 8:39	98.431	TOPP	0.005	121.944	121.946	-0.0137	-0.0094						
61	299-E24-21	8/29/2008 8:30	96.712	TOPP	0.004	121.955	121.957	-0.0022	0.0037	0.0008					
62	299-E24-24	8/29/2008 9:25	99.331	TOPP	0.006	121.963	121.964	-0.0039	-0.0012	-0.0036					
63	299-E25-36	8/29/2008 8:21	94.797	TOPP	0.004	121.946	121.945	-0.0012	0.0062	0.0043					
64	699-37-47A	8/29/2008 8:13	97.553	TOPP	0.004	121.946	121.944	-0.0015	0.0014	0.0018					
65					Range (m):	0.043	0.039								
66					Gradient Magnitude (m/m):			1.78E-05	**2.31E-05**	2.25E-05					
67					Direction (azimuth):			80	**63**	72					
68					R^2:			0.37	**0.78**	0.86					
69					p-Value:			0.1597	**0.0047**	0.0028					
70					Statistically Significant?:			No	**Yes**	Yes					
71															
72															
73						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
74	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
75															
76	299-E17-18	9/10/2008 9:27	98.843	TOPP	0.003	121.944	121.937	-0.0167	-0.0131						
77	299-E17-21	9/10/2008 9:01	103.278	TOC	0.000	122.147	122.154	0.1148							
78	299-E17-22	9/10/2008 9:25	99.535	TOPP	0.007	121.953	121.966	-0.0031	0.0129	0.0113					
79	299-E17-23	9/10/2008 9:18	102.760	TOPP	0.005	121.940	121.952	-0.0478	-0.0032	-0.0051	-0.0033	-0.0038	-0.0037	-0.0041	-0.0006
80	299-E17-25	9/10/2008 9:11	104.195	TOPP	0.006	121.964	121.963	-0.0495	0.0057	0.0042	0.0061	0.0054	0.0053	0.0050	
81	299-E24-16	9/10/2008 9:46	98.100	TOPP	0.016	121.955	121.959	0.0179	0.0083	0.0067	0.0080	0.0065			
82	299-E24-18	9/10/2008 10:34	98.421	TOPP	0.005	121.954	121.946	-0.0214	-0.0090	-0.0096	-0.0084				
83	299-E24-21	9/10/2008 10:50	96.702	TOPP	0.004	121.965	121.960	0.0048	0.0052	0.0050	0.0059	0.0036	0.0055		
84	299-E24-24	9/10/2008 10:22	99.336	TOPP	0.006	121.958	121.955	-0.0466	-0.0053	-0.0049	-0.0037	-0.0061	-0.0052	-0.0014	0.0004
85	299-E25-36	9/10/2008 10:07	94.803	TOPP	0.004	121.940	121.944	0.0365	-0.0022	-0.0044	-0.0033	-0.0046	-0.0021	0.0012	-0.0004
86	699-37-47A	9/10/2008 9:58	97.560	TOPP	0.004	121.939	121.946	0.0111	0.0007	-0.0031	-0.0013	-0.0010	0.0002	-0.0008	0.0005
87					Range (m):	0.208	0.217								
88					Gradient Magnitude (m/m):			9.18E-05	1.15E-05	9.67E-06	9.37E-06	1.02E-05	1.15E-05	1.32E-05	8.75E-06
89					Direction (azimuth):			52	84	71	78	90	79	52	67
90					R^2:			0.40	0.26	0.25	0.34	0.50	0.64	0.80	0.99
91					p-Value:			0.1317	0.3549	0.4253	0.3550	0.2548	0.2194	0.2015	0.1086
92					Statistically Significant?:			No	No	No	No	No	No	No	No

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
95						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
96	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
97															
98	299-E17-18	10/23/2008 13:58	98.848	TOPP	0.003	121.939	121.947	-0.0233	-0.0102	-0.0075	-0.0082				
99	299-E17-21	10/23/2008 13:10	103.443	TOC	0.000	121.983	121.983	-0.0195	0.0065	0.0051	0.0044				
100	299-E17-22	10/23/2008 13:38	99.526	TOPP	0.007	121.962	121.962	-0.0103	0.0009	0.0033	0.0022				
101	299-E17-23	10/23/2008 14:05	102.625	TOPP	0.005	122.074	122.079	0.0860							
102	299-E17-25	10/23/2008 13:05	104.195	TOPP	0.006	121.964	121.970	-0.0266	0.0000	-0.0006	-0.0008				
103	299-E24-16	10/23/2008 13:47	98.079	TOPP	0.016	121.975	121.978	0.0229	0.0224						
104	299-E24-18	10/23/2008 13:22	98.433	TOPP	0.005	121.942	121.949	-0.0135	-0.0129	-0.0093					
105	299-E24-21	10/23/2008 13:32	96.714	TOPP	0.004	121.953	121.958	0.0068	-0.0019	0.0030	0.0001				
106	299-E24-24	10/23/2008 13:25	99.333	TOPP	0.006	121.961	121.967	-0.0056	-0.0030	-0.0007	-0.0031				
107	299-E25-36	10/23/2008 14:17	94.796	TOPP	0.004	121.947	121.948	0.0059	-0.0001	0.0061	0.0042				
108	699-37-47A	10/23/2008 14:12	97.553	TOPP	0.004	121.946	121.950	-0.0228	-0.0017	0.0007	0.0011				
109					Range (m):	0.135	0.132								
110					Gradient Magnitude (m/m):			5.43E-05	1.95E-05	**2.51E-05**	2.39E-05				
111					Direction (azimuth):			22	61	**52**	59				
112					R^2:			0.26	0.46	**0.81**	0.89				
113					p-Value:			0.2992	0.1175	**0.0065**	0.0040				
114					Statistically Significant?:			No	No	**Yes**	Yes				
115															
116															
117						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
118	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
119															
120	299-E17-18	11/26/2008 10:25	98.845	TOPP	0.003	121.942	121.937	-0.0106	-0.0068	-0.0055					
121	299-E17-21	11/26/2008 8:56	103.474	TOC	0.000	121.952	121.955	-0.0004	-0.0023	0.0023	0.0020	-0.0010	-0.0017	-0.0008	
122	299-E17-22	11/26/2008 10:32	99.544	TOPP	0.007	121.944	121.951	0.0004	0.0038	0.0053	0.0045	0.0031	0.0037		
123	299-E17-23	11/26/2008 9:24	102.769	TOPP	0.005	121.931	121.941	-0.0087	-0.0089	-0.0051	-0.0060				
124	299-E17-25	11/26/2008 9:08	104.195	TOPP	0.006	121.964	121.964	0.0126	0.0118						
125	299-E24-16	11/26/2008 10:15	98.076	TOPP	0.016	121.978	121.982	0.0314							
126	299-E24-18	11/26/2008 9:48	98.426	TOPP	0.005	121.949	121.946	-0.0081	-0.0031	-0.0028	-0.0032	-0.0034	-0.0014	-0.0008	
127	299-E24-21	11/26/2008 9:55	96.711	TOPP	0.004	121.956	121.954	-0.0016	0.0053	0.0043	0.0041	0.0049			
128	299-E24-24	11/26/2008 8:44	99.341	TOPP	0.006	121.953	121.953	-0.0053	-0.0021	-0.0009	-0.0008	-0.0012	0.0009	0.0015	
129	299-E25-36	11/26/2008 10:50	94.806	TOPP	0.004	121.937	121.938	-0.0097	-0.0011	-0.0028	-0.0039	-0.0034	-0.0012	-0.0006	
130	699-37-47A	11/26/2008 11:03	97.562	TOPP	0.004	121.937	121.942	-0.0001	0.0034	0.0052	0.0034	0.0010	-0.0003	0.0007	
131					Range (m):	0.047	0.045								
132					Gradient Magnitude (m/m):			1.11E-05	1.31E-05	1.15E-05	1.03E-05	1.05E-05	**1.20E-05**	1.19E-05	
133					Direction (azimuth):			124	80	108	105	80	**55**	58	
134					R^2:			0.12	0.50	0.63	0.62	0.77	**0.91**	0.98	
135					p-Value:			0.6009	0.0861	0.0524	0.0864	0.0548	**0.0283**	0.0208	
136					Statistically Significant?:			No	No	No	No	No	**Yes**	Yes	

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
139						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
140	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
141															
142	299-E17-18	12/22/2008 12:31	98.870	TOPP	0.003	121.917	121.929	-0.0106	-0.0069	-0.0046	-0.0054	-0.00394			
143	299-E17-21	12/22/2008 12:54	103.488	TOC	0.000	121.938	121.946	-0.0106	-0.0124	-0.0046	-0.0054	-0.0022	-0.0028		
144	299-E17-22	12/22/2008 12:36	99.552	TOPP	0.007	121.936	121.940	-0.0036	-0.0003	0.0022	0.0009	0.0022	0.0014		
145	299-E17-23	12/22/2008 12:43	102.762	TOPP	0.005	121.938	121.948	0.0006	0.0004	0.0068	0.0067				
146	299-E17-25	12/22/2008 12:50	104.199	TOPP	0.006	121.960	121.971	0.0208	0.0200						
147	299-E24-16	12/22/2008 12:21	98.091	TOPP	0.016	121.963	121.970	0.0303							
148	299-E24-18	12/22/2008 12:05	98.456	TOPP	0.005	121.919	121.930	-0.0156	-0.0107	-0.0103					
149	299-E24-21	12/22/2008 12:08	96.736	TOPP	0.004	121.931	121.942	-0.0028	0.0038	0.0021	-0.0010	-0.0019	-0.0021		
150	299-E24-24	12/22/2008 12:00	99.350	TOPP	0.006	121.944	121.954	0.0009	0.0040	0.0061	0.0034	0.00386	0.0038		
151	299-E25-36	12/22/2008 13:21	94.816	TOPP	0.004	121.927	121.930	-0.0031	0.0052	0.0023	0.0003	-0.0006	-0.0014		
152	699-37-47A	12/22/2008 13:26	97.579	TOPP	0.004	121.920	121.927	-0.0064	-0.0031	0.0000	0.0005	0.0026	0.0011		
153					Range (m):	0.046	0.044								
154					Gradient Magnitude (m/m):			1.65E-05	2.31E-05	1.65E-05	1.72E-05	1.74E-05	1.64E-05		
155					Direction (azimuth):			75	58	81	93	108	106		
156					R^2:			0.23	0.54	0.68	0.83	0.92	0.94		
157					p-Value:			0.3532	0.0638	0.0330	0.0118	0.0072	0.0157		
158					Statistically Significant?:			No	No	Yes	Yes	Yes	Yes		
159															
160															
161						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
162	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
163															
164	299-E17-18	1/26/2009 10:27	98.869	TOPP	0.003	121.918	121.911	-0.0109	-0.0116						
165	299-E17-21	1/26/2009 9:29	103.494	TOC	0.000	121.933	121.937	0.0043	0.0033	0.0030	-0.0005	-0.0008	0.0000	-0.0019	
166	299-E17-22	1/26/2009 10:21	99.566	TOPP	0.007	121.922	121.934	0.0091	0.0078	0.0064	0.0047	0.0059			
167	299-E17-23	1/26/2009 9:41	102.794	TOPP	0.005	121.906	121.917	-0.0093	-0.0094	-0.0110					
168	299-E17-25	1/26/2009 9:34	104.222	TOPP	0.006	121.937	121.935	0.0067	0.0064	0.0052	0.0015	0.0015	0.0025	0.0017	-0.0004
169	299-E24-16	1/26/2009 10:14	98.123	TOPP	0.016	121.932	121.935	0.0119	0.0098	0.0083	0.0082				
170	299-E24-18	1/26/2009 9:54	98.455	TOPP	0.005	121.920	121.914	-0.0132							
171	299-E24-21	1/26/2009 9:59	96.733	TOPP	0.004	121.934	121.931	0.0036	0.0001	-0.0002	0.0009	0.0031	0.0039	0.0012	0.0005
172	299-E24-24	1/26/2009 10:06	99.362	TOPP	0.006	121.932	121.929	-0.0032	-0.0063	-0.0060	-0.0063	-0.0052	-0.0045		
173	299-E25-36	1/26/2009 10:34	94.827	TOPP	0.004	121.916	121.918	-0.0010	-0.0030	-0.0051	-0.0047	-0.0019	-0.0008	-0.0014	-0.0006
174	699-37-47A	1/26/2009 10:39	97.586	TOPP	0.004	121.913	121.919	0.0020	0.0028	-0.0005	-0.0038	-0.0026	-0.0012	0.0003	0.0005
175					Range (m):	0.031	0.026								
176					Gradient Magnitude (m/m):			1.09E-05	1.29E-05	1.05E-05	1.05E-05	1.23E-05	1.25E-05	1.41E-05	1.64E-05
177					Direction (azimuth):			93	110	107	76	66	68	81	78
178					R^2:			0.26	0.39	0.37	0.56	0.76	0.86	0.97	1.00
179					p-Value:			0.2977	0.1803	0.2468	0.1297	0.0588	0.0506	0.0309	0.0692
180					Statistically Significant?:			No	No	No	No	No	No	Yes	No

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
183						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
184	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
186	299-E17-18	2/5/2009 9:41	98.885	TOPP	0.003	121.902	121.912	-0.0121	-0.0088	-0.0057	-0.0043	-0.0039			
187	299-E17-21	2/5/2009 9:18	103.482	TOC	0.000	121.944	121.947	0.0040	0.0023	-0.0014	-0.0027	-0.0013			
188	299-E17-22	2/5/2009 9:47	99.562	TOPP	0.007	121.926	121.921	-0.0078	-0.0049	-0.0028	-0.0009	0.0006			
189	299-E17-23	2/5/2009 9:32	102.762	TOPP	0.005	121.938	121.937	0.0045	0.0044	0.0035	0.0021	0.0018			
190	299-E17-25	2/5/2009 9:26	104.225	TOPP	0.006	121.934	121.940	0.0043	0.0036	0.0017	0.0003	0.0004			
191	299-E24-16	2/5/2009 9:58	98.105	TOPP	0.016	121.950	121.952	0.0271							
192	299-E24-18	2/5/2009 8:59	98.466	TOPP	0.005	121.909	121.918	-0.0136	-0.0093	-0.0065	-0.0022	0.0014			
193	299-E24-21	2/5/2009 9:05	96.747	TOPP	0.004	121.920	121.928	-0.0032	0.0028	0.0070					
194	299-E24-24	2/5/2009 8:50	99.362	TOPP	0.006	121.932	121.938	-0.0021	0.0006	0.0009	0.0047				
195	299-E25-36	2/5/2009 10:13	94.824	TOPP	0.004	121.919	121.920	0.0025	0.0099						
196	699-37-47A	2/5/2009 10:06	97.585	TOPP	0.004	121.914	121.913	-0.0036	-0.0006	0.0033	0.0031	0.0010			
197					Range (m):	0.048	0.040								
198					Gradient Magnitude (m/m):			1.84E-05	2.37E-05	3.14E-05	**3.75E-05**	4.03E-05			
199					Direction (azimuth):			81	65	58	**47**	38			
200					R^2:			0.37	0.76	0.88	**0.95**	0.98			
201					p-Value:			0.1590	0.0069	0.0018	**0.0006**	0.0004			
202					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes			
203															
204															
205						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
206	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
208	299-E17-18	3/24/2009 12:21	98.889	TOPP	0.003	121.898	121.893	-0.0139	-0.0110						
209	299-E17-21	3/24/2009 12:55	103.500	TOC	0.000	121.927	121.922	-0.0015	-0.0029	-0.0031	-0.0038	-0.0032			
210	299-E17-22	3/24/2009 12:35	99.562	TOPP	0.007	121.926	121.916	0.0054	0.0080	0.0065	0.0052				
211	299-E17-23	3/24/2009 12:15	102.774	TOPP	0.005	121.926	121.918	0.0032	0.0031	0.0015	0.0014	0.0021			
212	299-E17-25	3/24/2009 12:09	104.231	TOPP	0.006	121.929	121.923	0.0055	0.0049	0.0037	0.0035	0.0041			
213	299-E24-16	3/24/2009 12:28	98.119	TOPP	0.016	121.936	121.930	0.0236							
214	299-E24-18	3/24/2009 11:40	98.472	TOPP	0.005	121.903	121.899	-0.0130	-0.0092	-0.0100					
215	299-E24-21	3/24/2009 11:35	96.753	TOPP	0.004	121.914	121.909	-0.0019	0.0033	0.0028	-0.0003	0.0005			
216	299-E24-24	3/24/2009 11:20	99.373	TOPP	0.006	121.921	121.917	-0.0021	0.0002	0.0005	-0.0021	-0.0014			
217	299-E25-36	3/24/2009 12:50	94.842	TOPP	0.004	121.901	121.898	-0.0019	0.0045	0.0022	0.0000	0.0010			
218	699-37-47A	3/24/2009 12:43	97.591	TOPP	0.004	121.908	121.898	-0.0034	-0.0008	-0.0042	-0.0040	-0.0030			
219					Range (m):	0.038	0.037								
220					Gradient Magnitude (m/m):			1.62E-05	2.16E-05	2.05E-05	**1.91E-05**	1.94E-05			
221					Direction (azimuth):			70	56	50	**59**	59			
222					R^2:			0.34	0.70	0.77	**0.89**	0.94			
223					p-Value:			0.1851	0.0144	0.0122	**0.0039**	0.0042			
224					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes			

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
227						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
228	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
229															
230	299-E17-18	6/29/2009 11:50	98.823	TOPP	0.003	121.964	121.964	-0.0145	-0.0131	-0.0106					
231	299-E17-21	6/29/2009 12:37	103.449	TOC	0.000	121.977	121.976	0.0019	-0.0076	-0.0082	-0.0083				
232	299-E17-22	6/29/2009 11:41	99.498	TOPP	0.007	121.990	121.984	0.0097	0.0066	0.0092	0.0078	0.0061	0.0041		
233	299-E17-23	6/29/2009 12:15	102.708	TOPP	0.005	121.992	121.987	0.0062	0.0052	0.0052	0.0037	-0.0001	-0.0011	-0.0002	
234	299-E17-25	6/29/2009 12:22	104.168	TOPP	0.006	121.991	121.990	0.0110	0.0075	0.0072	0.0062	0.0012	-0.0004	0.0006	
235	299-E24-16	6/29/2009 11:33	98.056	TOPP	0.016	121.998	121.995	0.0249	0.0212						
236	299-E24-18	6/29/2009 11:19	98.410	TOPP	0.005	121.965	121.964	-0.0024	-0.0112	-0.0071	-0.0077	-0.0097			
237	299-E24-21	6/29/2009 11:26	96.694	TOPP	0.004	121.973	121.972	0.0107	-0.0007	0.0048	0.0045	0.0032	-0.0017	-0.0006	
238	299-E24-24	6/29/2009 11:03	99.361	TOPP	0.006	121.933	121.933	-0.0293							
239	299-E25-36	6/29/2009 12:07	94.776	TOPP	0.004	121.967	121.966	-0.0054	-0.0051	0.0008	-0.0015	0.0018	0.0000	0.0007	
240	699-37-47A	6/29/2009 12:00	97.520	TOPP	0.004	121.979	121.975	-0.0128	-0.0028	-0.0012	-0.0046	-0.0026	-0.0009	-0.0005	
241					Range (m):	0.065	0.062								
242					Gradient Magnitude (m/m):			2.41E-05	1.16E-05	1.84E-05	1.90E-05	2.41E-05	**2.21E-05**	2.19E-05	
243					Direction (azimuth):			337	20	18	10	24	**36**	35	
244					R^2:			0.22	0.14	0.47	0.56	0.76	**0.95**	1.00	
245					p-Value:			0.3611	0.5791	0.1529	0.1317	0.0581	**0.0108**	0.0035	
246					Statistically Significant?:			No	No	No	No	No	**Yes**	Yes	
247															
248															
249						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
250	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
251															
252	299-E17-18	9/22/2009 7:50	98.870	TOPP	0.003	121.917	121.917	-0.0144	-0.0116	-0.0125					
253	299-E17-21	9/22/2009 7:58	103.468	TOC	0.000	121.958	121.954	0.0007	-0.0007	-0.0016	-0.0018	0.0012			
254	299-E17-22	9/22/2009 7:43	99.548	TOPP	0.007	121.940	121.940	0.0044	0.0069	0.0055	0.0037	0.0048			
255	299-E17-23	9/22/2009 8:09	102.757	TOPP	0.005	121.943	121.944	0.0011	0.0010	0.0009	-0.0008	0.0018			
256	299-E17-25	9/22/2009 8:05	104.202	TOPP	0.006	121.957	121.956	0.0098	0.0092	0.0089	0.0076				
257	299-E24-16	9/22/2009 7:33	98.103	TOPP	0.016	121.952	121.952	0.0232							
258	299-E24-18	9/22/2009 7:15	98.456	TOPP	0.005	121.919	121.920	-0.0158	-0.0121						
259	299-E24-21	9/22/2009 7:27	96.734	TOPP	0.004	121.933	121.932	-0.0010	0.0040	0.0004	-0.0004	-0.0010			
260	299-E24-24	9/22/2009 7:06	99.355	TOPP	0.006	121.939	121.940	-0.0047	-0.0024	-0.0055	-0.0054	-0.0046			
261	299-E25-36	9/22/2009 8:23	94.819	TOPP	0.004	121.924	121.923	0.0028	0.0091	0.0067	0.0039	0.0030			
262	699-37-47A	9/22/2009 8:14	97.581	TOPP	0.004	121.918	121.920	-0.0060	-0.0034	-0.0029	-0.0067	-0.0052			
263					Range (m):	0.041	0.039								
264					Gradient Magnitude (m/m):			2.28E-05	2.88E-05	2.70E-05	**2.56E-05**	2.25E-05			
265					Direction (azimuth):			56	49	57	**52**	58			
266					R^2:			0.45	0.71	0.78	**0.86**	0.90			
267					p-Value:			0.0921	0.0124	0.0102	**0.0069**	0.0100			
268					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes			

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
271						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
272	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
273															
274	299-E17-18	12/30/2009 8:53	98.923	TOPP	0.003	121.864	121.872	-0.0102	-0.0080	-0.0088					
275	299-E17-21	12/30/2009 10:10	103.523	TOC	0.000	121.904	121.912	0.0040	0.0029	0.0021	0.0019				
276	299-E17-22	12/30/2009 9:13	99.611	TOPP	0.007	121.877	121.887	-0.0012	0.0007	-0.0005	-0.0018				
277	299-E17-23	12/30/2009 8:39	102.815	TOPP	0.005	121.885	121.898	0.0038	0.0037	0.0036	0.0024				
278	299-E17-25	12/30/2009 8:23	104.265	TOPP	0.006	121.895	121.903	0.0045	0.0040	0.0038	0.0029				
279	299-E24-16	12/30/2009 9:02	98.162	TOPP	0.016	121.893	121.900	0.0180							
280	299-E24-18	12/30/2009 9:33	98.505	TOPP	0.005	121.870	121.877	-0.0139	-0.0111						
281	299-E24-21	12/30/2009 9:26	96.783	TOPP	0.004	121.884	121.891	0.0014	0.0054	0.0020	0.0014				
282	299-E24-24	12/30/2009 9:56	99.405	TOPP	0.006	121.889	121.897	-0.0053	-0.0034	-0.0063	-0.0062				
283	299-E25-36	12/30/2009 11:12	94.871	TOPP	0.004	121.872	121.876	0.0040	0.0089	0.0067	0.0047				
284	699-37-47A	12/30/2009 10:25	97.643	TOPP	0.004	121.856	121.868	-0.0051	-0.0031	-0.0026	-0.0053				
285					Range (m):	0.048	0.044								
286					Gradient Magnitude (m/m):			2.51E-05	2.88E-05	**2.83E-05**	2.68E-05				
287					Direction (azimuth):			74	66	**73**	71				
288					R^2:			0.64	0.81	**0.88**	0.92				
289					p-Value:			0.0175	0.0028	**0.0015**	0.0017				
290					Statistically Significant?:			Yes	Yes	**Yes**	Yes				
291															
292															
293						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
294	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
295															
296	299-E17-18	3/16/2010 7:41	98.949	TOPP	0.003	121.838	121.841	-0.0192	-0.0156						
297	299-E17-21	3/16/2010 7:10	103.541	TOC	0.000	121.886	121.882	0.0057	0.0038	0.0036	0.0027	0.0021			
298	299-E17-22	3/16/2010 8:54	99.628	TOPP	0.007	121.860	121.858	-0.0055	-0.0023	-0.0044	-0.0059				
299	299-E17-23	3/16/2010 7:31	102.833	TOPP	0.005	121.867	121.865	-0.0034	-0.0035	-0.0057	-0.0059	-0.0067			
300	299-E17-25	3/16/2010 7:22	104.284	TOPP	0.006	121.876	121.877	0.0061	0.0053	0.0037	0.0034	0.0026			
301	299-E24-16	3/16/2010 7:53	98.166	TOPP	0.016	121.889	121.889	0.0301							
302	299-E24-18	3/16/2010 9:09	98.529	TOPP	0.005	121.846	121.848	-0.0161	-0.0113	-0.0124					
303	299-E24-21	3/16/2010 8:40	96.810	TOPP	0.004	121.857	121.860	-0.0025	0.0041	0.0035	-0.0004	-0.0012			
304	299-E24-24	3/16/2010 8:30	99.424	TOPP	0.006	121.870	121.872	0.0012	0.0042	0.0046	0.0014	0.0007			
305	299-E25-36	3/16/2010 8:16	94.889	TOPP	0.004	121.854	121.852	-0.0006	0.0077	0.0043	0.0017	0.0005			
306	699-37-47A	3/16/2010 8:06	97.638	TOPP	0.004	121.861	121.860	0.0042	0.0076	0.0027	0.0030	0.0019			
307					Range (m):	0.051	0.048								
308					Gradient Magnitude (m/m):			1.63E-05	2.39E-05	2.29E-05	**2.04E-05**	2.00E-05			
309					Direction (azimuth):			61	48	40	**49**	49			
310					R^2:			0.23	0.61	0.72	**0.86**	0.91			
311					p-Value:			0.3470	0.0374	0.0230	**0.0071**	0.0086			
312					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes			

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
315						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
316	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
317															
318	299-E17-18	6/30/2010 8:55	98.937	TOPP	0.003	121.850	121.840	-0.0107	-0.0089	-0.0074	-0.0061	-0.0066			
319	299-E17-21	6/30/2010 10:01	103.568	TOC	0.000	121.859	121.860	-0.0025	-0.0034	-0.0024	0.0016	0.0010	0.0004	-0.0018	-0.0002
320	299-E17-22	6/30/2010 8:44	99.628	TOPP	0.007	121.860	121.864	0.0104	0.0120						
321	299-E17-23	6/30/2010 9:35	102.843	TOPP	0.005	121.857	121.856	0.0000	-0.0001	0.0013	0.0046	0.0044	0.0030	0.0025	
322	299-E17-25	6/30/2010 9:44	104.287	TOPP	0.006	121.873	121.867	0.0090	0.0086	0.0098					
323	299-E24-16	6/30/2010 8:35	98.188	TOPP	0.016	121.867	121.866	0.0150							
324	299-E24-18	6/30/2010 8:17	98.523	TOPP	0.005	121.852	121.845	-0.0102	-0.0078	-0.0066	-0.0062				
325	299-E24-21	6/30/2010 8:27	96.805	TOPP	0.004	121.862	121.857	0.0022	0.0054	0.0067	0.0060	0.0040	0.0034	0.0006	0.0005
326	299-E24-24	6/30/2010 7:57	99.436	TOPP	0.006	121.858	121.854	-0.0065	-0.0050	-0.0039	-0.0028	-0.0045	-0.0047		
327	299-E25-36	6/30/2010 9:25	94.899	TOPP	0.004	121.844	121.845	-0.0015	0.0026	0.0043	0.0030	0.0017	0.0000	-0.0005	-0.0006
328	699-37-47A	6/30/2010 9:04	97.659	TOPP	0.004	121.840	121.841	-0.0052	-0.0035	-0.0018	0.0000	0.0001	-0.0023	-0.0008	0.0003
329					Range (m):	0.033	0.027								
330					Gradient Magnitude (m/m):			1.15E-05	1.44E-05	1.48E-05	1.20E-05	1.25E-05	1.12E-05	1.40E-05	1.42E-05
331					Direction (azimuth):			79	65	66	84	94	90	100	107
332					R^2:			0.28	0.47	0.59	0.65	0.75	0.83	0.96	1.00
333					p-Value:			0.2706	0.1107	0.0674	0.0724	0.0647	0.0725	0.0377	0.0546
334					Statistically Significant?:			No	No	No	No	No	No	Yes	No
335															
336															
337						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
338	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
339															
340	299-E17-18	9/14/2010 8:43	98.967	TOPP	0.003	121.820	121.821	-0.0121	-0.0102						
341	299-E17-21	NM	NM	TOC	0.000	NM	NM								
342	299-E17-22	9/14/2010 10:16	99.656	TOPP	0.007	121.832	121.836	0.0009	0.0025	0.0011	-0.0002	0.0001			
343	299-E17-23	9/14/2010 9:05	102.865	TOPP	0.005	121.835	121.841	0.0025	0.0020	0.0005	0.0001	-0.0001			
344	299-E17-25	9/14/2010 9:12	104.319	TOPP	0.006	121.841	121.843	0.0029	0.0020	0.0009	0.0003	-0.0001			
345	299-E24-16	9/14/2010 10:09	98.210	TOPP	0.016	121.845	121.848	0.0160							
346	299-E24-18	9/14/2010 9:45	98.551	TOPP	0.005	121.824	121.824	-0.0112	-0.0088	-0.0095					
347	299-E24-21	9/14/2010 9:51	96.835	TOPP	0.004	121.832	121.833	-0.0010	0.0025	0.0021	-0.0009	-0.0002			
348	299-E24-24	9/14/2010 9:34	99.454	TOPP	0.006	121.840	121.841	0.0015	0.0028	0.0030	0.0003	0.0003			
349	299-E25-36	9/14/2010 8:56	94.916	TOPP	0.004	121.827	121.828	0.0001	0.0048	0.0027	0.0009				
350	699-37-47A	9/14/2010 10:25	97.673	TOPP	0.004	121.826	121.831	0.0005	0.0023	-0.0008	-0.0005	0.0001			
351					Range (m):	0.025	0.027								
352					Gradient Magnitude (m/m):			1.07E-05	1.56E-05	1.51E-05	**1.37E-05**	1.51E-05			
353					Direction (azimuth):			57	47	38	**49**	48			
354					R^2:			0.20	0.51	0.65	**0.99**	1.00			
355					p-Value:			0.4497	0.1156	0.0723	**0.0001**	0.0000			
356					Statistically Significant?:			No	No	No	**Yes**	Yes			

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
359						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
360	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
361															
362	299-E17-18	3/18/2011 8:47	98.975	TOPP	0.003	121.812	121.814	-0.0124	-0.0088						
363	299-E17-21	3/18/2011 8:06	103.575	TOC	0.000	121.852	121.848	0.0053	0.0045	0.0044					
364	299-E17-22	3/18/2011 8:36	99.656	TOPP	0.007	121.832	121.823	-0.0075	-0.0038	-0.0050					
365	299-E17-23	3/18/2011 8:24	102.861	TOPP	0.005	121.839	121.831	-0.0026	-0.0026	-0.0038					
366	299-E17-25	3/18/2011 8:11	104.319	TOPP	0.006	121.841	121.839	0.0026	0.0022	0.0013					
367	299-E24-16	3/18/2011 9:41	98.195	TOPP	0.016	121.860	121.858	0.0309							
368	299-E24-18	3/18/2011 9:52	98.555	TOPP	0.005	121.820	121.822	-0.0109	-0.0050	-0.0056					
369	299-E24-21	3/18/2011 10:13	96.839	TOPP	0.004	121.828	121.829	-0.0036	0.0045	0.0042					
370	299-E24-24	NM	NM	TOPP	0.006	NM	NM								
371	299-E25-36	3/18/2011 10:35	94.924	TOPP	0.004	121.819	121.816	-0.0049	0.0037	0.0018					
372	699-37-47A	3/18/2011 10:24	97.670	TOPP	0.004	121.829	121.823	0.0031	0.0054	0.0026					
373					Range (m):	0.048	0.044								
374					Gradient Magnitude (m/m):			1.58E-05	**2.15E-05**	2.05E-05					
375					Direction (azimuth):			82	**57**	51					
376					R^2:			0.24	**0.78**	0.84					
377					p-Value:			0.3816	**0.0110**	0.0099					
378					Statistically Significant?:			No	**Yes**	Yes					
379															
380															
381						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
382	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
383															
384	299-E17-18	6/20/2011 13:05	98.993	TOPP	0.003	121.794	121.790	-0.0111	-0.0092	-0.0098					
385	299-E17-21	6/20/2011 12:31	103.601	TOC	0.000	121.826	121.825	0.0027	0.0023	0.0006	0.0005				
386	299-E17-22	6/20/2011 13:41	99.673	TOPP	0.007	121.815	121.809	0.0021	0.0042	0.0026	0.0012				
387	299-E17-23	6/20/2011 12:42	102.888	TOPP	0.005	121.812	121.805	-0.0049	-0.0049	-0.0051	-0.0065				
388	299-E17-25	6/20/2011 12:37	104.336	TOPP	0.006	121.824	121.820	0.0063	0.0061	0.0055	0.0045				
389	299-E24-16	6/20/2011 13:11	98.231	TOPP	0.016	121.824	121.820	0.0168							
390	299-E24-18	6/20/2011 12:15	98.574	TOPP	0.005	121.801	121.798	-0.0129	-0.0097						
391	299-E24-21	6/20/2011 13:18	96.852	TOPP	0.004	121.815	121.811	-0.0002	0.0042	-0.0002	-0.0008				
392	299-E24-24	NM	NM	TOPP	0.006	NM	NM								
393	299-E25-36	6/20/2011 12:58	94.948	TOPP	0.004	121.795	121.795	0.0000	0.0046	0.0024	0.0002				
394	699-37-47A	6/20/2011 12:50	97.700	TOPP	0.004	121.799	121.793	0.0012	0.0025	0.0039	0.0008				
395					Range (m):	0.032	0.035								
396					Gradient Magnitude (m/m):			2.10E-05	2.28E-05	**2.43E-05**	2.23E-05				
397					Direction (azimuth):			90	77	**89**	87				
398					R^2:			0.53	0.74	**0.84**	0.92				
399					p-Value:			0.0703	0.0171	**0.0102**	0.0060				
400					Statistically Significant?:			No	Yes	**Yes**	Yes				

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
403						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
404	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
405															
406	299-E17-18	9/22/2011 7:43	99.004	TOPP	0.003	121.783	121.788	-0.0130	-0.0108						
407	299-E17-21	9/22/2011 7:11	103.606	TOC	0.000	121.821	121.822	0.0017	0.0011	0.0011	-0.0007	0.0000			
408	299-E17-22	9/22/2011 8:27	99.685	TOPP	0.007	121.803	121.808	0.0016	0.0038	0.0024	0.0006	0.0008			
409	299-E17-23	9/22/2011 7:25	102.895	TOPP	0.005	121.805	121.809	0.0002	0.0002	-0.0013	-0.0016	-0.0010			
410	299-E17-25	9/22/2011 7:19	104.348	TOPP	0.006	121.812	121.816	0.0037	0.0035	0.0024	0.0017				
411	299-E24-16	9/22/2011 7:50	98.237	TOPP	0.016	121.818	121.822	0.0186							
412	299-E24-18	9/22/2011 8:05	98.582	TOPP	0.005	121.793	121.797	-0.0137	-0.0101	-0.0107					
413	299-E24-21	9/22/2011 7:58	96.858	TOPP	0.004	121.809	121.812	0.0008	0.0056	0.0053	0.0004	0.0004			
414	299-E24-24	NM	NM	TOPP	0.006	NM	NM								
415	299-E25-36	9/22/2011 8:36	94.949	TOPP	0.004	121.794	121.795	-0.0010	0.0042	0.0019	-0.0007	-0.0009			
416	699-37-47A	9/22/2011 7:33	97.713	TOPP	0.004	121.786	121.793	0.0011	0.0025	-0.0010	0.0004	0.0006			
417					Range (m):	0.038	0.034								
418					Gradient Magnitude (m/m):			1.97E-05	2.14E-05	1.94E-05	**2.08E-05**	2.04E-05			
419					Direction (azimuth):			95	78	74	**89**	92			
420					R^2:			0.47	0.72	0.79	**0.99**	1.00			
421					p-Value:			0.1112	0.0221	0.0200	**0.0001**	0.0003			
422					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes			
423															
424															
425						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
426	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
427															
428	299-E17-18	12/29/2011 8:20	98.986	TOPP	0.003	121.801	121.803	-0.0007	-0.0013	-0.0004					
429	299-E17-21	12/29/2011 9:02	103.613	TOC	0.000	121.814	121.827	0.0003	-0.0021	-0.0021					
430	299-E17-22	12/29/2011 8:14	99.691	TOPP	0.007	121.797	121.814	0.0040	0.0021	0.0032					
431	299-E17-23	12/29/2011 8:52	102.908	TOPP	0.005	121.792	121.815	0.0018	0.0016	0.0016					
432	299-E17-25	12/29/2011 8:46	104.347	TOPP	0.006	121.813	121.820	0.0027	0.0019	0.0019					
433	299-E24-16	12/29/2011 8:08	98.248	TOPP	0.016	121.807	121.816	0.0099	0.0070						
434	299-E24-18	12/29/2011 7:44	98.577	TOPP	0.005	121.798	121.800	-0.0146							
435	299-E24-21	12/29/2011 8:01	96.858	TOPP	0.004	121.809	121.815	0.0000	-0.0055	-0.0031					
436	299-E24-24	12/29/2011 8:36	98.490	TOPP	0.006	122.804	122.810	Outlier - Not Used							
437	299-E25-36	12/29/2011 9:10	94.951	TOPP	0.004	121.792	121.800	0.0028	0.0004	0.0027					
438	699-37-47A	12/29/2011 9:18	97.727	TOPP	0.004	121.772	121.787	-0.0064	-0.0041	-0.0038					
439					Range (m):	1.032	1.023								
440					Gradient Magnitude (m/m):			2.30E-05	**2.70E-05**	2.67E-05					
441					Direction (azimuth):			91	**104**	98					
442					R^2:			0.69	**0.90**	0.95					
443					p-Value:			0.0157	**0.0009**	0.0004					
444					Statistically Significant?:			Yes	**Yes**	Yes					

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
447						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
448	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
449															
450	299-E17-18	6/22/2012 9:48	99.037	TOPP	0.003	121.750	121.760	-0.0397	-0.0351	0.0134	0.0092	0.0097			
451	299-E17-21	6/22/2012 9:50	103.871	TOC	0.000	121.557	121.562	0.1478							
452	299-E17-22	6/22/2012 9:22	99.711	TOPP	0.007	121.777	121.780	-0.0444	-0.0238	-0.0018	-0.0048	-0.0037	-0.0011	0.0009	0.0010
453	299-E17-23	6/22/2012 9:35	102.927	TOPP	0.005	121.773	121.779	-0.0882	-0.0308	0.0021	0.0018	0.0020	0.0049		
454	299-E17-25	6/22/2012 9:40	104.377	TOPP	0.006	121.783	121.791	-0.0961	-0.0249	-0.0068	-0.0060	-0.0055	-0.0036	0.0002	-0.0005
455	299-E24-16	6/22/2012 9:11	98.262	TOPP	0.016	121.793	121.798	-0.0297	-0.0422	-0.0232					
456	299-E24-18	6/22/2012 8:51	98.617	TOPP	0.005	121.758	121.768	0.0086	0.0246	0.0134	0.0101				
457	299-E24-21	6/22/2012 8:48	96.899	TOPP	0.004	121.768	121.777	0.0307	0.0312	0.0044	-0.0001	0.0031	0.0029	0.0019	
458	299-E24-24	6/22/2012 8:39	99.509	TOPP	0.006	121.785	121.792	-0.0072	0.0459	-0.0023	-0.0029	0.0003	-0.0016	-0.0017	-0.0001
459	299-E25-36	6/22/2012 10:09	94.977	TOPP	0.004	121.766	121.767	0.0072	-0.0427	0.0009	-0.0074	-0.0059	-0.0016	-0.0012	-0.0004
460	699-37-47A	6/22/2012 10:13	97.936	TOPP	0.004	121.563	121.569	-0.1110	0.0976						
461					Range (m):	0.236	0.236								
462					Gradient Magnitude (m/m):			1.37E-04	1.17E-04	1.77E-05	2.44E-05	2.54E-05	2.08E-05	2.23E-05	2.17E-05
463					Direction (azimuth):			171	123	87	75	84	73	58	67
464					R^2:			0.25	0.51	0.25	0.66	0.77	0.88	0.98	1.00
465					p-Value:			0.3104	0.0834	0.4177	0.0696	0.0518	0.0402	0.0194	0.0588
466					Statistically Significant?:			No	No	No	No	No	Yes	Yes	No
467															
468															
469						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)							
470	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
471															
472	299-E17-18	9/12/2012 12:01	99.006	TOPP	0.003	121.781	121.770	0.0136	0.0116	0.0124					
473	299-E17-21	9/12/2012 11:42	103.620	TOC	0.000	121.807	121.804	0.0009	0.0019	0.0028	0.0030	0.0002	-0.0007		
474	299-E17-22	9/12/2012 12:12	99.692	TOPP	0.007	121.796	121.796	-0.0064	-0.0082	-0.0068	-0.0051	-0.0061			
475	299-E17-23	9/12/2012 11:55	102.905	TOPP	0.005	121.795	121.793	-0.0009	-0.0008	-0.0008	0.0010	-0.0014			
476	299-E17-25	9/12/2012 11:46	104.347	TOPP	0.006	121.813	121.805	-0.0090	-0.0086	-0.0084	-0.0071				
477	299-E24-16	9/12/2012 12:23	98.248	TOPP	0.016	121.807	121.803	-0.0167							
478	299-E24-18	9/12/2012 13:11	98.585	TOPP	0.005	121.790	121.780	0.0144	0.0117						
479	299-E24-21	9/12/2012 13:17	96.860	TOPP	0.004	121.807	121.798	-0.0029	-0.0066	-0.0030	-0.0022	-0.0017	-0.0026		
480	299-E24-24	9/12/2012 12:58	99.486	TOPP	0.006	121.808	121.800	0.0045	0.0028	0.0058	0.0057	0.0049	0.0041		
481	299-E25-36	9/12/2012 12:37	94.963	TOPP	0.004	121.780	121.779	-0.0009	-0.0054	-0.0031	-0.0003	0.0005	-0.0006		
482	699-37-47A	9/12/2012 12:45	97.724	TOPP	0.004	121.775	121.770	-0.0035	0.0016	0.0011	0.0049	0.0036	0.0023		
483					Range (m):	0.038	0.035								
484					Gradient Magnitude (m/m):			2.18E-05	2.38E-05	2.46E-05	2.21E-05	**2.15E-05**	2.18E-05		
485					Direction (azimuth):			95	84	94	91	**101**	101		
486					R^2:			0.54	0.70	0.79	0.86	**0.91**	0.96		
487					p-Value:			0.0448	0.0154	0.0099	0.0070	**0.0076**	0.0082		
488					Statistically Significant?:			Yes	Yes	Yes	Yes	**Yes**	Yes		

Figure D-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX with Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
5	***Without Barometric Pressure Adjustments***													
6														
7	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
8						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
9														
10	299-E17-18	6/16/2008 9:13	98.831	TOPP	0.003	121.956	-0.0151	-0.0127						
11	299-E17-21	6/16/2008 8:38	103.439	TOC	0.000	121.987	0.0006	-0.0006	-0.0008	-0.0014				
12	299-E17-22	6/16/2008 9:25	99.512	TOPP	0.007	121.976	0.0010	0.0031	0.0014	0.0004				
13	299-E17-23	6/16/2008 9:00	102.724	TOPP	0.005	121.976	-0.0018	-0.0019	-0.0037	-0.0038				
14	299-E17-25	6/16/2008 8:48	104.176	TOPP	0.006	121.983	0.0026	0.0021	0.0008	0.0005				
15	299-E24-16	6/16/2008 9:35	98.062	TOPP	0.016	121.992	0.0200							
16	299-E24-18	6/16/2008 10:50	98.408	TOPP	0.005	121.967	-0.0105	-0.0073	-0.0082					
17	299-E24-21	6/16/2008 11:07	96.693	?	0.004	121.974	-0.0033	0.0011	0.0005	-0.0020				
18	299-E24-24	6/16/2008 10:27	99.299	TOC	0.000	121.989	0.0046	0.0066	0.0069	0.0048				
19	299-E25-36	6/16/2008 10:10	94.780	TOPP	0.004	121.963	-0.0031	0.0024	-0.0003	-0.0021				
20	699-37-47A	6/16/2008 9:53	97.529	TOPP	0.004	121.970	0.0051	0.0073	0.0034	0.0035				
21					Range (m):	0.036								
22					Gradient Magnitude (m/m):		1.49E-05	1.86E-05	**1.68E-05**	1.61E-05				
23					Direction (azimuth):		84	68	**61**	70				
24					R^2:		0.36	0.66	**0.77**	0.89				
25					p-Value:		0.1641	0.0227	**0.0117**	0.0043				
26					Statistically Significant?:		No	Yes	**Yes**	Yes				
27														
28														
29	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
30						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
31														
32	299-E17-18	8/1/2008 8:03	98.846	TOPP	0.003	121.941	-0.0084	-0.0051	-0.0030	-0.0034				
33	299-E17-21	8/1/2008 7:30	103.468	TOC	0.000	121.958	-0.0004	-0.0021	0.0048	0.0044				
34	299-E17-22	8/1/2008 8:12	99.534	TOPP	0.007	121.954	-0.0008	0.0022	0.0044	0.0037				
35	299-E17-23	8/1/2008 7:40	102.762	TOPP	0.005	121.938	-0.0110	-0.0112	-0.0055	-0.0056				
36	299-E17-25	8/1/2008 7:21	104.189	TOPP	0.006	121.970	0.0184	0.0177						
37	299-E24-16	8/1/2008 8:37	98.068	TOPP	0.016	121.986	0.0277							
38	299-E24-18	8/1/2008 8:52	98.422	TOPP	0.005	121.953	-0.0106	-0.0062	-0.0058					
39	299-E24-21	8/1/2008 8:47	96.698	TOPP	0.004	121.969	0.0002	0.0063	0.0047	0.0030				
40	299-E24-24	8/1/2008 9:08	99.331	TOPP	0.006	121.963	-0.0069	-0.0041	-0.0023	-0.0038				
41	299-E25-36	8/1/2008 8:24	94.793	TOPP	0.004	121.950	-0.0051	0.0024	-0.0001	-0.0013				
42	699-37-47A	8/1/2008 7:51	97.564	TOPP	0.004	121.935	-0.0031	0.0000	0.0028	0.0030				
43					Range (m):	0.051								
44					Gradient Magnitude (m/m):		2.62E-05	2.27E-05	**2.74E-05**	2.93E-05				
45					Direction (azimuth):		148	130	**148**	149				
46					R^2:		0.37	0.58	**0.86**	0.90				
47					p-Value:		0.1620	0.0469	**0.0029**	0.0035				
48					Statistically Significant?:		No	Yes	**Yes**	Yes				

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
51	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
52–53						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
54	299-E17-18	8/29/2008 9:03	98.848	TOPP	0.003	121.939	-0.0151	-0.0116						
55	299-E17-21	8/29/2008 7:36	103.446	TOC	0.000	121.980	0.0083	0.0066	0.0064	0.0056	0.0033			
56	299-E17-22	8/29/2008 9:10	99.525	TOPP	0.007	121.963	0.0050	0.0081	0.0065	0.0050	0.0042			
57	299-E17-23	8/29/2008 8:03	102.735	TOPP	0.005	121.965	0.0025	0.0023	0.0007	0.0005	-0.0014			
58	299-E17-25	8/29/2008 7:48	104.197	TOPP	0.006	121.962	-0.0034	-0.0041	-0.0053	-0.0056				
59	299-E24-16	8/29/2008 8:55	98.072	TOPP	0.016	121.982	0.0285							
60	299-E24-18	8/29/2008 8:39	98.431	TOPP	0.005	121.944	-0.0155	-0.0110	-0.0118					
61	299-E24-21	8/29/2008 8:30	96.712	TOPP	0.004	121.955	-0.0033	0.0030	0.0025	-0.0012	-0.0008			
62	299-E24-24	8/29/2008 9:25	99.331	TOPP	0.006	121.963	-0.0041	-0.0012	-0.0009	-0.0040	-0.0046			
63	299-E25-36	8/29/2008 8:21	94.797	TOPP	0.004	121.946	-0.0007	0.0071	0.0047	0.0021	0.0028			
64	699-37-47A	8/29/2008 8:13	97.553	TOPP	0.004	121.946	-0.0023	0.0009	-0.0027	-0.0024	-0.0035			
65					Range (m):	0.043								
66					Gradient Magnitude (m/m):		1.73E-05	2.39E-05	2.27E-05	**2.10E-05**	2.32E-05			
67					Direction (azimuth):		69	55	49	**59**	54			
68					R^2:		0.30	0.69	0.74	**0.87**	0.92			
69					p-Value:		0.2432	0.0175	0.0180	**0.0066**	0.0071			
70					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			
71														
72														
73	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
74–75						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
76	299-E17-18	9/10/2008 9:27	98.843	TOPP	0.003	121.944	-0.0056	-0.0020	-0.0003	-0.0022	-0.0016			
77	299-E17-21	9/10/2008 9:01	103.278	TOC	0.000	122.147	0.1115							
78	299-E17-22	9/10/2008 9:25	99.535	TOPP	0.007	121.953	-0.0136	0.0020	0.0044	0.0040				
79	299-E17-23	9/10/2008 9:18	102.760	TOPP	0.005	121.940	-0.0538	-0.0105	-0.0044	-0.0002	0.0007			
80	299-E17-25	9/10/2008 9:11	104.195	TOPP	0.006	121.964	-0.0431	0.0106						
81	299-E24-16	9/10/2008 9:46	98.100	TOPP	0.016	121.955	0.0140	0.0046	0.0038	-0.0006	-0.0002			
82	299-E24-18	9/10/2008 10:34	98.421	TOPP	0.005	121.954	-0.0145	-0.0024	-0.0015	-0.0030	-0.0025			
83	299-E24-21	9/10/2008 10:50	96.702	TOPP	0.004	121.965	0.0062	0.0065	0.0055	0.0019	0.0022			
84	299-E24-24	9/10/2008 10:22	99.336	TOPP	0.006	121.958	-0.0460	-0.0059	-0.0027	-0.0003	0.0003			
85	299-E25-36	9/10/2008 10:07	94.803	TOPP	0.004	121.940	0.0326	-0.0050	-0.0085					
86	699-37-47A	9/10/2008 9:58	97.560	TOPP	0.004	121.939	0.0121	0.0020	0.0037	0.0004	0.0011			
87					Range (m):	0.208								
88					Gradient Magnitude (m/m):		8.79E-05	1.81E-05	2.04E-05	**2.68E-05**	2.74E-05			
89					Direction (azimuth):		58	117	146	**173**	173			
90					R^2:		0.41	0.59	0.74	**0.94**	0.97			
91					p-Value:		0.1233	0.0457	0.0167	**0.0008**	0.0007			
92					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
95						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
96	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
97														
98	299-E17-18	10/23/2008 13:58	98.848	TOPP	0.003	121.939	-0.0274	-0.0144	-0.0116	-0.0124				
99	299-E17-21	10/23/2008 13:10	103.443	TOC	0.000	121.983	-0.0153	0.0104	0.0090	0.0081	0.0073			
100	299-E17-22	10/23/2008 13:38	99.526	TOPP	0.007	121.962	-0.0062	0.0048	0.0073	0.0059	0.0039	0.0056		
101	299-E17-23	10/23/2008 14:05	102.625	TOPP	0.005	122.074	0.0850							
102	299-E17-25	10/23/2008 13:05	104.195	TOPP	0.006	121.964	-0.0285	-0.0022	-0.0029	-0.0031	-0.0050	0.0002	0.0018	0.0007
103	299-E24-16	10/23/2008 13:47	98.079	TOPP	0.016	121.975	0.0240	0.0235						
104	299-E24-18	10/23/2008 13:22	98.433	TOPP	0.005	121.942	-0.0162	-0.0157	-0.0119					
105	299-E24-21	10/23/2008 13:32	96.714	TOPP	0.004	121.953	0.0061	-0.0025	0.0026	-0.0010	-0.0016	-0.0018	-0.0010	0.0007
106	299-E24-24	10/23/2008 13:25	99.333	TOPP	0.006	121.961	-0.0072	-0.0046	-0.0022	-0.0053	-0.0053	-0.0020	-0.0009	-0.0010
107	299-E25-36	10/23/2008 14:17	94.796	TOPP	0.004	121.947	0.0089	0.0030	0.0094	0.0071	0.0043	0.0014	0.0021	
108	699-37-47A	10/23/2008 14:12	97.553	TOPP	0.004	121.946	-0.0231	-0.0023	0.0003	0.0008	-0.0035	-0.0034	-0.0020	-0.0004
109					Range (m):	0.135								
110					Gradient Magnitude (m/m):		5.45E-05	1.96E-05	2.56E-05	2.40E-05	2.30E-05	1.60E-05	1.53E-05	1.91E-05
111					Direction (azimuth):		22	59	50	59	52	57	60	56
112					R^2:		0.26	0.37	0.66	0.74	0.84	0.83	0.95	0.99
113					p-Value:		0.3028	0.1989	0.0397	0.0345	0.0261	0.0677	0.0524	0.1051
114					Statistically Significant?:		No	No	Yes	Yes	Yes	No	No	No
115														
116														
117						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
118	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
119														
120	299-E17-18	11/26/2008 10:25	98.845	TOPP	0.003	121.942	-0.0028	0.0006	0.0024	0.0004	0.0005	0.0006		
121	299-E17-21	11/26/2008 8:56	103.474	TOC	0.000	121.952	-0.0003	-0.0020	0.0042	-0.0003	-0.0010	-0.0009		
122	299-E17-22	11/26/2008 10:32	99.544	TOPP	0.007	121.944	-0.0045	-0.0015	0.0005	-0.0013	-0.0008	-0.0005		
123	299-E17-23	11/26/2008 9:24	102.769	TOPP	0.005	121.931	-0.0146	-0.0147	-0.0096					
124	299-E17-25	11/26/2008 9:08	104.195	TOPP	0.006	121.964	0.0166	0.0158						
125	299-E24-16	11/26/2008 10:15	98.076	TOPP	0.016	121.978	0.0279							
126	299-E24-18	11/26/2008 9:48	98.426	TOPP	0.005	121.949	-0.0050	-0.0006	-0.0002	-0.0003	0.0017			
127	299-E24-21	11/26/2008 9:55	96.711	TOPP	0.004	121.956	-0.0010	0.0051	0.0038	0.0051				
128	299-E24-24	11/26/2008 8:44	99.341	TOPP	0.006	121.953	-0.0057	-0.0029	-0.0012	-0.0019	0.0003	0.0011		
129	299-E25-36	11/26/2008 10:50	94.806	TOPP	0.004	121.937	-0.0104	-0.0027	-0.0050	-0.0038	-0.0016	-0.0009		
130	699-37-47A	11/26/2008 11:03	97.562	TOPP	0.004	121.937	-0.0003	0.0028	0.0053	0.0021	0.0008	0.0006		
131					Range (m):	0.047								
132					Gradient Magnitude (m/m):		1.63E-05	1.46E-05	1.69E-05	1.35E-05	1.16E-05	1.14E-05		
133					Direction (azimuth):		141	111	139	117	95	88		
134					R^2:		0.20	0.43	0.68	0.86	0.97	0.98		
135					p-Value:		0.4092	0.1377	0.0323	0.0069	0.0009	0.0019		
136					Statistically Significant?:		No	No	Yes	Yes	Yes	Yes		

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
139						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
140	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
141														
142	299-E17-18	12/22/2008 12:31	98.870	TOPP	0.003	121.917	-0.0149	-0.0111	-0.0090	-0.0099				
143	299-E17-21	12/22/2008 12:54	103.488	TOC	0.000	121.938	-0.0077	-0.0096	-0.0024	-0.0033	-0.0039	-0.0038	-0.0016	-0.0008
144	299-E17-22	12/22/2008 12:36	99.552	TOPP	0.007	121.936	0.0008	0.0042	0.0065	0.0050	0.0034	0.0025	0.0034	
145	299-E17-23	12/22/2008 12:43	102.762	TOPP	0.005	121.938	-0.0002	-0.0004	0.0056	0.0054	0.0037	0.0044		
146	299-E17-25	12/22/2008 12:50	104.199	TOPP	0.006	121.960	0.0194	0.0186						
147	299-E24-16	12/22/2008 12:21	98.091	TOPP	0.016	121.963	0.0310							
148	299-E24-18	12/22/2008 12:05	98.456	TOPP	0.005	121.919	-0.0178	-0.0129	-0.0125					
149	299-E24-21	12/22/2008 12:08	96.736	TOPP	0.004	121.931	-0.0052	0.0016	0.0000	-0.0038	-0.0044			
150	299-E24-24	12/22/2008 12:00	99.350	TOPP	0.006	121.944	0.0011	0.0042	0.0061	0.0028	0.0028	0.0001	0.0001	0.0009
151	299-E25-36	12/22/2008 13:21	94.816	TOPP	0.004	121.927	0.0004	0.0089	0.0062	0.0037	0.0016	-0.0009	-0.0016	-0.0007
152	699-37-47A	12/22/2008 13:26	97.579	TOPP	0.004	121.920	-0.0068	-0.0034	-0.0005	0.0000	-0.0032	-0.0022	-0.0003	0.0006
153					Range (m):	0.046								
154					Gradient Magnitude (m/m):		1.35E-05	2.04E-05	1.40E-05	1.48E-05	1.29E-05	1.45E-05	1.63E-05	1.63E-05
155					Direction (azimuth):		76	55	79	96	91	111	125	125
156					R^2:		0.16	0.45	0.49	0.68	0.79	0.88	0.95	0.99
157					p-Value:		0.5047	0.1208	0.1351	0.0578	0.0433	0.0418	0.0459	0.0819
158					Statistically Significant?:		No	No	No	No	Yes	Yes	Yes	No
159														
160														
161						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
162	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
163														
164	299-E17-18	1/26/2009 10:27	98.869	TOPP	0.003	121.918	-0.0007	-0.0031	-0.0020	-0.0006	-0.0011			
165	299-E17-21	1/26/2009 9:29	103.494	TOC	0.000	121.933	0.0028	-0.0020	-0.0025	0.0016	0.0010			
166	299-E17-22	1/26/2009 10:21	99.566	TOPP	0.007	121.922	-0.0010	-0.0030	-0.0021	-0.0007	-0.0015			
167	299-E17-23	1/26/2009 9:41	102.794	TOPP	0.005	121.906	-0.0158							
168	299-E17-25	1/26/2009 9:34	104.222	TOPP	0.006	121.937	0.0128	0.0079	0.0076					
169	299-E24-16	1/26/2009 10:14	98.123	TOPP	0.016	121.932	0.0090	0.0090						
170	299-E24-18	1/26/2009 9:54	98.455	TOPP	0.005	121.920	-0.0081	-0.0082	-0.0068	-0.0066				
171	299-E24-21	1/26/2009 9:59	96.733	TOPP	0.004	121.934	0.0037	0.0053	0.0073	0.0063	0.0043			
172	299-E24-24	1/26/2009 10:06	99.362	TOPP	0.006	121.932	-0.0023	-0.0028	-0.0019	-0.0009	-0.0026			
173	299-E25-36	1/26/2009 10:34	94.827	TOPP	0.004	121.916	-0.0027	-0.0017	0.0008	-0.0006	-0.0019			
174	699-37-47A	1/26/2009 10:39	97.586	TOPP	0.004	121.913	0.0024	-0.0015	-0.0005	0.0015	0.0018			
175					Range (m):	0.031								
176					Gradient Magnitude (m/m):		1.62E-05	1.42E-05	1.52E-05	**1.44E-05**	1.57E-05			
177					Direction (azimuth):		124	96	86	**108**	115			
178					R^2:		0.43	0.60	0.73	**0.82**	0.92			
179					p-Value:		0.1092	0.0397	0.0203	**0.0146**	0.0060			
180					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
183						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
184	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
185														
186	299-E17-18	2/5/2009 9:41	98.885	TOPP	0.003	121.902	-0.0202	-0.0167						
187	299-E17-21	2/5/2009 9:18	103.482	TOC	0.000	121.944	0.0051	0.0033	0.0031	0.0021	-0.0003			
188	299-E17-22	2/5/2009 9:47	99.562	TOPP	0.007	121.926	0.0003	0.0035	0.0012	-0.0005	0.0015			
189	299-E17-23	2/5/2009 9:32	102.762	TOPP	0.005	121.938	0.0074	0.0073	0.0049	0.0047	0.0044			
190	299-E17-25	2/5/2009 9:26	104.225	TOPP	0.006	121.934	0.0008	0.0000	-0.0017	-0.0021	-0.0031			
191	299-E24-16	2/5/2009 9:58	98.105	TOPP	0.016	121.950	0.0290							
192	299-E24-18	2/5/2009 8:59	98.466	TOPP	0.005	121.909	-0.0174	-0.0128	-0.0139					
193	299-E24-21	2/5/2009 9:05	96.747	TOPP	0.004	121.920	-0.0048	0.0016	0.0009	-0.0035	0.0002			
194	299-E24-24	2/5/2009 8:50	99.362	TOPP	0.006	121.932	-0.0014	0.0015	0.0019	-0.0017	-0.0010			
195	299-E25-36	2/5/2009 10:13	94.824	TOPP	0.004	121.919	0.0046	0.0125	0.0090	0.0060				
196	699-37-47A	2/5/2009 10:06	97.585	TOPP	0.004	121.914	-0.0034	-0.0002	-0.0054	-0.0051	-0.0017			
197					Range (m):	0.048								
198					Gradient Magnitude (m/m):		1.68E-05	2.40E-05	2.28E-05	**2.02E-05**	2.64E-05			
199					Direction (azimuth):		62	49	41	**51**	48			
200					R^2:		0.24	0.58	0.68	**0.86**	0.95			
201					p-Value:		0.3283	0.0487	0.0324	**0.0077**	0.0029			
202					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			
203														
204														
205						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
206	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
207														
208	299-E17-18	3/24/2009 12:21	98.889	TOPP	0.003	121.898	-0.0159	-0.0129						
209	299-E17-21	3/24/2009 12:55	103.500	TOC	0.000	121.927	-0.0027	-0.0041	-0.0043	-0.0051	-0.0042			
210	299-E17-22	3/24/2009 12:35	99.562	TOPP	0.007	121.926	0.0092	0.0118	0.0101	0.0087				
211	299-E17-23	3/24/2009 12:15	102.774	TOPP	0.005	121.926	0.0037	0.0036	0.0018	0.0016	0.0028			
212	299-E17-25	3/24/2009 12:09	104.231	TOPP	0.006	121.929	0.0044	0.0037	0.0024	0.0021	0.0032			
213	299-E24-16	3/24/2009 12:28	98.119	TOPP	0.016	121.936	0.0242							
214	299-E24-18	3/24/2009 11:40	98.472	TOPP	0.005	121.903	-0.0137	-0.0098	-0.0107					
215	299-E24-21	3/24/2009 11:35	96.753	TOPP	0.004	121.914	-0.0006	0.0047	0.0042	0.0009	0.0022			
216	299-E24-24	3/24/2009 11:20	99.373	TOPP	0.006	121.921	-0.0021	0.0004	0.0007	-0.0021	-0.0010			
217	299-E25-36	3/24/2009 12:50	94.842	TOPP	0.004	121.901	-0.0046	0.0021	-0.0007	-0.0030	-0.0013			
218	699-37-47A	3/24/2009 12:43	97.591	TOPP	0.004	121.908	-0.0022	0.0005	-0.0035	-0.0032	-0.0016			
219					Range (m):	0.038								
220					Gradient Magnitude (m/m):		1.68E-05	2.32E-05	2.24E-05	**2.01E-05**	2.06E-05			
221					Direction (azimuth):		62	45	38	**46**	46			
222					R^2:		0.24	0.63	0.71	**0.82**	0.93			
223					p-Value:		0.3283	0.0299	0.0232	**0.0140**	0.0045			
224					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
227	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
228						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
229														
230	299-E17-18	6/29/2009 11:50	98.823	TOPP	0.003	121.964	-0.0173	-0.0159	-0.0133					
231	299-E17-21	6/29/2009 12:37	103.449	TOC	0.000	121.977	0.0010	-0.0087	-0.0093	-0.0094	-0.0080			
232	299-E17-22	6/29/2009 11:41	99.498	TOPP	0.007	121.990	0.0134	0.0103	0.0130	0.0112				
233	299-E17-23	6/29/2009 12:15	102.708	TOPP	0.005	121.992	0.0084	0.0073	0.0073	0.0054	0.0070	0.0030	0.0017	
234	299-E17-25	6/29/2009 12:22	104.168	TOPP	0.006	121.991	0.0094	0.0059	0.0056	0.0042	0.0057	0.0006	-0.0014	-0.0001
235	299-E24-16	6/29/2009 11:33	98.056	TOPP	0.016	121.998	0.0261	0.0223						
236	299-E24-18	6/29/2009 11:19	98.410	TOPP	0.005	121.965	-0.0027	-0.0117	-0.0074	-0.0082	-0.0066	-0.0087		
237	299-E24-21	6/29/2009 11:26	96.694	TOPP	0.004	121.973	0.0110	-0.0007	0.0051	0.0047	0.0064	0.0049	0.0000	0.0001
238	299-E24-24	6/29/2009 11:03	99.361	TOPP	0.006	121.933	-0.0299							
239	299-E25-36	6/29/2009 12:07	94.776	TOPP	0.004	121.967	-0.0066	-0.0063	-0.0001	-0.0029	-0.0011	0.0019	0.0001	-0.0002
240	699-37-47A	6/29/2009 12:00	97.520	TOPP	0.004	121.979	-0.0128	-0.0026	-0.0009	-0.0051	-0.0033	-0.0016	-0.0003	0.0001
241					Range (m):	0.065								
242					Gradient Magnitude (m/m):		2.68E-05	1.33E-05	2.04E-05	2.15E-05	2.17E-05	2.63E-05	**2.40E-05**	2.26E-05
243					Direction (azimuth):		336	12	12	4	5	18	**29**	29
244					R^2:		0.24	0.14	0.42	0.53	0.65	0.83	**0.99**	1.00
245					p-Value:		0.3271	0.5904	0.1996	0.1548	0.1252	0.0700	**0.0097**	0.0152
246					Statistically Significant?:		No	No	No	No	No	No	**Yes**	Yes
247														
248														
249	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
250						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
251														
252	299-E17-18	9/22/2009 7:50	98.870	TOPP	0.003	121.917	-0.0141	-0.0113	-0.0122					
253	299-E17-21	9/22/2009 7:58	103.468	TOC	0.000	121.958	0.0034	0.0020	0.0010	0.0008	0.0039			
254	299-E17-22	9/22/2009 7:43	99.548	TOPP	0.007	121.940	0.0043	0.0068	0.0052	0.0035	0.0047			
255	299-E17-23	9/22/2009 8:09	102.757	TOPP	0.005	121.943	-0.0003	-0.0004	-0.0005	-0.0022	0.0005			
256	299-E17-25	9/22/2009 8:05	104.202	TOPP	0.006	121.957	0.0101	0.0095	0.0092	0.0079				
257	299-E24-16	9/22/2009 7:33	98.103	TOPP	0.016	121.952	0.0234							
258	299-E24-18	9/22/2009 7:15	98.456	TOPP	0.005	121.919	-0.0171	-0.0134						
259	299-E24-21	9/22/2009 7:27	96.734	TOPP	0.004	121.933	-0.0004	0.0047	0.0006	-0.0001	-0.0007			
260	299-E24-24	9/22/2009 7:06	99.355	TOPP	0.006	121.939	-0.0068	-0.0044	-0.0079	-0.0078	-0.0069			
261	299-E25-36	9/22/2009 8:23	94.819	TOPP	0.004	121.924	0.0046	0.0110	0.0083	0.0055	0.0046			
262	699-37-47A	9/22/2009 8:14	97.581	TOPP	0.004	121.918	-0.0070	-0.0045	-0.0038	-0.0076	-0.0061			
263					Range (m):	0.041								
264					Gradient Magnitude (m/m):		2.42E-05	3.01E-05	2.83E-05	**2.68E-05**	2.37E-05			
265					Direction (azimuth):		58	50	59	**54**	60			
266					R^2:		0.46	0.70	0.78	**0.84**	0.86			
267					p-Value:		0.0854	0.0145	0.0112	**0.0109**	0.0195			
268					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
271	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
272						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
273														
274	299-E17-18	12/30/2009 8:53	98.923	TOPP	0.003	121.864	-0.0091	-0.0070	-0.0033	-0.0014	-0.0005			
275	299-E17-21	12/30/2009 10:10	103.523	TOC	0.000	121.904	0.0059	0.0048	0.0004	-0.0014	-0.0014			
276	299-E17-22	12/30/2009 9:13	99.611	TOPP	0.007	121.877	-0.0027	-0.0007	0.0018	0.0043				
277	299-E17-23	12/30/2009 8:39	102.815	TOPP	0.005	121.885	0.0012	0.0011	0.0000	-0.0018	-0.0015			
278	299-E17-25	12/30/2009 8:23	104.265	TOPP	0.006	121.895	0.0068	0.0063	0.0041	0.0022	0.0024			
279	299-E24-16	12/30/2009 9:02	98.162	TOPP	0.016	121.893	0.0181							
280	299-E24-18	12/30/2009 9:33	98.505	TOPP	0.005	121.870	-0.0140	-0.0111	-0.0078	-0.0023	-0.0012			
281	299-E24-21	12/30/2009 9:26	96.783	TOPP	0.004	121.884	0.0001	0.0041	0.0091					
282	299-E24-24	12/30/2009 9:56	99.405	TOPP	0.006	121.889	-0.0064	-0.0046	-0.0043	0.0006	0.0015			
283	299-E25-36	12/30/2009 11:12	94.871	TOPP	0.004	121.872	0.0067	0.0117						
284	699-37-47A	12/30/2009 10:25	97.643	TOPP	0.004	121.856	-0.0066	-0.0046	0.0001	-0.0003	0.0006			
285					Range (m):	0.048								
286					Gradient Magnitude (m/m):		2.45E-05	2.74E-05	3.58E-05	**4.25E-05**	4.38E-05			
287					Direction (azimuth):		86	76	67	**53**	52			
288					R^2:		0.61	0.78	0.90	**0.98**	0.99			
289					p-Value:		0.0243	0.0053	0.0011	**0.0001**	0.0001			
290					Statistically Significant?:		Yes	Yes	Yes	**Yes**	Yes			
291														
292														
293	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
294						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
295														
296	299-E17-18	3/16/2010 7:41	98.949	TOPP	0.003	121.838	-0.0227	-0.0190						
297	299-E17-21	3/16/2010 7:10	103.541	TOC	0.000	121.886	0.0088	0.0069	0.0066	0.0057	0.0039			
298	299-E17-22	3/16/2010 8:54	99.628	TOPP	0.007	121.860	-0.0036	-0.0003	-0.0029	-0.0046	-0.0055			
299	299-E17-23	3/16/2010 7:31	102.833	TOPP	0.005	121.867	-0.0027	-0.0028	-0.0055	-0.0057				
300	299-E17-25	3/16/2010 7:22	104.284	TOPP	0.006	121.876	0.0039	0.0031	0.0012	0.0008	-0.0011			
301	299-E24-16	3/16/2010 7:53	98.166	TOPP	0.016	121.889	0.0309							
302	299-E24-18	3/16/2010 9:09	98.529	TOPP	0.005	121.846	-0.0172	-0.0123	-0.0136					
303	299-E24-21	3/16/2010 8:40	96.810	TOPP	0.004	121.857	-0.0038	0.0030	0.0022	-0.0020	-0.0015			
304	299-E24-24	3/16/2010 8:30	99.424	TOPP	0.006	121.870	0.0002	0.0033	0.0038	0.0003	0.0001			
305	299-E25-36	3/16/2010 8:16	94.889	TOPP	0.004	121.854	0.0024	0.0108	0.0068	0.0039	0.0041			
306	699-37-47A	3/16/2010 8:06	97.638	TOPP	0.004	121.861	0.0038	0.0072	0.0014	0.0017	0.0000			
307					Range (m):	0.051								
308					Gradient Magnitude (m/m):		1.79E-05	2.63E-05	2.55E-05	**2.23E-05**	2.45E-05			
309					Direction (azimuth):		51	42	32	**41**	36			
310					R^2:		0.23	0.57	0.71	**0.87**	0.92			
311					p-Value:		0.3568	0.0520	0.0235	**0.0066**	0.0066			
312					Statistically Significant?:		No	No	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
315						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
316	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
317														
318	299-E17-18	6/30/2010 8:55	98.937	TOPP	0.003	121.850	-0.0024	-0.0008	0.0007	0.0017				
319	299-E17-21	6/30/2010 10:01	103.568	TOC	0.000	121.859	-0.0065	-0.0073	-0.0024	-0.0015				
320	299-E17-22	6/30/2010 8:44	99.628	TOPP	0.007	121.860	0.0041	0.0055	0.0071					
321	299-E17-23	6/30/2010 9:35	102.843	TOPP	0.005	121.857	-0.0008	-0.0009	0.0031	0.0042				
322	299-E17-25	6/30/2010 9:44	104.287	TOPP	0.006	121.873	0.0129	0.0125						
323	299-E24-16	6/30/2010 8:35	98.188	TOPP	0.016	121.867	0.0134							
324	299-E24-18	6/30/2010 8:17	98.523	TOPP	0.005	121.852	-0.0064	-0.0043	-0.0040	-0.0033				
325	299-E24-21	6/30/2010 8:27	96.805	TOPP	0.004	121.862	0.0034	0.0063	0.0053	0.0059				
326	299-E24-24	6/30/2010 7:57	99.436	TOPP	0.006	121.858	-0.0065	-0.0052	-0.0039	-0.0032				
327	299-E25-36	6/30/2010 9:25	94.899	TOPP	0.004	121.844	-0.0046	-0.0009	-0.0027	-0.0019				
328	699-37-47A	6/30/2010 9:04	97.659	TOPP	0.004	121.840	-0.0066	-0.0051	-0.0031	-0.0020				
329					Range (m):	0.033								
330					Gradient Magnitude (m/m):		1.30E-05	1.50E-05	**1.29E-05**	1.31E-05				
331					Direction (azimuth):		90	76	**101**	103				
332					R^2:		0.38	0.56	**0.69**	0.79				
333					p-Value:		0.1436	0.0565	**0.0291**	0.0192				
334					Statistically Significant?:		No	No	**Yes**	Yes				
335														
336														
337						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
338	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
339														
340	299-E17-18	9/14/2010 8:43	98.967	TOPP	0.003	121.820	-0.0100	-0.0082						
341	299-E17-21	NM	NM	TOC	0.000	NM								
342	299-E17-22	9/14/2010 10:16	99.656	TOPP	0.007	121.832	-0.0005	0.0010	-0.0002	-0.0013	-0.0007			
343	299-E17-23	9/14/2010 9:05	102.865	TOPP	0.005	121.835	0.0004	0.0000	-0.0012	-0.0016	0.0000			
344	299-E17-25	9/14/2010 9:12	104.319	TOPP	0.006	121.841	0.0047	0.0039	0.0030	0.0024				
345	299-E24-16	9/14/2010 10:09	98.210	TOPP	0.016	121.845	0.0147							
346	299-E24-18	9/14/2010 9:45	98.551	TOPP	0.005	121.824	-0.0099	-0.0077	-0.0082					
347	299-E24-21	9/14/2010 9:51	96.835	TOPP	0.004	121.832	-0.0016	0.0016	0.0013	-0.0013	-0.0015			
348	299-E24-24	9/14/2010 9:34	99.454	TOPP	0.006	121.840	0.0015	0.0026	0.0028	0.0005	0.0012			
349	299-E25-36	9/14/2010 8:56	94.916	TOPP	0.004	121.827	0.0007	0.0051	0.0034	0.0018	0.0010			
350	699-37-47A	9/14/2010 10:25	97.673	TOPP	0.004	121.826	0.0000	0.0017	-0.0008	-0.0006	-0.0001			
351					Range (m):	0.025								
352					Gradient Magnitude (m/m):		1.00E-05	1.36E-05	1.26E-05	**1.22E-05**	1.05E-05			
353					Direction (azimuth):		80	63	56	**68**	76			
354					R^2:		0.25	0.56	0.64	**0.92**	0.96			
355					p-Value:		0.3595	0.0850	0.0759	**0.0057**	0.0078			
356					Statistically Significant?:		No	No	No	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
359						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
360	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
361														
362	299-E17-18	3/18/2011 8:47	98.975	TOPP	0.003	121.812	-0.0182	-0.0146						
363	299-E17-21	3/18/2011 8:06	103.575	TOC	0.000	121.852	0.0057	0.0049	0.0048	0.0033				
364	299-E17-22	3/18/2011 8:36	99.656	TOPP	0.007	121.832	-0.0014	0.0024	0.0004	-0.0010	-0.0002			
365	299-E17-23	3/18/2011 8:24	102.861	TOPP	0.005	121.839	0.0005	0.0004	-0.0016	-0.0018	-0.0002			
366	299-E17-25	3/18/2011 8:11	104.319	TOPP	0.006	121.841	0.0000	-0.0004	-0.0019	-0.0024	-0.0003			
367	299-E24-16	3/18/2011 9:41	98.195	TOPP	0.016	121.860	0.0314							
368	299-E24-18	3/18/2011 9:52	98.555	TOPP	0.005	121.820	-0.0137	-0.0077	-0.0086					
369	299-E24-21	3/18/2011 10:13	96.839	TOPP	0.004	121.828	-0.0039	0.0043	0.0039	0.0000	0.0009			
370	299-E24-24	NM	NM	TOPP	0.006	NM								
371	299-E25-36	3/18/2011 10:35	94.924	TOPP	0.004	121.819	-0.0033	0.0053	0.0023	0.0002	-0.0010			
372	699-37-47A	3/18/2011 10:24	97.670	TOPP	0.004	121.829	0.0029	0.0054	0.0007	0.0018	0.0008			
373					Range (m):	0.048								
374					Gradient Magnitude (m/m):		1.64E-05	2.46E-05	2.40E-05	**2.17E-05**	1.91E-05			
375					Direction (azimuth):		58	41	33	**43**	39			
376					R^2:		0.23	0.70	0.86	**0.96**	0.99			
377					p-Value:		0.4078	0.0283	0.0076	**0.0012**	0.0007			
378					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			
379														
380														
381						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
382	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
383														
384	299-E17-18	6/20/2011 13:05	98.993	TOPP	0.003	121.794	-0.0116	-0.0095						
385	299-E17-21	6/20/2011 12:31	103.601	TOC	0.000	121.826	-0.0002	-0.0007	-0.0008	-0.0025	-0.0038			
386	299-E17-22	6/20/2011 13:41	99.673	TOPP	0.007	121.815	0.0043	0.0063	0.0051	0.0034	0.0027			
387	299-E17-23	6/20/2011 12:42	102.888	TOPP	0.005	121.812	-0.0027	-0.0027	-0.0040	-0.0043				
388	299-E17-25	6/20/2011 12:37	104.336	TOPP	0.006	121.824	0.0058	0.0055	0.0046	0.0040	0.0025			
389	299-E24-16	6/20/2011 13:11	98.231	TOPP	0.016	121.824	0.0175							
390	299-E24-18	6/20/2011 12:15	98.574	TOPP	0.005	121.801	-0.0128	-0.0095	-0.0101					
391	299-E24-21	6/20/2011 13:18	96.852	TOPP	0.004	121.815	0.0016	0.0062	0.0059	0.0013	0.0016			
392	299-E24-24	NM	NM	TOPP	0.006	NM								
393	299-E25-36	6/20/2011 12:58	94.948	TOPP	0.004	121.795	-0.0035	0.0013	-0.0007	-0.0031	-0.0029			
394	699-37-47A	6/20/2011 12:50	97.700	TOPP	0.004	121.799	0.0016	0.0030	0.0000	0.0012	0.0000			
395					Range (m):	0.032								
396					Gradient Magnitude (m/m):		2.01E-05	2.27E-05	2.13E-05	**2.16E-05**	2.22E-05			
397					Direction (azimuth):		82	69	64	**78**	73			
398					R^2:		0.51	0.74	0.78	**0.92**	0.95			
399					p-Value:		0.0840	0.0178	0.0215	**0.0062**	0.0107			
400					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
403	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
404						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
405														
406	299-E17-18	9/22/2011 7:43	99.004	TOPP	0.003	121.783	-0.0134	-0.0113	-0.0121					
407	299-E17-21	9/22/2011 7:11	103.606	TOC	0.000	121.821	0.0035	0.0030	0.0011	0.0009	0.0002			
408	299-E17-22	9/22/2011 8:27	99.685	TOPP	0.007	121.803	0.0004	0.0025	0.0007	-0.0010	-0.0003			
409	299-E17-23	9/22/2011 7:25	102.895	TOPP	0.005	121.805	0.0005	0.0005	0.0003	-0.0014	-0.0015			
410	299-E17-25	9/22/2011 7:19	104.348	TOPP	0.006	121.812	0.0036	0.0033	0.0027	0.0014	0.0011			
411	299-E24-16	9/22/2011 7:50	98.237	TOPP	0.016	121.818	0.0182							
412	299-E24-18	9/22/2011 8:05	98.582	TOPP	0.005	121.793	-0.0149	-0.0115						
413	299-E24-21	9/22/2011 7:58	96.858	TOPP	0.004	121.809	-0.0001	0.0047	-0.0005	-0.0012	0.0001			
414	299-E24-24	NM	NM	TOPP	0.006	NM								
415	299-E25-36	9/22/2011 8:36	94.949	TOPP	0.004	121.794	0.0022	0.0072	0.0046	0.0019				
416	699-37-47A	9/22/2011 7:33	97.713	TOPP	0.004	121.786	0.0001	0.0015	0.0032	-0.0006	0.0004			
417					Range (m):	0.038								
418					Gradient Magnitude (m/m):		2.01E-05	2.32E-05	2.59E-05	**2.33E-05**	2.43E-05			
419					Direction (azimuth):		82	85	99	**97**	93			
420					R^2:		0.51	0.71	0.84	**0.99**	0.99			
421					p-Value:		0.0840	0.0236	0.0096	**0.0002**	0.0004			
422					Statistically Significant?:		No	Yes	Yes	**Yes**	Yes			
423														
424														
425	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
426						New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
427														
428	299-E17-18	12/29/2011 8:20	98.986	TOPP	0.003	121.801	0.0087	0.0083	0.0093					
429	299-E17-21	12/29/2011 9:02	103.613	TOC	0.000	121.814	0.0000	-0.0016	0.0023					
430	299-E17-22	12/29/2011 8:14	99.691	TOPP	0.007	121.797	-0.0027	-0.0040	-0.0027					
431	299-E17-23	12/29/2011 8:52	102.908	TOPP	0.005	121.792	-0.0072	-0.0073	-0.0044					
432	299-E17-25	12/29/2011 8:46	104.347	TOPP	0.006	121.813	0.0095	0.0089						
433	299-E24-16	12/29/2011 8:08	98.248	TOPP	0.016	121.807	0.0084	0.0064	0.0064					
434	299-E24-18	12/29/2011 7:44	98.577	TOPP	0.005	121.798	-0.0097							
435	299-E24-21	12/29/2011 8:01	96.858	TOPP	0.004	121.809	-0.0016	-0.0053	-0.0055					
436	299-E24-24	12/29/2011 8:36	98.490	TOPP	0.006	122.804	Outlier - Not Used							
437	299-E25-36	12/29/2011 9:10	94.951	TOPP	0.004	121.792	0.0015	0.0000	-0.0012					
438	699-37-47A	12/29/2011 9:18	97.727	TOPP	0.004	121.772	-0.0068	-0.0053	-0.0043					
439					Range (m):	1.032								
440					Gradient Magnitude (m/m):		2.70E-05	**3.07E-05**	3.12E-05					
441					Direction (azimuth):		116	**121**	129					
442					R^2:		0.69	**0.78**	0.83					
443					p-Value:		0.0165	**0.0114**	0.0124					
444					Statistically Significant?:		Yes	**Yes**	Yes					

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE
447						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
448	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
449														
450	299-E17-18	6/22/2012 9:48	99.037	TOPP	0.003	121.750	0.0355	0.0309	-0.0182	-0.0139				
451	299-E17-21	6/22/2012 9:50	103.871	TOC	0.000	121.557	-0.1452							
452	299-E17-22	6/22/2012 9:22	99.711	TOPP	0.007	121.777	0.0477	0.0274	0.0052	0.0082	0.0047	0.0030	0.0020	0.0005
453	299-E17-23	6/22/2012 9:35	102.927	TOPP	0.005	121.773	0.0887	0.0322	-0.0010	-0.0008	-0.0049	-0.0053	-0.0040	
454	299-E17-25	6/22/2012 9:40	104.377	TOPP	0.006	121.783	0.0949	0.0250	0.0066	0.0057	0.0030	0.0022	0.0031	-0.0002
455	299-E24-16	6/22/2012 9:11	98.262	TOPP	0.016	121.793	0.0307	0.0429	0.0237					
456	299-E24-18	6/22/2012 8:51	98.617	TOPP	0.005	121.758	-0.0120	-0.0277	-0.0163	-0.0129	-0.0136			
457	299-E24-21	6/22/2012 8:48	96.899	TOPP	0.004	121.768	-0.0330	-0.0335	-0.0063	-0.0018	-0.0013	-0.0056		
458	299-E24-24	6/22/2012 8:39	99.509	TOPP	0.006	121.785	0.0077	-0.0446	0.0043	0.0049	0.0077	0.0036	-0.0009	0.0000
459	299-E25-36	6/22/2012 10:09	94.977	TOPP	0.004	121.766	-0.0029	0.0461	0.0020	0.0105	0.0044	0.0021	-0.0003	-0.0002
460	699-37-47A	6/22/2012 10:13	97.936	TOPP	0.004	121.563	-0.1120	-0.0989						
461					Range (m):	0.236								
462					Gradient Magnitude (m/m):		1.36E-04	1.15E-04	1.36E-05	2.05E-05	1.61E-05	1.52E-05	1.61E-05	1.58E-05
463					Direction (azimuth):		172	124	88	73	47	65	93	71
464					R^2:		0.25	0.49	0.13	0.41	0.43	0.70	0.87	1.00
465					p-Value:		0.3101	0.0960	0.6584	0.2654	0.3304	0.1655	0.1293	0.0376
466					Statistically Significant?:		No	No	No	No	No	No	No	Yes
467														
468														
469						Hydraulic Head (m NAVD88)	Trend-Surface Analyses Residuals (m)							
470	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration	6th Iteration	7th Iteration	8th Iteration
471														
472	299-E17-18	9/12/2012 12:01	99.006	TOPP	0.003	121.781	-0.0073	-0.0055	-0.0042	-0.0048				
473	299-E17-21	9/12/2012 11:42	103.620	TOC	0.000	121.807	-0.0038	-0.0047	-0.0002	-0.0009				
474	299-E17-22	9/12/2012 12:12	99.692	TOPP	0.007	121.796	0.0010	0.0026	0.0041	0.0031				
475	299-E17-23	9/12/2012 11:55	102.905	TOPP	0.005	121.795	-0.0018	-0.0019	0.0018	0.0017				
476	299-E17-25	9/12/2012 11:46	104.347	TOPP	0.006	121.813	0.0119	0.0116						
477	299-E24-16	9/12/2012 12:23	98.248	TOPP	0.016	121.807	0.0149							
478	299-E24-18	9/12/2012 13:11	98.585	TOPP	0.005	121.790	-0.0108	-0.0084	-0.0081					
479	299-E24-21	9/12/2012 13:17	96.860	TOPP	0.004	121.807	0.0049	0.0082	0.0072	0.0047				
480	299-E24-24	9/12/2012 12:58	99.486	TOPP	0.006	121.808	-0.0037	-0.0022	-0.0010	-0.0031				
481	299-E25-36	9/12/2012 12:37	94.963	TOPP	0.004	121.780	-0.0035	0.0006	-0.0011	-0.0027				
482	699-37-47A	9/12/2012 12:45	97.724	TOPP	0.004	121.775	-0.0019	-0.0002	0.0016	0.0019				
483					Range (m):	0.038								
484					Gradient Magnitude (m/m):		2.38E-05	2.52E-05	**2.41E-05**	2.55E-05				
485					Direction (azimuth):		101	91	**105**	110				
486					R^2:		0.65	0.79	**0.87**	0.94				
487					p-Value:		0.0144	0.0042	**0.0020**	0.0010				
488					Statistically Significant?:		Yes	Yes	**Yes**	Yes				

Figure D-5. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for IDF/PUREX without Barometric Adjustments (cont'd.)

Appendix E

Hydraulic Head Calculations and Trend-Surface Analysis Results for LLWMA-2

Three spreadsheets are presented in this appendix for LLWMA-2: one with well characteristics, one showing the determination of gyroscope correction coefficients, and one with the hydraulic head calculations and trend-surface analysis results that includes normalization of the measurements to a constant barometric pressure. Well characteristics are shown on the 'Wells' spreadsheet in Figure E-1. This spreadsheet lists, for each well, the default MP – RP values, horizontal coordinates, old reference point elevations, new reference point elevations resulting from the resurveys, and gyroscope correction coefficients. No formulas are used on this sheet.

The graphing feature of Microsoft Excel was used to determine the gyroscope correction coefficients for the LLWMA-2 wells. For each well, the measured depth to water in meters was plotted against the difference between the measured depth to water and the true vertical depth to water in feet (using an x-y scatter plot) for the lowermost gyroscope depth stations bracketing the water level. Then, the trend line feature of Excel was used to add a third degree polynomial trend line to the plots (except for 299-E33-37, in which a linear trend line was added). The equation of the trend line was displayed on the chart, and the coefficients were copied from this equation into the spreadsheet. Figure E-2 shows the gyroscope data used, graphs of the data, the fitted equations, and the coefficients for each well. Three wells (299-E27-9, 299-E33-14, and 299-E34-10) had constant correction values for all of the lowermost depth stations, so a polynomial equation was not needed. The correction values for these wells were specified as a constant (C_4 only) with the other coefficients equal to zero.

Figure E-3 shows a portion of the spreadsheet, with formulas displayed, that was used to calculate the hydraulic heads and display the trend-surface analysis results. It is nearly the same as the IDF/PUREX spreadsheets (Appendix D) and is designed for multiple trend-surface analysis iterations. The water-level measurements are in columns C through F (measurement date and time, depth to water, measurement point description, and MP – RP). In column G, the hydraulic head values are calculated (Equation 1) using the new reference point elevations and correcting for borehole deviation. The reference point elevations for each well are obtained from the "Wells" sheet (Figure E.1) using the "VLOOKUP" function. This function matches the well name in column B to the well names in the first column of the specified array on the "Wells" sheet (B6 to O13) and returns a value from the specified column of the array (column 9 for the new reference point values) in the same row as the matched well name. The gyroscope correction coefficients were obtained using the 'VLOOKUP' function in the same manner. In column H, the hydraulic head values normalized to a constant barometric pressure are displayed. This normalization was performed in a separate spreadsheet (see Appendix G for an example) and the results were copied into this spreadsheet.

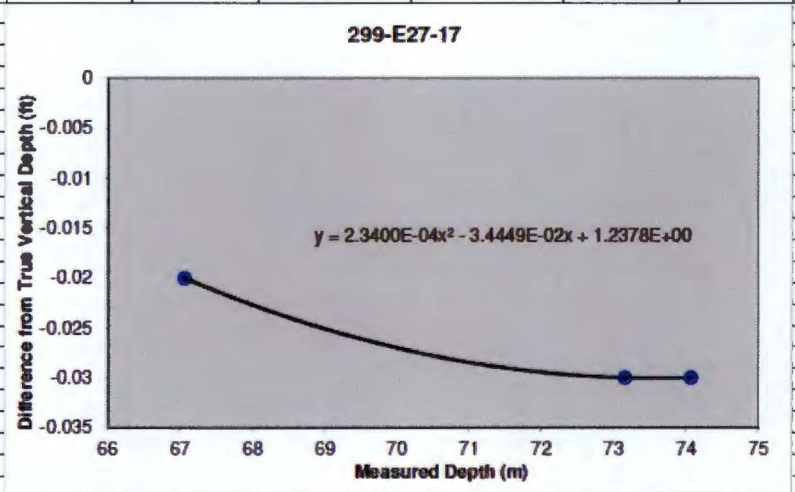
Once the hydraulic heads were calculated, they were copied into the trend-surface analysis spreadsheet (Appendix B) along with the horizontal coordinates for the wells, and the trend-surface results were then copied into this sheet (rows 19 through 23 in Figure E-3). The residuals for each iteration of the trend-surface analysis were copied into columns I through M, as needed, and the highest residual was highlighted red to identify the corresponding measurement that was removed from the next trend-surface analysis iteration. The final trend-surface analysis results, that met the criteria specified in Section 6 (i.e., statistically significant, all residuals were less than 0.01 m, and the removal of the measurement with the next highest residual still resulted in a statistically significant trend surface with all residuals less than 0.01 m and the dip direction changed by less than 10 degrees) are shown in bold text. Figure E-4 lists the entire spreadsheet with all of the water-level measurements collected for this study and the results of the

hydraulic head calculations (normalized to a constant barometric pressure) and trend-surface analyses. Many of the data sets did not yield statistically significant results.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**200 East Area Low Gradient Evaluation Study**														
2	LLWMA-2 Well Information (Wells worksheet)														
3															
4		Well Name	MP Desc.	MP-RP (m)	Horizontal Coordinates (m NAD83)			Old RP Elev (m NAVD88)		New RP Elev (m NAVD88)		Gyro Correction Coefficients			
5					East (m)	North (m)	Source	Value	Source	Value	Source	C1	C2	C3	C4
6		299-E27-17	TOPP	0.004	574547.310	137122.010	KEH	194.475	KEH	194.480	Fluor	0.00000E+00	2.34000E-04	-3.44490E-02	1.23780E+00
7		299-E27-18	TOPP	0.005	574299.610	137119.290	KEH	199.175	KEH	199.180	Fluor	0.00000E+00	-4.72100E-05	1.69800E-03	-8.15790E-02
8		299-E27-8	TOPP	0.012	574759.080	137044.178	USACE	195.503	USACE	195.499	Fluor	0.00000E+00	2.15280E-04	-3.18240E-02	1.13600E+00
9		299-E27-9	TOPP	0.012	574917.649	137040.904	USACE	192.874	USACE	192.872	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-3.00000E-02
10		299-E33-14	TOPP	0.005	573985.612	137567.216	USACE	190.625	USACE	190.619	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-1.00000E-02
11		299-E33-37	TOPP	0.004	574091.477	137185.421	USACE	200.124	KEH	200.129	Fluor	0.00000E+00	0.00000E+00	-1.61990E-03	5.85780E-02
12		299-E34-10	TOPP	0.004	574284.400	137224.570	KEH	196.016	KEH	196.022	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-4.00000E-02
13		299-E34-9	TOPP	0.004	574186.020	137429.820	KEH	192.642	KEH	192.643	Fluor	0.00000E+00	0.00000E+00	-2.52370E-03	7.92310E-02
14															
15		TOPP = Top of Pump Plate													

Figure E-1. Spreadsheet of Well Information for LLWMA-2 (i.e., "Wells" Sheet)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E27-17	220	67.056	219.98	-0.02	0.0000E+00	2.3400E-04	-3.4449E-02	1.2378E+00
	240	73.152	239.97	-0.03				
	243	74.0664	242.97	-0.03				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E27-18	220	67.056	219.82	-0.18	0.0000E+00	-4.7210E-05	1.6980E-03	-8.1579E-02
	240	73.152	239.79	-0.21				
	258	78.6384	257.76	-0.24				

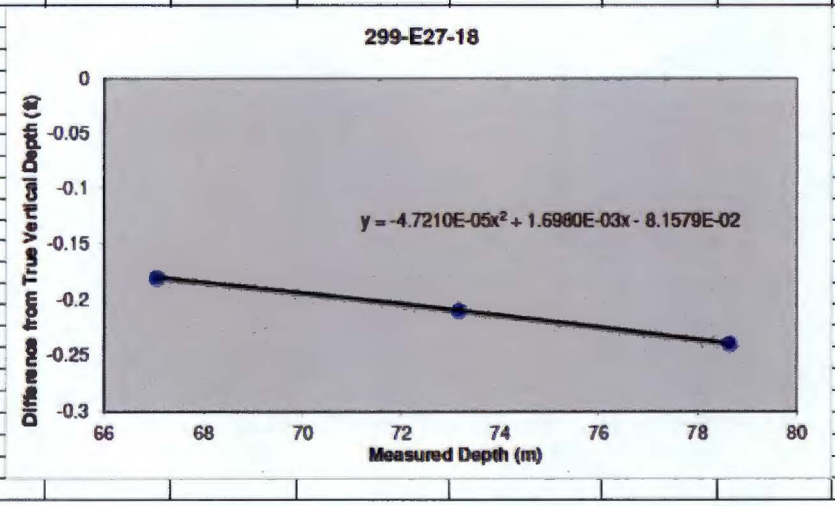
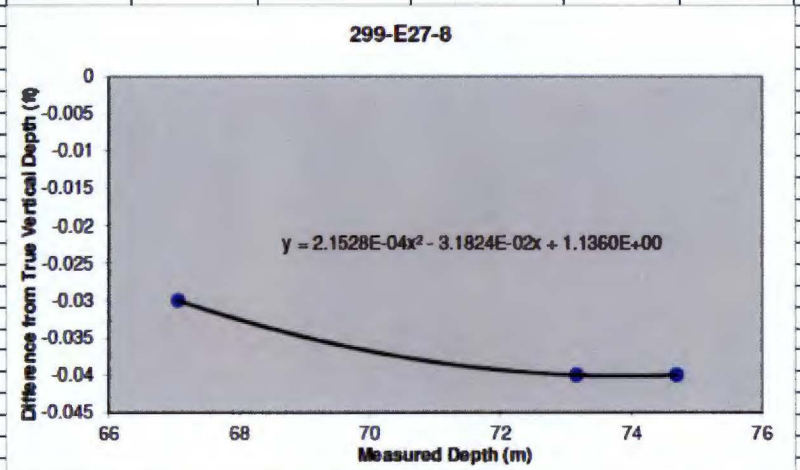


Figure E-2. Determination of Gyroscopic Correction Coefficients for the LLWMA-2 Wells

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E27-8	220	67.056	219.97	-0.03	0.0000E+00	2.1528E-04	-3.1824E-02	1.1360E+00
	240	73.152	239.96	-0.04				
	245	74.676	244.96	-0.04				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E27-9	220	67.056	219.97	-0.03	0.0000E+00	0.0000E+00	0.0000E+00	-3.0000E-02
	235	71.628	234.97	-0.03				

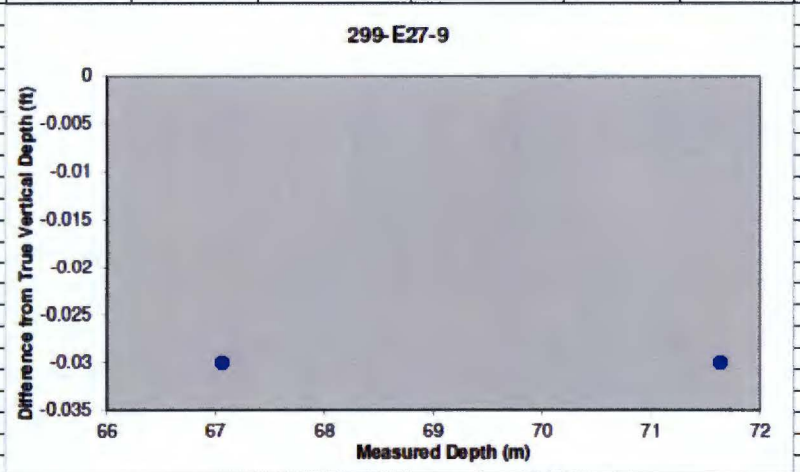
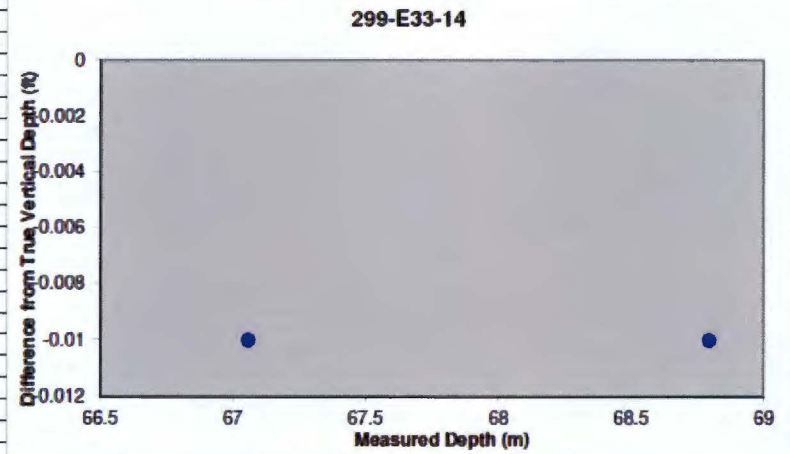


Figure E-2. Determination of Gyroscopic Correction Coefficients for the LLWMA-2 Wells (cont'd.)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E33-14	220	67.056	219.99	-0.01	0.0000E+00	0.0000E+00	0.0000E+00	-1.0000E-02
	225.7	68.79336	225.69	-0.01				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E33-37	220	67.056	219.95	-0.05	0.0000E+00	0.0000E+00	-1.6199E-03	5.8578E-02
	240	73.152	239.94	-0.06				
	260	79.248	259.93	-0.07				
	260.9	79.52232	260.83	-0.07				

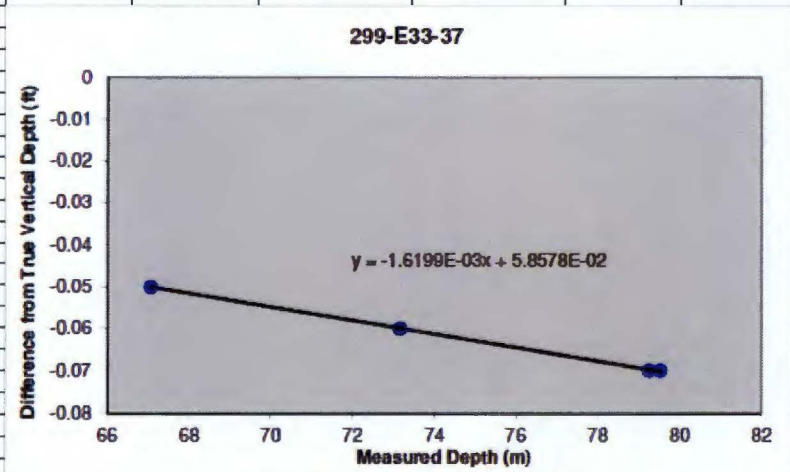
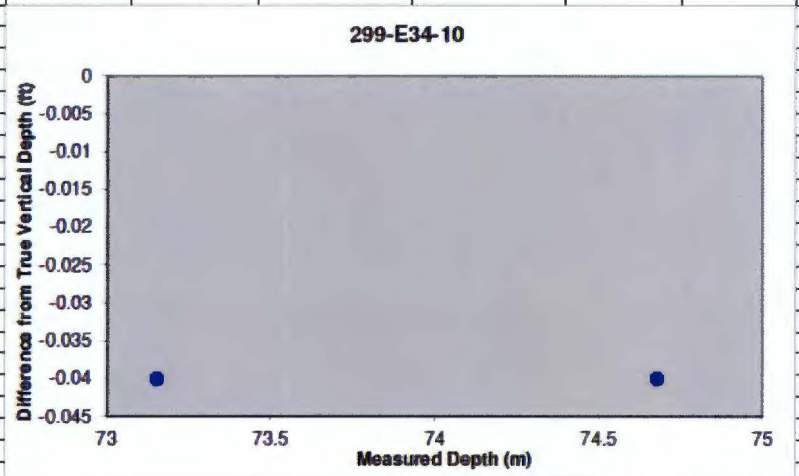


Figure E-2. Determination of Gyroscopic Correction Coefficients for the LLWMA-2 Wells (cont'd.)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E34-10	240	73.152	239.96	-0.04	0.0000E+00	0.0000E+00	0.0000E+00	-4.0000E-02
	245	74.676	244.96	-0.04				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients C1	C2	C3	C4
299-E34-9	220	67.056	219.91	-0.09	0.0000E+00	0.0000E+00	-2.5237E-03	7.9231E-02
	233	71.0184	232.9	-0.1				

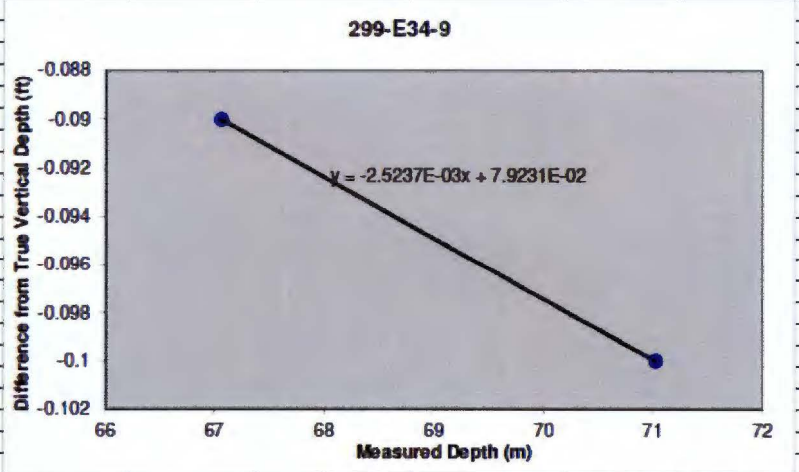


Figure E-2. Determination of Gyroscopic Correction Coefficients for the LLWMA-2 Wells (cont'd.)

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	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**200 East Area Low Gradient Evaluation Study**												
2	LLWMA-2 Hydraulic Head Calculations and Trend-Surface Analysis Result												
3													
4								Highest (magnitude) residual removed from the r					
5								**Bold indicates final trend-surface analysis result**					
6													
7		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
8							New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
9													
10		299-E27-17			TOPP	0.004	=ROUND(VLOOKUP($B10,Wells!$B$6:$O$13,9)-($D10-$F10+(VLOOKUP($B10,Wells!$B$6:$O$13,11)*$D10^3+VLOOKUP($B10,Wells!$B$6:$O$13,12)*$D10^2+VLOOKUP($B10,Wells!$B$6:$O$13,13)*$D10+VLOOKUP($B10,Wells!$B$6:$O$13,14))*0.3048),3)						
11		299-E27-18			TOPP	0.005	=ROUND(VLOOKUP($B11,Wells!$B$6:$O$13,9)-($D11-$F11+(VLOOKUP($B11,Wells!$B$6:$O$13,11)*$D11^3+VLOOKUP($B11,Wells!$B$6:$O$13,12)*$D11^2+VLOOKUP($B11,Wells!$B$6:$O$13,13)*$D11+VLOOKUP($B11,Wells!$B$6:$O$13,14))*0.3048),3)						
12		299-E27-8			TOPP	0.012	=ROUND(VLOOKUP($B12,Wells!$B$6:$O$13,9)-($D12-$F12+(VLOOKUP($B12,Wells!$B$6:$O$13,11)*$D12^3+VLOOKUP($B12,Wells!$B$6:$O$13,12)*$D12^2+VLOOKUP($B12,Wells!$B$6:$O$13,13)*$D12+VLOOKUP($B12,Wells!$B$6:$O$13,14))*0.3048),3)						
13		299-E27-9			TOPP	0.012	=ROUND(VLOOKUP($B13,Wells!$B$6:$O$13,9)-($D13-$F13+(VLOOKUP($B13,Wells!$B$6:$O$13,11)*$D13^3+VLOOKUP($B13,Wells!$B$6:$O$13,12)*$D13^2+VLOOKUP($B13,Wells!$B$6:$O$13,13)*$D13+VLOOKUP($B13,Wells!$B$6:$O$13,14))*0.3048),3)						
14		299-E33-14			TOPP	0.005	=ROUND(VLOOKUP($B14,Wells!$B$6:$O$13,9)-($D14-$F14+(VLOOKUP($B14,Wells!$B$6:$O$13,11)*$D14^3+VLOOKUP($B14,Wells!$B$6:$O$13,12)*$D14^2+VLOOKUP($B14,Wells!$B$6:$O$13,13)*$D14+VLOOKUP($B14,Wells!$B$6:$O$13,14))*0.3048),3)						
15		299-E33-37			TOPP	0.004	=ROUND(VLOOKUP($B15,Wells!$B$6:$O$13,9)-($D15-$F15+(VLOOKUP($B15,Wells!$B$6:$O$13,11)*$D15^3+VLOOKUP($B15,Wells!$B$6:$O$13,12)*$D15^2+VLOOKUP($B15,Wells!$B$6:$O$13,13)*$D15+VLOOKUP($B15,Wells!$B$6:$O$13,14))*0.3048),3)						
16		299-E34-10			TOPP	0.004	=ROUND(VLOOKUP($B16,Wells!$B$6:$O$13,9)-($D16-$F16+(VLOOKUP($B16,Wells!$B$6:$O$13,11)*$D16^3+VLOOKUP($B16,Wells!$B$6:$O$13,12)*$D16^2+VLOOKUP($B16,Wells!$B$6:$O$13,13)*$D16+VLOOKUP($B16,Wells!$B$6:$O$13,14))*0.3048),3)						
17		299-E34-9			TOPP	0.004	=ROUND(VLOOKUP($B17,Wells!$B$6:$O$13,9)-($D17-$F17+(VLOOKUP($B17,Wells!$B$6:$O$13,11)*$D17^3+VLOOKUP($B17,Wells!$B$6:$O$13,12)*$D17^2+VLOOKUP($B17,Wells!$B$6:$O$13,13)*$D17+VLOOKUP($B17,Wells!$B$6:$O$13,14))*0.3048),3)						
18						Range (m):	=MAX(G10:G17)-MIN(G10:G17)	=MAX(H10:H17)-MIN(H10:H17)					
19						Gradient Magnitude (m/m):							
20						Direction (azimuth):							
21						R^2:							
22						p-Value:							
23						Statistically Significant?:							

Figure E-3. Example Spreadsheet of Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 with Formulas Displayed

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	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**200 East Area Low Gradient Evaluation Study**												
2	LLWMA-2 Hydraulic Head Calculations and Trend-Surface Analysis Results												
3													
4								Highest (magnitude) residual removed from the next iteration					
5								**Bold indicates final trend-surface analysis result**					
6													
7							Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
9													
10		299-E27-17	3/24/2009 10:34	72.577	TOPP	0.004	121.916	121.916	-0.0065				
11		299-E27-18	NM	NM	TOPP	0.005	NM	NM					
12		299-E27-8	3/24/2009 10:17	72.145	TOPP	0.012	123.378	123.380	Outlier - Not Used				
13		299-E27-9	3/24/2009 9:57	70.974	TOPP	0.012	121.919	121.924	0.0032	0.0001	-0.0002		
14		299-E33-14	3/24/2009 11:08	68.707	TOPP	0.005	121.920	121.922	-0.0008	-0.0005	-0.0006		
15		299-E33-37	3/24/2009 10:52	78.227	TOPP	0.004	121.927	121.927	0.0022	0.0005	-0.0001		
16		299-E34-10	3/24/2009 10:41	74.115	TOPP	0.004	121.923	121.924	0.0006	-0.0010			
17		299-E34-9	3/24/2009 11:03	70.756	TOPP	0.004	121.921	121.924	0.0014	0.0009	0.0008		
18						Range (m):	1.462	1.464					
19						Gradient Magnitude (m/m):			9.20E-06	1.32E-05	1.46E-05		
20						Direction (azimuth):			41	23	24		
21						R^2:			0.12	0.81	0.93		
22						p-Value:			0.8189	0.1861	0.2711		
23						Statistically Significant?:			No	No	No		
24													
25													
26							Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
27		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
28													
29		299-E27-17	4/30/2009 9:06	72.576	TOPP	0.004	121.917	121.920	-0.0101				
30		299-E27-18	NM	NM	TOPP	0.005	NM	NM					
31		299-E27-8	4/30/2009 8:54	73.598	TOPP	0.012	121.925	121.930	0.0001	-0.0027			
32		299-E27-9	4/30/2009 8:47	70.966	TOPP	0.012	121.927	121.934	0.0046	0.0019	-0.0001	0.0001	
33		299-E33-14	4/30/2009 9:36	68.704	TOPP	0.005	121.923	121.927	-0.0015	-0.0013	-0.0009	0.0001	
34		299-E33-37	4/30/2009 9:25	78.223	TOPP	0.004	121.931	121.934	0.0028	0.0006	0.0003	0.0002	
35		299-E34-10	4/30/2009 9:15	74.108	TOPP	0.004	121.930	121.932	0.0018	0.0000	-0.0007	-0.0004	
36		299-E34-9	4/30/2009 9:30	70.751	TOPP	0.004	121.926	121.931	0.0021	0.0015	0.0014		
37						Range (m):	0.014	0.014					
38						Gradient Magnitude (m/m):			8.89E-06	1.50E-05	1.62E-05	1.91E-05	
39						Direction (azimuth):			24	16	8	9	
40						R^2:			0.03	0.57	0.90	0.99	
41						p-Value:			0.9331	0.2854	0.0973	0.0880	
42						Statistically Significant?:			No	No	No	No	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2

	B	C	D	E	F	G	H	I	J	K	L	M
45						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
46	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
47												
48	299-E27-17	5/28/2009 10:59	72.553	TOPP	0.004	121.940	121.941	-0.0065				
49	299-E27-18	5/28/2009 11:23	77.308	TOPP	0.005	121.948	121.950	0.0014	0.0003	0.0003	0.0000	
50	299-E27-8	5/28/2009 10:47	73.577	TOPP	0.012	121.946	121.948	0.0004	-0.0012	-0.0011		
51	299-E27-9	5/28/2009 10:52	70.943	TOPP	0.012	121.950	121.949	0.0020	0.0003	0.0005	-0.0002	
52	299-E33-14	5/28/2009 11:29	68.685	TOPP	0.005	121.942	121.943	-0.0017	-0.0017	-0.0003	-0.0002	
53	299-E33-37	5/28/2009 11:18	78.206	TOPP	0.004	121.948	121.949	0.0003	-0.0005	-0.0005	-0.0005	
54	299-E34-10	5/28/2009 11:05	74.091	TOPP	0.004	121.947	121.949	0.0016	0.0007	0.0010	0.0008	
55	299-E34-9	5/28/2009 11:12	70.731	TOPP	0.004	121.946	121.948	0.0025	0.0021			
56					Range (m):	0.010	0.009					
57					Gradient Magnitude (m/m):			1.24E-05	1.38E-05	**1.80E-05**	1.78E-05	
58					Direction (azimuth):			20	14	**14**	11	
59					R^2:			0.19	0.70	**0.91**	0.97	
60					p-Value:			0.5989	0.0906	**0.0272**	0.0325	
61					Statistically Significant?:			No	No	**Yes**	Yes	
62												
63												
64						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
65	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
66												
67	299-E27-17	6/29/2009 9:05	72.562	TOPP	0.004	121.931	121.932	-0.0391				
68	299-E27-18	6/29/2009 9:34	77.277	TOPP	0.005	121.979	121.980	0.0057	-0.0007	-0.0008	-0.0011	
69	299-E27-8	6/29/2009 8:47	73.548	TOPP	0.012	121.975	121.977	0.0078	-0.0019	-0.0017		
70	299-E27-9	6/29/2009 8:39	70.913	TOPP	0.012	121.980	121.979	0.0118	0.0012	0.0016	0.0004	
71	299-E33-14	6/29/2009 9:56	68.656	TOPP	0.005	121.971	121.971	-0.0023	-0.0024	-0.0002	0.0000	
72	299-E33-37	6/29/2009 9:47	78.172	TOPP	0.004	121.982	121.982	0.0057	0.0012	0.0012	0.0011	
73	299-E34-10	6/29/2009 9:23	74.061	TOPP	0.004	121.977	121.978	0.0047	-0.0005	0.0000	-0.0003	
74	299-E34-9	6/29/2009 10:02	70.700	TOPP	0.004	121.977	121.978	0.0057	0.0032			
75					Range (m):	0.051	0.050					
76					Gradient Magnitude (m/m):			1.72E-05	2.29E-05	**2.93E-05**	2.89E-05	
77					Direction (azimuth):			49	19	**18**	15	
78					R^2:			0.03	0.68	**0.89**	0.96	
79					p-Value:			0.9249	0.1038	**0.0352**	0.0400	
80					Statistically Significant?:			No	No	**Yes**	Yes	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
83						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
84	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
85												
86	299-E27-17	7/27/2009 8:27	72.526	TOPP	0.004	121.967	121.972	-0.0090				
87	299-E27-18	7/27/2009 8:03	77.274	TOPP	0.005	121.982	121.986	0.0029	0.0015	0.0009		
88	299-E27-8	7/27/2009 8:37	73.549	TOPP	0.012	121.974	121.980	-0.0009	-0.0031			
89	299-E27-9	7/27/2009 8:46	70.917	TOPP	0.012	121.976	121.984	0.0044	0.0019	-0.0003		
90	299-E33-14	7/27/2009 7:37	68.657	TOPP	0.005	121.970	121.975	-0.0009	-0.0009	-0.0005		
91	299-E33-37	7/27/2009 7:57	78.173	TOPP	0.004	121.981	121.984	0.0006	-0.0004	-0.0005		
92	299-E34-10	7/27/2009 8:09	74.059	TOPP	0.004	121.979	121.982	0.0011	-0.0001	-0.0006		
93	299-E34-9	7/27/2009 7:45	70.705	TOPP	0.004	121.972	121.979	0.0018	0.0012	0.0010		
94					Range (m):	0.015	0.014					
95					Gradient Magnitude (m/m):			2.34E-05	**2.52E-05**	2.51E-05		
96					Direction (azimuth):			21	**16**	10		
97					R^2:			0.29	**0.79**	0.97		
98					p-Value:			0.4190	**0.0459**	0.0059		
99					Statistically Significant?:			No	**Yes**	Yes		
100												
101												
102						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
103	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
104												
105	299-E27-17	8/6/2009 11:09	72.509	TOPP	0.004	121.984	121.984	-0.0038				
106	299-E27-18	8/6/2009 12:12	77.265	TOPP	0.005	121.991	121.991	0.0015	0.0009	0.0005		
107	299-E27-8	8/6/2009 10:42	73.536	TOPP	0.012	121.987	121.987	-0.0008	-0.0018			
108	299-E27-9	8/6/2009 10:50	70.900	TOPP	0.012	121.993	121.989	0.0021	0.0011	-0.0002		
109	299-E33-14	8/6/2009 11:44	68.642	TOPP	0.005	121.985	121.983	-0.0007	-0.0007	-0.0005		
110	299-E33-37	8/6/2009 12:30	78.163	TOPP	0.004	121.991	121.990	0.0003	-0.0002	-0.0002		
111	299-E34-10	8/6/2009 11:21	74.050	TOPP	0.004	121.988	121.988	0.0002	-0.0003	-0.0006		
112	299-E34-9	8/6/2009 11:32	70.690	TOPP	0.004	121.987	121.986	0.0012	0.0010	0.0009		
113					Range (m):	0.009	0.008					
114					Gradient Magnitude (m/m):			1.88E-05	**1.96E-05**	1.94E-05		
115					Direction (azimuth):			20	**18**	14		
116					R^2:			0.56	**0.85**	0.96		
117					p-Value:			0.1278	**0.0233**	0.0072		
118					Statistically Significant?:			No	**Yes**	Yes		

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
121						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
122	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
123												
124	299-E27-17	9/22/2009 9:24	72.553	TOPP	0.004	121.940	121.940	-0.0081				
125	299-E27-18	9/22/2009 9:39	77.305	TOPP	0.005	121.951	121.951	0.0020	0.0007	-0.0001	-0.0006	
126	299-E27-8	9/22/2009 9:20	73.576	TOPP	0.012	121.947	121.946	-0.0021	-0.0041			
127	299-E27-9	9/22/2009 9:15	70.943	TOPP	0.012	121.950	121.953	0.0054	0.0032	0.0003	0.0000	
128	299-E33-14	9/22/2009 9:47	68.682	TOPP	0.005	121.945	121.945	-0.0008	-0.0008	-0.0003	-0.0005	
129	299-E33-37	9/22/2009 9:34	78.203	TOPP	0.004	121.951	121.951	0.0020	0.0010	0.0010	0.0004	
130	299-E34-10	9/22/2009 9:29	74.089	TOPP	0.004	121.949	121.948	0.0000	-0.0011	-0.0018		
131	299-E34-9	9/22/2009 9:44	70.730	TOPP	0.004	121.947	121.948	0.0016	0.0011	0.0008	0.0006	
132					Range (m):	0.011	0.013					
133					Gradient Magnitude (m/m):			1.01E-05	1.19E-05	**1.23E-05**	1.32E-05	
134					Direction (azimuth):			20	11	**355**	357	
135					R^2:			0.08	0.38	**0.88**	0.97	
136					p-Value:			0.8173	0.3889	**0.0412**	0.0277	
137					Statistically Significant?:			No	No	**Yes**	Yes	
138												
139												
140						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
141	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
142												
143	299-E27-17	10/29/2009 8:56	72.564	TOPP	0.004	121.929	121.926	-0.00328	-0.0016	-0.0013		
144	299-E27-18	10/29/2009 9:06	77.324	TOPP	0.005	121.932	121.930	0.0008	0.0006	0.0005	0.0003	0.0004
145	299-E27-8	10/29/2009 8:52	73.593	TOPP	0.012	121.930	121.927	-0.0026	0.0002	0.0005	-0.0003	-0.0001
146	299-E27-9	10/29/2009 8:39	70.955	TOPP	0.012	121.938	121.933	0.00329				
147	299-E33-14	10/29/2009 9:11	68.698	TOPP	0.005	121.929	121.926	-0.0014	-0.0017	0.0000	-0.0001	0.0000
148	299-E33-37	10/29/2009 9:03	78.222	TOPP	0.004	121.932	121.930	0.0011	-0.0003	-0.0005	-0.0004	-0.0003
149	299-E34-10	10/29/2009 8:59	74.108	TOPP	0.004	121.930	121.929	0.0002	0.0004	0.0008	0.0006	
150	299-E34-9	10/29/2009 9:15	70.744	TOPP	0.004	121.933	121.930	0.0020	0.0025			
151					Range (m):	0.009	0.007					
152					Gradient Magnitude (m/m):			3.77E-06	1.12E-05	1.66E-05	1.55E-05	1.54E-05
153					Direction (azimuth):			355	39	32	30	30
154					R^2:			0.11	0.42	0.83	0.95	0.98
155					p-Value:			0.7526	0.3405	0.0681	0.0489	0.1430
156					Statistically Significant?:			No	No	No	Yes	No

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
159						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
160	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
161												
162	299-E27-17	11/12/2009 10:07	72.584	TOPP	0.004	121.909	121.908	-0.0093				
163	299-E27-18	11/12/2009 9:50	77.335	TOPP	0.005	121.921	121.920	0.0014	-0.0002	0.0002	0.0002	0.0001
164	299-E27-8	11/12/2009 9:44	73.604	TOPP	0.012	121.919	121.918	0.0016	-0.0007	-0.0005	-0.0004	
165	299-E27-9	11/12/2009 9:39	70.975	TOPP	0.012	121.918	121.918	0.0024	-0.0001	0.0000	0.0003	0.0000
166	299-E33-14	11/12/2009 10:17	68.709	TOPP	0.005	121.918	121.917	-0.0014	-0.0014	-0.0012	0.0000	0.0000
167	299-E33-37	11/12/2009 9:56	78.233	TOPP	0.004	121.921	121.920	0.0005	-0.0006	-0.0002	-0.0001	-0.0001
168	299-E34-10	11/12/2009 10:01	74.115	TOPP	0.004	121.923	121.921	0.0027	0.00150			
169	299-E34-9	11/12/2009 10:12	70.756	TOPP	0.004	121.921	121.920	0.0021	0.00148	0.0017		
170					Range (m):	0.014	0.013					
171					Gradient Magnitude (m/m):			7.08E-06	8.05E-06	7.14E-06	1.03E-05	1.02E-05
172					Direction (azimuth):			52	32	31	26	24
173					R^2:			0.09	0.43	0.47	0.96	1.00
174					p-Value:			0.7813	0.3293	0.3871	0.0419	0.0687
175					Statistically Significant?:			No	No	No	Yes	No
176												
177												
178						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
179	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
180												
181	299-E27-17	1/4/2010 9:53	71.732	TOPP	0.004	122.761	122.755	Outlier - Not Used				
182	299-E27-18	1/4/2010 10:02	77.350	TOPP	0.005	121.906	121.903	0.0003	-0.0001	0.0003		
183	299-E27-8	1/4/2010 9:48	73.616	TOPP	0.012	121.907	121.900	-0.0021				
184	299-E27-9	1/4/2010 9:44	70.981	TOPP	0.012	121.912	121.903	0.0014	-0.0001	0.0001		
185	299-E33-14	1/4/2010 8:10	68.725	TOPP	0.005	121.902	121.898	0.0002	0.0005	0.0006		
186	299-E33-37	1/4/2010 9:58	78.249	TOPP	0.004	121.905	121.902	-0.0005	-0.0006	-0.0002		
187	299-E34-10	1/4/2010 10:09	74.132	TOPP	0.004	121.906	121.903	0.0017	0.0013			
188	299-E34-9	1/4/2010 10:13	70.774	TOPP	0.004	121.903	121.898	-0.0009	-0.0010	-0.0009		
189					Range (m):	0.859	0.857					
190					Gradient Magnitude (m/m):			1.38E-05	**1.38E-05**	1.30E-05		
191					Direction (azimuth):			14	**7**	6		
192					R^2:			0.67	**0.89**	0.95		
193					p-Value:			0.1066	**0.0364**	0.0472		
194					Statistically Significant?:			No	**Yes**	Yes		

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
197						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
198	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
199												
200	299-E27-17	1/20/2010 12:32	72.602	TOPP	0.004	121.891	121.889	-0.0065				
201	299-E27-18	1/20/2010 12:47	77.359	TOPP	0.005	121.897	121.895	0.0009	-0.0001	-0.0008	-0.0004	
202	299-E27-8	1/20/2010 12:25	73.628	TOPP	0.012	121.895	121.894	-0.0021	-0.0037			
203	299-E27-9	1/20/2010 12:17	70.984	TOPP	0.012	121.909	121.901	0.0040	0.0023	-0.0003	0.0000	
204	299-E33-14	1/20/2010 13:12	68.727	TOPP	0.005	121.900	121.895	-0.0011	-0.0011	-0.0006	-0.0004	
205	299-E33-37	1/20/2010 12:53	78.257	TOPP	0.004	121.897	121.894	0.0006	-0.0002	-0.0002	0.0003	
206	299-E34-10	1/20/2010 12:40	74.140	TOPP	0.004	121.898	121.898	0.0031	0.0023	0.0017		
207	299-E34-9	1/20/2010 13:03	70.775	TOPP	0.004	121.902	121.897	0.0009	0.0005	0.0003	0.0005	
208					Range (m):	0.018	0.012					
209					Gradient Magnitude (m/m):			1.03E-05	9.58E-06	**1.15E-05**	1.24E-05	
210					Direction (azimuth):			214	224	**237**	234	
211					R^2:			0.11	0.36	**0.88**	0.98	
212					p-Value:			0.7390	0.4133	**0.0424**	0.0217	
213					Statistically Significant?:			No	No	**Yes**	Yes	
214												
215												
216						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
217	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
218												
219	299-E27-17	2/18/2010 10:10	72.622	TOPP	0.004	121.871	121.872	-0.0061				
220	299-E27-18	2/18/2010 10:19	77.376	TOPP	0.005	121.880	121.881	0.0002	-0.0009	-0.0005	-0.0005	
221	299-E27-8	2/18/2010 9:56	73.645	TOPP	0.012	121.878	121.880	0.0029	-0.0005	-0.0002	0.0001	
222	299-E27-9	2/18/2010 9:29	70.013	TOPP	0.012	122.880	122.883	Outlier - Not Used				
223	299-E33-14	2/18/2010 10:28	68.753	TOPP	0.005	121.874	121.876	-0.0013	-0.0011	-0.0009	0.0000	
224	299-E33-37	2/18/2010 10:15	78.273	TOPP	0.004	121.881	121.882	0.0000	0.0000	0.0004	0.0003	
225	299-E34-10	2/18/2010 10:02	74.157	TOPP	0.004	121.881	121.882	0.0026	0.0016			
226	299-E34-9	2/18/2010 10:24	70.800	TOPP	0.004	121.877	121.879	0.0017	0.0010	0.0012		
227					Range (m):	1.009	1.011					
228					Gradient Magnitude (m/m):			1.88E-05	1.54E-05	1.47E-05	1.76E-05	
229					Direction (azimuth):			35	20	20	21	
230					R^2:			0.28	0.78	0.87	0.98	
231					p-Value:			0.5124	0.1012	0.1279	0.1299	
232					Statistically Significant?:			No	No	No	No	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
235						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
236	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
237												
238	299-E27-17	3/10/2010 10:37	72.639	TOPP	0.004	121.854	121.859	-0.1210	-0.0114			
239	299-E27-18	3/10/2010 10:49	77.382	TOPP	0.005	121.874	121.877	0.0149	0.0020	0.0001	0.0008	
240	299-E27-8	3/10/2010 10:57	73.656	TOPP	0.012	121.867	121.873	-0.1832	0.0049	-0.0015	-0.0009	
241	299-E27-9	3/10/2010 11:02	70.553	TOPP	0.012	122.340	122.349	0.2189				
242	299-E33-14	3/10/2010 10:14	68.762	TOPP	0.005	121.865	121.869	0.0176	-0.0024	-0.0021	-0.0017	
243	299-E33-37	3/10/2010 10:44	78.281	TOPP	0.004	121.873	121.876	0.0919	-0.0014	-0.0014	-0.0006	
244	299-E34-10	3/10/2010 10:30	74.162	TOPP	0.004	121.876	121.878	-0.0093	0.0049	0.0029		
245	299-E34-9	3/10/2010 10:21	70.808	TOPP	0.004	121.869	121.874	-0.0299	0.0034	0.0020	0.0024	
246					Range (m):	0.486	0.490					
247					Gradient Magnitude (m/m):			5.64E-04	2.76E-05	2.06E-05	1.94E-05	
248					Direction (azimuth):			237	41	24	24	
249					R^2:			0.47	0.22	0.60	0.72	
250					p-Value:			0.2071	0.6014	0.2498	0.2764	
251					Statistically Significant?:			No	No	No	No	
252												
253												
254						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
255	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
256												
257	299-E27-17	5/23/2010 7:54	74.644	TOPP	0.004	119.849	119.856	Outlier - Not Used				
258	299-E27-18	5/23/2010 7:38	77.387	TOPP	0.005	121.869	121.874	0.0098	0.0337			
259	299-E27-8	5/23/2010 8:10	73.656	TOPP	0.012	121.867	121.875	0.1258				
260	299-E27-9	5/23/2010 8:19	71.300	TOPP	0.012	121.593	121.603	-0.1051	-0.0160	-0.0109		
261	299-E33-14	5/23/2010 7:00	68.707	TOPP	0.005	121.920	121.926	0.0076	-0.0033	-0.0085		
262	299-E33-37	5/23/2010 7:29	78.290	TOPP	0.004	121.864	121.868	-0.0464	-0.0446	-0.0228		
263	299-E34-10	5/23/2010 7:21	74.172	TOPP	0.004	121.866	121.870	0.0083	0.0302	0.0422		
264	299-E34-9	5/23/2010 7:10	71.805	TOPP	0.004	120.873	120.882	Outlier - Not Used				
265					Range (m):	2.071	2.070					
266					Gradient Magnitude (m/m):			2.68E-04	3.70E-04	3.32E-04		
267					Direction (azimuth):			77	81	94		
268					R^2:			0.57	0.93	0.96		
269					p-Value:			0.2850	0.0654	0.1988		
270					Statistically Significant?:			No	No	No		

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
273						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
274	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
275												
276	299-E27-17	6/30/2010 10:05	72.645	TOPP	0.004	121.848	121.857	-0.0108				
277	299-E27-18	6/30/2010 10:36	77.391	TOPP	0.005	121.865	121.871	0.0017	0.0000	-0.0002		
278	299-E27-8	6/30/2010 9:57	73.665	TOPP	0.012	121.858	121.870	0.0013	-0.0013	-0.0011		
279	299-E27-9	6/30/2010 9:52	71.033	TOPP	0.012	121.860	121.871	0.0032	0.0003	0.0007		
280	299-E33-14	6/30/2010 10:50	68.778	TOPP	0.005	121.849	121.856	-0.0029	-0.0029	-0.0002		
281	299-E33-37	6/30/2010 10:30	78.289	TOPP	0.004	121.865	121.870	0.0013	0.0001	0.0000		
282	299-E34-10	6/30/2010 10:20	74.177	TOPP	0.004	121.861	121.868	0.0015	0.0001	0.0007		
283	299-E34-9	6/30/2010 10:59	70.821	TOPP	0.004	121.856	121.866	0.0046	0.0038			
284					Range (m):	0.017	0.015					
285					Gradient Magnitude (m/m):			2.80E-05	**3.05E-05**	3.82E-05		
286					Direction (azimuth):			12	**8**	9		
287					R^2:			0.39	**0.86**	0.99		
288					p-Value:			0.2942	**0.0210**	0.0017		
289					Statistically Significant?:			No	**Yes**	Yes		
290												
291												
292						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
293	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
294												
295	299-E27-17	7/13/2010 11:06	72.645	TOPP	0.004	121.848	121.857	-0.0107				
296	299-E27-18	7/13/2010 10:39	77.392	TOPP	0.005	121.864	121.871	0.0013	-0.0004	-0.0005	0.0000	
297	299-E27-8	7/13/2010 10:51	73.666	TOPP	0.012	121.857	121.869	0.0016	-0.0010	-0.0009	-0.0006	
298	299-E27-9	7/13/2010 10:58	71.039	TOPP	0.012	121.854	121.869	0.0028	-0.0001	0.0003	0.0005	
299	299-E33-14	7/13/2010 10:16	68.774	TOPP	0.005	121.853	121.862	-0.0025	-0.0026	-0.0005	0.0000	
300	299-E33-37	7/13/2010 10:32	78.289	TOPP	0.004	121.865	121.871	0.0008	-0.0004	-0.0004	0.0002	
301	299-E34-10	7/13/2010 11:11	74.173	TOPP	0.004	121.865	121.871	0.0030	0.0016	0.0021		
302	299-E34-9	7/13/2010 10:25	70.820	TOPP	0.004	121.857	121.869	0.0037	0.0030			
303					Range (m):	0.017	0.014					
304					Gradient Magnitude (m/m):			1.86E-05	2.07E-05	**2.67E-05**	2.60E-05	
305					Direction (azimuth):			25	18	**17**	16	
306					R^2:			0.15	0.68	**0.91**	0.99	
307					p-Value:			0.6686	0.1008	**0.0293**	0.0107	
308					Statistically Significant?:			No	No	**Yes**	Yes	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
311						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
312	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
313												
314	299-E27-17	8/23/2010 10:20	72.679	TOPP	0.004	121.814	121.830	-0.0146				
315	299-E27-18	8/23/2010 10:38	77.419	TOPP	0.005	121.837	121.848	0.0022	-0.0002	-0.0006		
316	299-E27-8	8/23/2010 10:15	73.697	TOPP	0.012	121.826	121.846	0.0015	-0.0021			
317	299-E27-9	8/23/2010 10:11	71.071	TOPP	0.012	121.822	121.849	0.0052	0.0013	-0.0002		
318	299-E33-14	8/23/2010 10:50	68.802	TOPP	0.005	121.825	121.840	-0.0015	-0.0015	-0.0012		
319	299-E33-37	8/23/2010 10:33	78.316	TOPP	0.004	121.838	121.848	0.0020	0.0003	0.0003		
320	299-E34-10	8/23/2010 10:27	74.201	TOPP	0.004	121.837	121.847	0.0025	0.0005	0.0002		
321	299-E34-9	8/23/2010 10:44	70.851	TOPP	0.004	121.826	121.845	0.0027	0.0017	0.0016		
322					Range (m):	0.024	0.019					
323					Gradient Magnitude (m/m):			1.40E-05	**1.72E-05**	1.73E-05		
324					Direction (azimuth):			21	**10**	4		
325					R^2:			0.06	**0.78**	0.91		
326					p-Value:			0.8554	**0.0472**	0.0252		
327					Statistically Significant?:			No	**Yes**	Yes		
328												
329												
330						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
331	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
332												
333	299-E27-17	9/17/2010 7:46	72.642	TOPP	0.004	121.851	121.852	-0.0110				
334	299-E27-18	9/17/2010 8:00	77.391	TOPP	0.005	121.865	121.865	0.0017	-0.0001	-0.0007	-0.0005	
335	299-E27-8	9/17/2010 7:38	73.661	TOPP	0.012	121.862	121.863	-0.0008	-0.0035			
336	299-E27-9	9/17/2010 7:33	71.026	TOPP	0.012	121.867	121.869	0.0053	0.0023	-0.0002	0.0000	
337	299-E33-14	9/17/2010 8:09	68.770	TOPP	0.005	121.857	121.857	-0.0011	-0.0011	-0.0006	-0.0005	
338	299-E33-37	9/17/2010 7:56	78.290	TOPP	0.004	121.864	121.864	0.0014	0.0001	0.0001	0.0003	
339	299-E34-10	9/17/2010 7:51	74.173	TOPP	0.004	121.865	121.865	0.0030	0.0015	0.0010		
340	299-E34-9	9/17/2010 8:05	70.817	TOPP	0.004	121.860	121.861	0.0014	0.0007	0.0005	0.0007	
341					Range (m):	0.016	0.017					
342					Gradient Magnitude (m/m):			1.22E-05	1.51E-05	**1.60E-05**	1.55E-05	
343					Direction (azimuth):			4	357	**347**	346	
344					R^2:			0.15	0.74	**0.97**	0.99	
345					p-Value:			0.6564	0.0678	**0.0041**	0.0125	
346					Statistically Significant?:			No	No	**Yes**	Yes	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
349						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
350	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
351												
352	299-E27-17	1/4/2011 11:31	72.629	TOPP	0.004	121.864	121.862	-0.0014	-0.0007			
353	299-E27-18	1/4/2011 11:47	77.389	TOPP	0.005	121.867	121.866	0.0011	0.0014			
354	299-E27-8	1/4/2011 11:19	73.656	TOPP	0.012	121.867	121.866	0.0023				
355	299-E27-9	1/4/2011 11:01	71.029	TOPP	0.012	121.864	121.861	-0.0018	-0.0005			
356	299-E33-14	1/4/2011 12:04	68.768	TOPP	0.005	121.859	121.857	-0.0005	-0.0008			
357	299-E33-37	1/4/2011 11:56	78.290	TOPP	0.004	121.864	121.863	-0.0017	-0.0018			
358	299-E34-10	1/4/2011 11:39	74.174	TOPP	0.004	121.864	121.864	0.0012	0.0015			
359	299-E34-9	1/4/2011 12:13	70.816	TOPP	0.004	121.861	121.860	0.0008	0.0009			
360					Range (m):	0.008	0.009					
361					Gradient Magnitude (m/m):			**2.13E-05**	2.17E-05			
362					Direction (azimuth):			**16**	20			
363					R^2:			**0.74**	0.81			
364					p-Value:			**0.0348**	0.0351			
365					Statistically Significant?:			**Yes**	Yes			
366												
367												
368						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
369	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
370												
371	299-E27-17	2/11/2011 9:28	72.649	TOPP	0.004	121.844	121.840	-0.0134	-0.0030	-0.0022		
372	299-E27-18	2/11/2011 9:04	77.403	TOPP	0.005	121.853	121.850	0.0027	0.0015	0.0012	0.0009	
373	299-E27-8	2/11/2011 9:36	73.677	TOPP	0.012	121.846	121.841	-0.0174	0.0004	0.0011	-0.0001	
374	299-E27-9	2/11/2011 10:00	71.004	TOPP	0.012	121.889	121.883	0.0207				
375	299-E33-14	2/11/2011 8:47	68.784	TOPP	0.005	121.843	121.839	-0.0018	-0.0037	0.0003	0.0001	
376	299-E33-37	2/11/2011 8:36	78.301	TOPP	0.004	121.853	121.851	0.0087	-0.0002	-0.0005	-0.0005	
377	299-E34-10	2/11/2011 9:23	74.191	TOPP	0.004	121.847	121.845	-0.0022	-0.0008	0.0001	-0.0003	
378	299-E34-9	2/11/2011 8:56	70.825	TOPP	0.004	121.852	121.848	0.0026	0.0058			
379					Range (m):	0.046	0.044					
380					Gradient Magnitude (m/m):			2.48E-05	3.57E-05	**4.83E-05**	4.63E-05	
381					Direction (azimuth):			263	38	**33**	31	
382					R^2:			0.29	0.59	**0.94**	0.99	
383					p-Value:			0.4249	0.1643	**0.0145**	0.0099	
384					Statistically Significant?:			No	No	**Yes**	Yes	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
387						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
388	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
389												
390	299-E27-17	3/21/2011 9:07	72.667	TOPP	0.004	121.826	121.824	-0.0059				
391	299-E27-18	3/21/2011 9:15	77.419	TOPP	0.005	121.837	121.834	0.0016	0.0006	0.0001	0.0007	
392	299-E27-8	3/21/2011 9:02	73.692	TOPP	0.012	121.831	121.828	-0.0010	-0.0024			
393	299-E27-9	3/21/2011 8:53	71.057	TOPP	0.012	121.836	121.830	0.0026	0.0010	-0.0007	-0.0004	
394	299-E33-14	3/21/2011 9:27	68.795	TOPP	0.005	121.832	121.827	-0.0013	-0.0014	-0.0010	-0.0008	
395	299-E33-37	3/21/2011 9:19	78.318	TOPP	0.004	121.836	121.833	-0.0005	-0.0012	-0.0012	-0.0006	
396	299-E34-10	3/21/2011 9:11	74.201	TOPP	0.004	121.837	121.834	0.0031	0.0023	0.0019		
397	299-E34-9	3/21/2011 9:23	70.842	TOPP	0.004	121.835	121.830	0.0015	0.0011	0.0009	0.0012	
398					Range (m):	0.011	0.010					
399					Gradient Magnitude (m/m):			1.92E-05	2.02E-05	1.97E-05	1.85E-05	
400					Direction (azimuth):			32	28	22	22	
401					R^2:			0.35	0.65	0.80	0.90	
402					p-Value:			0.3398	0.1222	0.0867	0.1022	
403					Statistically Significant?:			No	No	No	No	
404												
405												
406						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
407	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
408												
409	299-E27-17	4/25/2011 11:15	72.660	TOPP	0.004	121.833	121.824	-0.0003	-0.0001			
410	299-E27-18	4/25/2011 11:28	77.422	TOPP	0.005	121.834	121.827	0.0001	0.0004			
411	299-E27-8	4/25/2011 11:10	73.688	TOPP	0.012	121.835	121.823	-0.0010	-0.0009			
412	299-E27-9	4/25/2011 11:02	71.051	TOPP	0.012	121.842	121.823	0.0006	0.0006			
413	299-E33-14	4/25/2011 12:03	68.800	TOPP	0.005	121.827	121.819	-0.0003	0.0000			
414	299-E33-37	4/25/2011 11:23	78.320	TOPP	0.004	121.834	121.827	-0.0005	-0.0001			
415	299-E34-10	4/25/2011 11:19	74.207	TOPP	0.004	121.831	121.826	0.0015				
416	299-E34-9	NM	NM	TOPP	0.004	NM	NM					
417					Range (m):	0.015	0.008					
418					Gradient Magnitude (m/m):			**2.63E-05**	2.58E-05			
419					Direction (azimuth):			**23**	22			
420					R^2:			**0.92**	0.97			
421					p-Value:			**0.0063**	0.0050			
422					Statistically Significant?:			**Yes**	Yes			

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
425						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
426	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
427												
428	299-E27-17	5/25/2011 10:36	72.665	TOPP	0.004	121.828	121.821	0.0006	-0.0002	-0.0001		
429	299-E27-18	5/25/2011 10:58	77.429	TOPP	0.005	121.827	121.822	0.0002	-0.0001	-0.0001		
430	299-E27-8	5/25/2011 10:29	73.697	TOPP	0.012	121.826	121.818	-0.0024				
431	299-E27-9	5/25/2011 10:18	71.060	TOPP	0.012	121.833	121.821	0.0014	0.0001	0.0001		
432	299-E33-14	5/25/2011 11:09	68.802	TOPP	0.005	121.825	121.817	-0.0002	0.0000	0.0001		
433	299-E33-37	5/25/2011 10:52	78.326	TOPP	0.004	121.828	121.822	0.0000	0.0000	0.0001		
434	299-E34-10	5/25/2011 10:46	74.213	TOPP	0.004	121.825	121.821	0.0006	0.0003			
435	299-E34-9	5/25/2011 11:04	70.851	TOPP	0.004	121.826	121.818	-0.0001	-0.0002	-0.0001		
436					Range (m):	0.008	0.005					
437					Gradient Magnitude (m/m):			1.51E-05	**1.47E-05**	1.45E-05		
438					Direction (azimuth):			21	**15**	15		
439					R^2:			0.70	**0.99**	1.00		
440					p-Value:			0.0503	**0.0001**	0.0001		
441					Statistically Significant?:			No	**Yes**	Yes		
442												
443												
444						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
445	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
446												
447	299-E27-17	6/20/2011 10:31	72.684	TOPP	0.004	121.809	121.813	0.0203				
448	299-E27-18	6/20/2011 10:51	77.437	TOPP	0.005	121.819	121.822	0.0047	0.0082	-0.0029	-0.0037	
449	299-E27-8	6/20/2011 10:25	73.771	TOPP	0.012	121.752	121.757	-0.0192	-0.0079	-0.0029	-0.0009	
450	299-E27-9	NM	NM	TOPP	0.012	NM	NM					
451	299-E33-14	6/20/2011 9:11	68.815	TOPP	0.005	121.812	121.816	-0.0069	-0.0075	-0.0076	-0.0016	
452	299-E33-37	6/20/2011 10:47	78.333	TOPP	0.004	121.821	121.823	-0.0111	-0.0111			
453	299-E34-10	6/20/2011 10:37	74.221	TOPP	0.004	121.817	121.820	0.0072	0.0107	0.0048	0.0062	
454	299-E34-9	6/20/2011 10:40	70.865	TOPP	0.004	121.812	121.816	0.0051	0.0076	0.0087		
455					Range (m):	0.069	0.066					
456					Gradient Magnitude (m/m):			1.14E-04	1.31E-04	1.98E-04	2.18E-04	
457					Direction (azimuth):			60	63	54	51	
458					R^2:			0.68	0.85	0.94	0.98	
459					p-Value:			0.1014	0.0558	0.0567	0.1370	
460					Statistically Significant?:			No	No	No	No	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
463						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
464	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
465												
466	299-E27-17	7/14/2011 9:58	72.689	TOPP	0.004	121.804	121.806	-0.0063				
467	299-E27-18	7/14/2011 10:20	77.443	TOPP	0.005	121.813	121.815	0.0005	-0.0005	-0.0006	-0.0004	
468	299-E27-8	7/14/2011 9:52	73.713	TOPP	0.012	121.810	121.813	0.0011	-0.0004	-0.0003	-0.0001	
469	299-E27-9	7/14/2011 9:41	71.082	TOPP	0.012	121.811	121.812	0.0014	-0.0003	0.0001	0.0002	
470	299-E33-14	7/14/2011 11:15	68.821	TOPP	0.005	121.806	121.807	-0.0026	-0.0026	-0.0002	0.0000	
471	299-E33-37	7/14/2011 10:15	78.339	TOPP	0.004	121.815	121.816	0.0009	0.0001	0.0001	0.0004	
472	299-E34-10	7/14/2011 10:04	74.226	TOPP	0.004	121.812	121.814	0.0012	0.0003	0.0009		
473	299-E34-9	7/14/2011 10:09	70.865	TOPP	0.004	121.812	121.814	0.0038	0.0034			
474					Range (m):	0.011	0.010					
475					Gradient Magnitude (m/m):			1.89E-05	2.01E-05	**2.68E-05**	2.66E-05	
476					Direction (azimuth):			27	22	**20**	20	
477					R^2:			0.29	0.64	**0.97**	0.99	
478					p-Value:			0.4189	0.1306	**0.0043**	0.0074	
479					Statistically Significant?:			No	No	**Yes**	Yes	
480												
481												
482						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
483	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
484												
485	299-E27-17	8/15/2011 9:40	72.695	TOPP	0.004	121.798	121.804	-0.0154				
486	299-E27-18	8/15/2011 10:06	77.436	TOPP	0.005	121.820	121.824	0.0029	0.0004	-0.0003	-0.0003	
487	299-E27-8	8/15/2011 9:33	73.712	TOPP	0.012	121.811	121.819	0.0005	-0.0033			
488	299-E27-9	8/15/2011 9:26	71.081	TOPP	0.012	121.812	121.823	0.0056	0.0014	-0.0008	-0.0005	
489	299-E33-14	8/15/2011 10:29	68.814	TOPP	0.005	121.813	121.818	-0.0022	-0.0023	-0.0019	-0.0005	
490	299-E33-37	8/15/2011 10:00	78.335	TOPP	0.004	121.819	121.823	0.0009	-0.0009	-0.0010	-0.0010	
491	299-E34-10	8/15/2011 9:45	74.217	TOPP	0.004	121.821	121.825	0.0045	0.0024	0.0019	0.0023	
492	299-E34-9	8/15/2011 10:21	70.861	TOPP	0.004	121.816	121.823	0.0032	0.0022	0.0020		
493					Range (m):	0.023	0.021					
494					Gradient Magnitude (m/m):			9.72E-06	1.19E-05	1.15E-05	1.56E-05	
495					Direction (azimuth):			45	24	11	12	
496					R^2:			0.05	0.28	0.56	0.77	
497					p-Value:			0.8856	0.5255	0.2877	0.2258	
498					Statistically Significant?:			No	No	No	No	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
501						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
502	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
503												
504	299-E27-17	9/26/2011 9:11	72.684	TOPP	0.004	121.809	121.818	-0.0095				
505	299-E27-18	9/26/2011 9:31	77.430	TOPP	0.005	121.826	121.832	0.0028	0.0013	0.0009		
506	299-E27-8	9/26/2011 8:56	73.707	TOPP	0.012	121.816	121.827	0.0007	-0.0017			
507	299-E27-9	9/26/2011 9:02	71.077	TOPP	0.012	121.816	121.829	0.0037	0.0011	-0.0001	0.0000	0.0000
508	299-E33-14	9/26/2011 9:41	68.804	TOPP	0.005	121.823	121.830	-0.0001	-0.0001	0.0001	0.0000	-0.0001
509	299-E33-37	9/26/2011 9:35	78.327	TOPP	0.004	121.827	121.831	0.0006	-0.0005	-0.0005	0.0001	0.0000
510	299-E34-10	9/26/2011 9:17	74.214	TOPP	0.004	121.824	121.830	0.0010	-0.0003	-0.0006	-0.0002	
511	299-E34-9	9/26/2011 9:25	70.857	TOPP	0.004	121.820	121.830	0.0009	0.0002	0.0001	0.0001	0.0001
512					Range (m):	0.018	0.014					
513					Gradient Magnitude (m/m):			6.99E-06	7.20E-06	6.47E-06	4.15E-06	4.45E-06
514					Direction (azimuth):			69	46	36	43	42
515					R^2:			0.16	0.59	0.72	0.96	0.99
516					p-Value:			0.6376	0.1703	0.1492	0.0387	0.0742
517					Statistically Significant?:			No	No	No	Yes	No
518												
519												
520						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
521	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
522												
523	299-E27-17	11/30/2011 10:17	72.689	TOPP	0.004	121.804	121.813	-0.0191				
524	299-E27-18	11/30/2011 10:30	77.423	TOPP	0.005	121.833	121.839	0.0041	0.0010	0.0009		
525	299-E27-8	11/30/2011 10:12	73.700	TOPP	0.012	121.823	121.834	0.0038	-0.0009	-0.0008		
526	299-E27-9	11/30/2011 9:01	71.077	TOPP	0.012	121.816	121.834	0.0056	0.0005	0.0006		
527	299-E33-14	11/30/2011 10:41	68.801	TOPP	0.005	121.826	121.835	-0.0008	-0.0008	0.0002		
528	299-E33-37	11/30/2011 10:26	78.321	TOPP	0.004	121.833	121.839	0.0021	-0.0001	-0.0001		
529	299-E34-10	11/30/2011 10:22	74.204	TOPP	0.004	121.834	121.836	0.0015	-0.0010	-0.0008		
530	299-E34-9	11/30/2011 10:36	70.851	TOPP	0.004	121.826	121.837	0.0027	0.0014			
531					Range (m):	0.030	0.026					
532					Gradient Magnitude (m/m):			1.29E-05	**1.41E-05**	1.68E-05		
533					Direction (azimuth):			62	**38**	34		
534					R^2:			0.12	**0.80**	0.91		
535					p-Value:			0.7283	**0.0414**	0.0290		
536					Statistically Significant?:			No	**Yes**	Yes		

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
539						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
540	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
541												
542	299-E27-17	12/29/2011 10:46	72.687	TOPP	0.004	121.806	121.816	-0.0149				
543	299-E27-18	12/29/2011 11:18	77.425	TOPP	0.005	121.831	121.837	0.0036	0.0011	0.0012	0.0003	
544	299-E27-8	12/29/2011 10:36	73.704	TOPP	0.012	121.819	121.832	0.0029	-0.0008	-0.0009	-0.0009	
545	299-E27-9	12/29/2011 10:30	71.076	TOPP	0.012	121.817	121.832	0.0045	0.0005	0.0003	0.0006	
546	299-E33-14	12/29/2011 13:33	68.795	TOPP	0.005	121.832	121.836	0.0010	0.0009	-0.0001	0.0000	
547	299-E33-37	12/29/2011 11:05	78.323	TOPP	0.004	121.831	121.836	0.0007	-0.0010	-0.0010		
548	299-E34-10	12/29/2011 10:52	74.207	TOPP	0.004	121.831	121.836	0.0028	0.0008	0.0005	0.0000	
549	299-E34-9	12/29/2011 10:57	70.853	TOPP	0.004	121.824	121.833	-0.0005	-0.0015			
550					Range (m):	0.026	0.021					
551					Gradient Magnitude (m/m):			1.07E-05	1.09E-05	8.52E-06	1.28E-05	
552					Direction (azimuth):			71	47	58	49	
553					R^2:			0.17	0.75	0.86	0.95	
554					p-Value:			0.6306	0.0612	0.0537	0.0542	
555					Statistically Significant?:			No	No	No	No	
556												
557												
558						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
559	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
560												
561	299-E27-17	1/25/2012 10:36	72.700	TOPP	0.004	121.793	121.806	-0.0446				
562	299-E27-18	1/25/2012 10:56	77.431	TOPP	0.005	121.825	121.834	0.0079	0.0006	-0.0058	-0.0063	0.0008
563	299-E27-8	1/25/2012 10:29	73.702	TOPP	0.012	121.821	121.838	-0.0224	-0.0335			
564	299-E27-9	1/25/2012 9:01	71.009	TOPP	0.012	121.884	121.910	0.0346	0.0225	-0.0009	0.0029	0.0001
565	299-E33-14	1/25/2012 11:09	68.801	TOPP	0.005	121.826	121.838	-0.0194	-0.0194	-0.0153	0.0006	0.0003
566	299-E33-37	1/25/2012 10:50	78.333	TOPP	0.004	121.821	121.829	0.0140	0.0088	0.0083	0.0082	
567	299-E34-10	1/25/2012 10:42	74.204	TOPP	0.004	121.834	121.841	0.0018	-0.0041	-0.0096	-0.0055	-0.0013
568	299-E34-9	1/25/2012 11:04	70.806	TOPP	0.004	121.871	121.886	0.0281	0.0252	0.0233		
569					Range (m):	0.091	0.104					
570					Gradient Magnitude (m/m):			1.69E-04	1.63E-04	1.78E-04	**1.40E-04**	1.74E-04
571					Direction (azimuth):			215	219	227	**237**	232
572					R^2:			0.35	0.53	0.83	**0.97**	1.00
573					p-Value:			0.3417	0.2172	0.0727	**0.0322**	0.0251
574					Statistically Significant?:			No	No	No	**Yes**	Yes

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
577						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
578	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
579												
580	299-E27-17	2/28/2012 11:12	72.670	TOPP	0.004	121.823	121.817	-0.0030	-0.0027	-0.0008		
581	299-E27-18	2/28/2012 11:30	77.431	TOPP	0.005	121.825	121.822	0.0010	0.0008	0.0006	0.0004	
582	299-E27-8	2/28/2012 11:05	73.699	TOPP	0.012	121.824	121.817	-0.0026	-0.0025	0.0006	0.0001	
583	299-E27-9	2/28/2012 8:33	71.063	TOPP	0.012	121.830	121.822	0.0031	0.0035			
584	299-E33-14	2/28/2012 11:44	68.803	TOPP	0.005	121.824	121.817	-0.0023	0.0002	0.0002	0.0002	
585	299-E33-37	2/28/2012 11:24	78.329	TOPP	0.004	121.825	121.823	0.0015	0.0015	0.0000	0.0000	
586	299-E34-10	2/28/2012 11:18	74.216	TOPP	0.004	121.822	121.819	-0.0014	-0.0008	-0.0005	-0.0007	
587	299-E34-9	2/28/2012 11:37	70.848	TOPP	0.004	121.829	121.823	0.0036				
588					Range (m):	0.008	0.006					
589					Gradient Magnitude (m/m):			8.15E-06	1.53E-05	**2.48E-05**	2.40E-05	
590					Direction (azimuth):			32	23	**35**	34	
591					R^2:			0.10	0.35	**0.95**	0.98	
592					p-Value:			0.7591	0.4262	**0.0098**	0.0216	
593					Statistically Significant?:			No	No	**Yes**	Yes	
594												
595												
596						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
597	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
598												
599	299-E27-17	4/18/2012 9:00	72.701	TOPP	0.004	121.792	121.790	-0.0288	-0.0092			
600	299-E27-18	4/18/2012 9:11	77.450	TOPP	0.005	121.806	121.805	0.0050	0.0027	0.0011	0.0016	
601	299-E27-8	4/18/2012 8:53	73.720	TOPP	0.012	121.803	121.801	-0.0293	0.0042	-0.0009	-0.0005	
602	299-E27-9	4/18/2012 9:35	71.008	TOPP	0.012	121.885	121.881	0.0390				
603	299-E33-14	4/18/2012 9:22	68.820	TOPP	0.005	121.807	121.805	0.0032	-0.0004	-0.0002	0.0001	
604	299-E33-37	4/18/2012 9:08	78.350	TOPP	0.004	121.804	121.803	0.0149	-0.0018	-0.0018	-0.0012	
605	299-E34-10	4/18/2012 9:04	74.230	TOPP	0.004	121.808	121.806	0.0012	0.0037	0.0021		
606	299-E34-9	4/18/2012 9:17	70.871	TOPP	0.004	121.806	121.804	-0.0051	0.0008	-0.0003	0.0000	
607					Range (m):	0.093	0.091					
608					Gradient Magnitude (m/m):			9.41E-05	1.25E-05	4.32E-06	4.03E-06	
609					Direction (azimuth):			233	82	87	99	
610					R^2:			0.38	0.30	0.40	0.60	
611					p-Value:			0.3004	0.4855	0.4665	0.3972	
612					Statistically Significant?:			No	No	No	No	

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
615						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
616	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
617												
618	299-E27-17	5/15/2012 11:15	72.687	TOPP	0.004	121.806	121.805	-0.0018	-0.0014	-0.0012		
619	299-E27-18	5/15/2012 10:42	77.446	TOPP	0.005	121.810	121.809	0.0004	0.0003	0.0006	0.0004	
620	299-E27-8	5/15/2012 11:20	73.715	TOPP	0.012	121.808	121.806	0.0001	0.0004	0.0006	-0.0001	
621	299-E27-9	NM	NM	TOPP	0.012	NM	NM					
622	299-E33-14	5/15/2012 11:06	68.818	TOPP	0.005	121.809	121.805	-0.0018	-0.0002	0.0001	0.0000	
623	299-E33-37	5/15/2012 10:32	78.343	TOPP	0.004	121.811	121.809	-0.0005	-0.0007	-0.0002	-0.0003	
624	299-E34-10	5/15/2012 10:54	74.228	TOPP	0.004	121.810	121.809	0.0012	0.0016			
625	299-E34-9	5/15/2012 10:59	70.865	TOPP	0.004	121.812	121.809	0.0024				
626					Range (m):	0.006	0.004					
627					Gradient Magnitude (m/m):			1.16E-05	1.68E-05	1.64E-05	1.54E-05	
628					Direction (azimuth):			39	33	32	30	
629					R^2:			0.40	0.74	0.87	0.98	
630					p-Value:			0.3561	0.1339	0.1312	0.1430	
631					Statistically Significant?:			No	No	No	No	
632												
633												
634						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
635	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
636												
637	299-E27-17	6/14/2012 13:03	72.701	TOPP	0.004	121.792	121.791	-0.0044	-0.0118	-0.0168		
638	299-E27-18	6/14/2012 12:56	77.462	TOPP	0.005	121.794	121.794	0.0109	0.0147	0.0070	0.0037	0.0056
639	299-E27-8	6/14/2012 11:59	73.726	TOPP	0.012	121.797	121.797	0.0188	0.0158	0.0125	0.0079	
640	299-E27-9	6/14/2012 11:54	71.095	TOPP	0.012	121.798	121.793	0.0086	-0.0006	-0.0023	-0.0072	-0.0013
641	299-E33-14	6/14/2012 13:09	68.631	TOPP	0.005	121.996	121.994	0.0706	0.0098	0.0022	0.0008	0.0005
642	299-E33-37	6/14/2012 12:51	78.350	TOPP	0.004	121.804	121.802	0.0055	0.0068	-0.0025	-0.0052	-0.0047
643	299-E34-10	6/14/2012 12:44	74.241	TOPP	0.004	121.797	121.798	-0.0208	-0.0347			
644	299-E34-9	6/14/2012 13:14	70.880	TOPP	0.004	121.797	121.796	-0.0892				
645					Range (m):	0.204	0.203					
646					Gradient Magnitude (m/m):			3.48E-04	5.28E-04	5.18E-04	**5.16E-04**	5.15E-04
647					Direction (azimuth):			188	190	189	**189**	188
648					R^2:			0.59	0.94	0.98	**1.00**	1.00
649					p-Value:			0.1046	0.0033	0.0019	**0.0050**	0.0433
650					Statistically Significant?:			No	Yes	Yes	**Yes**	Yes

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
653						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
654	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
655												
656	299-E27-17	7/30/2012 8:58	72.705	TOPP	0.004	121.788	121.790	-0.0091				
657	299-E27-18	7/30/2012 8:47	77.453	TOPP	0.005	121.803	121.804	0.0026	0.0011	0.0011		
658	299-E27-8	7/30/2012 9:04	73.727	TOPP	0.012	121.796	121.799	0.0013	-0.0010	-0.0009	-0.0007	
659	299-E27-9	7/30/2012 9:20	71.098	TOPP	0.012	121.795	121.799	0.0027	0.0002	0.0004	0.0004	
660	299-E33-14	7/30/2012 8:13	68.829	TOPP	0.005	121.798	121.800	-0.0009	-0.0009	0.0000	-0.0002	
661	299-E33-37	7/30/2012 8:23	78.353	TOPP	0.004	121.801	121.803	0.0002	-0.0008	-0.0008	-0.0001	
662	299-E34-10	7/30/2012 8:39	74.236	TOPP	0.004	121.802	121.802	0.0013	0.0001	0.0003	0.0006	
663	299-E34-9	7/30/2012 8:30	70.878	TOPP	0.004	121.799	121.802	0.0019	0.0013			
664					Range (m):	0.015	0.014					
665					Gradient Magnitude (m/m):			1.18E-05	1.26E-05	1.50E-05	1.22E-05	
666					Direction (azimuth):			51	39	35	36	
667					R^2:			0.23	0.76	0.87	0.92	
668					p-Value:			0.5279	0.0569	0.0479	0.0844	
669					Statistically Significant?:			No	No	Yes	No	
670												
671												
672						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
673	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
674												
675	299-E27-17	NM	NM	TOPP	0.004	NM	NM					
676	299-E27-18	8/20/2012 8:23	77.453	TOPP	0.005	121.803	121.806	0.0005	0.0004			
677	299-E27-8	8/20/2012 8:57	73.728	TOPP	0.012	121.795	121.802	0.0006	0.0007			
678	299-E27-9	8/20/2012 9:12	71.102	TOPP	0.012	121.791	121.799	-0.0006	-0.0004			
679	299-E33-14	8/20/2012 8:01	68.829	TOPP	0.005	121.798	121.802	-0.0008	0.0003			
680	299-E33-37	NM	NM	TOPP	0.004	NM	NM					
681	299-E34-10	8/20/2012 8:40	74.237	TOPP	0.004	121.801	121.803	-0.0012	-0.0010			
682	299-E34-9	8/20/2012 8:31	70.878	TOPP	0.004	121.799	121.804	0.0016				
683					Range (m):	0.012	0.007					
684					Gradient Magnitude (m/m):			1.82E-05	2.11E-05			
685					Direction (azimuth):			39	35			
686					R^2:			0.80	0.93			
687					p-Value:			0.0907	0.0738			
688					Statistically Significant?:			No	No			

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L	M
691						Hydraulic Head (m NAVD88)		Trend-Surface Analyses Residuals (m)				
692	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP Desc.	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP	1st Iteration	2nd Iteration	3rd Iteration	4th Iteration	5th Iteration
693												
694	299-E27-17	9/11/2012 8:08	72.718	TOPP	0.004	121.775	121.787	-0.0160				
695	299-E27-18	9/11/2012 7:56	77.455	TOPP	0.005	121.801	121.809	0.0026	0.0000	0.0003		
696	299-E27-8	9/11/2012 8:16	73.734	TOPP	0.012	121.789	121.804	0.0033	-0.0007	-0.0005		
697	299-E27-9	9/11/2012 8:28	71.113	TOPP	0.012	121.780	121.803	0.0044	0.0001	0.0002		
698	299-E33-14	9/11/2012 7:20	68.833	TOPP	0.005	121.794	121.806	-0.0008	-0.0008	-0.0006		
699	299-E33-37	9/11/2012 7:47	78.352	TOPP	0.004	121.802	121.810	0.0013	-0.0005	-0.0002		
700	299-E34-10	9/11/2012 7:36	74.236	TOPP	0.004	121.802	121.809	0.0033	0.0012			
701	299-E34-9	9/11/2012 7:28	70.883	TOPP	0.004	121.794	121.807	0.0018	0.0007	0.0009		
702					Range (m):	0.027	0.023					
703					Gradient Magnitude (m/m):			1.63E-05	**1.73E-05**	1.66E-05		
704					Direction (azimuth):			58	**42**	42		
705					R^2:			0.21	**0.92**	0.96		
706					p-Value:			0.5634	**0.0061**	0.0091		
707					Statistically Significant?:			No	**Yes**	Yes		

Figure E-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LLWMA-2 (cont'd.)

Appendix F

Hydraulic Head Calculations and Trend-Surface Analysis Results for LERF

Three spreadsheets are presented in this appendix for LERF: one with well characteristics, one showing the determination of gyroscope correction coefficients, and one with the hydraulic head calculations and trend-surface analysis results that includes normalization of the measurements to a constant barometric pressure. Well characteristics are shown on the 'Wells' spreadsheet in Figure F-1. This spreadsheet lists, for each well, the default MP – RP values, horizontal coordinates, old reference point elevations, new reference point elevations resulting from the resurveys, and gyroscope correction coefficients. No formulas are used on this sheet.

The graphing feature of Microsoft Excel was used to determine the gyroscope correction coefficients for the LERF wells. For each well, the measured depth to water in meters was plotted against the difference between the measured depth to water and the true vertical depth to water in feet (using an x-y scatter plot) for the lowermost gyroscope depth stations bracketing the water level. Then, the trend line feature of Excel was used to add a third degree polynomial trend line to the plots. The equation of the trend line was displayed on the chart, and the coefficients were copied from this equation into the spreadsheet. Figure F-2 shows the gyroscope data used, graphs of the data, the fitted equations, and the coefficients for each well.

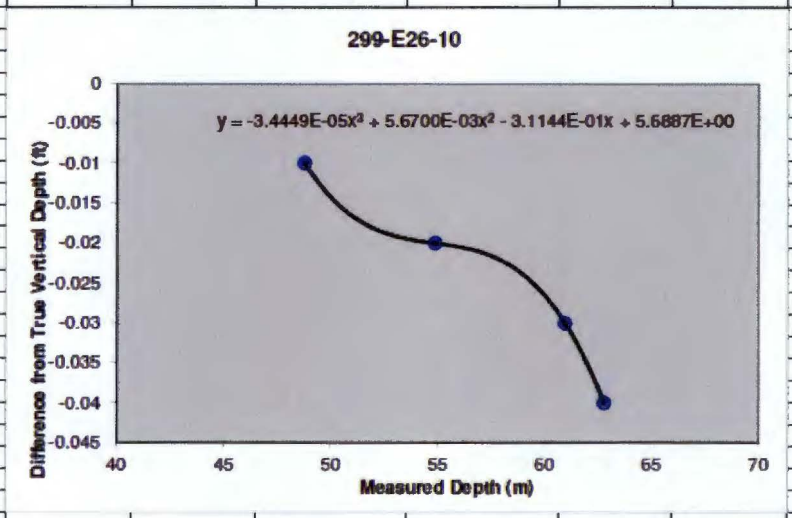
Figure F-3 shows a portion of the spreadsheet, with formulas displayed, that was used to calculate the hydraulic head values and display the trend-surface analysis results. The water-level measurements are in columns C through F (measurement date & time, depth to water, measurement point description, and MP – RP). In column G, the hydraulic head values are calculated (Equation 1) using the new reference point elevations and correcting for borehole deviation. The reference point elevations for each well are obtained from the "Wells" sheet (Figure F-1) using the "VLOOKUP" function. This function matches the well name in column B to the well names in the first column of the specified array on the "Wells" sheet (B6 to O9) and returns a value from the specified column of the array (column 9 for the new reference point values) in the same row as the matched well name. The gyroscope correction coefficients were also obtained using the "VLOOKUP" function in the same manner. In column H, the hydraulic head values normalized to a constant barometric pressure are displayed. This normalization was performed in a separate spreadsheet (see Appendix G for an example) and the results were copied into this spreadsheet.

Once the hydraulic heads were calculated, they were copied into the trend-surface analysis spreadsheet (Appendix B) along with the horizontal coordinates for the wells, and the trend-surface results were then copied into this sheet (rows 480 through 484 in Figure F-3). Figure F-4 lists the entire spreadsheet with all of the water-level measurements collected for this study and the results of the hydraulic head calculations (normalized to a constant barometric pressure) and trend-surface analyses.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	**200 East Area Low Gradient Evaluation Study**														
2	LERF Well Information (Wells worksheet)														
3															
4		Well Name	MP Desc.	MP-RP (m)	Horizontal Coordinates (m NAD83)			Old RP Elev (m NAVD88)		New RP Elev (m NAVD88)		Gyro Correction Coefficients			
5					East (m)	North (m)	Source	Value	Source	Value	Source	C1	C2	C3	C4
6		299-E26-10	TOPP	0.006	575588.999	137023.494	USACE	184.420	USACE	184.418	Fluor	-3.44490E-05	5.67000E-03	-3.11440E-01	5.68870E+00
7		299-E26-14	TOPP	0.007	575786.450	137264.500	Fluor	183.221	Fluor	183.224	Fluor	0.00000E+00	0.00000E+00	0.00000E+00	-2.00000E-02
8		299-E26-77	TOPP	0.010	575579.030	137129.970	Fluor	184.771	Fluor	184.772	Fluor	1.32610E-05	-2.75820E-03	1.49520E-01	-2.63990E+00
9		299-E26-79	TOPP	0.010	575827.880	137051.500	Fluor	183.114	Fluor	183.115	Fluor	-7.35720E-06	5.38200E-04	-5.55010E-02	1.56000E+00
10															
11		TOPP = Top of Pump Plate													
12		TOC = Top of Casing													
13		TOT = Top of Discharge Tee													

Figure F-1. Spreadsheet of Well Information for LERF (i.e., "Wells" sheet)

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients A	B	C	D
299-E26-10	160	48.768	159.99	-0.01	-3.4449E-05	5.6700E-03	-3.1144E-01	5.6887E+00
	180	54.864	179.98	-0.02				
	200	60.96	199.97	-0.03				
	206	62.7888	205.96	-0.04				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients A	B	C	D
299-E26-14	200	60.96	199.98	-0.02	0.0000E+00	0.0000E+00	0.0000E+00	2.0000E-02
	215	65.532	214.98	-0.02				

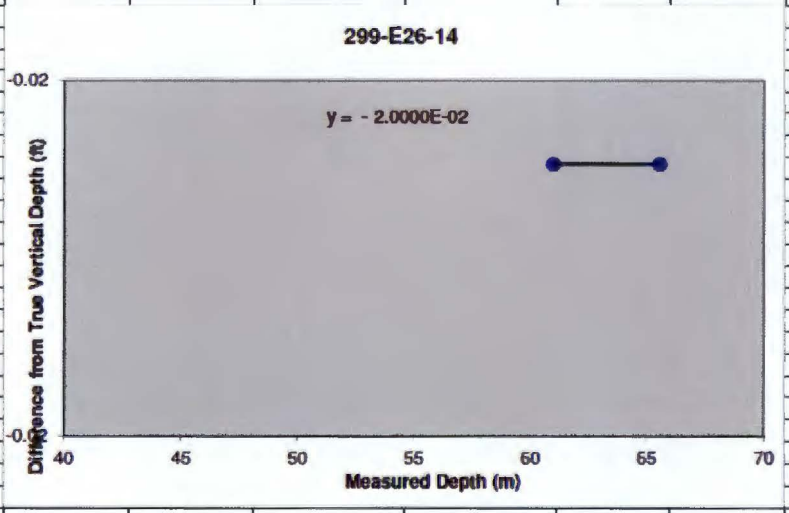
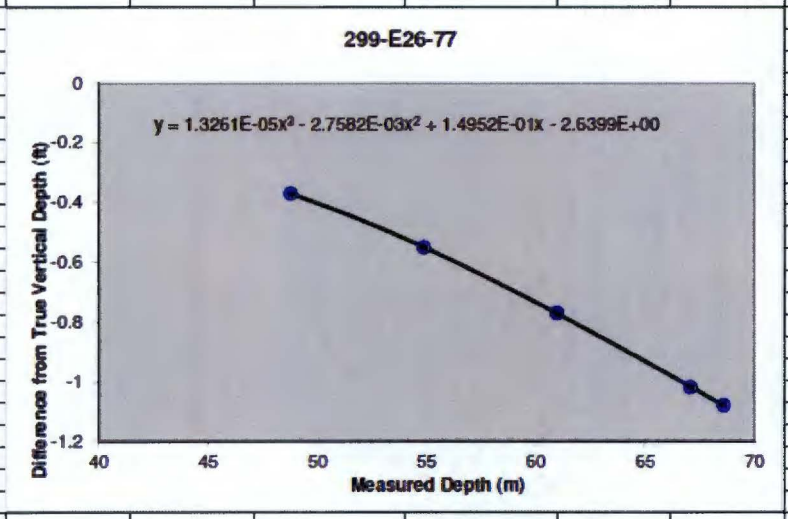


Figure F-2. Determination of Gyroscopic Correction Coefficients for the LERF Wells

Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients A	B	C	D
299-E26-77	160	48.768	159.63	-0.37	1.3261E-05	-2.7582E-03	1.4952E-01	-2.6399E+00
	180	54.864	179.45	-0.55				
	200	60.96	199.23	-0.77				
	220	67.056	218.98	-1.02				
	225	68.58	223.92	-1.08				



Well	Measured Depth (ft)	Measured Depth (m)	True Vertical Depth (ft)	Difference (ft)	Fitted Coefficients A	B	C	D
299-E26-79	160	48.768	159.28	-0.72	-7.3572E-06	5.3820E-04	-5.5501E-02	1.5600E+00
	180	54.864	178.92	-1.08				
	200	60.96	198.51	-1.49				
	220	67.056	218.04	-1.96				

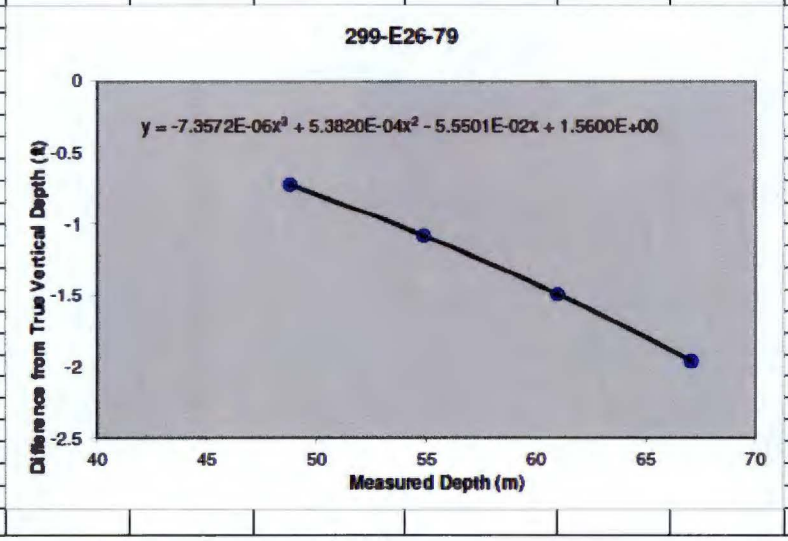


Figure F-2. Determination of Gyroscopic Correction Coefficients for the LERF Wells (cont'd.)

	B	C	D	E	F	G	H
472						Hydraulic Head (m NAVD88)	
473	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
474							
475	299-E26-10			TOPP	0.006	=ROUND(VLOOKUP($B475,Wells!$B$6:$O$9,9)-($D475-$F475+(VLOOKUP($B475,Wells!$B$6:$O$9,11)*($D475)^3+VLOOKUP($B475,Wells!$B$6:$O$9,12)*($D475)^2+VLOOKUP($B475,Wells!$B$6:$O$9,13)*($D475)+VLOOKUP($B475,Wells!$B$6:$O$9,14))*0.3048),3)	121.838
476	299-E26-14			TOPP	0.007	=ROUND(VLOOKUP($B476,Wells!$B$6:$O$9,9)-($D476-$F476+(VLOOKUP($B476,Wells!$B$6:$O$9,11)*($D476)^3+VLOOKUP($B476,Wells!$B$6:$O$9,12)*($D476)^2+VLOOKUP($B476,Wells!$B$6:$O$9,13)*($D476)+VLOOKUP($B476,Wells!$B$6:$O$9,14))*0.3048),3)	121.911
477	299-E26-77			TOPP	0.01	=ROUND(VLOOKUP($B477,Wells!$B$6:$O$9,9)-($D477-$F477+(VLOOKUP($B477,Wells!$B$6:$O$9,11)*($D477)^3+VLOOKUP($B477,Wells!$B$6:$O$9,12)*($D477)^2+VLOOKUP($B477,Wells!$B$6:$O$9,13)*($D477)+VLOOKUP($B477,Wells!$B$6:$O$9,14))*0.3048),3)	121.844
478	299-E26-79			TOPP	0.01	=ROUND(VLOOKUP($B478,Wells!$B$6:$O$9,9)-($D478-$F478+(VLOOKUP($B478,Wells!$B$6:$O$9,11)*($D478)^3+VLOOKUP($B478,Wells!$B$6:$O$9,12)*($D478)^2+VLOOKUP($B478,Wells!$B$6:$O$9,13)*($D478)+VLOOKUP($B478,Wells!$B$6:$O$9,14))*0.3048),3)	121.847
479					Range (m):	=MAX(G475:G478)-MIN(G475:G478)	=MAX(H475:H478)-MIN(H475:H478)
480					Gradient Magnitude (m/m):		
481					Direction (azimuth):		
482					R^2:		
483					p-Value:		
484					Statistically Significant?:		

Figure F-3. Example Spreadsheet of Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF with Formulas Displayed

	A	B	C	D	E	F	G	H
1	**200 East Area Low Gradient Evaluation Study**							
2	LERF Hydraulic Head Calculations and Trend-Surface Analysis Results							
3							Outlier removed	
4								
5								
6								
7							Hydraulic Head (m NAVD88)	
8		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
9								
10		299-E26-10	11/26/2008 8:52	62.643	TOPP	0.006	121.793	121.797
11		299-E26-77	11/26/2008 8:41	63.054	TOPP	0.010	121.988	121.990
12		299-E26-79	11/26/2008 8:45	61.618	TOPP	0.010	121.976	121.978
13						Range (m):	0.195	0.193
14						Gradient Magnitude (m/m):		
15						Direction (azimuth):		
16						R^2:		
17						p-Value:		
18						Statistically Significant?:		
19								
20								
21								
22							Hydraulic Head (m NAVD88)	
23		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
24								
25		299-E26-10	2/23/2009 9:55	62.477	TOPP	0.006	121.959	121.952
26		299-E26-77	2/23/2009 9:31	63.082	TOPP	0.010	121.961	121.960
27		299-E26-79	2/23/2009 9:40	61.612	TOPP	0.010	121.982	121.978
28						Range (m):	0.023	0.026
29						Gradient Magnitude (m/m):		
30						Direction (azimuth):		
31						R^2:		
32						p-Value:		
33						Statistically Significant?:		
34								
35								
36								
37							Hydraulic Head (m NAVD88)	
38		Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
39								
40		299-E26-10	3/24/2009 9:13	62.502	TOPP	0.006	121.934	121.945
41		299-E26-77	3/24/2009 9:31	63.087	TOPP	0.010	121.956	121.961
42		299-E26-79	3/24/2009 9:34	61.647	TOC	0.000	121.937	121.946
43						Range (m):	0.022	0.016
44						Gradient Magnitude (m/m):		1.50E-04
45						Direction (azimuth):		175
46						R^2:		
47						p-Value:		
48						Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF

	B	C	D	E	F	G	H
52						Hydraulic Head (m NAVD88)	
53	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
54							
55	299-E26-10	4/30/2009 8:28	62.495	TOPP	0.006	121.941	121.948
56	299-E26-77	4/30/2009 8:13	63.095	TOPP	0.010	121.948	121.951
57	299-E26-79	4/30/2009 8:21	61.655	TOPP	0.010	121.939	121.944
58					Range (m):	0.009	0.007
59					Gradient Magnitude (m/m):		3.30E-05
60					Direction (azimuth):		143
61					R^2:		
62					p-Value:		
63					Statistically Significant?:		
64							
65							
66							
67						Hydraulic Head (m NAVD88)	
68	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
69							
70	299-E26-10	5/28/2009 9:46	62.469	TOPP	0.006	121.967	121.968
71	299-E26-77	5/28/2009 9:32	63.077	TOPP	0.010	121.965	121.966
72	299-E26-79	5/28/2009 9:38	61.623	TOPP	0.010	121.971	121.972
73					Range (m):	0.006	0.006
74					Gradient Magnitude (m/m):		2.53E-05
75					Direction (azimuth):		312
76					R^2:		
77					p-Value:		
78					Statistically Significant?:		
79							
80							
81							
82						Hydraulic Head (m NAVD88)	
83	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
84							
85	299-E26-10	6/29/2009 8:23	62.440	TOPP	0.006	121.996	121.996
86	299-E26-77	6/29/2009 7:33	63.049	TOPP	0.010	121.993	121.995
87	299-E26-79	6/29/2009 7:42	61.602	TOC	0.000	121.981	121.983
88					Range (m):	0.015	0.013
89					Gradient Magnitude (m/m):		5.47E-05
90					Direction (azimuth):		75
91					R^2:		
92					p-Value:		
93					Statistically Significant?:		

	B	C	D	E	F	G	H
97						Hydraulic Head (m NAVD88)	
98	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
99							
100	299-E26-10	7/13/2009 8:53	62.416	TOC	0.000	122.014	122.016
101	299-E26-77	7/13/2009 10:00	63.015	TOC	0.000	122.017	122.018
102	299-E26-79	7/13/2009 11:20	61.564	TOC	0.000	122.018	122.018
103					Range (m):	0.004	0.002
104					Gradient Magnitude (m/m):		2.03E-05
105					Direction (azimuth):		198
106					R^2:		
107					p-Value:		
108					Statistically Significant?:		
109							
110							
111							
112						Hydraulic Head (m NAVD88)	
113	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
114							
115	299-E26-10	7/27/2009 8:58	62.438	TOPP	0.006	121.998	122.003
116	299-E26-77	7/27/2009 9:14	63.039	TOPP	0.010	122.003	122.005
117	299-E26-79	7/27/2009 9:20	61.328	TOPP	0.010	122.259	122.261
118					Range (m):	0.261	0.258
119					Gradient Magnitude (m/m):		
120					Direction (azimuth):		
121					R^2:		
122					p-Value:		
123					Statistically Significant?:		
124							
125							
126							
127						Hydraulic Head (m NAVD88)	
128	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
129							
130	299-E26-10	8/6/2009 9:15	62.429	TOPP	0.006	122.007	122.004
131	299-E26-77	8/6/2009 9:34	63.029	TOPP	0.010	122.013	122.010
132	299-E26-79	8/6/2009 9:46	61.581	TOPP	0.010	122.012	122.007
133					Range (m):	0.006	0.006
134					Gradient Magnitude (m/m):		5.72E-05
135					Direction (azimuth):		186
136					R^2:		
137					p-Value:		
138					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
142						Hydraulic Head (m NAVD88)	
143	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
144							
145	299-E26-10	9/22/2009 8:50	62.476	TOPP	0.006	121.960	121.967
146	299-E26-77	9/22/2009 9:00	63.071	TOPP	0.010	121.971	121.977
147	299-E26-79	9/22/2009 9:06	61.633	TOPP	0.010	121.961	121.970
148					Range (m):	0.011	0.010
149					Gradient Magnitude (m/m):		9.41E-05
150					Direction (azimuth):		181
151					R^2:		
152					p-Value:		
153					Statistically Significant?:		
154							
155							
156							
157						Hydraulic Head (m NAVD88)	
158	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
159							
160	299-E26-10	10/29/2009 7:40	69.423	TOPP	0.006	115.041	115.044
161	299-E26-77	10/29/2009 7:52	63.085	TOPP	0.010	121.958	121.961
162	299-E26-79	10/29/2009 7:56	61.654	TOPP	0.010	121.940	121.944
163					Range (m):	6.917	6.917
164					Gradient Magnitude (m/m):		
165					Direction (azimuth):		
166					R^2:		
167					p-Value:		
168					Statistically Significant?:		
169							
170							
171							
172						Hydraulic Head (m NAVD88)	
173	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
174							
175	299-E26-10	11/12/2009 9:01	62.494	TOPP	0.006	121.942	121.938
176	299-E26-77	11/12/2009 9:20	63.095	TOPP	0.010	121.948	121.946
177	299-E26-79	11/12/2009 10:50	61.665	TOPP	0.010	121.930	121.926
178					Range (m):	0.018	0.020
179					Gradient Magnitude (m/m):		9.09E-05
180					Direction (azimuth):		140
181					R^2:		
182					p-Value:		
183					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
187						Hydraulic Head (m NAVD88)	
188	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
189							
190	299-E26-10	1/4/2010 9:12	62.519	TOPP	0.006	121.917	121.918
191	299-E26-77	1/4/2010 9:30	63.117	TOPP	0.010	121.926	121.925
192	299-E26-79	NM	NM	TOPP	0.010	NM	NM
193					Range (m):	0.009	0.007
194					Gradient Magnitude (m/m):		
195					Direction (azimuth):		
196					R^2:		
197					p-Value:		
198					Statistically Significant?:		
199							
200							
201							
202						Hydraulic Head (m NAVD88)	
203		Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
204							
205	299-E26-10	2/18/2010 9:10	62.540	TOPP	0.006	121.896	121.898
206	299-E26-77	2/18/2010 9:22	63.138	TOPP	0.010	121.905	121.907
207	299-E26-79	NM	NM	TOPP	0.010	NM	NM
208					Range (m):	0.009	0.009
209					Gradient Magnitude (m/m):		
210					Direction (azimuth):		
211					R^2:		
212					p-Value:		
213					Statistically Significant?:		
214							
215							
216							
217						Hydraulic Head (m NAVD88)	
218	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
219							
220	299-E26-10	3/10/2010 11:46	62.546	TOPP	0.006	121.890	121.892
221	299-E26-77	3/10/2010 12:07	63.140	TOPP	0.010	121.903	121.904
222	299-E26-79	NM	NM	TOPP	0.010	NM	NM
223					Range (m):	0.013	0.012
224					Gradient Magnitude (m/m):		
225					Direction (azimuth):		
226					R^2:		
227					p-Value:		
228					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
232						Hydraulic Head (m NAVD88)	
233	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
234							
235	299-E26-10	4/28/2010 7:50	62.546	TOPP	0.006	121.890	121.879
236	299-E26-77	4/28/2010 7:36	63.149	TOPP	0.010	121.894	121.888
237	299-E26-79	NM	NM	TOPP	0.010	NM	NM
238					Range (m):	0.004	0.009
239					Gradient Magnitude (m/m):		
240					Direction (azimuth):		
241					R^2:		
242					p-Value:		
243					Statistically Significant?:		
244							
245							
246							
247						Hydraulic Head (m NAVD88)	
248	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
249							
250	299-E26-10	5/23/2010 8:34	62.555	TOPP	0.006	121.881	121.881
251	299-E26-77	5/23/2010 9:00	63.155	TOPP	0.010	121.888	121.887
252	299-E26-79	NM	NM	TOPP	0.010	NM	NM
253					Range (m):	0.007	0.006
254					Gradient Magnitude (m/m):		
255					Direction (azimuth):		
256					R^2:		
257					p-Value:		
258					Statistically Significant?:		
259							
260							
261							
262						Hydraulic Head (m NAVD88)	
263	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
264							
265	299-E26-10	6/30/2010 9:15	62.599	TOPP	0.006	121.837	121.841
266	299-E26-77	6/30/2010 8:40	63.146	TOPP	0.010	121.897	121.897
267	299-E26-79	6/30/2010 8:50	61.607	TOPP	0.010	121.986	121.986
268					Range (m):	0.149	0.145
269					Gradient Magnitude (m/m):		
270					Direction (azimuth):		
271					R^2:		
272					p-Value:		
273					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
277						Hydraulic Head (m NAVD88)	
278	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
279							
280	299-E26-10	7/13/2010 11:24	62.553	TOPP	0.006	121.883	121.889
281	299-E26-77	7/13/2010 10:20	63.149	TOPP	0.010	121.894	121.894
282	299-E26-79	7/13/2010 10:34	61.704	TOPP	0.010	121.892	121.893
283					Range (m):	0.011	0.005
284					Gradient Magnitude (m/m):		4.93E-05
285					Direction (azimuth):		193
286					R^2:		
287					p-Value:		
288					Statistically Significant?:		
289							
290							
291							
292						Hydraulic Head (m NAVD88)	
293	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
294							
295	299-E26-10	8/23/2010 9:10	62.589	TOPP	0.006	121.847	121.865
296	299-E26-77	8/23/2010 9:26	63.174	TOPP	0.010	121.870	121.876
297	299-E26-79	8/23/2010 9:31	61.731	TOPP	0.010	121.865	121.875
298					Range (m):	0.023	0.011
299					Gradient Magnitude (m/m):		1.10E-04
300					Direction (azimuth):		196
301					R^2:		
302					p-Value:		
303					Statistically Significant?:		
304							
305							
306							
307						Hydraulic Head (m NAVD88)	
308	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
309							
310	299-E26-10	9/17/2010 6:28	62.560	TOPP	0.006	121.876	121.877
311	299-E26-77	9/17/2010 6:54	63.157	TOPP	0.010	121.886	121.886
312	299-E26-79	9/17/2010 7:02	61.715	TOPP	0.010	121.881	121.881
313					Range (m):	0.010	0.009
314					Gradient Magnitude (m/m):		8.54E-05
315					Direction (azimuth):		185
316					R^2:		
317					p-Value:		
318					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
322						Hydraulic Head (m NAVD88)	
323	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
324							
325	299-E26-10	1/4/2011 10:01	62.559	TOPP	0.006	121.877	121.883
326	299-E26-77	1/4/2011 10:30	63.159	TOPP	0.010	121.885	121.891
327	299-E26-79	1/4/2011 10:21	61.715	TOPP	0.010	121.881	121.891
328					Range (m):	0.008	0.008
329					Gradient Magnitude (m/m):		8.12E-05
330					Direction (azimuth):		198
331					R^2:		
332					p-Value:		
333					Statistically Significant?:		
334							
335							
336							
337						Hydraulic Head (m NAVD88)	
338	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
339							
340	299-E26-10	2/11/2011 11:10	62.563	TOPP	0.006	121.873	121.864
341	299-E26-77	2/11/2011 11:46	63.155	TOPP	0.010	121.888	121.881
342	299-E26-79	2/11/2011 11:57	61.715	TOPP	0.010	121.881	121.870
343					Range (m):	0.015	0.017
344					Gradient Magnitude (m/m):		1.60E-04
345					Direction (azimuth):		182
346					R^2:		
347					p-Value:		
348					Statistically Significant?:		
349							
350							
351							
352						Hydraulic Head (m NAVD88)	
353	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
354							
355	299-E26-10	3/21/2011 7:53	62.577	TOPP	0.006	121.859	121.850
356	299-E26-77	3/21/2011 8:06	63.162	TOC	0.000	121.872	121.867
357	299-E26-79	3/21/2011 8:11	61.721	TOPP	0.010	121.875	121.866
358					Range (m):	0.016	0.017
359					Gradient Magnitude (m/m):		1.71E-04
360					Direction (azimuth):		196
361					R^2:		
362					p-Value:		
363					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
367						Hydraulic Head (m NAVD88)	
368	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
369							
370	299-E26-10	4/25/2011 10:20	62.596	TOPP	0.006	121.840	121.827
371	299-E26-77	4/25/2011 10:05	63.187	TOC	0.000	121.847	121.841
372	299-E26-79	4/25/2011 10:10	61.739	TOPP	0.010	121.857	121.846
373					Range (m):	0.017	0.019
374					Gradient Magnitude (m/m):		1.51E-04
375					Direction (azimuth):		205
376					R^2:		
377					p-Value:		
378					Statistically Significant?:		
379							
380							
381							
382						Hydraulic Head (m NAVD88)	
383	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
384							
385	299-E26-10	5/25/2011 9:54	62.601	TOPP	0.006	121.835	121.832
386	299-E26-77	5/25/2011 9:33	63.198	TOC	0.000	121.836	121.837
387	299-E26-79	5/25/2011 9:41	61.755	TOPP	0.010	121.842	121.844
388					Range (m):	0.007	0.012
389					Gradient Magnitude (m/m):		6.76E-05
390					Direction (azimuth):		221
391					R^2:		
392					p-Value:		
393					Statistically Significant?:		
394							
395							
396							
397						Hydraulic Head (m NAVD88)	
398	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
399							
400	299-E26-10	6/20/2011 9:38	61.608	TOPP	0.006	122.826	122.827
401	299-E26-77	6/20/2011 9:24	63.188	TOC	0.000	121.846	121.846
402	299-E26-79	6/20/2011 9:26	61.752	TOPP	0.010	121.845	121.845
403					Range (m):	0.981	0.982
404					Gradient Magnitude (m/m):		
405					Direction (azimuth):		
406					R^2:		
407					p-Value:		
408					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
412						Hydraulic Head (m NAVD88)	
413	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
414							
415	299-E26-10	7/14/2011 8:54	62.599	TOPP	0.006	121.837	121.836
416	299-E26-77	7/14/2011 8:29	63.211	TOPP	0.010	121.833	121.831
417	299-E26-79	7/14/2011 8:39	61.756	TOPP	0.010	121.841	121.838
418					Range (m):	0.008	0.007
419					Gradient Magnitude (m/m):		4.77E-05
420					Direction (azimuth):		343
421					R^2:		
422					p-Value:		
423					Statistically Significant?:		
424							
425							
426							
427						Hydraulic Head (m NAVD88)	
428	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
429							
430	299-E26-10	8/15/2011 8:47	62.611	TOPP	0.006	121.825	121.828
431	299-E26-77	NM	NM	TOPP	0.010	NM	NM
432	299-E26-79	8/15/2011 8:29	61.763	TOPP	0.010	121.834	121.835
433					Range (m):	0.009	0.007
434					Gradient Magnitude (m/m):		
435					Direction (azimuth):		
436					R^2:		
437					p-Value:		
438					Statistically Significant?:		
439							
440							
441							
442						Hydraulic Head (m NAVD88)	
443	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
444							
445	299-E26-10	9/26/2011 10:10	62.602	TOPP	0.006	121.834	121.837
446	299-E26-77	9/26/2011 9:53	63.198	TOPP	0.010	121.846	121.845
447	299-E26-79	9/26/2011 9:58	61.751	TOPP	0.010	121.846	121.845
448					Range (m):	0.012	0.008
449					Gradient Magnitude (m/m):		8.12E-05
450					Direction (azimuth):		198
451					R^2:		
452					p-Value:		
453					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
457						Hydraulic Head (m NAVD88)	
458	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
459							
460	299-E26-10	11/30/2011 9:30	62.603	TOPP	0.006	121.833	121.841
461	299-E26-77	11/30/2011 9:51	63.201	TOPP	0.010	121.843	121.850
462	299-E26-79	11/30/2011 9:56	61.758	TOPP	0.010	121.839	121.849
463					Range (m):	0.010	0.009
464					Gradient Magnitude (m/m):		8.98E-05
465					Direction (azimuth):		195
466					R^2:		
467					p-Value:		
468					Statistically Significant?:		
469							
470							
471							
472						Hydraulic Head (m NAVD88)	
473	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
474							
475	299-E26-10	12/29/2011 9:32	62.593	TOPP	0.006	121.843	121.838
476	299-E26-14	12/29/2011 9:10	61.315	TOPP	0.007	121.922	121.911
477	299-E26-77	12/29/2011 8:46	63.194	TOPP	0.010	121.850	121.844
478	299-E26-79	12/29/2011 8:55	61.739	TOPP	0.010	121.857	121.847
479					Range (m):	0.079	0.073
480					Gradient Magnitude (m/m):		2.75E-04
481					Direction (azimuth):		195
482					R^2:		0.92
483					p-Value:		0.2858
484					Statistically Significant?:		No
485							
486							
487							
488						Hydraulic Head (m NAVD88)	
489	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
490							
491	299-E26-10	1/25/2012 9:37	61.612	TOPP	0.006	122.822	122.831
492	299-E26-14	1/25/2012 10:00	61.372	TOPP	0.007	121.865	121.867
493	299-E26-77	1/25/2012 10:07	63.201	TOPP	0.010	121.843	121.846
494	299-E26-79	1/25/2012 10:13	61.775	TOPP	0.010	121.822	121.828
495					Range (m):	1.000	1.003
496					Gradient Magnitude (m/m):		
497					Direction (azimuth):		
498					R^2:		
499					p-Value:		
500					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
504						Hydraulic Head (m NAVD88)	
505	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
506							
507	299-E26-10	2/28/2012 9:14	62.600	TOPP	0.006	121.836	121.834
508	299-E26-14	2/28/2012 9:36	61.341	TOPP	0.007	121.896	121.895
509	299-E26-77	2/28/2012 9:42	63.201	TOPP	0.010	121.843	121.843
510	299-E26-79	2/28/2012 9:48	61.762	TOPP	0.010	121.835	121.835
511					Range (m):	0.061	0.061
512					Gradient Magnitude (m/m):		2.49E-04
513					Direction (azimuth):		186
514					R^2:		0.93
515					p-Value:		0.2670
516					Statistically Significant?:		No
517							
518							
519							
520						Hydraulic Head (m NAVD88)	
521	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
522							
523	299-E26-10	4/18/2012 8:13	62.62	TOPP	0.006	121.816	121.816
524	299-E26-14	4/18/2012 8:28	61.35	TOPP	0.007	121.887	121.890
525	299-E26-77	4/18/2012 8:33	63.22	TOPP	0.010	121.824	121.824
526	299-E26-79	4/18/2012 8:38	61.78	TOPP	0.010	121.817	121.818
527					Range (m):	0.071	0.074
528					Gradient Magnitude (m/m):		2.98E-04
529					Direction (azimuth):		188
530					R^2:		0.91
531					p-Value:		0.2928
532					Statistically Significant?:		No
533							
534							
535							
536						Hydraulic Head (m NAVD88)	
537	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
538							
539	299-E26-10	5/15/2012 13:04	62.608	TOPP	0.006	121.828	121.818
540	299-E26-14	5/15/2012 13:30	61.337	TOPP	0.007	121.900	121.894
541	299-E26-77	NM	NM	TOPP	0.010	NM	NM
542	299-E26-79	5/15/2012 12:53	61.759	TOPP	0.010	121.838	121.828
543					Range (m):	0.072	0.076
544					Gradient Magnitude (m/m):		3.11E-04
545					Direction (azimuth):		181
546					R^2:		
547					p-Value:		
548					Statistically Significant?:		

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
552						Hydraulic Head (m NAVD88)	
553	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
554							
555	299-E26-10	6/14/2012 12:17	62.630	TOPP	0.006	121.806	121.805
556	299-E26-14	NM	NM	TOPP	0.007	NM	NM
557	299-E26-77	NM	NM	TOPP	0.010	NM	NM
558	299-E26-79	NM	NM	TOPP	0.010	NM	NM
559					Range (m):	0.000	0.000
560					Gradient Magnitude (m/m):		
561					Direction (azimuth):		
562					R^2:		
563					p-Value:		
564					Statistically Significant?:		
565							
566							
567							
568						Hydraulic Head (m NAVD88)	
569	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
570							
571	299-E26-10	NM	NM	TOPP	0.006	NM	NM
572	299-E26-14	7/26/2012 13:15	61.355	TOPP	0.007	121.882	121.882
573	299-E26-77	7/26/2012 13:20	63.168	TOPP	0.010	121.876	121.875
574	299-E26-79	7/26/2012 13:29	61.771	TOPP	0.010	121.826	121.823
575					Range (m):	0.056	0.059
576					Gradient Magnitude (m/m):		
577					Direction (azimuth):		
578					R^2:		
579					p-Value:		
580					Statistically Significant?:		
581							
582							
583							
584						Hydraulic Head (m NAVD88)	
585	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
586							
587	299-E26-10	8/20/2012 9:42	62.628	TOPP	0.006	121.808	121.808
588	299-E26-14	8/20/2012 10:28	61.358	TOPP	0.007	121.879	121.878
589	299-E26-77	8/20/2012 10:35	63.223	TOPP	0.010	121.821	121.820
590	299-E26-79	8/20/2012 10:50	61.781	TOPP	0.010	121.816	121.813
591					Range (m):	0.071	0.070
592					Gradient Magnitude (m/m):		2.77E-04
593					Direction (azimuth):		188
594					R^2:		0.94
595					p-Value:		0.2348
596					Statistically Significant?:		No

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

	B	C	D	E	F	G	H
600						Hydraulic Head (m NAVD88)	
601	Well Name	Measurement Date & Time (PST)	Measured Depth to Water (m)	MP	MP-RP	New RP & Gyro Correction	New RP, Gyro Correction & BP Adjustment
602							
603	299-E26-10	9/11/2012 8:42	62.638	TOPP	0.006	121.798	121.809
604	299-E26-14	9/11/2012 9:16	61.363	TOPP	0.007	121.874	121.878
605	299-E26-77	9/11/2012 9:24	63.226	TOPP	0.010	121.818	121.822
606	299-E26-79	9/11/2012 9:34	61.785	TOPP	0.010	121.812	121.816
607					Range (m):	0.076	0.069
608					Gradient Magnitude (m/m):		2.69E-04
609					Direction (azimuth):		189
610					R^2:		0.95
611					p-Value:		0.2132
612					Statistically Significant?:		No

Figure F-4. Hydraulic Gradient Calculations and Trend-Surface Analysis Results for LERF (cont'd.)

Appendix G

Spreadsheet Calculations — Normalization of the Manual Water-Level Measurements to a Constant Barometric Pressure

This appendix documents the spreadsheets used to deconvolve barometric pressure effects from the manual hydraulic head measurements thereby normalizing the measurements to a constant barometric pressure. Due to the large number of calculations and the large amount of input data, all of the spreadsheets used in this study are not included in this appendix. What is included is (1) an example spreadsheet documenting how the deconvolution was performed, (2) all of the input data and calculation results for the normalization of one set of measurements collected at LLWMA-1, and (3) spreadsheets with the BRF coefficients for all of the wells in this study (charts of the BRFs were presented in Appendix A).

Figure G-1 shows an example of the spreadsheets used for the deconvolution with formulas displayed. This particular spreadsheet is for LLWMA-1. The barometric pressure measurements from the 200 East Area Station #6 are listed in columns B (the date and time) and C (the barometric pressure in units of meters of water). These values are copied from a master spreadsheet containing all of the hourly barometric pressure measurements for each year. The data are in hourly time steps, and the change in pressure between time steps is calculated in column D. The wells are listed in Column F and the corresponding water-level elevations to be normalized are listed in columns G (date and time) and H (the measured hydraulic heads in meters). The water-level measurements are copied from the hydraulic head calculation spreadsheets for each site (e.g., for LLWMA-1, see Figure C.4 in Appendix C, columns J and R).

The deconvolution is performed in column I (Figure G-1), in which Equation 6 from Section 3.2 is implemented. The equations in column I are entered as array formulas, meaning that they act on many cells in a column of data simultaneously rather than just an individual cell (to enter an array formula in Microsoft Excel, hold down the "Ctrl" and "Shift" keys at the same time when pressing "Enter"). Each equation in this column refers to the coefficients comprising the BRF for each well, which are listed on the spreadsheet named "ResponseFunctions" (Figures G-3 through G-6). For instance, cell I6 in Figure G-1 refers to "ResponseFunctions!C8:C68," which contains the BRF coefficients for well 299-E28-1 (see Figure G-3). The formulas in column I use the MROUND, MATCH, and INDIRECT functions to identify and refer to the appropriate array of barometric pressure changes in column D to use in the deconvolution. MROUND rounds the date/time of the manual measurement (column G) to the nearest hour. MATCH finds this date/time in the specified array of barometric pressure data (i.e., $B$6:$B$500) and returns the row number of the match relative to the first record within the array. To convert this to a cell reference, 5 is added to the returned number (because the first record of the array is in row 6 of the spreadsheet) and the result is concatenated (the "&" symbol) with the letter "D" producing a cell reference in text, such as "D262". INDIRECT converts this text argument into an actual cell reference. Thus, the phrase "INDIRECT("D"&(MATCH(MROUND(G6,1/24),$B$6:$B$500,1)+5))" simply returns a cell reference (e.g., D262) to be used in the remainder of the equation. This phrase directly returns the last element in the barometric pressure change array to be convolved with the BRF. The first element is identified by taking the row number returned from the MATCH function and subtracting the number of coefficients in the BRF for that well (i.e., the maximum time lag). These values are in row 8 of the ResponseFunctions spreadsheet. Thus, the full phrase "INDIRECT("D"&((MATCH(MROUND(G6, 1/24),$B$6:$B$500,1)+5)-ResponseFunctions!B8)):INDIRECT("D"&(MATCH(MROUND(G6,1/24), $B$6:$B$500,1)+5))" returns a reference to an array in column D, the hourly changes in barometric pressure, such as "D202:D262." This array is the same size as the array of BRF coefficients, and the corresponding

elements in each array are multiplied together (by the "*" symbol) and the results summed (the SUM function) to determine the change in water level that has occurred due to the barometric pressure changes [this corresponds to the '$u(\tau) \cdot \Delta B(t-\tau)$' term of Equation 6 in Section 3.2]. Because of the sign conventions used, an increase in water level will be a value less than zero, so this result is added to the water-level measurement in column H to remove the barometric pressure effects. The final result is then rounded to three decimal places.

The same spreadsheet as in Figure G-1, with the input data and results displayed for the LLWMA-1 water-level measurements collected on August 29, 2008, is shown in Figure G-2. The largest BRF for an LLWMA-1 well (i.e., the BRF with the largest number of coefficients) is for well 699-49-55A, which has a maximum time lag of 240 hours (cell AI8 in Figure G-3). Thus, the array of barometric pressure measurements in columns B through D in Figure G-2 must have, at a minimum, 240 records that end no earlier than the time of the last water-level measurement collected on August 29, 2008. Because 240 hours is 10 days, at least 10 days of barometric pressure measurements are needed (from sometime on August 19, 2008, to August 29, 2008). In practice, more than 240 records were usually copied into the spreadsheet to make sure the start and end times needed for the convolution were fully bracketed. In Figure G-2, 270 total barometric pressure measurement records were entered (the block from B6 to D276). Column I contains the hydraulic heads normalized to a constant barometric pressure, which were then copied into another spreadsheet for analysis (i.e., compare the values in columns H and I in Figure G-2 to columns R and S of Figure C-4 [p. 7 of 25].

Figures G-3 through G-6 show the "ResponseFunctions" spreadsheets for LLWMA-1, IDF/PUREX, LLWMA-2, and LERF, respectively. The coefficients in these spreadsheets are listed in reverse order (i.e., with the maximum time lag first) so they will be in the proper order for multiplying with the identified array of barometric pressure changes. This can also be seen in Equation 6, where the BRF (u) is a direct function of τ [i.e., $u(\tau)$] (where τ is the time lag ranging from 0 to n, the maximum time lag), but the argument to the barometric pressure change array (ΔB) is $t-\tau$ (i.e., it basically runs from n to zero in terms of counting elements). Thus, the first element of the BRF array is multiplied by the last element of the barometric pressure change array, the second element of the BRF array is multiplied by the second to last element of the barometric pressure change array, and so on.

	B	C	D	E	F	G	H	I
3			Change in				Measured	BP Adjusted
4		BP Station #6	BP Station #6				Hyd Head	Hyd Head
5	Date/Time (PST)	(m H2O)	(m H2O)		Well Name	Date/Time (PST)	(m NAVD88)	(m NAVD88)
6					299-E28-1			=ROUND(H6+SUM(ResponseFunctions!C8:C68*INDIRECT("D"&((MATCH(MROUND(G6,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!B8)):INDIRECT("D"&(MATCH(MROUND(G6,1/24),$B$6:$B$500,1)+5))),3)
7			=C7-C6		299-E28-17			=ROUND(H7+SUM(ResponseFunctions!F8:F78*INDIRECT("D"&((MATCH(MROUND(G7,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!E8)):INDIRECT("D"&(MATCH(MROUND(G7,1/24),$B$6:$B$500,1)+5))),3)
8			=C8-C7		299-E28-18			=ROUND(H8+SUM(ResponseFunctions!I8:I68*INDIRECT("D"&((MATCH(MROUND(G8,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!H8)):INDIRECT("D"&(MATCH(MROUND(G8,1/24),$B$6:$B$500,1)+5))),3)
9			=C9-C8		299-E28-27			=ROUND(H9+SUM(ResponseFunctions!L8:L98*INDIRECT("D"&((MATCH(MROUND(G9,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!K8)):INDIRECT("D"&(MATCH(MROUND(G9,1/24),$B$6:$B$500,1)+5))),3)
10			=C10-C9		299-E32-5			=ROUND(H10+SUM(ResponseFunctions!M8:M108*INDIRECT("D"&((MATCH(MROUND(G10,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!N8)):INDIRECT("D"&(MATCH(MROUND(G10,1/24),$B$6:$B$500,1)+5))),3)
11			=C11-C10		299-E32-6			=ROUND(H11+SUM(ResponseFunctions!R8:R98*INDIRECT("D"&((MATCH(MROUND(G11,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!Q8)):INDIRECT("D"&(MATCH(MROUND(G11,1/24),$B$6:$B$500,1)+5))),3)
12			=C12-C11		299-E32-8			=ROUND(H12+SUM(ResponseFunctions!U8:U93*INDIRECT("D"&((MATCH(MROUND(G12,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!T8)):INDIRECT("D"&(MATCH(MROUND(G12,1/24),$B$6:$B$500,1)+5))),3)
13			=C13-C12		299-E33-28			=ROUND(H13+SUM(ResponseFunctions!X8:X138*INDIRECT("D"&((MATCH(MROUND(G13,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!W8)):INDIRECT("D"&(MATCH(MROUND(G13,1/24),$B$6:$B$500,1)+5))),3)
14			=C14-C13		299-E33-339			=ROUND(H14+SUM(ResponseFunctions!AA8:AA83*INDIRECT("D"&((MATCH(MROUND(G14,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!Z8)):INDIRECT("D"&(MATCH(MROUND(G14,1/24),$B$6:$B$500,1)+5))),3)
15			=C15-C14		299-E33-34			=ROUND(H15+SUM(ResponseFunctions!AD8:AD138*INDIRECT("D"&((MATCH(MROUND(G15,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!AC8)):INDIRECT("D"&(MATCH(MROUND(G15,1/24),$B$6:$B$500,1)+5))),3)
16			=C16-C15		299-E33-38			=ROUND(H16+SUM(ResponseFunctions!AG8:AG158*INDIRECT("D"&((MATCH(MROUND(G16,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!AF8)):INDIRECT("D"&(MATCH(MROUND(G16,1/24),$B$6:$B$500,1)+5))),3)
17			=C17-C16		699-49-55A			=ROUND(H17+SUM(ResponseFunctions!AJ8:AJ248*INDIRECT("D"&((MATCH(MROUND(G17,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!AI8)):INDIRECT("D"&(MATCH(MROUND(G17,1/24),$B$6:$B$500,1)+5))),3)
18			=C18-C17		699-49-57A			=ROUND(H18+SUM(ResponseFunctions!AM8:AM188*INDIRECT("D"&((MATCH(MROUND(G18,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!AL8)):INDIRECT("D"&(MATCH(MROUND(G18,1/24),$B$6:$B$500,1)+5))),3)
19			=C19-C18		699-50-56			=ROUND(H19+SUM(ResponseFunctions!AP8:AP38*INDIRECT("D"&((MATCH(MROUND(G19,1/24),$B$6:$B$500,1)+5)-ResponseFunctions!AO8)):INDIRECT("D"&(MATCH(MROUND(G19,1/24),$B$6:$B$500,1)+5))),3)
20			=C20-C19					
21			=C21-C20					
22			=C22-C21			Range:	=MAX(H6:H19)-MIN(H6:H19)	=MAX(I6:I19)-MIN(I6:I19)
23			=C23-C22			Mean:	=ROUND(AVERAGE(H6:H19),3)	=ROUND(AVERAGE(I6:I19),3)
24			=C24-C23			St. Dev:	=STDEV(H6:H19)	=STDEV(I6:I19)

Figure G-1. Example Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for LLWMA-1 with Formulas Displayed

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	B	C	D	E	F	G	H	I
3			Change in				Measured	BP Adjusted
4		BP Station #6	BP Station #6				Hyd Head	Hyd Head
5	Date/Time (PST)	(m H2O)	(m H2O)		Well Name	Date/Time (PST)	(m NAVD88)	(m NAVD88)
6	8/18/08 18:00	10.0042189			299-E28-1	8/29/2008 9:47	121.975	121.957
7	8/18/08 19:00	10.00822456	0.004005666		299-E28-17	8/29/2008 9:37	121.966	121.964
8	8/18/08 20:00	10.00307936	-0.005145208		299-E28-18	8/29/2008 10:32	121.962	121.961
9	8/18/08 21:00	10.00711955	0.004040197		299-E28-27	8/29/2008 11:10	121.965	121.964
10	8/18/08 22:00	10.00908785	0.001968301		299-E32-5	8/29/2008 10:24	121.968	121.968
11	8/18/08 23:00	10.0061872	-0.002900654		299-E32-6	8/29/2008 10:19	121.964	121.964
12	8/19/08 0:00	10.01229929	0.006112093		299-E32-8	8/29/2008 10:14	121.972	121.970
13	8/19/08 1:00	10.01599417	0.003694881		299-E33-28	8/29/2008 11:05	121.963	121.963
14	8/19/08 2:00	10.01865311	0.002658933		299-E33-339	8/29/2008 9:54	121.969	121.967
15	8/19/08 3:00	10.01899842	0.000345316		299-E33-34	8/29/2008 10:09	121.972	121.968
16	8/19/08 4:00	10.02134657	0.002348149		299-E33-38	8/29/2008 10:02	121.967	121.966
17	8/19/08 5:00	10.02376378	0.002417212		699-49-55A	8/29/2008 10:52	121.988	121.985
18	8/19/08 6:00	10.02773492	0.003971134		699-49-57A	8/29/2008 10:43	121.975	121.971
19	8/19/08 7:00	10.03239668	0.004661766		699-50-56	8/29/2008 10:57	121.987	121.980
20	8/19/08 8:00	10.03422686	0.001830175					
21	8/19/08 9:00	10.0328456	-0.001381264					
22	8/19/08 10:00	10.03177512	-0.00107048			Range:	0.026	0.028
23	8/19/08 11:00	10.0293579	-0.002417212			Mean:	121.971	121.968
24	8/19/08 12:00	10.0247652	-0.004592703			St. Dev:	0.008147338	0.007300459
25	8/19/08 13:00	10.01965452	-0.005110677					
26	8/19/08 14:00	10.014164	-0.005490524					
27	8/19/08 15:00	10.00736127	-0.006802725					
28	8/19/08 16:00	10.00698143	-0.000379848					
29	8/19/08 17:00	10.00977849	0.00279706					
30	8/19/08 18:00	10.00870801	-0.00107048					
31	8/19/08 19:00	10.01008927	0.001381264					
32	8/19/08 20:00	10.00995114	-0.000138126					
33	8/19/08 21:00	10.0135079	0.003556755					
34	8/19/08 22:00	10.0120921	-0.001415796					
35	8/19/08 23:00	10.01115975	-0.000932353					
36	8/20/08 0:00	10.00646345	-0.004696298					
37	8/20/08 1:00	9.999246349	-0.007217104					
38	8/20/08 2:00	9.995620531	-0.003625818					
39	8/20/08 3:00	9.998970096	0.003349565					
40	8/20/08 4:00	9.993099724	-0.005870372					
41	8/20/08 5:00	9.990371728	-0.002727996					
42	8/20/08 6:00	9.99323785	0.002866123					
43	8/20/08 7:00	9.992892534	-0.000345316					
44	8/20/08 8:00	9.994377393	0.001484859					
45	8/20/08 9:00	9.993721293	-0.0006561					
46	8/20/08 10:00	9.989404843	-0.00431645					
47	8/20/08 11:00	9.990026412	0.000621569					
48	8/20/08 12:00	9.985122924	-0.004903487					
49	8/20/08 13:00	9.983983382	-0.001139543					
50	8/20/08 14:00	9.975177824	-0.008805558					
51	8/20/08 15:00	9.972104511	-0.003073312					
52	8/20/08 16:00	9.969411046	-0.002693465					
53	8/20/08 17:00	9.972277169	0.002866123					
54	8/20/08 18:00	9.967926188	-0.004350982					

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008

	B	C	D	E	F	G	H	I
55	8/20/08 19:00	9.969376515	0.001450327					
56	8/20/08 20:00	9.976317366	0.006940852					
57	8/20/08 21:00	9.979528805	0.003211439					
58	8/20/08 22:00	9.982809307	0.003280502					
59	8/20/08 23:00	9.986193404	0.003384097					
60	8/21/08 0:00	9.986089809	-0.000103595					
61	8/21/08 1:00	9.986296999	0.00020719					
62	8/21/08 2:00	9.99106236	0.004765361					
63	8/21/08 3:00	9.996760074	0.005697714					
64	8/21/08 4:00	9.998141338	0.001381264					
65	8/21/08 5:00	10.0002823	0.002140959					
66	8/21/08 6:00	10.00950223	0.009219937					
67	8/21/08 7:00	10.01685746	0.007355231					
68	8/21/08 8:00	10.0242127	0.007355231					
69	8/21/08 9:00	10.0294615	0.005248803					
70	8/21/08 10:00	10.03609157	0.006630067					
71	8/21/08 11:00	10.03781815	0.00172658					
72	8/21/08 12:00	10.04285976	0.005041614					
73	8/21/08 13:00	10.04714168	0.004281918					
74	8/21/08 14:00	10.05308111	0.005939435					
75	8/21/08 15:00	10.05660334	0.003522223					
76	8/21/08 16:00	10.06375138	0.007148041					
77	8/21/08 17:00	10.06893112	0.00517974					
78	8/21/08 18:00	10.0759065	0.006975383					
79	8/21/08 19:00	10.08374517	0.007838673					
80	8/21/08 20:00	10.09296511	0.009219937					
81	8/21/08 21:00	10.10111457	0.008149458					
82	8/21/08 22:00	10.10701947	0.005904904					
83	8/21/08 23:00	10.11219921	0.00517974					
84	8/22/08 0:00	10.11509987	0.002900654					
85	8/22/08 1:00	10.11838037	0.003280502					
86	8/22/08 2:00	10.12293854	0.004558171					
87	8/22/08 3:00	10.12380183	0.00086329					
88	8/22/08 4:00	10.12528669	0.001484859					
89	8/22/08 5:00	10.12970673	0.004420045					
90	8/22/08 6:00	10.13675118	0.007044446					
91	8/22/08 7:00	10.14106763	0.00431645					
92	8/22/08 8:00	10.14279421	0.00172658					
93	8/22/08 9:00	10.14227624	-0.000517974					
94	8/22/08 10:00	10.14110216	-0.001174074					
95	8/22/08 11:00	10.13757994	-0.003522223					
96	8/22/08 12:00	10.1324002	-0.00517974					
97	8/22/08 13:00	10.12646076	-0.005939435					
98	8/22/08 14:00	10.12021054	-0.00625022					
99	8/22/08 15:00	10.11137045	-0.00884009					
100	8/22/08 16:00	10.10446413	-0.00690632					
101	8/22/08 17:00	10.10166707	-0.00279706					
102	8/22/08 18:00	10.097765	-0.003902071					
103	8/22/08 19:00	10.09621108	-0.001553922					
104	8/22/08 20:00	10.09893908	0.002727996					

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008 (cont'd.)

	B	C	D	E	F	G	H	I
105	8/22/08 21:00	10.10059659	0.001657517					
106	8/22/08 22:00	10.10066566	6.90632E-05					
107	8/22/08 23:00	10.10094191	0.000276253					
108	8/23/08 0:00	10.10035487	-0.000587037					
109	8/23/08 1:00	10.10270302	0.002348149					
110	8/23/08 2:00	10.10425694	0.001553922					
111	8/23/08 3:00	10.10480945	0.000552506					
112	8/23/08 4:00	10.10429148	-0.000517974					
113	8/23/08 5:00	10.10605259	0.001761112					
114	8/23/08 6:00	10.11157764	0.005525056					
115	8/23/08 7:00	10.11620488	0.004627234					
116	8/23/08 8:00	10.11689551	0.000690632					
117	8/23/08 9:00	10.11558331	-0.001312201					
118	8/23/08 10:00	10.11330422	-0.002279086					
119	8/23/08 11:00	10.10805542	-0.005248803					
120	8/23/08 12:00	10.10063113	-0.007424294					
121	8/23/08 13:00	10.0911004	-0.009530722					
122	8/23/08 14:00	10.08150062	-0.009599785					
123	8/23/08 15:00	10.07428352	-0.007217104					
124	8/23/08 16:00	10.06723907	-0.007044446					
125	8/23/08 17:00	10.06009103	-0.007148041					
126	8/23/08 18:00	10.05584364	-0.004247387					
127	8/23/08 19:00	10.05746663	0.001622985					
128	8/23/08 20:00	10.06033275	0.002866123					
129	8/23/08 21:00	10.05784647	-0.002486275					
130	8/23/08 22:00	10.05905508	0.001208606					
131	8/23/08 23:00	10.05532567	-0.003729413					
132	8/24/08 0:00	10.05380628	-0.00151939					
133	8/24/08 1:00	10.05660334	0.00279706					
134	8/24/08 2:00	10.05439331	-0.002210022					
135	8/24/08 3:00	10.05401347	-0.000379848					
136	8/24/08 4:00	10.0547041	0.000690632					
137	8/24/08 5:00	10.05978024	0.005076145					
138	8/24/08 6:00	10.06226652	0.002486275					
139	8/24/08 7:00	10.06264637	0.000379848					
140	8/24/08 8:00	10.05953852	-0.003107844					
141	8/24/08 9:00	10.05636162	-0.003176907					
142	8/24/08 10:00	10.05418612	-0.002175491					
143	8/24/08 11:00	10.0467273	-0.007458826					
144	8/24/08 12:00	10.03899222	-0.007735078					
145	8/24/08 13:00	10.03498655	-0.004005666					
146	8/24/08 14:00	10.03029026	-0.004696298					
147	8/24/08 15:00	10.02459254	-0.005697714					
148	8/24/08 16:00	10.01861858	-0.005973967					
149	8/24/08 17:00	10.01592511	-0.002693465					
150	8/24/08 18:00	10.01385322	-0.002071896					
151	8/24/08 19:00	10.01768622	0.003833008					
152	8/24/08 20:00	10.03225856	0.014572335					
153	8/24/08 21:00	10.04482806	0.012569502					
154	8/24/08 22:00	10.04327414	-0.001553922					

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008 (cont'd.)

	B	C	D	E	F	G	H	I
155	8/24/08 23:00	10.04058067	-0.002693465					
156	8/25/08 0:00	10.0427907	0.002210022					
157	8/25/08 1:00	10.04037348	-0.002417212					
158	8/25/08 2:00	10.04320508	0.002831591					
159	8/25/08 3:00	10.04544963	0.002244554					
160	8/25/08 4:00	10.04130584	-0.004143792					
161	8/25/08 5:00	10.04382664	0.002520807					
162	8/25/08 6:00	10.04431009	0.000483442					
163	8/25/08 7:00	10.04437915	6.90632E-05					
164	8/25/08 8:00	10.04355039	-0.000828758					
165	8/25/08 9:00	10.04320508	-0.000345316					
166	8/25/08 10:00	10.04500072	0.001795643					
167	8/25/08 11:00	10.04734887	0.002348149					
168	8/25/08 12:00	10.04379211	-0.003556755					
169	8/25/08 13:00	10.04513885	0.001346732					
170	8/25/08 14:00	10.04330867	-0.001830175					
171	8/25/08 15:00	10.04120224	-0.002106428					
172	8/25/08 16:00	10.04002817	-0.001174074					
173	8/25/08 17:00	10.042031	0.002002833					
174	8/25/08 18:00	10.04510431	0.003073312					
175	8/25/08 19:00	10.05349549	0.008391179					
176	8/25/08 20:00	10.06140323	0.007907736					
177	8/25/08 21:00	10.0680333	0.006630067					
178	8/25/08 22:00	10.07438711	0.006353814					
179	8/25/08 23:00	10.08592066	0.011533554					
180	8/26/08 0:00	10.0938284	0.007907736					
181	8/26/08 1:00	10.09914627	0.005317866					
182	8/26/08 2:00	10.10294474	0.003798476					
183	8/26/08 3:00	10.10760651	0.004661766					
184	8/26/08 4:00	10.11102514	0.003418628					
185	8/26/08 5:00	10.11534159	0.00431645					
186	8/26/08 6:00	10.1224551	0.00711351					
187	8/26/08 7:00	10.13094987	0.008494774					
188	8/26/08 8:00	10.13550804	0.004558171					
189	8/26/08 9:00	10.13353974	-0.001968301					
190	8/26/08 10:00	10.13606055	0.002520807					
191	8/26/08 11:00	10.13025924	-0.005801309					
192	8/26/08 12:00	10.12369824	-0.006561004					
193	8/26/08 13:00	10.11848396	-0.005214272					
194	8/26/08 14:00	10.11085248	-0.007631484					
195	8/26/08 15:00	10.09966424	-0.011188238					
196	8/26/08 16:00	10.09040977	-0.009254469					
197	8/26/08 17:00	10.08447034	-0.005939435					
198	8/26/08 18:00	10.0766662	-0.007804142					
199	8/26/08 19:00	10.07293678	-0.003729413					
200	8/26/08 20:00	10.0700016	-0.002935186					
201	8/26/08 21:00	10.06561608	-0.004385513					
202	8/26/08 22:00	10.06095432	-0.004661766					
203	8/26/08 23:00	10.06019462	-0.000759695					
204	8/27/08 0:00	10.05888242	-0.001312201					

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008 (cont'd.)

	B	C	D	E	F	G	H	I
205	8/27/08 1:00	10.0546005	-0.004281918					
206	8/27/08 2:00	10.05356456	-0.001035948					
207	8/27/08 3:00	10.05605083	0.002486275					
208	8/27/08 4:00	10.05335737	-0.002693465					
209	8/27/08 5:00	10.05515301	0.001795643					
210	8/27/08 6:00	10.0599529	0.004799892					
211	8/27/08 7:00	10.06647937	0.006526472					
212	8/27/08 8:00	10.07079582	0.00431645					
213	8/27/08 9:00	10.07611369	0.005317866					
214	8/27/08 10:00	10.08043014	0.00431645					
215	8/27/08 11:00	10.08395236	0.003522223					
216	8/27/08 12:00	10.08588613	0.00193377					
217	8/27/08 13:00	10.08954648	0.00366035					
218	8/27/08 14:00	10.09168744	0.002140959					
219	8/27/08 15:00	10.09676359	0.005076145					
220	8/27/08 16:00	10.100493	0.003729413					
221	8/27/08 17:00	10.10449867	0.004005666					
222	8/27/08 18:00	10.11099061	0.006491941					
223	8/27/08 19:00	10.11268265	0.001692048					
224	8/27/08 20:00	10.12210978	0.009427127					
225	8/27/08 21:00	10.13001752	0.007907736					
226	8/27/08 22:00	10.13094987	0.000932353					
227	8/27/08 23:00	10.13488647	0.003936602					
228	8/28/08 0:00	10.13702743	0.002140959					
229	8/28/08 1:00	10.13319443	-0.003833008					
230	8/28/08 2:00	10.13592242	0.002727996					
231	8/28/08 3:00	10.13264192	-0.003280502					
232	8/28/08 4:00	10.13160597	-0.001035948					
233	8/28/08 5:00	10.13188222	0.000276253					
234	8/28/08 6:00	10.13564617	0.003763944					
235	8/28/08 7:00	10.13505913	-0.000587037					
236	8/28/08 8:00	10.13409225	-0.000966885					
237	8/28/08 9:00	10.13606055	0.001968301					
238	8/28/08 10:00	10.13440303	-0.001657517					
239	8/28/08 11:00	10.13088081	-0.003522223					
240	8/28/08 12:00	10.12742765	-0.00345316					
241	8/28/08 13:00	10.12238603	-0.005041614					
242	8/28/08 14:00	10.11423658	-0.008149458					
243	8/28/08 15:00	10.10660509	-0.007631484					
244	8/28/08 16:00	10.09956065	-0.007044446					
245	8/28/08 17:00	10.09337949	-0.006181156					
246	8/28/08 18:00	10.08996086	-0.003418628					
247	8/28/08 19:00	10.09268886	0.002727996					
248	8/28/08 20:00	10.09648733	0.003798476					
249	8/28/08 21:00	10.0971089	0.000621569					
250	8/28/08 22:00	10.09496794	-0.002140959					
251	8/28/08 23:00	10.09472622	-0.000241721					
252	8/29/08 0:00	10.09410465	-0.000621569					
253	8/29/08 1:00	10.09078962	-0.003315034					
254	8/29/08 2:00	10.0878199	-0.002969718					

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008 (cont'd.)

	B	C	D	E	F	G	H	I
255	8/29/08 3:00	10.08744006	-0.000379848					
256	8/29/08 4:00	10.08592066	-0.00151939					
257	8/29/08 5:00	10.08139703	-0.00452364					
258	8/29/08 6:00	10.08074092	-0.0006561					
259	8/29/08 7:00	10.08098265	0.000241721					
260	8/29/08 8:00	10.07690792	-0.004074729					
261	8/29/08 9:00	10.07203896	-0.004868956					
262	8/29/08 10:00	10.06409669	-0.007942268					
263	8/29/08 11:00	10.0527358	-0.011360896					
264	8/29/08 12:00	10.04210006	-0.010635733					
265	8/29/08 13:00	10.03163699	-0.010463075					
266	8/29/08 14:00	10.01892936	-0.012707629					
267	8/29/08 15:00	10.00715409	-0.011775276					
268	8/29/08 16:00	9.997416174	-0.009737911					
269	8/29/08 17:00	9.991994713	-0.005421461					
270	8/29/08 18:00	9.99237456	0.000379848					
271	8/29/08 19:00	9.995793189	0.003418628					
272	8/29/08 20:00	10.00687783	0.011084644					
273	8/29/08 21:00	10.0089152	0.002037364					
274	8/29/08 22:00	10.0101238	0.001208606					
275	8/29/08 23:00	10.01485463	0.004730829					
276	8/30/08 0:00	10.02051781	0.005663182					
277								

Figure G-2. Spreadsheet of Normalization of Hydraulic Heads to a Constant Barometric Pressure for the LLWMA-1 Measurements Collected on 8/29/2008 (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
4											
5	299-E28-1			299-E28-17			299-E28-18			299-E28-27	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	60	0.016810705		70	-0.000266318		60	0.002551634		90	0.001238155
9	59	0.002428443		69	-0.011128992		59	0.025132372		89	0.012326106
10	58	0.003650054		68	-0.004303339		58	0.007536798		88	0.000813296
11	57	0.004871366		67	0.008215564		57	-0.00282979		87	-0.001270814
12	56	0.019999332		66	-0.004740213		56	0.007998938		86	0.001000065
13	55	0.023583207		65	-0.005241571		55	0.018313418		85	-0.003572772
14	54	-0.001716566		64	0.002183511		54	0.006707474		84	-0.000726916
15	53	0.047745359		63	0.001472987		53	0.00658915		83	0.006319208
16	52	0.027798681		62	-0.001398375		52	-0.010565408		82	0.004079202
17	51	0.003907753		61	-0.011139098		51	-0.012086371		81	-0.001878071
18	50	0.000669457		60	0.001945678		50	0.000128968		80	0.001202276
19	49	-0.014281993		59	-0.005509096		49	0.007658978		79	0.002989847
20	48	0.011557066		58	-0.001934991		48	0.003268811		78	0.003503887
21	47	0.023010667		57	-0.000726899		47	0.010493432		77	-0.000620811
22	46	-0.010410352		56	-0.001321585		46	0.000836459		76	0.009590442
23	45	0.017443641		55	-0.008408416		45	0.000698119		75	-0.00446988
24	44	0.024625546		54	-0.009349878		44	0.003969144		74	-0.003162996
25	43	0.038421305		53	-0.011922699		43	-0.000491682		73	0.002624748
26	42	0.043224041		52	-0.010033089		42	-0.003058906		72	0.005191229
27	41	0.00567061		51	-0.014033366		41	-0.003281532		71	0.012832644
28	40	0.034143905		50	0.003614892		40	0.000143939		70	0.005631067
29	39	0.005169079		49	-0.002017974		39	0.000319424		69	0.004673207
30	38	0.01846328		48	0.010195386		38	0.009769048		68	-0.004563786
31	37	-0.004497558		47	-0.000496065		37	0.000561094		67	-0.000140199
32	36	0.020099272		46	-0.003744919		36	0.006094255		66	0.011727198
33	35	0.020572237		45	-0.005445347		35	0.002954768		65	0.005265604
34	34	0.026706474		44	-0.0120766		34	-0.000371176		64	-0.00452991
35	33	0.04318596		43	-0.010273571		33	-0.001096651		63	0.00399675
36	32	0.046596723		42	-0.005730341		32	0.007815131		62	0.003769535
37	31	0.058215697		41	-0.00923176		31	0.00146675		61	-0.001475161
38	30	0.008446748		40	-0.005850229		30	0.009202574		60	0.009859297
39	29	0.049993266		39	-0.006946473		29	0.003603802		59	0.003546301
40	28	0.032711111		38	-0.011885819		28	0.000307594		58	0.004954929
41	27	0.050519832		37	-0.00799412		27	-0.00222138		57	-0.001717026
42	26	0.04550793		36	-0.015158814		26	-0.007387117		56	0.002632417
43	25	0.04635071		35	-0.025278486		25	-0.004854204		55	0.008751505
44	24	0.061210659		34	-0.018775104		24	-0.011258635		54	0.004991756
45	23	0.092684905		33	-0.011512484		23	-0.002959362		53	0.001348242
46	22	0.086849928		32	-0.01244431		22	-0.002139467		52	0.00251337
47	21	0.083872443		31	-0.010068999		21	0.002764122		51	0.001555626
48	20	0.058350339		30	-0.017139033		20	-0.009968209		50	0.012338113
49	19	0.093269232		29	-0.006714334		19	-0.001661349		49	0.006914715
50	18	0.065513121		28	-0.017143546		18	0.000583802		48	0.009090706
51	17	0.106099096		27	-0.026542305		17	0.00251583		47	0.003008319
52	16	0.116061332		26	-0.018721242		16	-0.002912315		46	0.017178104
53	15	0.093921652		25	-0.016690038		15	-0.004420801		45	0.007180216
54	14	0.122122721		24	-0.018724937		14	-0.006813314		44	0.005389841
55	13	0.133767305		23	-0.017928256		13	-0.015821307		43	0.009739334
56	12	0.09503405		22	-0.033635507		12	-0.009163757		42	-7.57822E-05
57	11	0.16662606		21	-0.01829219		11	-0.014690898		41	0.00352935
58	10	0.192221045		20	-0.02966131		10	-0.017274648		40	0.006865255
59	9	0.198351411		19	-0.024244528		9	-0.009866954		39	0.00304727
60	8	0.199366307		18	-0.020053603		8	-0.02875908		38	0.006794785
61	7	0.224080743		17	-0.022087751		7	-0.03510242		37	0.011485816
62	6	0.275663672		16	-0.017043691		6	-0.030939092		36	0.001919409
63	5	0.289987727		15	-0.03019679		5	-0.030904807		35	-0.002002407
64	4	0.353391839		14	-0.030600493		4	-0.029857089		34	0.012120488
65	3	0.4451638		13	-0.022594162		3	0.007637054		33	0.016434872

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells

	B	C	D	E	F	G	H	I	J	K	L
66	2	0.55068226		12	-0.020257436		2	0.027242289		32	0.004923976
67	1	0.684797405		11	-0.024325941		1	0.048747929		31	0.004199462
68	0	0.879387297		10	-0.023616894		0	0.088304761		30	0.007187209
69				9	-0.024772789					29	0.004557824
70				8	-0.036822095					28	0.007405985
71				7	-0.020539067					27	0.018081164
72				6	-0.025042263					26	0.019906102
73				5	-0.006833016					25	0.008790557
74				4	0.014114371					24	0.008700735
75				3	0.047177567					23	0.009309438
76				2	0.086517503					22	0.002394505
77				1	0.130777728					21	0.01941775
78				0	0.16434534					20	0.018412142
79										19	0.014594786
80										18	0.016240323
81										17	0.013071363
82										16	0.021959577
83										15	0.012295137
84										14	0.003305957
85										13	0.024113455
86										12	0.00327112
87										11	0.006207221
88										10	0.004467653
89										9	-0.000394842
90										8	0.005633025
91										7	0.007357901
92										6	0.010734068
93										5	0.009528446
94										4	0.008142796
95										3	0.019589037
96										2	0.025544326
97										1	0.035302056
98										0	0.040555853

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
5	299-E32-5			299-E32-6			299-E32-8			299-E33-28	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	100	-0.006721979		90	0.008099786		85	0.009292229		130	-0.004354958
9	99	-0.016293603		89	0.010793618		84	0.000826939		129	0.004622107
10	98	-0.01724812		88	0.00450208		83	0.004812323		128	0.001379703
11	97	0.005140136		87	-0.000382785		82	0.001078417		127	-0.003361177
12	96	0.006838916		86	0.010369212		81	0.005772133		126	-0.001662071
13	95	0.004046961		85	0.00198084		80	0.003563789		125	-0.002961384
14	94	0.0061672		84	0.016831304		79	0.005129422		124	0.000310997
15	93	-0.00901456		83	0.012806154		78	0.007057146		123	0.004882692
16	92	-0.014134188		82	0.010366922		77	0.002588645		122	0.000273274
17	91	-0.003483254		81	0.015359473		76	0.004408175		121	0.00019406
18	90	-0.009572726		80	0.00607279		75	0.002726797		120	-0.002346541
19	89	-0.001964647		79	0.000389247		74	0.001057094		119	-0.001575858
20	88	-0.009329589		78	0.004815917		73	0.007367783		118	-0.003654918
21	87	-0.003048416		77	0.010675215		72	0.015476033		117	0.003673961
22	86	-0.008006391		76	0.006061648		71	0.022909116		116	0.010419868
23	85	-0.003002844		75	0.005305928		70	0.014957492		115	0.001066889
24	84	0.004549264		74	0.002914074		69	0.002359184		114	-0.005389067
25	83	0.008676614		73	0.010835204		68	0.00888635		113	-0.005833604
26	82	-0.00403192		72	0.003799621		67	0.004580368		112	-0.001999117
27	81	-0.018012508		71	0.013902181		66	0.003386984		111	-0.004816795
28	80	-0.015835888		70	0.012918658		65	0.005490061		110	0.002926318
29	79	-0.013099536		69	0.016184952		64	0.000505366		109	-0.011009664
30	78	-0.002822842		68	0.015166677		63	0.015231699		108	-0.002221071
31	77	0.003766062		67	0.011292349		62	0.004856571		107	-0.002371209
32	76	0.002957889		66	0.01409049		61	0.005548649		106	-0.01058306
33	75	-0.005158161		65	0.014195177		60	-0.000632812		105	0.013059632
34	74	-0.002740531		64	0.003254598		59	0.01982186		104	-0.002761955
35	73	0.001578599		63	0.004507809		58	0.004435547		103	0.004844093
36	72	0.012539308		62	0.010954594		57	0.002911448		102	-0.000253538
37	71	0.004041087		61	0.010304131		56	-0.001265213		101	0.000803455
38	70	-0.001881359		60	0.010965927		55	0.00473524		100	0.001955661
39	69	-0.007169495		59	0.004310299		54	0.002943589		99	-0.000779284
40	68	0.001524292		58	0.006479989		53	0.012905326		98	0.009353104
41	67	0.004664695		57	0.020074486		52	0.014160061		97	0.010083354
42	66	0.004288026		56	0.014013796		51	0.005185009		96	0.005718441
43	65	-0.001672598		55	0.007866565		50	0.014136502		95	-0.006644837
44	64	-0.008094143		54	0.007753355		49	0.005618092		94	0.003425467
45	63	-0.000152782		53	0.012000893		48	0.013582603		93	-0.000438066
46	62	-0.002693093		52	0.008946777		47	0.011016913		92	-0.000462767
47	61	-0.013990144		51	0.007857945		46	0.013904175		91	-0.000679685
48	60	0.008677051		50	0.015379669		45	0.009945173		90	0.002819859
49	59	-0.003098884		49	0.01522858		44	0.013820066		89	0.001786718
50	58	-0.010016409		48	0.014274759		43	0.017630245		88	0.00474108
51	57	-0.007066031		47	0.0209091		42	0.009050473		87	-0.014234512
52	56	0.007154377		46	0.010402422		41	0.008920935		86	0.005700834
53	55	0.001309056		45	0.006250887		40	0.006477761		85	0.005706553
54	54	0.004555542		44	0.021390931		39	0.009830259		84	0.003491742
55	53	-0.000199548		43	0.01851291		38	0.004897939		83	0.002621909
56	52	-0.016326231		42	0.013300088		37	0.00794085		82	0.005824429
57	51	-0.006345738		41	0.009855439		36	0.017097652		81	-0.00357212
58	50	0.012158853		40	0.015959132		35	0.017731048		80	0.003035879
59	49	-0.00065914		39	0.015213104		34	0.00657977		79	0.001275364
60	48	0.008593631		38	0.016284461		33	0.022849639		78	-0.00737872
61	47	0.015569895		37	0.017854527		32	0.020376322		77	0.004169163
62	46	0.006630199		36	0.016890228		31	0.020051065		76	-0.003383592
63	45	0.004274893		35	0.007648508		30	0.022751916		75	0.004211818
64	44	0.005495673		34	0.007473843		29	0.011252558		74	0.004805455
65	43	-0.000470121		33	0.007587225		28	0.015869696		73	0.007568775
66	42	0.001507177		32	0.012445344		27	0.015292884		72	-0.004462884
67	41	0.011102368		31	0.019383113		26	0.008670253		71	0.007947754
68	40	0.011666359		30	0.026273694		25	0.017318041		70	-0.002760061
69	39	0.007518823		29	0.016113728		24	0.010173746		69	0.017331822
70	38	0.002576393		28	0.014028616		23	0.025931151		68	0.002681155
71	37	0.006206877		27	0.020537667		22	0.028738639		67	0.003467047
72	36	-0.00716574		26	0.017067071		21	0.020516864		66	-0.00347204

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
73	35	-0.019413236		25	0.020221445		20	0.011761318		65	0.008779257
74	34	0.012870075		24	0.019286774		19	0.013450201		64	0.002900783
75	33	0.020596335		23	0.025178712		18	0.01633591		63	0.016101518
76	32	0.021375134		22	0.021030875		17	0.026307691		62	0.001701841
77	31	0.017838601		21	0.016475229		16	0.021435617		61	0.016377187
78	30	0.007509175		20	0.020252547		15	0.01857959		60	0.011372648
79	29	0.008520486		19	0.003109212		14	0.018020189		59	-0.000745633
80	28	0.015505149		18	0.015110274		13	0.025966118		58	0.004424657
81	27	0.007942906		17	0.020828755		12	0.027116017		57	0.004144944
82	26	0.010201806		16	0.016908649		11	0.023398449		56	0.001757032
83	25	0.00180592		15	0.028732533		10	0.022624248		55	0.005940256
84	24	0.012643326		14	0.015802741		9	0.020941045		54	0.014973523
85	23	-0.002026873		13	0.018153867		8	0.027780202		53	-0.000289623
86	22	0.000393317		12	0.010318307		7	0.027163936		52	0.009641416
87	21	0.021156558		11	0.016621107		6	0.021879835		51	0.000954994
88	20	0.015034846		10	0.017859475		5	0.025497483		50	0.006382597
89	19	0.023342011		9	0.015643423		4	0.032815537		49	0.005481638
90	18	0.013841109		8	0.012923313		3	0.043930224		48	0.004386553
91	17	0.016415488		7	0.018567223		2	0.052227732		47	0.018054099
92	16	0.011067356		6	0.01126488		1	0.060801105		46	0.023853138
93	15	0.009785382		5	0.010886816		0	0.05789709		45	0.009331858
94	14	0.012088286		4	0.012650168					44	0.0183208
95	13	0.007352334		3	0.019159512					43	0.000353586
96	12	0.015888469		2	0.018162173					42	0.001923772
97	11	0.0201466		1	0.025315668					41	0.007911229
98	10	0.018819658		0	0.028162821					40	0.010052606
99	9	0.014288488								39	0.017462857
100	8	0.014588813								38	0.010406442
101	7	0.01793972								37	0.006240326
102	6	0.022242657								36	0.017167124
103	5	0.023509266								35	0.00736023
104	4	0.036294435								34	0.002945613
105	3	0.054330795								33	0.013261881
106	2	0.062044998								32	0.010736232
107	1	0.059176393								31	0.006284546
108	0	0.102728715								30	0.009020517
109										29	0.014349056
110										28	0.010716635
111										27	0.022382969
112										26	0.01220113
113										25	0.015624036
114										24	0.021759336
115										23	0.012461553
116										22	0.018286625
117										21	0.007995753
118										20	0.01297309
119										19	0.0273459
120										18	0.01914926
121										17	0.019450048
122										16	0.016961751
123										15	0.003755176
124										14	0.029135528
125										13	0.020523927
126										12	0.007678999
127										11	0.020237688
128										10	0.015568434
129										9	0.016063045
130										8	0.017214146
131										7	0.019468651
132										6	0.016644516
133										5	0.028498236
134										4	0.014864602
135										3	-0.006062966
136										2	0.004208625
137										1	-0.004323851
138										0	0.00031391

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
5	299-E33-339			299-E33-34			299-E33-38			699-49-55A	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	75	-0.007039186		130	0.014964135		150	-0.003138963		240	0.004497309
9	74	0.010820608		129	-0.001047684		149	-0.004667377		239	0.01889092
10	73	0.012008		128	-0.003342916		148	-0.005343066		238	0.012673358
11	72	0.008974676		127	0.00350328		147	0.00131167		237	0.004881208
12	71	0.009189182		126	0.004726576		146	0.003157864		236	0.009348241
13	70	-0.004542249		125	0.012412491		145	-6.48077E-05		235	0.005173093
14	69	-0.001066208		124	0.006631676		144	-0.001954294		234	0.013929602
15	68	-0.002653457		123	0.010757876		143	0.001852226		233	0.006390812
16	67	-0.008687444		122	0.009670941		142	-0.003028243		232	0.003367718
17	66	-0.001452612		121	0.027357266		141	-0.002265254		231	0.006382072
18	65	-0.00476395		120	-0.015096883		140	0.000213359		230	0.007514555
19	64	-0.001214563		119	0.026916467		139	0.003437238		229	0.014400693
20	63	-0.00495756		118	0.045337529		138	0.006937384		228	0.011967904
21	62	-0.002645421		117	0.019465504		137	-0.01061145		227	0.006464934
22	61	0.001601872		116	0.008942366		136	-0.008557235		226	0.002338485
23	60	0.005786484		115	0.026448471		135	-0.001274628		225	0.00469814
24	59	-0.005503752		114	-0.009176798		134	-0.002208284		224	0.008058251
25	58	-0.001399251		113	0.010971596		133	-0.004808695		223	0.00868527
26	57	-0.003687305		112	0.016818531		132	0.00278477		222	0.009659788
27	56	0.000836544		111	0.013998448		131	0.000947001		221	0.009379999
28	55	0.008210265		110	-0.012479391		130	0.001561341		220	0.011469715
29	54	0.006613346		109	-0.000878646		129	0.007898059		219	0.014027661
30	53	-0.00339494		108	0.010415023		128	-0.001971406		218	0.002975616
31	52	-0.003379331		107	0.002375664		127	-0.004186612		217	0.004781411
32	51	-0.016476969		106	0.015215062		126	-0.001453335		216	0.016781551
33	50	0.000772612		105	0.018926145		125	-0.001345641		215	0.011707959
34	49	0.006651572		104	-0.001761821		124	0.000564725		214	0.004913253
35	48	0.009834986		103	0.006951389		123	-0.007877887		213	0.004057745
36	47	0.010826678		102	0.019725349		122	-0.001997792		212	0.007391965
37	46	0.017423706		101	0.004462113		121	0.004945917		211	0.009551038
38	45	0.007544546		100	0.013267074		120	-0.001013532		210	0.008375678
39	44	0.00181187		99	0.005966796		119	-3.30844E-05		209	0.003733099
40	43	0.00621457		98	0.022632243		118	0.003069272		208	0.007326382
41	42	0.01177141		97	0.019724315		117	0.00279056		207	0.010380512
42	41	-0.004182459		96	0.011992796		116	0.000525628		206	0.010375967
43	40	0.010830838		95	-0.000922737		115	-0.004177225		205	0.003393777
44	39	0.011459039		94	0.01366159		114	-0.002956129		204	0.014244905
45	38	-0.002569777		93	0.028027112		113	-0.001180397		203	0.006127284
46	37	0.009271053		92	0.015101466		112	0.000789118		202	0.01584196
47	36	0.015378564		91	-0.009769145		111	3.6799E-05		201	0.013519435
48	35	0.007486282		90	-0.006565076		110	-0.002846648		200	0.006529908
49	34	-0.001219228		89	0.020155708		109	-0.003594693		199	0.005515023
50	33	-0.001571923		88	0.034129261		108	0.003500889		198	0.012761772
51	32	0.008507404		87	-0.006474036		107	0.000455765		197	0.010610105
52	31	0.007570055		86	0.009744573		106	-0.00751706		196	0.005078369
53	30	0.012694409		85	0.024898218		105	-0.003670048		195	0.015816078
54	29	0.005902605		84	-0.01071069		104	0.002095936		194	0.004820649
55	28	0.029284462		83	0.023817959		103	0.008853732		193	0.010544178
56	27	0.027341998		82	0.028355957		102	-0.004223738		192	0.010395818
57	26	0.016470239		81	0.006360268		101	0.002042114		191	-0.003298355
58	25	0.013503013		80	0.006188322		100	0.002877305		190	0.008371282
59	24	0.018945971		79	-0.012736071		99	0.003249155		189	0.008384628
60	23	0.01398445		78	0.010231988		98	-0.000713183		188	0.007530765
61	22	0.013023045		77	0.046342976		97	0.002970555		187	0.011661774
62	21	0.026371003		76	-0.007104168		96	0.0064841		186	0.009138585
63	20	0.024783878		75	0.011449936		95	0.003582944		185	0.011529239
64	19	0.027080614		74	-0.000854942		94	0.004698155		184	0.012281375
65	18	0.026854936		73	0.000867641		93	-0.005162751		183	0.002729198

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
66	17	0.035639284		72	-0.000324514		92	-0.004172299		182	0.01144042
67	16	0.04529538		71	0.043261373		91	0.003317001		181	0.00654461
68	15	0.035484881		70	0.019412412		90	-0.00016199		180	0.004022474
69	14	0.035469507		69	0.014133926		89	0.003838217		179	0.001757605
70	13	0.035415525		68	0.013833444		88	0.007186285		178	0.008801495
71	12	0.035860515		67	-0.022922713		87	-0.000119009		177	0.012483234
72	11	0.047004731		66	-0.002242066		86	-9.90711E-05		176	0.017067304
73	10	0.050219559		65	0.020061806		85	0.000747748		175	0.010605571
74	9	0.053702265		64	0.030939793		84	0.004284636		174	0.006783878
75	8	0.057017378		63	0.020018454		83	0.006573501		173	0.004505728
76	7	0.045902215		62	0.000140466		82	0.001164945		172	0.01107588
77	6	0.053366588		61	-0.007673717		81	-0.005964366		171	0.011952891
78	5	0.057340616		60	0.006619234		80	0.000362354		170	0.010796024
79	4	0.062566604		59	0.01228294		79	0.003310458		169	0.004471307
80	3	0.059268465		58	0.011325865		78	0.005597435		168	0.00430805
81	2	0.04719002		57	0.012266847		77	-0.001221233		167	0.012305234
82	1	0.036029516		56	0.009516931		76	0.003514665		166	0.013834063
83	0	0.07005567		55	0.030593341		75	0.012641439		165	0.009206514
84				54	0.016250639		74	0.000639116		164	0.014697066
85				53	0.014684266		73	0.006044637		163	0.006212217
86				52	0.00975336		72	0.014135866		162	0.015438874
87				51	-0.006385628		71	0.00611231		161	0.008039576
88				50	0.015526526		70	0.002047708		160	0.005752383
89				49	0.018909582		69	0.006099875		159	0.009782491
90				48	0.006155332		68	0.009607015		158	0.012131047
91				47	0.028864753		67	0.00457295		157	0.0121076
92				46	0.024668772		66	0.008148083		156	0.014762907
93				45	0.014540268		65	0.00017975		155	0.007046166
94				44	0.016080835		64	0.007662556		154	0.011205549
95				43	0.033204141		63	0.008838668		153	0.013092679
96				42	0.022824581		62	0.004595657		152	0.007462748
97				41	0.00779647		61	0.006978081		151	0.01484871
98				40	-0.001234971		60	0.009623141		150	0.008683538
99				39	0.019264696		59	0.011348975		149	0.016068683
100				38	0.011431362		58	0.00777742		148	0.012000914
101				37	0.018301072		57	0.011229335		147	0.021176201
102				36	0.022585962		56	0.009641053		146	0.017201356
103				35	0.017393935		55	0.010890542		145	0.017870785
104				34	0.021791063		54	0.015678275		144	0.013665435
105				33	0.024569876		53	0.017771471		143	0.008670514
106				32	0.007431013		52	0.008564307		142	0.010537633
107				31	0.051581327		51	0.015194993		141	0.007610648
108				30	0.027060666		50	0.009942957		140	0.011569324
109				29	0.015759648		49	0.017625977		139	0.009970882
110				28	0.022605882		48	0.017235457		138	0.023035248
111				27	0.014571968		47	0.014580189		137	0.014618943
112				26	0.024582854		46	0.017565624		136	0.018012625
113				25	0.027220015		45	0.021931723		135	0.019132213
114				24	0.022068151		44	0.018925057		134	0.014812629
115				23	0.052850449		43	0.019377589		133	0.01095856
116				22	0.035914691		42	0.019721215		132	0.0179677
117				21	0.046766631		41	0.027660689		131	0.005428576
118				20	0.030620749		40	0.022250157		130	0.024726985
119				19	0.020947033		39	0.024536202		129	0.015974508
120				18	0.024923952		38	0.022860914		128	0.011471711
121				17	0.043448095		37	0.019929782		127	0.018210343
122				16	0.033589395		36	0.024769154		126	0.016483858
123				15	0.027820441		35	0.024826133		125	0.020820862
124				14	0.034635755		34	0.026620183		124	0.012656566
125				13	0.047216653		33	0.033350441		123	0.013540274
126				12	0.049722183		32	0.03367252		122	0.015316881

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
127				11	0.04770137		31	0.033244948		121	0.017533929
128				10	0.018475801		30	0.031892017		120	0.01997613
129				9	0.042798848		29	0.0363555		119	0.016304743
130				8	0.026257986		28	0.036106886		118	0.015706736
131				7	0.049412642		27	0.043039937		117	0.01674037
132				6	0.067475012		26	0.03851879		116	0.019249204
133				5	0.050505806		25	0.036225959		115	0.018143764
134				4	0.04509371		24	0.038182788		114	0.01138025
135				3	0.081551726		23	0.043548505		113	0.014962274
136				2	0.095630778		22	0.042944595		112	0.02252385
137				1	0.108530908		21	0.046474801		111	0.024501002
138				0	0.195762114		20	0.046226796		110	0.015276854
139							19	0.045286934		109	0.017603928
140							18	0.045696685		108	0.011761841
141							17	0.048268015		107	0.024053719
142							16	0.049775423		106	0.026124343
143							15	0.051624135		105	0.021091311
144							14	0.050061835		104	0.02284845
145							13	0.05441866		103	0.010109668
146							12	0.050022731		102	0.020953127
147							11	0.049218579		101	0.020489136
148							10	0.050552454		100	0.024648719
149							9	0.046333531		99	0.019325518
150							8	0.0428736		98	0.019725468
151							7	0.038836931		97	0.02283989
152							6	0.038051707		96	0.031337003
153							5	0.030220317		95	0.023216513
154							4	0.026170552		94	0.027488668
155							3	0.019668062		93	0.024294778
156							2	0.012870897		92	0.026501979
157							1	0.002089338		91	0.024124444
158							0	9.82207E-05		90	0.012156215
159										89	0.027722806
160										88	0.022190654
161										87	0.018834904
162										86	0.018727921
163										85	0.030920171
164										84	0.024980455
165										83	0.030518092
166										82	0.021591867
167										81	0.023339205
168										80	0.033556242
169										79	0.034345818
170										78	0.023098386
171										77	0.024437795
172										76	0.030844477
173										75	0.032725653
174										74	0.033221535
175										73	0.035966961
176										72	0.02335038
177										71	0.030181532
178										70	0.033602968
179										69	0.033651685
180										68	0.034472654
181										67	0.027661747
182										66	0.033593397
183										65	0.030563742
184										64	0.039333505
185										63	0.032139354
186										62	0.041101105
187										61	0.034506228

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
188										60	0.04197144
189										59	0.033910602
190										58	0.028516182
191										57	0.034247868
192										56	0.037087162
193										55	0.050644566
194										54	0.044258901
195										53	0.042325773
196										52	0.041541517
197										51	0.046714967
198										50	0.046740523
199										49	0.04848709
200										48	0.042460329
201										47	0.041658333
202										46	0.046378732
203										45	0.048280197
204										44	0.043316197
205										43	0.049564097
206										42	0.057289545
207										41	0.052011349
208										40	0.050223863
209										39	0.054069804
210										38	0.057854653
211										37	0.059014446
212										36	0.065551276
213										35	0.054225441
214										34	0.059363919
215										33	0.068134505
216										32	0.056046676
217										31	0.060203296
218										30	0.06436464
219										29	0.066080622
220										28	0.067926455
221										27	0.068539802
222										26	0.070664597
223										25	0.07212465
224										24	0.079047157
225										23	0.080810384
226										22	0.074293544
227										21	0.079489687
228										20	0.085523258
229										19	0.081677766
230										18	0.086806215
231										17	0.082956296
232										16	0.090695499
233										15	0.084675578
234										14	0.097063487
235										13	0.093347489
236										12	0.094447916
237										11	0.102280456
238										10	0.099975479
239										9	0.103633883
240										8	0.100059251
241										7	0.108902355
242										6	0.100919571
243										5	0.105241447
244										4	0.1042952
245										3	0.098840973
246										2	0.090351049
247										1	0.082163468
248										0	0.037836078

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	AL	AM	AN	AO	AP
5	699-49-57A			699-50-56	
6					
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	180	0.001376459		30	0.005161804
9	179	0.000149302		29	0.016432877
10	178	-0.005952339		28	-0.032884161
11	177	-0.001663488		27	0.012153011
12	176	-0.001192872		26	-0.025663744
13	175	0.0003914		25	-0.002028138
14	174	-0.000824236		24	0.015464127
15	173	-0.00040074		23	0.031130022
16	172	0.000370008		22	0.005657117
17	171	0.004536299		21	0.006995197
18	170	0.005385747		20	0.011058717
19	169	0.007337939		19	0.012960163
20	168	0.009002098		18	-0.023624729
21	167	0.003474226		17	0.002352384
22	166	-0.000607849		16	0.010729059
23	165	-0.004170559		15	0.012228703
24	164	-0.001861828		14	-0.021940195
25	163	0.004305079		13	0.023870483
26	162	0.000181923		12	0.000888226
27	161	-0.00342939		11	-0.012584752
28	160	0.003054813		10	0.018458552
29	159	0.001124443		9	0.00402565
30	158	-0.001135609		8	-0.023081103
31	157	0.000841663		7	-0.018173568
32	156	-0.003742325		6	0.004675963
33	155	0.001400418		5	-0.021650034
34	154	0.003566864		4	-0.010097696
35	153	5.57017E-05		3	-0.033811001
36	152	0.003554647		2	-0.000717309
37	151	0.004824538		1	0.051271557
38	150	0.00171848		0	0.542808443
39	149	0.001389152			
40	148	0.004872301			
41	147	0.001867729			
42	146	0.005644572			
43	145	0.003834104			
44	144	0.001517433			
45	143	0.001383553			
46	142	0.004119165			
47	141	0.000531883			
48	140	-0.001479391			
49	139	-0.002181087			
50	138	-0.001331284			
51	137	0.00038196			
52	136	-0.002527122			
53	135	5.24113E-05			
54	134	-0.000453321			
55	133	-0.00011808			
56	132	0.006736369			
57	131	0.005718892			
58	130	0.005769783			
59	129	0.005767269			
60	128	0.004819169			
61	127	0.003844382			
62	126	0.00225767			
63	125	0.005420854			
64	124	0.003829547			
65	123	0.00366375			
66	122	0.002154963			

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	AL	AM	AN	AO	AP
67	121	-0.00085383			
68	120	0.006152272			
69	119	0.00789545			
70	118	0.003911909			
71	117	0.000685403			
72	116	0.001092579			
73	115	0.002351253			
74	114	0.001018958			
75	113	0.003057947			
76	112	0.001687936			
77	111	0.000114835			
78	110	0.00662447			
79	109	0.003228275			
80	108	0.00761794			
81	107	0.003379004			
82	106	0.007531758			
83	105	0.004980741			
84	104	0.00251987			
85	103	0.002996722			
86	102	0.004921394			
87	101	-0.002004698			
88	100	0.005066129			
89	99	0.006245546			
90	98	0.004931717			
91	97	0.004486152			
92	96	0.007865175			
93	95	0.005140345			
94	94	0.003282269			
95	93	0.007179613			
96	92	0.00727853			
97	91	0.008182392			
98	90	0.007931258			
99	89	0.00705578			
100	88	0.005503768			
101	87	0.004750628			
102	86	0.006431518			
103	85	0.006303471			
104	84	0.005661444			
105	83	0.002741045			
106	82	0.007432269			
107	81	0.00218184			
108	80	0.005396544			
109	79	0.009186539			
110	78	0.008694085			
111	77	0.006045197			
112	76	0.010657287			
113	75	0.007436957			
114	74	0.006708827			
115	73	0.010269082			
116	72	0.010731717			
117	71	0.009677195			
118	70	0.015283465			
119	69	0.014526324			
120	68	0.01364977			
121	67	0.009982246			
122	66	0.011431599			
123	65	0.011679908			
124	64	0.012297652			
125	63	0.009978978			
126	62	0.008589386			
127	61	0.007650162			

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	AL	AM	AN	AO	AP
128	60	0.009651625			
129	59	0.01087896			
130	58	0.013360423			
131	57	0.011915278			
132	56	0.012416924			
133	55	0.013165505			
134	54	0.015761788			
135	53	0.016682064			
136	52	0.018654179			
137	51	0.015580427			
138	50	0.022678396			
139	49	0.015652552			
140	48	0.01639269			
141	47	0.016837425			
142	46	0.020670292			
143	45	0.022497304			
144	44	0.019630455			
145	43	0.013884747			
146	42	0.016315516			
147	41	0.022149948			
148	40	0.026809581			
149	39	0.026194357			
150	38	0.0271836			
151	37	0.020773373			
152	36	0.024271606			
153	35	0.023673051			
154	34	0.024408994			
155	33	0.026668414			
156	32	0.027053895			
157	31	0.028223197			
158	30	0.030504521			
159	29	0.030306635			
160	28	0.034340053			
161	27	0.040476661			
162	26	0.04193406			
163	25	0.040113064			
164	24	0.039851662			
165	23	0.0363957			
166	22	0.040218501			
167	21	0.040287277			
168	20	0.046521213			
169	19	0.046279076			
170	18	0.047034434			
171	17	0.048368743			
172	16	0.050864812			
173	15	0.050756227			
174	14	0.052601777			
175	13	0.060400704			
176	12	0.065937085			
177	11	0.065281549			
178	10	0.070714843			
179	9	0.072102975			
180	8	0.080925703			
181	7	0.083589383			
182	6	0.090523219			
183	5	0.093502408			
184	4	0.101126261			
185	3	0.09549838			
186	2	0.103461912			
187	1	0.106719786			
188	0	0.08710882			

Figure G-3. Barometric Response Function Coefficients for the LLWMA-1 Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
5	299-E17-18			299-E17-21			299-E17-22			299-E17-23	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	100	-0.007170435		140	-0.012216738		140	-0.00399292		170	-0.002517127
9	99	-0.011783843		139	-0.015386084		139	0.010957202		169	-0.009919153
10	98	-0.012511519		138	-0.009795357		138	0.004012041		168	-0.006562549
11	97	-0.000300575		137	-0.008815832		137	0.005520032		167	-0.000950149
12	96	-0.010269076		136	-0.012262343		136	0.003631699		166	0.00546728
13	95	-0.007428685		135	-0.006459726		135	-0.003918327		165	0.009779027
14	94	-0.008352138		134	-0.009902155		134	-0.005244325		164	-0.002384874
15	93	-0.001338678		133	-0.007108699		133	-0.011306318		163	-0.004566822
16	92	-0.017919729		132	-0.007314173		132	-0.007527798		162	0.00206802
17	91	-0.01146788		131	-0.004668816		131	-0.019224		161	-0.002541879
18	90	-0.010377697		130	-0.005368141		130	-0.005551397		160	-0.003292642
19	89	-0.007800047		129	-0.01207489		129	0.007548953		159	0.007636721
20	88	-0.004408874		128	-0.006085548		128	-0.012008063		158	-0.000200243
21	87	-0.002286922		127	-0.012574541		127	-0.017803241		157	-0.012266373
22	86	-0.017739367		126	-0.016371733		126	-0.015768969		156	-0.019390725
23	85	-0.001072832		125	-0.010591523		125	-0.019422532		155	-0.02714086
24	84	-0.026412307		124	-0.012669997		124	-0.003475953		154	-0.022452874
25	83	-0.003804114		123	-0.015254356		123	-0.011559919		153	-0.02536506
26	82	-0.014997594		122	-0.010924895		122	-0.004488686		152	-0.007020622
27	81	-0.004003691		121	-0.011080492		121	-0.01306983		151	-0.014968625
28	80	-0.015720226		120	-0.004597407		120	-0.008920383		150	0.007300198
29	79	-0.00523006		119	-0.007872665		119	-0.017560069		149	0.014527926
30	78	-0.014980307		118	-0.006502887		118	-0.009650683		148	0.017764035
31	77	-0.01002325		117	-0.013065074		117	0.003828727		147	0.010347353
32	76	-0.003735459		116	-0.019583197		116	-0.000288988		146	0.007791427
33	75	-0.012464976		115	-0.017066346		115	-0.006710178		145	0.007874528
34	74	-0.019480052		114	-0.012688295		114	0.000780242		144	-0.006043469
35	73	-0.018703812		113	-0.009599598		113	-0.00272882		143	-0.004013698
36	72	-0.013729445		112	-0.004173914		112	-0.006856536		142	-0.012449125
37	71	-0.017954381		111	-0.012701662		111	-0.006386231		141	-0.007792427
38	70	-0.003478249		110	-0.004469404		110	-0.004829209		140	-0.000586709
39	69	-0.01361056		109	-0.008651544		109	-0.013807132		139	0.000961393
40	68	-0.015789648		108	-0.012204622		108	0.003516118		138	-0.001387369
41	67	-0.010035369		107	-0.010140927		107	-0.023570072		137	0.000283892
42	66	0.003014092		106	-0.032226523		106	-0.019883772		136	-0.004316993
43	65	-0.020165227		105	-0.011331978		105	-0.024002217		135	-0.005201543
44	64	-0.021634631		104	-0.015854708		104	-0.017357109		134	-0.009128422
45	63	-0.01746434		103	-0.025707218		103	-0.005618633		133	-0.00897567
46	62	-0.019628274		102	-0.026690469		102	-0.003215205		132	-0.002055941
47	61	-0.02134734		101	-0.006419275		101	-0.000619358		131	0.002630819
48	60	-0.01731589		100	-0.009914905		100	-0.000620926		130	-0.000472181
49	59	-0.004241799		99	-0.005982818		99	0.000869534		129	-0.004988758
50	58	-0.027539658		98	-0.008158935		98	-0.002221983		128	0.007389767
51	57	-0.010994057		97	-0.020942804		97	0.003898054		127	-0.009479867
52	56	-0.013390196		96	-0.012634908		96	-0.000385057		126	-0.021320017
53	55	-0.026303891		95	-0.017290266		95	0.007988948		125	-0.014146917
54	54	-0.03386722		94	-0.011010502		94	-0.000625467		124	-0.00688826
55	53	-0.028983844		93	-0.00947979		93	-0.002047015		123	-0.011196792
56	52	-0.029439856		92	-0.018915017		92	-0.0053096		122	0.002622144
57	51	-0.023097227		91	-0.012754879		91	-0.000353415		121	-0.006793191
58	50	-0.019446991		90	-0.019163613		90	-0.015816078		120	-0.005393013
59	49	-0.016133694		89	-0.018334512		89	-0.004285645		119	-0.011261151
60	48	-0.019256532		88	-0.019319171		88	-0.008595723		118	-0.014065348
61	47	-0.030681117		87	-0.016179171		87	-0.022294831		117	-0.012216718
62	46	-0.03236789		86	-0.014005876		86	-0.024091945		116	0.005141318
63	45	-0.030107301		85	-0.012642856		85	-0.02270455		115	-0.000367397
64	44	-0.025728637		84	-0.009176661		84	-0.019326324		114	-0.002272477

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells

	B	C	D	E	F	G	H	I	J	K	L
65	43	-0.026877878		83	-0.012206681		83	-0.001022629		113	0.000527332
66	42	-0.036189935		82	-0.019305982		82	-0.005592019		112	0.002081164
67	41	-0.023942827		81	-0.020644334		81	0.012118698		111	0.001088997
68	40	-0.040580902		80	-0.029308346		80	0.006422126		110	-0.005419539
69	39	-0.036789538		79	-0.018111973		79	0.011444549		109	0.002115159
70	38	-0.03850682		78	-0.019885184		78	-0.001743371		108	-0.003842576
71	37	-0.044177787		77	-0.012723855		77	-0.005999161		107	0.004705085
72	36	-0.048508991		76	-0.022203694		76	-0.002052536		106	0.004206126
73	35	-0.050226763		75	-0.024523508		75	-0.001384032		105	-0.013203766
74	34	-0.039446938		74	-0.01553326		74	0.004095271		104	-0.021384939
75	33	-0.053953103		73	-0.031156757		73	-0.013866141		103	-0.016659359
76	32	-0.063575817		72	-0.022896141		72	0.00908775		102	-0.032674063
77	31	-0.054593979		71	-0.013944836		71	0.001674411		101	-0.018310963
78	30	-0.04616926		70	-0.020324222		70	-0.004917041		100	-0.008705034
79	29	-0.074454089		69	-0.021423537		69	-0.015351193		99	-0.007415216
80	28	-0.065113895		68	-0.017892137		68	0.001171915		98	0.002433994
81	27	-0.059857118		67	-0.018673575		67	-0.011971664		97	-0.006497051
82	26	-0.065348144		66	-0.021639673		66	-0.009801847		96	0.011667776
83	25	-0.074226862		65	-0.020111509		65	-0.018653689		95	-0.003153469
84	24	-0.066449257		64	-0.027294987		64	-0.017450282		94	0.008369022
85	23	-0.077419551		63	-0.019194699		63	-0.018776678		93	0.002709568
86	22	-0.081524561		62	-0.029909338		62	-0.011200889		92	-0.006548704
87	21	-0.082494801		61	-0.032086681		61	-0.004632236		91	-0.01391004
88	20	-0.088206063		60	-0.033780569		60	-0.016925203		90	-0.00632863
89	19	-0.093269835		59	-0.036275693		59	-0.015001187		89	-0.009037225
90	18	-0.093513835		58	-0.034286748		58	-0.022006606		88	-0.012814338
91	17	-0.098922119		57	-0.025324472		57	-0.026576809		87	-0.025126668
92	16	-0.103823898		56	-0.021486938		56	-0.008819868		86	-0.017972623
93	15	-0.108090234		55	-0.020436515		55	-0.020937197		85	-0.014233483
94	14	-0.11880094		54	-0.037173507		54	0.000461615		84	-0.014455104
95	13	-0.119305281		53	-0.046054525		53	-0.009340125		83	-0.000803279
96	12	-0.126281574		52	-0.039336344		52	-0.008562134		82	0.002053539
97	11	-0.117009947		51	-0.036526498		51	-0.010756498		81	-0.001566881
98	10	-0.124915114		50	-0.027750233		50	-0.011866572		80	-0.008926213
99	9	-0.119237864		49	-0.02364432		49	-0.018787454		79	0.000725193
100	8	-0.125523209		48	-0.028527048		48	-0.021560175		78	0.006064661
101	7	-0.128771838		47	-0.030074786		47	-0.026316252		77	0.001278912
102	6	-0.117747896		46	-0.035710065		46	-0.005460472		76	-0.012277467
103	5	-0.112505283		45	-0.041361089		45	-0.009531889		75	-0.0129492
104	4	-0.093261647		44	-0.036960574		44	-0.030836276		74	-0.005592118
105	3	-0.074479968		43	-0.039842309		43	-0.030007474		73	-0.004989338
106	2	-0.036118443		42	-0.039045517		42	-0.02096481		72	-0.019813466
107	1	-0.01035468		41	-0.034157044		41	-0.03120722		71	-0.029618225
108	0	0.027883501		40	-0.043179724		40	-0.033375054		70	-0.033481555
109				39	-0.050300053		39	-0.021694336		69	-0.007492983
110				38	-0.057434701		38	-0.015262677		68	-0.012225585
111				37	-0.045226598		37	-0.011679042		67	-0.009641571
112				36	-0.038316244		36	-0.012015651		66	-0.021363483
113				35	-0.049631845		35	-0.025942511		65	-0.004610577
114				34	-0.042955678		34	-0.000961527		64	-0.012742048
115				33	-0.041465961		33	-0.012977205		63	-0.00966949
116				32	-0.046729511		32	-0.020155552		62	-0.017596701
117				31	-0.046021162		31	-0.031254744		61	-0.010979063
118				30	-0.048594117		30	-0.033168395		60	0.004537123
119				29	-0.052982429		29	-0.025189356		59	-0.019506012
120				28	-0.045309321		28	-0.050271795		58	-0.017685891
121				27	-0.052555456		27	-0.027184451		57	-0.015205371
122				26	-0.054718013		26	-0.03293232		56	-0.015920829
123				25	-0.045975834		25	-0.029049774		55	-0.017146907
124				24	-0.053156609		24	-0.020903493		54	-0.013547818

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
125				23	-0.060926613		23	-0.015681054		53	-0.030899079
126				22	-0.049586941		22	-0.027193001		52	-0.024961652
127				21	-0.040140388		21	-0.005247772		51	-0.021359715
128				20	-0.034693158		20	-0.012860572		50	-0.011454119
129				19	-0.033822888		19	-0.005631718		49	-0.014178621
130				18	-0.038205441		18	-0.013674281		48	-0.003106699
131				17	-0.031271181		17	-0.004423386		47	-0.011252629
132				16	-0.041062281		16	-0.007980693		46	-0.022356555
133				15	-0.032436913		15	0.0031019		45	-0.013245019
134				14	-0.021539803		14	0.004493137		44	-0.029754902
135				13	-0.014911593		13	0.005422353		43	-0.031869992
136				12	-0.002659967		12	0.010145911		42	-0.02972463
137				11	-0.005176414		11	0.013499368		41	-0.040170796
138				10	0.013426527		10	0.023084817		40	-0.039390495
139				9	0.010252691		9	0.027682208		39	-0.023112299
140				8	0.017036335		8	0.049303732		38	-0.031651301
141				7	0.031942101		7	0.070333455		37	-0.040443953
142				6	0.035857296		6	0.100257788		36	-0.052818134
143				5	0.039300757		5	0.136257044		35	-0.038511338
144				4	0.048445728		4	0.172240441		34	-0.039979289
145				3	0.038999079		3	0.219890838		33	-0.040991286
146				2	0.052021706		2	0.304073015		32	-0.031154493
147				1	0.050549783		1	0.387623369		31	-0.045551275
148				0	0.048165667		0	0.430917709		30	-0.046630611
149										29	-0.043303108
150										28	-0.037598976
151										27	-0.050847908
152										26	-0.053873978
153										25	-0.039124523
154										24	-0.040031388
155										23	-0.045500687
156										22	-0.0466684
157										21	-0.054945275
158										20	-0.046080125
159										19	-0.057310366
160										18	-0.049077669
161										17	-0.075081133
162										16	-0.052364502
163										15	-0.064744498
164										14	-0.051976323
165										13	-0.040652418
166										12	-0.029027786
167										11	-0.000731157
168										10	0.008281139
169										9	0.018018486
170										8	0.020966361
171										7	0.055577954
172										6	0.093437837
173										5	0.123510233
174										4	0.187633093
175										3	0.237848466
176										2	0.297892009
177										1	0.328453655
178										0	0.358103032

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
5	299-E17-25			299-E24-16			299-E24-18			299-E24-21	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	140	0.002297851		140	0.00873538		380	-0.002697504		175	-0.010386505
9	139	0.025256389		139	0.014088442		379	-0.00276676		174	-0.008885175
10	138	0.010290121		138	0.016575682		378	-0.002374181		173	-0.020964931
11	137	-0.00076071		137	0.015304362		377	-0.012433368		172	-0.019183687
12	136	-0.000607797		136	0.012075135		376	0.000184215		171	-0.003885026
13	135	-0.005105877		135	-0.003178897		375	0.000553998		170	-0.018297277
14	134	-0.006983074		134	-0.004749572		374	0.008805339		169	0.004766223
15	133	-0.001577267		133	-0.020163272		373	-0.001410623		168	-0.012408913
16	132	0.00628859		132	-0.00060953		372	0.004676146		167	0.002271529
17	131	-0.008170382		131	0.025737539		371	-0.000545111		166	-0.013622895
18	130	0.007678502		130	0.009536877		370	-0.010086238		165	-0.017026724
19	129	0.000773044		129	0.012019323		369	-0.008695628		164	-0.012802985
20	128	-0.001977713		128	0.007477458		368	-0.005287311		163	-0.02578274
21	127	0.010280635		127	-0.007706198		367	0.003156473		162	-0.01680503
22	126	-0.015421458		126	-0.007851956		366	0.000174703		161	-0.022585295
23	125	0.00330434		125	0.000187599		365	0.006913608		160	0.006151999
24	124	-0.008703595		124	0.005611782		364	-0.005130948		159	-0.006640374
25	123	-0.000639847		123	-0.004341072		363	0.004456341		158	0.009531133
26	122	0.003508839		122	-0.001468945		362	-0.001021845		157	-0.015875133
27	121	-0.015333776		121	-0.006442798		361	-0.009044509		156	-0.01424561
28	120	-0.002298153		120	-0.011259204		360	0.007998061		155	-0.023561034
29	119	-0.019803383		119	0.003439716		359	-0.005590236		154	-0.006515509
30	118	0.003738183		118	-0.004869645		358	-0.008628254		153	-0.025143974
31	117	-0.004515692		117	0.007605174		357	-0.009476123		152	-0.010219936
32	116	0.00038224		116	0.005823846		356	-0.009407028		151	-0.016474065
33	115	-0.004478836		115	-0.016078554		355	0.007538218		150	0.003107647
34	114	0.000543571		114	0.01145108		354	0.000952079		149	0.01557278
35	113	-0.000337585		113	0.014731603		353	-0.00929735		148	-0.015672987
36	112	-0.013923009		112	0.022454089		352	-0.008926439		147	0.011859095
37	111	0.00143181		111	0.007062058		351	0.006930286		146	-0.014719264
38	110	0.000296775		110	0.002980691		350	-0.001373644		145	-0.003850596
39	109	-0.004857007		109	0.011012016		349	-0.008889632		144	-0.007045021
40	108	-0.004137539		108	-0.006155798		348	0.000341758		143	-0.005146648
41	107	0.000195051		107	0.000275872		347	-0.007062921		142	-0.012811169
42	106	-0.004483943		106	-0.003890091		346	0.004351147		141	-0.011915324
43	105	-0.004024176		105	-0.013622115		345	-0.009230816		140	-0.005994104
44	104	-0.012636505		104	-0.00829337		344	0.004087755		139	0.005448596
45	103	-0.007511456		103	-0.011452395		343	-0.008031334		138	-0.010173452
46	102	-0.019452317		102	-0.009633591		342	0.004882844		137	-0.006677451
47	101	-0.014542234		101	-0.005312756		341	-0.002012531		136	-0.004138517
48	100	-0.00816291		100	-0.003733648		340	0.001423639		135	-0.026890945
49	99	-0.006244108		99	-0.001622865		339	0.000292776		134	-0.003375456
50	98	0.00019958		98	-0.004291041		338	-0.008759266		133	-0.019221748
51	97	-0.005237693		97	0.004692811		337	-0.00042219		132	-0.016652893
52	96	-0.008382596		96	0.000550653		336	-0.008732177		131	-0.000140703
53	95	-0.01657709		95	0.019120906		335	-0.005031339		130	-0.000948155
54	94	0.012266396		94	-0.002544804		334	-0.000820651		129	0.000872836
55	93	-0.006919202		93	0.013337102		333	-0.004726206		128	-0.010533912
56	92	-0.002387831		92	8.24607E-05		332	-0.002356023		127	-0.021559749
57	91	-0.015029247		91	0.005025562		331	-0.013754848		126	-0.021648322
58	90	0.015516738		90	-0.009020819		330	0.013576484		125	0.001082763
59	89	-0.005457671		89	-0.007686809		329	-0.011738173		124	-0.005937201
60	88	-0.004412591		88	-0.01468999		328	0.004443705		123	-0.010052775
61	87	-0.005532612		87	-0.019088066		327	-0.008719743		122	-0.015990411
62	86	-0.00629591		86	0.001353123		326	-0.015090226		121	0.007146982
63	85	-0.008074972		85	0.001278555		325	-5.33132E-05		120	-0.012182229
64	84	-0.025455829		84	-0.008761602		324	-0.004120879		119	-0.013672836

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
65	83	-0.006018886		83	-0.006330596		323	-0.004335617		118	-0.007208775
66	82	-0.009115251		82	-0.006691187		322	-0.012579662		117	-0.012462892
67	81	-0.000280107		81	-0.012127731		321	-0.004975151		116	-0.003591197
68	80	-0.003900539		80	-0.005872662		320	0.006809661		115	-0.016964894
69	79	-0.015353951		79	0.004156454		319	-0.011608998		114	0.010392234
70	78	-0.017073388		78	0.008199108		318	-0.015802568		113	-0.006568137
71	77	0.00647016		77	0.009639127		317	0.003969698		112	-0.012744988
72	76	-0.009000622		76	-0.000626278		316	-0.01486875		111	-0.007957389
73	75	-0.017376354		75	-0.00383		315	-0.002344971		110	-0.018225447
74	74	-0.018219856		74	-0.002412697		314	-0.00340016		109	0.000236512
75	73	-0.004537684		73	-0.026077257		313	-0.008244357		108	-0.008427601
76	72	-0.020459764		72	-0.011284583		312	-0.000437556		107	-0.016647216
77	71	-0.019828572		71	-0.014894591		311	-0.011487976		106	-0.005635368
78	70	-0.011964892		70	-0.022276578		310	-0.013968146		105	-0.001580499
79	69	0.002803601		69	-0.024092381		309	-0.005803881		104	-0.012112479
80	68	-0.008081344		68	-0.016813827		308	0.004447641		103	0.005655487
81	67	-0.007463208		67	0.004129022		307	0.012695602		102	-0.038628124
82	66	-0.01735385		66	-0.013302995		306	0.002064328		101	0.001235353
83	65	-0.033064115		65	-0.018160769		305	-0.001840225		100	-0.018749523
84	64	-0.005640881		64	-0.02032937		304	-0.006379636		99	-0.028294496
85	63	-0.02020116		63	-0.010310147		303	-0.006419514		98	-0.014278055
86	62	-0.013431346		62	-0.011382358		302	-0.003278729		97	-0.021527576
87	61	-0.014873125		61	-0.02083504		301	-0.0004794		96	0.012788583
88	60	-0.009192689		60	-0.01329855		300	-0.01021291		95	-0.00812094
89	59	-0.026841213		59	-0.011899105		299	0.006889386		94	-0.003258101
90	58	-0.020738696		58	0.002722356		298	0.010527137		93	-0.004639181
91	57	-0.030904722		57	0.009215987		297	0.000349687		92	-0.015718295
92	56	-0.007296541		56	-0.000953089		296	0.010280902		91	-0.009808698
93	55	-0.0104041		55	-0.0136276		295	0.000487247		90	-0.013388592
94	54	-0.023614344		54	0.000871418		294	-0.002119739		89	-0.006869104
95	53	-0.042257316		53	-0.026933991		293	-0.007275448		88	-0.021457738
96	52	-0.024607945		52	-0.030668983		292	-0.010580515		87	-0.00278424
97	51	-0.028984875		51	-0.017117653		291	-0.00278845		86	0.005736874
98	50	-0.022108445		50	-0.009092771		290	-0.004091959		85	-0.019884947
99	49	-0.018648738		49	-0.008933356		289	-0.00768444		84	-0.010433825
100	48	-0.018256847		48	0.001423774		288	-0.011333063		83	-0.003127243
101	47	-0.027926129		47	-0.013949752		287	-0.002643579		82	-0.015060592
102	46	-0.028162718		46	-0.019351364		286	-5.21721E-05		81	-0.022481474
103	45	-0.020863998		45	-0.010213837		285	0.006784697		80	-0.009546709
104	44	-0.040830927		44	-0.028073726		284	0.001775844		79	-0.004374347
105	43	-0.042021157		43	-0.023419104		283	0.002411691		78	-0.01024591
106	42	-0.036603003		42	-0.024814829		282	-0.003614166		77	-0.022014483
107	41	-0.051648329		41	-0.015193865		281	-3.56773E-05		76	-0.017273192
108	40	-0.035066133		40	-0.041454812		280	-0.013374872		75	-0.007535593
109	39	-0.034344337		39	-0.024118667		279	-0.002515172		74	-0.00228466
110	38	-0.061297366		38	-0.014360966		278	-0.010751001		73	-0.011187918
111	37	-0.033853851		37	-0.040907912		277	-0.010033657		72	-0.011251484
112	36	-0.041461299		36	-0.034733471		276	-0.006927806		71	-0.018897499
113	35	-0.032216929		35	-0.036778862		275	-0.005971956		70	-0.027997054
114	34	-0.038707981		34	-0.03461958		274	-0.00179995		69	-0.012391241
115	33	-0.042654232		33	-0.016733185		273	0.006669471		68	-0.021933681
116	32	-0.058039553		32	-0.029315452		272	-0.02248193		67	-0.010358318
117	31	-0.053879182		31	-0.018629173		271	-0.007560672		66	-0.014557064
118	30	-0.061467024		30	-0.03741206		270	-0.008533933		65	0.00684915
119	29	-0.048245847		29	-0.038667093		269	-0.019351121		64	-0.030606288
120	28	-0.055968048		28	-0.022926889		268	-0.004120851		63	-0.027233205
121	27	-0.038877381		27	-0.035927022		267	-0.020107885		62	-0.013286215
122	26	-0.061921693		26	-0.023414284		266	-0.004659703		61	-0.026230497
123	25	-0.045660747		25	-0.019216845		265	-0.011657143		60	-0.019842491
124	24	-0.048423882		24	-0.026904454		264	-0.004572174		59	-0.012658727

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
125	23	-0.062314174		23	-0.052246574		263	-0.005946262		58	-0.014272389
126	22	-0.076323529		22	-0.041832491		262	-0.014343872		57	-0.02119036
127	21	-0.070399835		21	-0.037397964		261	-0.010584213		56	-0.033480071
128	20	-0.068157336		20	-0.035021814		260	-0.001496165		55	-0.026199337
129	19	-0.08921135		19	-0.040387097		259	-0.002697349		54	-0.00287237
130	18	-0.069916558		18	-0.063149423		258	-0.012090306		53	-0.028718524
131	17	-0.072289176		17	-0.06180994		257	0.00337614		52	-0.014918936
132	16	-0.063345999		16	-0.045520115		256	0.002641723		51	-0.027887782
133	15	-0.082330171		15	-0.03907139		255	-0.007838527		50	-0.035442403
134	14	-0.075808392		14	-0.039336586		254	-0.008461598		49	-0.016226025
135	13	-0.069144604		13	-0.030997908		253	-0.012131546		48	-0.022149497
136	12	-0.085623327		12	-0.034162069		252	-0.011639089		47	-0.01869578
137	11	-0.081556448		11	-0.021076161		251	-0.010122824		46	-0.025541509
138	10	-0.07937453		10	-0.028773937		250	-0.009421026		45	-0.031382262
139	9	-0.083083107		9	-0.028879294		249	0.000600897		44	-0.049078235
140	8	-0.063662261		8	-0.033902925		248	-0.015599209		43	-0.018861848
141	7	-0.059923335		7	-0.024054635		247	0.007242829		42	-0.030826335
142	6	-0.036630455		6	0.010984213		246	-0.00151769		41	-0.047430807
143	5	-0.025646469		5	0.040788698		245	-0.007654516		40	-0.017071792
144	4	-0.006150484		4	0.062971838		244	0.004533479		39	-0.03655049
145	3	0.011625074		3	0.102468851		243	-0.007284737		38	-0.035734035
146	2	0.039162726		2	0.131734012		242	-0.00520373		37	-0.036208992
147	1	0.067255225		1	0.163838308		241	-0.001826132		36	-0.054906272
148	0	0.076598226		0	0.181359043		240	-0.004094452		35	-0.043171454
149							239	0.001222553		34	-0.051775118
150							238	0.003565424		33	-0.057968556
151							237	-0.009064498		32	-0.053108469
152							236	-0.005823227		31	-0.042153697
153							235	-0.005183416		30	-0.057506774
154							234	0.001341885		29	-0.054663262
155							233	-0.003840448		28	-0.054792657
156							232	-0.004060028		27	-0.054585572
157							231	0.002322134		26	-0.051111315
158							230	-0.001319065		25	-0.069980244
159							229	0.002189739		24	-0.059469001
160							228	-0.00843619		23	-0.050972965
161							227	-0.014603816		22	-0.082926689
162							226	-0.014984231		21	-0.063560159
163							225	-0.004222842		20	-0.068096427
164							224	0.001327902		19	-0.057743542
165							223	0.006427671		18	-0.076864325
166							222	0.002015071		17	-0.0808284
167							221	0.006281736		16	-0.093917633
168							220	-0.001280156		15	-0.083868484
169							219	0.001690462		14	-0.101610974
170							218	0.005248664		13	-0.089794869
171							217	0.01274557		12	-0.090662712
172							216	-0.000192635		11	-0.078727311
173							215	0.00562331		10	-0.089511672
174							214	0.000635895		9	-0.069622823
175							213	-0.003326051		8	-0.08411746
176							212	0.001245125		7	-0.079117655
177							211	0.002016528		6	-0.08725202
178							210	0.0001694		5	-0.07660438
179							209	-0.004003507		4	-0.065418275
180							208	-0.003760766		3	-0.043147459
181							207	-0.005895963		2	-0.003940006
182							206	0.003557163		1	0.020377372
183							205	0.004370291		0	0.02864668
184							204	-0.013197418			
185							203	0.002624575			

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
186							202	-0.019347456			
187							201	0.003635921			
188							200	-0.003705183			
189							199	-0.005018038			
190							198	-0.001128998			
191							197	0.005311515			
192							196	0.000882413			
193							195	0.002981764			
194							194	-0.006807218			
195							193	0.000744102			
196							192	-0.013060143			
197							191	0.003553117			
198							190	0.005698337			
199							189	-0.000860767			
200							188	-0.001123414			
201							187	-0.000821759			
202							186	0.002363696			
203							185	-0.004421905			
204							184	-0.000301084			
205							183	-0.0060265			
206							182	-0.002543311			
207							181	-0.009277276			
208							180	0.003315452			
209							179	-0.000104989			
210							178	0.005506973			
211							177	-0.005120323			
212							176	-0.015605187			
213							175	-0.010885953			
214							174	-0.007479318			
215							173	-0.006439467			
216							172	-0.006017729			
217							171	0.013809551			
218							170	0.008230779			
219							169	0.00686345			
220							168	0.00527369			
221							167	-0.004474293			
222							166	-0.00189845			
223							165	-0.01344707			
224							164	-0.009549185			
225							163	0.001213189			
226							162	0.004328483			
227							161	0.003313843			
228							160	-0.003739912			
229							159	-0.007331253			
230							158	-0.004019581			
231							157	-0.001730277			
232							156	-0.003688498			
233							155	-0.017879058			
234							154	-0.001022117			
235							153	-0.008655871			
236							152	-0.006605358			
237							151	0.002352279			
238							150	-0.006543343			
239							149	-0.016514784			
240							148	-0.010481922			
241							147	-0.00384569			
242							146	-0.004700852			
243							145	-0.003331933			
244							144	-0.008267121			
245							143	-0.011684365			
246							142	-0.003756944			

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
247							141	-0.013998792			
248							140	-0.009853463			
249							139	-0.017081022			
250							138	0.002088126			
251							137	-0.006214453			
252							136	-0.008459251			
253							135	0.003860714			
254							134	0.000964955			
255							133	-0.007395846			
256							132	0.001954419			
257							131	0.002149667			
258							130	-0.009445396			
259							129	-0.000761455			
260							128	-0.004910895			
261							127	-0.004506783			
262							126	-0.019486101			
263							125	-0.017306633			
264							124	0.002883631			
265							123	0.000321741			
266							122	0.004779361			
267							121	-0.005881648			
268							120	0.002649928			
269							119	-0.004385552			
270							118	0.005986687			
271							117	-0.015147686			
272							116	-0.007719429			
273							115	-0.004802021			
274							114	-0.012530278			
275							113	-0.002065472			
276							112	-0.001447494			
277							111	-0.020059828			
278							110	0.00344351			
279							109	-0.021794162			
280							108	-0.00013919			
281							107	0.006626737			
282							106	-0.006214053			
283							105	-0.007458466			
284							104	0.009287			
285							103	-0.006160552			
286							102	-0.004827134			
287							101	-0.019216456			
288							100	-0.009313805			
289							99	-0.017617311			
290							98	-0.009138202			
291							97	0.001416627			
292							96	0.00091792			
293							95	-0.014835035			
294							94	-0.013235807			
295							93	-0.003637004			
296							92	-0.005709367			
297							91	-0.024115114			
298							90	-0.024143009			
299							89	-0.003657412			
300							88	-0.010334959			
301							87	-0.011829994			
302							86	-0.019334476			
303							85	-0.004220989			
304							84	-0.007245842			
305							83	-0.009294351			
306							82	-0.006194737			
307							81	-0.00735337			

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
308							80	-0.011143656			
309							79	-0.016499673			
310							78	-0.008367323			
311							77	-0.004713846			
312							76	-0.017133679			
313							75	-0.012113208			
314							74	-0.018470462			
315							73	-0.014637941			
316							72	-0.008870672			
317							71	-0.007141946			
318							70	-0.015143498			
319							69	-0.006488603			
320							68	-0.009160572			
321							67	-0.009757546			
322							66	-0.01198302			
323							65	-0.017733284			
324							64	-0.020997908			
325							63	-0.012517732			
326							62	-0.01464025			
327							61	-0.014384697			
328							60	-0.007617467			
329							59	-0.022485453			
330							58	-0.005279079			
331							57	-0.016675652			
332							56	-0.029391194			
333							55	-0.021520135			
334							54	-0.009219589			
335							53	-0.017428102			
336							52	-0.023661553			
337							51	-0.023705908			
338							50	-0.026638556			
339							49	-0.018919256			
340							48	-0.020028643			
341							47	-0.02950937			
342							46	-0.019957604			
343							45	-0.028489548			
344							44	-0.031490451			
345							43	-0.029582462			
346							42	-0.028736409			
347							41	-0.028229533			
348							40	-0.034048716			
349							39	-0.02387432			
350							38	-0.035274284			
351							37	-0.034492601			
352							36	-0.042869115			
353							35	-0.048577143			
354							34	-0.031995041			
355							33	-0.048246859			
356							32	-0.045103622			
357							31	-0.034607141			
358							30	-0.048155147			
359							29	-0.049987769			
360							28	-0.047205634			
361							27	-0.070904099			
362							26	-0.052254571			
363							25	-0.078068006			
364							24	-0.058673024			
365							23	-0.052912415			
366							22	-0.056890398			
367							21	-0.072401494			

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
368							20	-0.066583309			
369							19	-0.082003905			
370							18	-0.082878025			
371							17	-0.100995268			
372							16	-0.091926884			
373							15	-0.092645225			
374							14	-0.105194968			
375							13	-0.090542878			
376							12	-0.108407159			
377							11	-0.103578284			
378							10	-0.108020221			
379							9	-0.124938633			
380							8	-0.10258684			
381							7	-0.106005879			
382							6	-0.119042857			
383							5	-0.082167126			
384							4	-0.085498026			
385							3	-0.055504918			
386							2	-0.038428878			
387							1	0.005938658			
388							0	0.017469324			

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG
5	299-E24-24			299-E35-36			699-37-47A	
6								
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	185	0.011468377		110	-0.013724863		115	-0.003893075
9	184	0.003489634		109	-0.004830499		114	0.027019496
10	183	-0.014854204		108	0.008346969		113	0.026052778
11	182	0.023467448		107	-0.003918824		112	0.015291282
12	181	0.001111028		106	-0.015627281		111	0.00653596
13	180	0.005772709		105	-0.017691696		110	0.00606959
14	179	0.001948538		104	0.001815946		109	0.008498818
15	178	0.006742092		103	-0.013706306		108	0.018931229
16	177	0.012659723		102	-0.00472726		107	0.011143789
17	176	-0.001844435		101	-0.017033021		106	-0.01233226
18	175	0.015754351		100	-0.010505149		105	-0.017345721
19	174	-0.000207056		99	-0.003123627		104	-0.006250347
20	173	0.007775486		98	-0.012828327		103	-0.001038962
21	172	0.000499321		97	-0.008913178		102	0.009239589
22	171	0.033022786		96	-0.02479689		101	0.010456343
23	170	0.003196984		95	0.0086261		100	0.011684071
24	169	0.001712107		94	-0.020125188		99	0.000609227
25	168	0.007984164		93	-0.011590342		98	-0.000985192
26	167	-0.00753869		92	-0.000243423		97	0.011019323
27	166	0.027492324		91	-0.014102394		96	0.000215218
28	165	0.015158618		90	-0.017787616		95	0.018048172
29	164	-0.00790303		89	-0.005319347		94	0.021932641
30	163	0.001935907		88	-0.008122768		93	0.019858845
31	162	-0.003391349		87	0.008158743		92	0.023811978
32	161	0.00676778		86	-0.04627387		91	0.016880739
33	160	-0.000164841		85	-0.012899831		90	0.003465708
34	159	-0.007385666		84	0.015057982		89	-0.001097347
35	158	-0.004586621		83	-0.010452754		88	-0.002151736
36	157	-0.014449172		82	-0.009441503		87	-0.014350863
37	156	0.002232871		81	-0.022773773		86	0.004299755
38	155	0.007870977		80	-0.014286139		85	0.001216437
39	154	-0.004579768		79	-0.010615505		84	-0.014063097
40	153	-0.015237425		78	-0.013729208		83	-0.014189136
41	152	-0.002136867		77	-0.005607382		82	-0.011966607
42	151	-0.001964515		76	-0.001191318		81	0.001018337
43	150	-0.008070703		75	-0.014619252		80	-0.024634173
44	149	-0.008559656		74	-0.032948593		79	-0.009055338
45	148	0.005349153		73	0.012866504		78	-0.001267632
46	147	0.00278075		72	-0.005895209		77	0.002319586
47	146	0.022705159		71	-0.020788858		76	0.007815198
48	145	-0.00704434		70	-0.014818349		75	0.002855626
49	144	-0.007053977		69	-0.016012579		74	0.015361224
50	143	-0.007096405		68	0.005823185		73	0.022074237
51	142	-0.026590855		67	-0.008946138		72	0.018902682
52	141	-0.009855308		66	-0.030684857		71	0.007664976
53	140	-0.004287323		65	-0.008857136		70	0.006865144
54	139	-0.004402369		64	0.007363068		69	0.0020834
55	138	0.010962379		63	-0.028099188		68	-0.020488421
56	137	-0.007956796		62	-0.02194572		67	-0.019661144
57	136	0.024812494		61	-0.039142243		66	-0.00639948
58	135	0.007595803		60	-0.007105889		65	-0.009441475
59	134	0.007701486		59	-0.027393875		64	0.00522451
60	133	-0.00412905		58	-0.011187619		63	0.006376466
61	132	0.004208299		57	-4.80949E-05		62	-0.003479426
62	131	0.009124797		56	0.003764401		61	-0.018116036
63	130	-0.002585825		55	-0.013099433		60	-0.001116509
64	129	0.012026209		54	-0.026733022		59	-0.003839647
65	128	-0.019319102		53	-0.003548887		58	0.000195925
66	127	-0.006559408		52	-0.033865939		57	0.010779407
67	126	0.010045183		51	0.003403193		56	0.003836287

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG
68	125	0.017587772		50	-0.041224232		55	-0.000351818
69	124	-0.013971087		49	-0.003149906		54	-0.000543539
70	123	-0.012995661		48	0.00079405		53	-0.011711205
71	122	0.004176378		47	-0.007266141		52	-0.020597832
72	121	-0.008649737		46	-0.023704559		51	-0.007040323
73	120	-0.001956368		45	-0.025465786		50	-0.008170888
74	119	-0.01235539		44	-0.026475631		49	-0.009346754
75	118	0.007796915		43	0.007725973		48	-0.006413651
76	117	0.002916675		42	-0.010954522		47	-0.007944475
77	116	0.008294628		41	-0.022312393		46	-0.026609182
78	115	0.000298729		40	-0.009811786		45	-0.02777034
79	114	-0.00565504		39	-0.014996548		44	-0.016387329
80	113	0.001113276		38	-0.011743528		43	-0.026919852
81	112	0.001007773		37	-0.040276649		42	-0.006480359
82	111	0.000241032		36	-0.039480878		41	-0.021212099
83	110	-0.010583669		35	-0.025844451		40	-0.021037141
84	109	-0.005607179		34	-0.011671244		39	-0.016927951
85	108	0.003308248		33	-0.046084943		38	-0.01943749
86	107	-0.011593389		32	-0.027403498		37	-0.010127697
87	106	0.006106752		31	-0.005584894		36	-0.023037471
88	105	-0.00209884		30	-0.018361723		35	-0.025620459
89	104	0.007680123		29	-0.03606595		34	-0.011425921
90	103	-0.026867571		28	-0.029207343		33	-0.02966027
91	102	-0.016053199		27	-0.025460316		32	-0.031744908
92	101	-0.002259472		26	-0.008332856		31	-0.035266988
93	100	-0.005434152		25	-0.029675335		30	-0.031470697
94	99	-0.01823392		24	-0.011489482		29	-0.027287332
95	98	-0.016418704		23	-0.006466516		28	-0.020913576
96	97	0.019006978		22	-0.024166393		27	-0.014485874
97	96	-0.014309024		21	-0.036548459		26	-0.024404645
98	95	-0.007551408		20	-0.034584227		25	-0.033409078
99	94	0.014720307		19	-0.020650353		24	-0.045343682
100	93	-0.014629378		18	-0.023348956		23	-0.033761764
101	92	-0.000181949		17	-0.026275093		22	-0.029281089
102	91	-0.010718412		16	-0.04392444		21	-0.027840725
103	90	-0.008896779		15	-0.003579722		20	-0.035176097
104	89	-0.015970833		14	-0.008221439		19	-0.044883786
105	88	-0.015853405		13	-0.00026134		18	-0.045075685
106	87	0.002699808		12	0.006100424		17	-0.04547958
107	86	-0.009847549		11	0.002308281		16	-0.043120153
108	85	-0.004229169		10	0.012638865		15	-0.042307255
109	84	-0.009039013		9	0.013966262		14	-0.052087052
110	83	-0.008627031		8	0.010960507		13	-0.04518419
111	82	-0.008889331		7	0.029262268		12	-0.0349285
112	81	-0.009060562		6	0.034431871		11	-0.010869329
113	80	0.006479865		5	0.031939669		10	0.005454209
114	79	-0.009390426		4	0.055450863		9	0.039405028
115	78	-0.00621265		3	0.044360612		8	0.022656971
116	77	-0.010728795		2	0.04829997		7	0.038071782
117	76	-0.017394347		1	0.039778255		6	0.050704582
118	75	-0.001240937		0	0.025083223		5	0.076588964
119	74	-0.003222257					4	0.111678859
120	73	-0.022126083					3	0.176320202
121	72	0.001478741					2	0.241940408
122	71	-0.028352168					1	0.313623986
123	70	-0.016053904					0	0.391590878
124	69	-0.023529455						
125	68	-0.013582704						
126	67	0.000828267						
127	66	-0.01361213						
128	65	-0.010621791						
129	64	-0.012226662						
130	63	0.002182369						

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	Z	AA	AB	AC	AD	AE	AF	AG
131	62	-0.010459412						
132	61	-0.022263909						
133	60	-0.004231144						
134	59	-0.009445361						
135	58	-0.008119509						
136	57	-0.030413843						
137	56	-0.016974264						
138	55	0.001275556						
139	54	-0.026540066						
140	53	-0.023799801						
141	52	-0.030704591						
142	51	-0.017650932						
143	50	-0.021085879						
144	49	-0.029363447						
145	48	0.012870183						
146	47	-0.01125164						
147	46	-0.024349477						
148	45	-0.01506474						
149	44	-0.031463911						
150	43	-0.027492199						
151	42	-0.024870023						
152	41	-0.027587787						
153	40	-0.030003232						
154	39	-0.029876717						
155	38	-0.031800362						
156	37	-0.031027028						
157	36	-0.04332586						
158	35	-0.049485931						
159	34	-0.040970288						
160	33	-0.044591366						
161	32	-0.048136755						
162	31	-0.031765185						
163	30	-0.031454266						
164	29	-0.047831235						
165	28	-0.038708565						
166	27	-0.071737237						
167	26	-0.055244219						
168	25	-0.034538769						
169	24	-0.053344642						
170	23	-0.039525177						
171	22	-0.059933195						
172	21	-0.057302672						
173	20	-0.057511612						
174	19	-0.075622328						
175	18	-0.065227369						
176	17	-0.062098149						
177	16	-0.07326227						
178	15	-0.087856827						
179	14	-0.064144787						
180	13	-0.059992474						
181	12	-0.074985373						
182	11	-0.067437741						
183	10	-0.075737701						
184	9	-0.051987983						
185	8	-0.070271242						
186	7	-0.066663924						
187	6	-0.045325193						
188	5	-0.046166082						
189	4	-0.012215719						
190	3	-0.012352481						
191	2	0.023132141						
192	1	0.038694896						
193	0	0.04495672						

Figure G-4. Barometric Response Function Coefficients for the IDF/PUREX Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
5	299-E27-17			299-E27-18			299-E27-8			299-E27-9	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	85	0.000808608		85	0.008170942		70	0.001211259		80	0.007884981
9	84	-0.003099288		84	0.003100164		69	0.006717977		79	0.023329772
10	83	-9.6538E-05		83	0.006344591		68	0.005957551		78	0.017001789
11	82	-0.002622839		82	0.00741579		67	0.001465779		77	0.001022961
12	81	-0.002705827		81	0.004576888		66	0.004912417		76	0.018315503
13	80	-0.00467562		80	0.002256448		65	0.004471985		75	0.021568154
14	79	0.002360768		79	0.007862851		64	0.002354797		74	0.012907064
15	78	0.005152329		78	0.005833431		63	0.005951737		73	0.013427628
16	77	0.00086466		77	0.008400513		62	0.002281242		72	0.022593028
17	76	0.00373352		76	0.006389179		61	0.003258686		71	0.022863874
18	75	0.006040339		75	0.00922356		60	0.004864552		70	0.026031983
19	74	0.005314828		74	0.009808275		59	0.001924249		69	0.027545917
20	73	0.002393948		73	0.002730625		58	0.001173912		68	0.004023777
21	72	0.002700951		72	0.010043663		57	0.001719245		67	0.004609799
22	71	0.005740195		71	0.0073338		56	0.003939312		66	0.018963127
23	70	-0.000398602		70	0.002661767		55	0.006096533		65	0.014257325
24	69	0.004989849		69	0.003157213		54	0.005190632		64	0.01644996
25	68	0.004622282		68	0.002137427		53	0.010170371		63	0.010723487
26	67	-0.000901974		67	0.00585536		52	0.008354263		62	0.016543042
27	66	-0.004791602		66	0.006579308		51	0.010426481		61	0.020927752
28	65	-0.000952097		65	0.006698293		50	0.012490277		60	0.01475993
29	64	0.001201672		64	0.006032889		49	0.009440974		59	0.006245695
30	63	-0.003140559		63	0.008459235		48	0.008234139		58	0.01294756
31	62	0.005515642		62	0.004626807		47	0.011939743		57	0.033527544
32	61	-0.000174684		61	0.003316501		46	0.01021787		56	0.016810309
33	60	0.002550795		60	0.006818296		45	0.012740017		55	0.01377883
34	59	-0.00132789		59	0.006760261		44	0.006033333		54	0.018137426
35	58	0.008066366		58	0.003475872		43	0.010468035		53	0.039954103
36	57	-0.000784349		57	0.012768158		42	0.014449858		52	0.029795515
37	56	0.001896391		56	0.007159248		41	0.011866041		51	0.010391624
38	55	-0.0011478		55	0.008217316		40	0.018923816		50	0.009488722
39	54	0.006422708		54	0.010616726		39	0.014288903		49	0.025896869
40	53	0.010921528		53	0.008142484		38	0.015256596		48	0.037563711
41	52	0.003136068		52	0.003130099		37	0.015153194		47	0.046608671
42	51	0.003541235		51	0.012597009		36	0.01601847		46	0.025072142
43	50	0.006361171		50	0.006823786		35	0.02144707		45	0.01471224
44	49	0.009538124		49	0.001844498		34	0.025224186		44	0.028474963
45	48	0.009826205		48	0.002401314		33	0.021981476		43	0.034068982
46	47	0.006598711		47	0.006777146		32	0.024005713		42	0.034026608
47	46	0.005503683		46	0.010664035		31	0.030363864		41	0.040111479
48	45	0.007039177		45	0.012242391		30	0.025369754		40	0.032613003
49	44	0.005698686		44	0.009714966		29	0.031933285		39	0.033229118
50	43	0.000316427		43	0.00772153		28	0.034765042		38	0.03549561
51	42	0.006033769		42	0.010620537		27	0.042730123		37	0.027690289
52	41	0.006600344		41	0.015945775		26	0.044405888		36	0.049477347
53	40	0.017897358		40	0.011296769		25	0.047282329		35	0.039545494
54	39	0.011952006		39	0.009410381		24	0.0522249		34	0.054681301
55	38	0.013191846		38	0.015786263		23	0.050166785		33	0.060429292
56	37	0.008992102		37	0.009927222		22	0.054351868		32	0.050633148
57	36	0.017227962		36	0.01735571		21	0.060529025		31	0.071007073
58	35	0.010417603		35	0.014987917		20	0.066910608		30	0.049116574
59	34	0.014441985		34	0.017247439		19	0.068787647		29	0.0376575
60	33	0.018637174		33	0.016316901		18	0.076241951		28	0.060836751
61	32	0.01660719		32	0.017461171		17	0.082596162		27	0.06658791
62	31	0.020207183		31	0.018342021		16	0.089341772		26	0.067601428
63	30	0.023032151		30	0.018619045		15	0.098068226		25	0.067581804
64	29	0.020156302		29	0.021631223		14	0.107474436		24	0.097519806

Figure G-5. Barometric Response Function Coefficients for the LLWMA-2 Wells

	B	C	D	E	F	G	H	I	J	K	L
65	28	0.030571988		28	0.02456469		13	0.117758714		23	0.104980906
66	27	0.034755749		27	0.025896661		12	0.128623702		22	0.107359718
67	26	0.03113387		26	0.026488861		11	0.138097841		21	0.090984081
68	25	0.036016585		25	0.026604163		10	0.149144034		20	0.092528487
69	24	0.041496883		24	0.030694137		9	0.154999942		19	0.115363232
70	23	0.040132561		23	0.03207878		8	0.173281569		18	0.121864053
71	22	0.040957652		22	0.037034749		7	0.185633225		17	0.11936694
72	21	0.043026175		21	0.041221063		6	0.1990003		16	0.125237331
73	20	0.056477863		20	0.043400601		5	0.202961852		15	0.130259156
74	19	0.056926583		19	0.043002444		4	0.20348975		14	0.137464896
75	18	0.064842793		18	0.048986783		3	0.194191396		13	0.149178405
76	17	0.068539697		17	0.048964982		2	0.169024576		12	0.161196987
77	16	0.068394647		16	0.051434272		1	0.125535301		11	0.171760884
78	15	0.07717166		15	0.056106884		0	0.066860251		10	0.191345041
79	14	0.08048176		14	0.063065156					9	0.200530892
80	13	0.090826346		13	0.071307975					8	0.209298669
81	12	0.105128491		12	0.072696773					7	0.210015591
82	11	0.109221127		11	0.083052234					6	0.239308705
83	10	0.11747305		10	0.086216144					5	0.245288992
84	9	0.122851829		9	0.090065467					4	0.234668527
85	8	0.145625075		8	0.101110234					3	0.257133806
86	7	0.145977125		7	0.105186981					2	0.285505465
87	6	0.154591249		6	0.107463693					1	0.363952774
88	5	0.152500844		5	0.106976252					0	0.531874881
89	4	0.156565026		4	0.098598353						
90	3	0.14746784		3	0.089350977						
91	2	0.118146746		2	0.071350608						
92	1	0.09671649		1	0.050218596						
93	0	0.091517775		0	0.02855388						

Figure G-5. Barometric Response Function Coefficients for the LLWMA-2 Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
5	299-E33-14			299-E33-37			299-E34-10			299-E34-9	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	95	0.005942428		80	0.011551168		80	0.000881286		85	0.012362784
9	94	0.01446939		79	-0.000927967		79	0.003255265		84	0.016618498
10	93	0.007420565		78	0.006117372		78	0.005697968		83	0.012634331
11	92	0.013941264		77	0.008308086		77	0.004130199		82	0.012065415
12	91	0.002864418		76	0.009335059		76	0.00421261		81	0.012979398
13	90	0.002520028		75	0.014485423		75	0.003403933		80	0.020230152
14	89	0.001748893		74	0.016489611		74	0.004571338		79	0.005446464
15	88	0.007832656		73	0.013282287		73	0.001187783		78	0.020064154
16	87	0.004713551		72	0.00729807		72	0.004733029		77	0.012238005
17	86	0.008199774		71	0.014463781		71	0.003653596		76	0.015676051
18	85	0.008082815		70	0.00739072		70	0.00027757		75	0.01620635
19	84	0.004269356		69	0.012382498		69	0.002145087		74	0.014822835
20	83	0.004693832		68	0.014625708		68	0.005137093		73	0.013859569
21	82	0.009285724		67	0.011485645		67	-0.005648998		72	0.013017312
22	81	0.007519705		66	0.006219889		66	0.000516389		71	0.009431365
23	80	0.007464329		65	0.005901483		65	0.004846121		70	0.018839903
24	79	0.013917757		64	0.00952174		64	0.007193261		69	0.018547943
25	78	0.014035405		63	0.00401578		63	0.006088749		68	0.015904938
26	77	0.011052889		62	0.011258092		62	0.008334153		67	0.008380964
27	76	0.005149485		61	0.007780759		61	0.001554975		66	0.010573161
28	75	0.005354082		60	0.009772373		60	0.00869447		65	0.014340644
29	74	0.012250999		59	0.003563007		59	0.00165054		64	0.0160272
30	73	0.015636264		58	0.011239827		58	0.005047039		63	0.012515534
31	72	0.013832507		57	0.006410528		57	0.000303406		62	0.021572439
32	71	0.012348807		56	0.015491708		56	0.00405234		61	0.014080246
33	70	0.010479834		55	0.014255729		55	0.005636133		60	0.019598536
34	69	0.00213358		54	0.011295924		54	0.005261629		59	0.009145368
35	68	0.012395411		53	0.016143525		53	0.008154652		58	0.016306009
36	67	0.007515519		52	0.008926675		52	0.006165198		57	0.014047729
37	66	0.011249816		51	0.007424752		51	0.012521308		56	0.0150661
38	65	0.012964056		50	0.007097045		50	0.001155145		55	0.02571984
39	64	0.018269692		49	0.006941117		49	0.007878579		54	0.016957962
40	63	0.010149118		48	0.011741791		48	0.005075915		53	0.021403367
41	62	0.007270301		47	0.016764592		47	0.008507045		52	0.021625967
42	61	0.011653714		46	0.014419722		46	0.01247086		51	0.021339374
43	60	0.017127214		45	0.007605115		45	0.009751672		50	0.020372581
44	59	0.01034462		44	0.008066058		44	0.007772242		49	0.017571227
45	58	0.020310158		43	0.002312891		43	0.010614911		48	0.018175338
46	57	0.013306854		42	0.009122662		42	0.010597549		47	0.025779893
47	56	0.020978235		41	0.023882132		41	0.008631815		46	0.02109803
48	55	0.0096155		40	0.018002098		40	0.007182561		45	0.022414498
49	54	0.022311734		39	0.017238222		39	0.01516267		44	0.025402706
50	53	0.012675932		38	0.016120246		38	0.013704492		43	0.021109528
51	52	0.020902543		37	0.01658867		37	0.010600742		42	0.022245134
52	51	0.015383131		36	0.012374825		36	0.00567494		41	0.024630577
53	50	0.017214289		35	0.01062557		35	0.010626013		40	0.029075879
54	49	0.012831154		34	0.014460829		34	0.018046532		39	0.033723575
55	48	0.02552466		33	0.009678751		33	0.01626551		38	0.029308811
56	47	0.026265784		32	0.011279251		32	0.018254002		37	0.021953025
57	46	0.016384063		31	0.015886698		31	0.016659357		36	0.030125064
58	45	0.024662552		30	0.022715962		30	0.022069974		35	0.030080868
59	44	0.020022936		29	0.023614988		29	0.014983839		34	0.037852171
60	43	0.020534876		28	0.029679053		28	0.026011824		33	0.033819935
61	42	0.019725643		27	0.028868874		27	0.027951282		32	0.04310936
62	41	0.028207451		26	0.031783138		26	0.029221523		31	0.038040737
63	40	0.022523116		25	0.022335267		25	0.0297786		30	0.040610119
64	39	0.027645307		24	0.026566974		24	0.037900687		29	0.049141389

Figure G-5. Barometric Response Function Coefficients for the LLWMA-2 Wells (cont'd.)

	N	O	P	Q	R	S	T	U	V	W	X
65	38	0.025765571		23	0.036062036		23	0.031920545		28	0.051292314
66	37	0.02783006		22	0.033950104		22	0.031700481		27	0.053836793
67	36	0.030195552		21	0.038787444		21	0.039350354		26	0.056095204
68	35	0.037441769		20	0.045149973		20	0.041905283		25	0.05208627
69	34	0.042500867		19	0.045302485		19	0.046775259		24	0.062829633
70	33	0.034468176		18	0.045947185		18	0.049174374		23	0.070270785
71	32	0.037517392		17	0.046844026		17	0.05216309		22	0.067479234
72	31	0.032514846		16	0.045304689		16	0.052614604		21	0.068360416
73	30	0.044388697		15	0.050009983		15	0.058726847		20	0.074695704
74	29	0.047097479		14	0.050325746		14	0.060885792		19	0.085113075
75	28	0.052530126		13	0.057537663		13	0.070859125		18	0.080486286
76	27	0.046919423		12	0.073326938		12	0.079401632		17	0.09311778
77	26	0.052788817		11	0.070913519		11	0.086690063		16	0.100628331
78	25	0.055059389		10	0.079622637		10	0.08690335		15	0.105993734
79	24	0.058605321		9	0.076969208		9	0.089486309		14	0.106467064
80	23	0.05447106		8	0.091712565		8	0.096832863		13	0.119326594
81	22	0.0704321		7	0.098919128		7	0.102834767		12	0.124296933
82	21	0.066260532		6	0.10219515		6	0.09679192		11	0.13618322
83	20	0.067482206		5	0.10090451		5	0.086894026		10	0.144288398
84	19	0.074042305		4	0.098256012		4	0.079673918		9	0.146352687
85	18	0.076213479		3	0.097802409		3	0.05659329		8	0.159541024
86	17	0.082769379		2	0.08106289		2	0.017606454		7	0.16021035
87	16	0.078438162		1	0.081569313		1	-0.009920642		6	0.17925561
88	15	0.087262847		0	0.129596068		0	-0.004177775		5	0.171760443
89	14	0.08942415								4	0.167133082
90	13	0.095751007								3	0.165743458
91	12	0.104457396								2	0.149006629
92	11	0.109742833								1	0.134585811
93	10	0.109569822								0	0.103497772
94	9	0.110550473									
95	8	0.124283478									
96	7	0.124295255									
97	6	0.127394825									
98	5	0.124353411									
99	4	0.125987046									
100	3	0.131359053									
101	2	0.132983397									
102	1	0.132820162									
103	0	0.177640355									

Figure G-5. Barometric Response Function Coefficients for the LLWMA-2 Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
5	299-E26-10			299-E26-14			299-E26-77			299-E26-79	
6											
7	Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response		Time Lag (hrs)	Response
8	240	0.012729264		350	0.004884879		240	0.014043366		240	0.02032343
9	239	0.00652178		349	0.022239956		239	0.02153808		239	0.032431832
10	238	0.007291049		348	0.018931917		238	0.023099102		238	0.034722259
11	237	0.011347149		347	0.022092446		237	0.011536722		237	0.024956658
12	236	0.021213038		346	0.014139031		236	0.021542162		236	0.038191313
13	235	0.008411939		345	0.014245534		235	0.01029603		235	0.024056223
14	234	0.00738633		344	-0.002038091		234	0.007024707		234	0.012644358
15	233	0.002226238		343	0.009756037		233	0.014433354		233	0.022656765
16	232	0.022303659		342	0.009225221		232	0.020268012		232	0.032496023
17	231	0.009415395		341	0.009415666		231	0.016181598		231	0.018567908
18	230	0.000455872		340	0.01313292		230	0.01802966		230	0.012713545
19	229	0.014240123		339	0.009894636		229	0.012801803		229	0.025746769
20	228	0.016084385		338	0.000368702		228	0.018584078		228	0.025709798
21	227	0.014355038		337	0.017575172		227	0.015612987		227	0.027418198
22	226	0.001002304		336	0.009634421		226	0.008153928		226	0.016659585
23	225	0.019611032		335	0.007942593		225	0.019397563		225	0.030663516
24	224	0.00753588		334	0.008805117		224	0.019657244		224	0.025989214
25	223	0.017729817		333	0.013250859		223	0.017364877		223	0.026261905
26	222	0.014344785		332	0.014475257		222	0.012842825		222	0.022696209
27	221	-0.000147259		331	0.011713884		221	0.017920432		221	0.021696001
28	220	0.014556732		330	0.016814867		220	0.02203664		220	0.032511101
29	219	0.019269579		329	0.007940031		219	0.023040665		219	0.033037038
30	218	0.013082733		328	0.020890239		218	0.017626623		218	0.029594436
31	217	0.014455028		327	0.012942921		217	0.016700796		217	0.031723751
32	216	0.008427965		326	0.004875857		216	0.017790278		216	0.02582272
33	215	0.001672279		325	0.006874073		215	0.012851199		215	0.01929796
34	214	0.010937666		324	0.01155173		214	0.018233572		214	0.025415073
35	213	0.001501849		323	0.012123643		213	0.017623022		213	0.021092008
36	212	0.020358291		322	0.013372558		212	0.019785305		212	0.035234467
37	211	0.014340464		321	0.015460945		211	0.019892986		211	0.026976538
38	210	0.009921282		320	0.013942988		210	0.015993064		210	0.016741246
39	209	0.011186936		319	0.014293188		209	0.019936887		209	0.027872632
40	208	0.022630505		318	0.012301057		208	0.026228777		208	0.044312836
41	207	-0.001091306		317	0.010951667		207	0.020108807		207	0.018854955
42	206	0.005111091		316	0.021581648		206	0.017890117		206	0.017863795
43	205	0.007029902		315	0.013146721		205	0.016917094		205	0.020988984
44	204	0.009251787		314	0.007421962		204	0.019331175		204	0.02404748
45	203	0.010855923		313	0.015952487		203	0.02031414		203	0.027000671
46	202	0.028071986		312	0.012548002		202	0.023708522		202	0.037325122
47	201	0.027998878		311	0.015923994		201	0.020966199		201	0.035597031
48	200	0.006415139		310	0.018430311		200	0.011277773		200	0.019595417
49	199	0.001194587		309	0.013577926		199	0.017688653		199	0.02153239
50	198	0.016262335		308	0.019048238		198	0.019647378		198	0.02716125
51	197	0.004741741		307	0.018244934		197	0.023887016		197	0.027299357
52	196	0.030794031		306	0.016501582		196	0.024394408		196	0.031476565
53	195	0.006939516		305	0.013374293		195	0.01704656		195	0.02456448
54	194	0.007417336		304	0.005163078		194	0.018822088		194	0.020131561
55	193	0.012205661		303	0.014657603		193	0.022505646		193	0.030067285
56	192	0.013186648		302	0.011273949		192	0.017307331		192	0.034643256
57	191	0.017707082		301	0.021771267		191	0.025614753		191	0.031401146
58	190	0.016840327		300	0.008724548		190	0.027570167		190	0.033621111
59	189	0.013950266		299	0.004738763		189	0.024771491		189	0.023817517
60	188	0.02103724		298	0.001852955		188	0.03064125		188	0.043365084
61	187	-0.001355093		297	0.01416978		187	0.017583367		187	0.019171877
62	186	0.014074421		296	0.015800698		186	0.023330758		186	0.02783161
63	185	0.00335304		295	0.022567259		185	0.016510974		185	0.031325083
64	184	0.011411313		294	0.01593803		184	0.018310998		184	0.034392582
65	183	0.022132205		293	0.011915968		183	0.026220646		183	0.032692445

Figure G-6. Barometric Response Function Coefficients for the LERF Wells

	B	C	D	E	F	G	H	I	J	K	L
66	182	0.003512486		292	0.0084081		182	0.02357334		182	0.024039694
67	181	0.020194019		291	0.02102734		181	0.026559092		181	0.033480769
68	180	0.012431953		290	0.01416733		180	0.018134297		180	0.028042597
69	179	0.024157763		289	0.016047959		179	0.027173434		179	0.04384679
70	178	0.008199273		288	0.017998613		178	0.019370773		178	0.022314436
71	177	0.011463274		287	0.011523815		177	0.022560606		177	0.023739664
72	176	0.009950969		286	0.014002296		176	0.023100612		176	0.032302327
73	175	0.01982632		285	0.016977297		175	0.02183743		175	0.044931925
74	174	0.013927836		284	0.013653503		174	0.030333419		174	0.035364699
75	173	0.008075154		283	0.019228501		173	0.023410224		173	0.029968317
76	172	-0.001408211		282	0.012890268		172	0.021388528		172	0.02500378
77	171	0.013739731		281	0.012690661		171	0.028432255		171	0.037626401
78	170	0.000918301		280	0.015294579		170	0.019722007		170	0.021373329
79	169	0.024800208		279	0.021887018		169	0.033301116		169	0.042530727
80	168	0.017264148		278	0.021093769		168	0.03000599		168	0.043815626
81	167	0.029650135		277	0.019102264		167	0.029906494		167	0.040897426
82	166	0.005527048		276	0.022854515		166	0.021321703		166	0.029372715
83	165	0.00842858		275	0.013157625		165	0.024167243		165	0.03391681
84	164	0.000378395		274	0.018032738		164	0.01773268		164	0.0312688
85	163	0.007267414		273	0.019210212		163	0.025367191		163	0.036955691
86	162	0.025279182		272	0.01970229		162	0.0275732		162	0.036796119
87	161	0.009640156		271	0.010491979		161	0.018385677		161	0.028479132
88	160	0.038238922		270	0.013814532		160	0.03032533		160	0.046546446
89	159	0.019275469		269	0.014985074		159	0.022057786		159	0.037729087
90	158	0.022626811		268	0.029127171		158	0.026596625		158	0.043323791
91	157	0.018763889		267	0.025306921		157	0.027492922		157	0.039949068
92	156	-0.000711002		266	0.020309015		156	0.023638939		156	0.031071482
93	155	0.012973546		265	0.020644555		155	0.026043542		155	0.031298476
94	154	0.015477356		264	0.027033072		154	0.020621759		154	0.032292081
95	153	0.004014584		263	0.024724468		153	0.024141704		153	0.034996746
96	152	0.014726401		262	0.018395677		152	0.023972185		152	0.036772893
97	151	0.008817006		261	0.025108793		151	0.027091174		151	0.044902287
98	150	0.021671235		260	0.022260771		150	0.029664164		150	0.038663551
99	149	0.01263337		259	0.022856155		149	0.025319867		149	0.033669537
100	148	0.023520207		258	0.033640173		148	0.030843961		148	0.039517558
101	147	0.015916468		257	0.026295762		147	0.023516687		147	0.024963653
102	146	0.008649808		256	0.030298985		146	0.025405302		146	0.036849847
103	145	0.018458523		255	0.032035876		145	0.024333479		145	0.039481592
104	144	0.018713934		254	0.021131717		144	0.026335482		144	0.04254165
105	143	0.01352019		253	0.023652553		143	0.02371983		143	0.03744984
106	142	0.018079978		252	0.028604187		142	0.026035647		142	0.03962434
107	141	0.020416893		251	0.027040362		141	0.033245231		141	0.050202095
108	140	0.009398068		250	0.024462156		140	0.025524684		140	0.023575386
109	139	0.021693784		249	0.031590705		139	0.031047671		139	0.04182343
110	138	0.023815291		248	0.027468728		138	0.028298781		138	0.038572243
111	137	0.016226298		247	0.030331848		137	0.022509514		137	0.040850406
112	136	0.022733207		246	0.023725433		136	0.02733821		136	0.043673473
113	135	0.019043938		245	0.025761766		135	0.028139856		135	0.044983832
114	134	0.013210808		244	0.02506441		134	0.028740947		134	0.043423953
115	133	0.006406374		243	0.024008928		133	0.024716342		133	0.031592405
116	132	0.020535742		242	0.029809811		132	0.029700608		132	0.030260896
117	131	0.024454752		241	0.03259484		131	0.031962772		131	0.044992374
118	130	0.030257724		240	0.032605562		130	0.041312584		130	0.051297357
119	129	0.029345253		239	0.022372164		129	0.038146722		129	0.047909597
120	128	0.01819288		238	0.030743918		128	0.032122066		128	0.039050514
121	127	0.02665507		237	0.036942013		127	0.029434981		127	0.046951499
122	126	0.005316277		236	0.032468342		126	0.023759293		126	0.034199664
123	125	0.02672958		235	0.031783315		125	0.028420278		125	0.040090779
124	124	0.025544305		234	0.028916363		124	0.031361027		124	0.044091003
125	123	0.003824441		233	0.030004049		123	0.031303432		123	0.037317617
126	122	0.020662778		232	0.035321787		122	0.034701035		122	0.044547815

Figure G-6. Barometric Response Function Coefficients for the LERF Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
127	121	0.005891465		231	0.033117185		121	0.029610938		121	0.02922304
128	120	0.020647178		230	0.024267245		120	0.031415336		120	0.034012183
129	119	0.029757209		229	0.027335233		119	0.036448279		119	0.051211592
130	118	0.025172699		228	0.029440757		118	0.032729451		118	0.05079437
131	117	0.022266921		227	0.021216681		117	0.035099135		117	0.045500592
132	116	0.016872311		226	0.031746111		116	0.033162482		116	0.045315201
133	115	0.027525873		225	0.027983149		115	0.039341631		115	0.047656392
134	114	0.027307071		224	0.028755199		114	0.031356612		114	0.043777587
135	113	0.016514868		223	0.026467049		113	0.034359851		113	0.043206068
136	112	0.026298832		222	0.037749232		112	0.039217337		112	0.052843067
137	111	0.016892679		221	0.035199715		111	0.031525386		111	0.042077423
138	110	0.032054705		220	0.038268347		110	0.036803197		110	0.051687367
139	109	0.009165076		219	0.031420881		109	0.03060822		109	0.038376235
140	108	0.036140714		218	0.032753813		108	0.038595425		108	0.05873829
141	107	0.011483497		217	0.031359356		107	0.02890689		107	0.038475522
142	106	0.025859077		216	0.037287026		106	0.036270271		106	0.05341699
143	105	0.018988222		215	0.036164871		105	0.034877626		105	0.046834207
144	104	0.023977534		214	0.039097887		104	0.035296203		104	0.051425555
145	103	0.028363097		213	0.032499965		103	0.033140536		103	0.045922324
146	102	0.03385141		212	0.025244665		102	0.036641259		102	0.058772188
147	101	0.031181014		211	0.043370306		101	0.039027686		101	0.057956476
148	100	0.007635251		210	0.036262009		100	0.028032219		100	0.035763692
149	99	0.022338701		209	0.031252767		99	0.034185235		99	0.044166562
150	98	0.022736121		208	0.040565206		98	0.036604025		98	0.051615745
151	97	0.006475441		207	0.044536236		97	0.029440031		97	0.038889223
152	96	0.051138231		206	0.039867555		96	0.035958869		96	0.057172961
153	95	0.03607858		205	0.038035442		95	0.039558801		95	0.05791791
154	94	0.043488209		204	0.041164169		94	0.043830257		94	0.062981721
155	93	0.012782163		203	0.036533964		93	0.031838273		93	0.03960921
156	92	0.016610624		202	0.04178233		92	0.032776134		92	0.048662913
157	91	0.04113954		201	0.045045123		91	0.035771281		91	0.056175287
158	90	0.022182486		200	0.039403364		90	0.031914954		90	0.051247986
159	89	0.040479656		199	0.04247306		89	0.03767192		89	0.059469149
160	88	0.026721248		198	0.036727199		88	0.032942261		88	0.047949422
161	87	0.030015592		197	0.041713406		87	0.037003741		87	0.057847436
162	86	0.030548909		196	0.042677602		86	0.035798085		86	0.053444558
163	85	0.012388692		195	0.046395976		85	0.026829814		85	0.044021569
164	84	0.042852237		194	0.041374035		84	0.043399512		84	0.067426578
165	83	0.032891826		193	0.050325028		83	0.04079805		83	0.058678463
166	82	0.026680817		192	0.039394046		82	0.041551471		82	0.052801258
167	81	0.037092547		191	0.039149539		81	0.042063153		81	0.058341041
168	80	0.029411628		190	0.04667783		80	0.031036725		80	0.048654948
169	79	0.040074418		189	0.0449154		79	0.038238733		79	0.062688741
170	78	0.03464044		188	0.036908573		78	0.037531068		78	0.053136203
171	77	0.027365075		187	0.046160593		77	0.031325596		77	0.055008169
172	76	0.036645714		186	0.04774402		76	0.031118659		76	0.04925557
173	75	0.025969648		185	0.041450486		75	0.030385319		75	0.046697468
174	74	0.042238972		184	0.046195827		74	0.039164473		74	0.062752411
175	73	0.036971203		183	0.044434395		73	0.03379338		73	0.055078534
176	72	0.044829485		182	0.043012918		72	0.038307735		72	0.060697346
177	71	0.060231392		181	0.046731257		71	0.039682209		71	0.070281336
178	70	0.027208367		180	0.054106934		70	0.033582224		70	0.046924723
179	69	0.046761892		179	0.043149603		69	0.038235484		69	0.054808638
180	68	0.043206948		178	0.046843169		68	0.036941326		68	0.061919203
181	67	0.039173691		177	0.045630959		67	0.038743825		67	0.065029559
182	66	0.040893159		176	0.047712923		66	0.037979482		66	0.06166469
183	65	0.034584849		175	0.04271894		65	0.036051291		65	0.055418015
184	64	0.050098588		174	0.041072455		64	0.040295978		64	0.064017457
185	63	0.042365981		173	0.036666155		63	0.03835201		63	0.059714065
186	62	0.045244963		172	0.035530297		62	0.038770088		62	0.061976903
187	61	0.051942858		171	0.051321907		61	0.045385524		61	0.076425667

Figure G-6. Barometric Response Function Coefficients for the LERF Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
188	60	0.052690168		170	0.038667871		60	0.039471467		60	0.06767306
189	59	0.046461301		169	0.0484001		59	0.032166394		59	0.061056041
190	58	0.053199946		168	0.05884817		58	0.039234268		58	0.062406387
191	57	0.04793678		167	0.045312383		57	0.039298574		57	0.05549681
192	56	0.057000862		166	0.039096558		56	0.047947459		56	0.067674414
193	55	0.052779522		165	0.050699148		55	0.047451261		55	0.071341476
194	54	0.069657435		164	0.048087549		54	0.045381122		54	0.075351331
195	53	0.0485318		163	0.043214469		53	0.04040615		53	0.064093399
196	52	0.048072781		162	0.042251479		52	0.035379513		52	0.061022636
197	51	0.050529393		161	0.045387805		51	0.040823869		51	0.062916061
198	50	0.064589214		160	0.052597587		50	0.043804803		50	0.070865221
199	49	0.057640304		159	0.045755336		49	0.043717816		49	0.06827878
200	48	0.064485802		158	0.045589959		48	0.044318087		48	0.072591239
201	47	0.068392516		157	0.044236829		47	0.042465595		47	0.075054543
202	46	0.067066079		156	0.034760791		46	0.038781652		46	0.0651746
203	45	0.067444639		155	0.044855559		45	0.04219245		45	0.068956769
204	44	0.068084399		154	0.049648641		44	0.044564517		44	0.066983764
205	43	0.075732047		153	0.051498236		43	0.043683464		43	0.077009141
206	42	0.066396233		152	0.053521194		42	0.046758986		42	0.074728674
207	41	0.071198812		151	0.05731518		41	0.044425128		41	0.075171131
208	40	0.070494331		150	0.056709305		40	0.043886466		40	0.073477942
209	39	0.066593946		149	0.049961754		39	0.043956933		39	0.073746458
210	38	0.086447096		148	0.044490809		38	0.044214122		38	0.07661377
211	37	0.093617958		147	0.054444393		37	0.046916068		37	0.086929264
212	36	0.065521281		146	0.051126454		36	0.039467876		36	0.069859603
213	35	0.067500772		145	0.046258787		35	0.044776497		35	0.066830536
214	34	0.092271826		144	0.043486584		34	0.038794788		34	0.078553906
215	33	0.060773261		143	0.04590609		33	0.035342158		33	0.063169594
216	32	0.090281259		142	0.050516711		32	0.039316125		32	0.077639723
217	31	0.088638715		141	0.049787492		31	0.042070237		31	0.074408028
218	30	0.08185615		140	0.059257737		30	0.035252064		30	0.067292817
219	29	0.10348494		139	0.05427219		29	0.045209844		29	0.090947484
220	28	0.078696318		138	0.05215618		28	0.045485525		28	0.072897678
221	27	0.093598025		137	0.045844396		27	0.041244337		27	0.070933431
222	26	0.104038885		136	0.048858452		26	0.042713894		26	0.079321746
223	25	0.083580635		135	0.054028315		25	0.037438418		25	0.072676384
224	24	0.091997736		134	0.051484158		24	0.037415791		24	0.072591777
225	23	0.094361222		133	0.058237631		23	0.037362388		23	0.072269643
226	22	0.099985047		132	0.062302385		22	0.038523979		22	0.071051082
227	21	0.097682082		131	0.049615928		21	0.038142501		21	0.075332497
228	20	0.096569217		130	0.058660721		20	0.035709716		20	0.063508408
229	19	0.09227665		129	0.054960495		19	0.040828349		19	0.071353536
230	18	0.101343121		128	0.049443001		18	0.043933531		18	0.07290999
231	17	0.095392887		127	0.054006915		17	0.036642763		17	0.059401737
232	16	0.085607891		126	0.063830455		16	0.036489772		16	0.058094497
233	15	0.110549273		125	0.054944547		15	0.040064729		15	0.069138989
234	14	0.090821994		124	0.065961528		14	0.036709771		14	0.058865318
235	13	0.080433718		123	0.059484811		13	0.031608231		13	0.051183458
236	12	0.098278305		122	0.051931758		12	0.032445139		12	0.0562863
237	11	0.081937016		121	0.05606059		11	0.032901271		11	0.049241899
238	10	0.107417648		120	0.064072698		10	0.043563265		10	0.064325165
239	9	0.080634185		119	0.052834972		9	0.033528015		9	0.045970826
240	8	0.076585511		118	0.059728805		8	0.030315163		8	0.047758579
241	7	0.074832657		117	0.056025134		7	0.032727747		7	0.045139029
242	6	0.069755886		116	0.05420112		6	0.02447064		6	0.023572679
243	5	0.090322223		115	0.056493604		5	0.036234533		5	0.049222881
244	4	0.096821295		114	0.053014206		4	0.03360678		4	0.046126544
245	3	0.094678978		113	0.064083698		3	0.029876719		3	0.0501918
246	2	0.105734962		112	0.06786298		2	0.039973376		2	0.058569594
247	1	0.100101705		111	0.060048922		1	0.039314118		1	0.055734464
248	0	0.249082778		110	0.058818841		0	0.120074695		0	0.236215884

Figure G-6. Barometric Response Function Coefficients for the LERF Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
249				109	0.059898177						
250				108	0.056466346						
251				107	0.067945121						
252				106	0.064114087						
253				105	0.063430808						
254				104	0.064358513						
255				103	0.063701921						
256				102	0.056211118						
257				101	0.063239358						
258				100	0.075284813						
259				99	0.079686655						
260				98	0.068612461						
261				97	0.063323339						
262				96	0.063008327						
263				95	0.071273018						
264				94	0.075708844						
265				93	0.072074833						
266				92	0.059320042						
267				91	0.071364159						
268				90	0.063900996						
269				89	0.067075411						
270				88	0.067550753						
271				87	0.069390631						
272				86	0.069261146						
273				85	0.065084709						
274				84	0.074653327						
275				83	0.067587213						
276				82	0.073289366						
277				81	0.073192844						
278				80	0.070600298						
279				79	0.071382293						
280				78	0.07474527						
281				77	0.074025448						
282				76	0.069968023						
283				75	0.067376163						
284				74	0.072809749						
285				73	0.072068272						
286				72	0.080618339						
287				71	0.076007877						
288				70	0.06621163						
289				69	0.073534127						
290				68	0.074775958						
291				67	0.063560905						
292				66	0.072127292						
293				65	0.077377102						
294				64	0.078279698						
295				63	0.073390058						
296				62	0.07451149						
297				61	0.076879738						
298				60	0.071868518						
299				59	0.077468836						
300				58	0.076707605						
301				57	0.074530139						
302				56	0.07488851						
303				55	0.074371345						
304				54	0.079462599						
305				53	0.073322136						
306				52	0.074581244						
307				51	0.073807895						
308				50	0.069178755						
309				49	0.070667113						

Figure G-6. Barometric Response Function Coefficients for the LERF Wells (cont'd.)

	B	C	D	E	F	G	H	I	J	K	L
310				48	0.080663868						
311				47	0.079951054						
312				46	0.071779228						
313				45	0.076362493						
314				44	0.072252755						
315				43	0.073013355						
316				42	0.06810539						
317				41	0.072605996						
318				40	0.072297109						
319				39	0.074197523						
320				38	0.077677922						
321				37	0.075275147						
322				36	0.079774663						
323				35	0.067267168						
324				34	0.065777744						
325				33	0.068691621						
326				32	0.06785218						
327				31	0.071204404						
328				30	0.077190077						
329				29	0.063492902						
330				28	0.064922834						
331				27	0.069184504						
332				26	0.071973652						
333				25	0.06500957						
334				24	0.067700908						
335				23	0.068178172						
336				22	0.064927008						
337				21	0.056957835						
338				20	0.060259889						
339				19	0.06881471						
340				18	0.061692987						
341				17	0.0568672						
342				16	0.056166756						
343				15	0.044391117						
344				14	0.052685465						
345				13	0.051566745						
346				12	0.046181541						
347				11	0.050851665						
348				10	0.045487195						
349				9	0.048828552						
350				8	0.05354027						
351				7	0.038896465						
352				6	0.03029953						
353				5	0.039201344						
354				4	0.040770652						
355				3	0.020205618						
356				2	0.020152962						
357				1	0.029343802						
358				0	0.046025841						

Figure G-6. Barometric Response Function Coefficients for the LERF Wells (cont'd.)

Appendix H

Spreadsheet Calculations — Estimate of Error in the Manual Hydraulic Head Measurements

This appendix documents the spreadsheets used to estimate the error remaining in the manual hydraulic head measurements collected for this study. Separate error estimates were made for LLWMA-1, IDF/PUREX, and LLWMA-2.

Figure H-1 shows a portion of the spreadsheet, with formulas displayed, that was used to estimate the error in the LLWMA-1 measurements. The wells used for the estimate are in column B, and the manual water-level measurements are listed in columns C (date and time) and D (hydraulic head). In column E, the difference of each measurement from the mean of all the measurements (on a given measurement date) are calculated (the difference is assumed to be the error in the measurement, so this method assumes that the water table is flat and that all of the variability in the measurements is due to error). The 25th and 75th percentiles of the differences are calculated in cells G9 and G10, respectively, and the difference between them (the IQR) is in cell G11. The IQR is then used in column F to identify potential outliers in the differences using the "IF" function: if the difference is less than the 25th percentile less 1.5 times the IQR, or if it is greater than the 75th percentile plus 1.5 times the IQR, then "Potential Outlier" appears in the cell; otherwise, the cell remains blank. Outliers were confirmed by inspection of the temporal water-level trends. If the measurements collected on a given date included an outlier, or if one or more wells were not measured, all the measurements on that date were excluded from the error estimate. This was done to prevent any bias from being introduced by not including the same number of measurements from each well. The final error estimate is calculated in cell F4 as 1.65 times the standard deviation of all the differences (a 90 percent confidence interval). Figure H.2 shows the full spreadsheet for LLWMA-1, and Figure H-3 shows the full spreadsheet for LLWMA-2, which used a spreadsheet of the same form as the example in Figure H-1.

Figure H-4 shows a portion of the spreadsheet, with formulas displayed, that was used to estimate the error in the IDF/PUREX measurements. The methodology used for IDF/PUREX was different from LLWMA-1 and LLWMA-2 in that it was not assumed that all of the variability in the measurements was due to error. To account for the interpreted hydraulic gradient, the predicted water-level for each well was calculated from the regression coefficients of the fitted plane. In Figure H-4, this calculation is performed in column E and the regression coefficients are listed in cells H14, H15, and H16. The differences (in column F) were calculated as the measured value minus the predicted value. The remainder of the calculations are the same as for LLWMA-1 and LLWMA-2. Figure H-5 shows the full spreadsheet and error estimate for IDF/PUREX. The cells with the "#VALUE!" error denote those measurement dates that did not yield a statistically significant trend surface.

	A	B	C	D	E	F	G	H
1	**Error Estimation**							
2								
3								
4			Final error estimate for LLWMA -1 (1.65 * standard deviation):			=ROUND(1.65*STDEV(E9:E14,E16:E21,E23:E28,E30:E35,E44:E49,E51:E56,E58:E63,E65:E70,E72:E77,E79:E84,E86:E91,E93:E98,E100:E105,E107:E112,E114:E119,E121:E126,E128:E133,E135:E140,E142:E147),3)	m	
5								
6						Outliers in red		
7								
8		Well Name	Date/Time (PST)	Hydraulic Head (m NAVD88) New RP, Gyro Corrected, & BP Adjusted	Difference from Mean (m)	Potential Outlier Identification by IQR Method		
9		299-E28-27			=D9-AVERAGE(D9:D14)	=IF(OR(E9<G9-1.5*G11,E9>G10+1.5*G11),"Potential Outlier",""'	=PERCENTILE(E9:E14,0.25)	25th Percentile
10		299-E32-5			=D10-AVERAGE(D9:D14)	=IF(OR(E10<G9-1.5*G11,E10>G10+1.5*G11),"Potential Outlier",""'	=PERCENTILE(E9:E14,0.75)	75th Percentile
11		299-E32-6			=D11-AVERAGE(D9:D14)	=IF(OR(E11<G9-1.5*G11,E11>G10+1.5*G11),"Potential Outlier",""'	=G10-G9	IQR
12		299-E32-8			=D12-AVERAGE(D9:D14)	=IF(OR(E12<G9-1.5*G11,E12>G10+1.5*G11),"Potential Outlier",""'		
13		299-E33-28			=D13-AVERAGE(D9:D14)	=IF(OR(E13<G9-1.5*G11,E13>G10+1.5*G11),"Potential Outlier",""'		
14		299-E33-34			=D14-AVERAGE(D9:D14)	=IF(OR(E14<G9-1.5*G11,E14>G10+1.5*G11),"Potential Outlier",""'		

Figure H-1. Spreadsheet for Estimating the Error in the Measured Hydraulic Heads for LLWMA-1 with Formulas Displayed

	A	B	C	D	E	F	G	H
1	**Error Estimation**							
2								
3								
4		Final error estimate for LLWMA -1 (1.65 * standard deviation):				0.006	m	
5								
6						Outliers in red		
7								
8		Well Name	Date/Time (PST)	Hydraulic Head (m NAVD88) New RP, Gyro Corrected, & BP Adjusted	Difference from Mean (m)	Potential Outlier Identification by IQR Method		
9		299-E28-27	1/12/09 10:33	121.943	0.0011667		-0.00158	25th Percentile
10		299-E32-5	1/12/09 9:16	121.939	-0.002833		0.000917	75th Percentile
11		299-E32-6	1/12/09 9:24	121.94	-0.001833		0.0025	IQR
12		299-E32-8	1/12/09 9:31	121.946	0.0041667			
13		299-E33-28	1/12/09 10:39	121.942	0.0001667			
14		299-E33-34	1/12/09 9:37	121.941	-0.000833			
15								
16		299-E28-27	2/23/09 11:16	121.922	-0.000833		-0.00158	25th Percentile
17		299-E32-5	2/23/09 11:41	121.917	-0.005833		0.002667	75th Percentile
18		299-E32-6	2/23/09 11:25	121.921	-0.001833		0.00425	IQR
19		299-E32-8	2/23/09 11:34	121.927	0.0041667			
20		299-E33-28	2/23/09 11:10	121.924	0.0011667			
21		299-E33-34	2/23/09 10:55	121.926	0.0031667			
22								
23		299-E28-27	3/24/09 7:33	121.913	-0.003	Potential Outlier	-0.00075	25th Percentile
24		299-E32-5	3/24/09 7:06	121.916	0		0.00075	75th Percentile
25		299-E32-6	3/24/09 7:10	121.916	0		0.0015	IQR
26		299-E32-8	3/24/09 7:13	121.919	0.003	Potential Outlier		
27		299-E33-28	3/24/09 7:37	121.917	0.001			
28		299-E33-34	3/24/09 7:16	121.915	-0.001			
29								
30		299-E28-27	4/13/09 9:01	121.924	0.005		-0.00275	25th Percentile
31		299-E32-5	4/13/09 7:48	121.913	-0.006		0.004	75th Percentile
32		299-E32-6	4/13/09 7:56	121.916	-0.003		0.00675	IQR
33		299-E32-8	4/13/09 8:05	121.924	0.005			
34		299-E33-28	4/13/09 9:07	121.92	0.001			
35		299-E33-34	4/13/09 8:11	121.917	-0.002			
36								
37		299-E28-27	5/28/09 8:00	121.93	0.015		0.01025	25th Percentile
38		299-E32-5	5/28/09 8:36	121.926	0.011		0.0145	75th Percentile
39		299-E32-6	5/28/09 8:30	121.925	0.01		0.00425	IQR
40		299-E32-8	5/28/09 8:20	121.85	-0.065	Potential Outlier		
41		299-E33-28	5/28/09 7:52	121.931	0.016			
42		299-E33-34	5/28/09 8:10	121.928	0.013			
43								

Figure H-2. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-1

	A	B	C	D	E	F	G	H
44		299-E28-27	7/17/09 10:09	121.973	0.006		-0.001	25th Percentile
45		299-E32-5	7/17/09 9:50	121.965	-0.002		0.005	75th Percentile
46		299-E32-6	7/17/09 9:42	121.952	-0.015	Potential Outlier	0.006	IQR
47		299-E32-8	7/17/09 9:31	121.969	0.002			
48		299-E33-28	7/17/09 10:04	121.974	0.007			
49		299-E33-34	7/17/09 7:29	121.969	0.002			
50								
51		299-E28-27	9/21/09 8:51	121.924	-0.016	Potential Outlier	-0.00025	25th Percentile
52		299-E32-5	9/21/09 8:27	121.939	-0.001		0.005	75th Percentile
53		299-E32-6	9/21/09 8:22	121.942	0.002		0.00525	IQR
54		299-E32-8	9/21/09 8:18	121.946	0.006			
55		299-E33-28	9/21/09 8:43	121.947	0.007			
56		299-E33-34	9/21/09 8:13	121.942	0.002			
57								
58		299-E28-27	10/27/09 8:42	121.919	-0.002833		-0.00283	25th Percentile
59		299-E32-5	10/27/09 8:26	121.917	-0.004833		0.001417	75th Percentile
60		299-E32-6	10/27/09 8:21	121.919	-0.002833		0.00425	IQR
61		299-E32-8	10/27/09 8:15	121.924	0.0021667			
62		299-E33-28	10/27/09 8:36	121.921	-0.000833			
63		299-E33-34	10/27/09 8:10	121.931	0.0091667	Potential Outlier		
64								
65		299-E28-27	11/12/09 10:08	121.918	0.0023333		-0.00117	25th Percentile
66		299-E32-5	11/12/09 9:33	121.916	0.0003333		0.001833	75th Percentile
67		299-E32-6	11/12/09 9:37	121.912	-0.003667		0.003	IQR
68		299-E32-8	11/12/09 9:41	121.918	0.0023333			
69		299-E33-28	11/12/09 10:12	121.916	0.0003333			
70		299-E33-34	11/12/09 9:45	121.914	-0.001667			
71								
72		299-E28-27	1/21/10 9:37	121.88	0		-0.001	25th Percentile
73		299-E32-5	1/21/10 8:43	121.878	-0.002		0.00075	75th Percentile
74		299-E32-6	1/21/10 8:51	121.879	-0.001		0.00175	IQR
75		299-E32-8	1/21/10 9:13	121.883	0.003			
76		299-E33-28	1/21/10 9:28	121.881	0.001			
77		299-E33-34	1/21/10 9:22	121.879	-0.001			
78								
79		299-E28-27	5/23/10 8:48	121.846	-0.000333		-0.00183	25th Percentile
80		299-E32-5	5/23/10 8:13	121.844	-0.002333		0.001917	75th Percentile
81		299-E32-6	5/23/10 8:20	121.844	-0.002333		0.00375	IQR
82		299-E32-8	5/23/10 8:27	121.849	0.0026667			
83		299-E33-28	5/23/10 8:42	121.849	0.0026667			
84		299-E33-34	5/23/10 8:34	121.846	-0.000333			
85								

Figure H-2. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-1 (cont'd.)

	A	B	C	D	E	F	G	H
86		299-E28-27	6/30/10 13:40	121.858	0.0056667		-0.00233	25th Percentile
87		299-E32-5	6/30/10 12:26	121.853	0.0006667		0.002917	75th Percentile
88		299-E32-6	6/30/10 12:30	121.847	-0.005333		0.00525	IQR
89		299-E32-8	6/30/10 12:36	121.85	-0.002333			
90		299-E33-28	6/30/10 13:44	121.856	0.0036667			
91		299-E33-34	6/30/10 12:41	121.85	-0.002333			
92								
93		299-E28-27	7/13/10 9:19	121.853	-0.000167		-0.00392	25th Percentile
94		299-E32-5	7/13/10 10:36	121.85	-0.003167		-0.00042	75th Percentile
95		299-E32-6	7/13/10 10:41	121.849	-0.004167		0.0035	IQR
96		299-E32-8	7/13/10 10:46	121.852	-0.001167			
97		299-E33-28	7/13/10 9:14	121.868	0.0148333	Potential Outlier		
98		299-E33-34	7/13/10 9:06	121.847	-0.006167			
99								
100		299-E28-27	9/15/10 10:18	121.845	0.003		-0.00275	25th Percentile
101		299-E32-5	9/15/10 9:45	121.836	-0.006		0.00275	75th Percentile
102		299-E32-6	9/15/10 9:51	121.838	-0.004		0.0055	IQR
103		299-E32-8	9/15/10 9:58	121.846	0.004			
104		299-E33-28	9/15/10 10:13	121.843	0.001			
105		299-E33-34	9/15/10 10:04	121.844	0.002			
106								
107		299-E28-27	1/4/11 10:51	121.85	0.0008333		-0.00117	25th Percentile
108		299-E32-5	1/4/11 10:38	121.847	-0.002167		0.000833	75th Percentile
109		299-E32-6	1/4/11 10:32	121.848	-0.001167		0.002	IQR
110		299-E32-8	1/4/11 10:25	121.85	0.0008333			
111		299-E33-28	1/4/11 10:45	121.848	-0.001167			
112		299-E33-34	1/4/11 10:20	121.852	0.0028333			
113								
114		299-E28-27	2/11/11 9:23	121.829	0.0001667		-0.00208	25th Percentile
115		299-E32-5	2/11/11 8:42	121.826	-0.002833		0.001667	75th Percentile
116		299-E32-6	2/11/11 8:53	121.829	0.0001667		0.00375	IQR
117		299-E32-8	2/11/11 9:01	121.826	-0.002833			
118		299-E33-28	2/11/11 9:15	121.831	0.0021667			
119		299-E33-34	2/11/11 9:08	121.832	0.0031667			
120								
121		299-E28-27	3/21/11 10:20	121.824	0.0041667		-0.00058	25th Percentile
122		299-E32-5	3/21/11 9:52	121.82	0.0001667		0.001667	75th Percentile
123		299-E32-6	3/21/11 9:56	121.814	-0.005833	Potential Outlier	0.00225	IQR
124		299-E32-8	3/21/11 10:00	121.82	0.0001667			
125		299-E33-28	3/21/11 10:25	121.822	0.0021667			
126		299-E33-34	3/21/11 10:04	121.819	-0.000833			
127								

Figure H-2. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-1 (cont'd.)

	A	B	C	D	E	F	G	H
128		299-E28-27	4/25/11 12:16	121.812	-0.001167		-0.00092	25th Percentile
129		299-E32-5	4/25/11 12:42	121.813	-0.000167		0.000583	75th Percentile
130		299-E32-6	4/25/11 12:36	121.813	-0.000167		0.0015	IQR
131		299-E32-8	4/25/11 12:28	121.814	0.0008333			
132		299-E33-28	4/25/11 12:11	121.812	-0.001167			
133		299-E33-34	4/25/11 12:23	121.815	0.0018333			
134								
135		299-E28-27	5/25/11 8:20	121.809	-0.0015		-0.0015	25th Percentile
136		299-E32-5	5/25/11 8:45	121.811	0.0005		0.00125	75th Percentile
137		299-E32-6	5/25/11 8:40	121.808	-0.0025		0.00275	IQR
138		299-E32-8	5/25/11 8:35	121.814	0.0035			
139		299-E33-28	5/25/11 8:14	121.809	-0.0015			
140		299-E33-34	5/25/11 8:29	121.812	0.0015			
141								
142		299-E28-27	6/20/11 11:12	121.812	-0.001		-0.0025	25th Percentile
143		299-E32-5	6/20/11 11:58	121.817	0.004		0.003	75th Percentile
144		299-E32-6	6/20/11 8:56	121.809	-0.004		0.0055	IQR
145		299-E32-8	6/20/11 9:00	121.817	0.004			
146		299-E33-28	6/20/11 11:07	121.813	0			
147		299-E33-34	6/20/11 9:05	121.81	-0.003			

Figure H-2. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-1 (cont'd.)

	A	B	C	D	E	F	G	H
1	**Error Estimation**							
2								
3								
4		Final error estimate for LLWMA -2 (1.65 * standard deviation):				0.008	m	
5								
6						Outliers in red		
7								
8		Well Name	Date/Time (PST)	Hydraulic Head (m NAVD88) New RP, Gyro Corrected, & BP Adjusted	Difference from Mean (m)	Potential Outlier Identification by IQR Method		
9		299-E27-17	5/28/09 10:59	121.941	-0.006125	Potential Outlier	-0.00037	25th Percentile
10		299-E27-18	5/28/09 11:23	121.95	0.002875		0.001875	75th Percentile
11		299-E27-8	5/28/09 10:47	121.948	0.000875		0.00225	IQR
12		299-E27-9	5/28/09 10:52	121.949	0.001875			
13		299-E33-14	5/28/09 11:29	121.943	-0.004125	Potential Outlier		
14		299-E33-37	5/28/09 11:18	121.949	0.001875			
15		299-E34-10	5/28/09 11:05	121.949	0.001875			
16		299-E34-9	5/28/09 11:12	121.948	0.000875			
17								
18		299-E27-17	6/29/09 9:05	121.932	-0.040125	Potential Outlier	0.003375	25th Percentile
19		299-E27-18	6/29/09 9:34	121.98	0.007875		0.007125	75th Percentile
20		299-E27-8	6/29/09 8:47	121.977	0.004875		0.00375	IQR
21		299-E27-9	6/29/09 8:39	121.979	0.006875			
22		299-E33-14	6/29/09 9:56	121.971	-0.001125			
23		299-E33-37	6/29/09 9:47	121.982	0.009875			
24		299-E34-10	6/29/09 9:23	121.978	0.005875			
25		299-E34-9	6/29/09 10:02	121.978	0.005875			
26								
27		299-E27-17	7/27/09 8:27	121.972	-0.00825		-0.00225	25th Percentile
28		299-E27-18	7/27/09 8:03	121.986	0.00575		0.00375	75th Percentile
29		299-E27-8	7/27/09 8:37	121.98	-0.00025		0.006	IQR
30		299-E27-9	7/27/09 8:46	121.984	0.00375			
31		299-E33-14	7/27/09 7:37	121.975	-0.00525			
32		299-E33-37	7/27/09 7:57	121.984	0.00375			
33		299-E34-10	7/27/09 8:09	121.982	0.00175			
34		299-E34-9	7/27/09 7:45	121.979	-0.00125			
35								
36		299-E27-17	8/6/09 11:09	121.984	-0.00325		-0.00175	25th Percentile
37		299-E27-18	8/6/09 12:12	121.991	0.00375		0.002	75th Percentile
38		299-E27-8	8/6/09 10:42	121.987	-0.00025		0.00375	IQR
39		299-E27-9	8/6/09 10:50	121.989	0.00175			
40		299-E33-14	8/6/09 11:44	121.983	-0.00425			
41		299-E33-37	8/6/09 12:30	121.99	0.00275			
42		299-E34-10	8/6/09 11:21	121.988	0.00075			
43		299-E34-9	8/6/09 11:32	121.986	-0.00125			
44								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2

	A	B	C	D	E	F	G	H
45		299-E27-17	9/22/09 9:24	121.94	-0.00775		-0.002	25th Percentile
46		299-E27-18	9/22/09 9:39	121.951	0.00325		0.00325	75th Percentile
47		299-E27-8	9/22/09 9:20	121.946	-0.00175		0.00525	IQR
48		299-E27-9	9/22/09 9:15	121.953	0.00525			
49		299-E33-14	9/22/09 9:47	121.945	-0.00275			
50		299-E33-37	9/22/09 9:34	121.951	0.00325			
51		299-E34-10	9/22/09 9:29	121.948	0.00025			
52		299-E34-9	9/22/09 9:44	121.948	0.00025			
53								
54		299-E27-17	10/29/09 8:56	121.926	-0.002875		-0.00212	25th Percentile
55		299-E27-18	10/29/09 9:06	121.93	0.001125		0.001125	75th Percentile
56		299-E27-8	10/29/09 8:52	121.927	-0.001875		0.00325	IQR
57		299-E27-9	10/29/09 8:39	121.933	0.004125			
58		299-E33-14	10/29/09 9:11	121.926	-0.002875			
59		299-E33-37	10/29/09 9:03	121.93	0.001125			
60		299-E34-10	10/29/09 8:59	121.929	0.000125			
61		299-E34-9	10/29/09 9:15	121.93	0.001125			
62								
63		299-E27-17	11/12/09 10:07	121.908	-0.00975	Potential Outlier	7.11E-15	25th Percentile
64		299-E27-18	11/12/09 9:50	121.92	0.00225		0.00225	75th Percentile
65		299-E27-8	11/12/09 9:44	121.918	0.00025		0.00225	IQR
66		299-E27-9	11/12/09 9:39	121.918	0.00025			
67		299-E33-14	11/12/09 10:17	121.917	-0.00075			
68		299-E33-37	11/12/09 9:56	121.92	0.00225			
69		299-E34-10	11/12/09 10:01	121.921	0.00325			
70		299-E34-9	11/12/09 10:12	121.92	0.00225			
71								
72		299-E27-17	1/4/10 9:53	122.755	0.74725	Potential Outlier	-0.10825	25th Percentile
73		299-E27-18	1/4/10 10:02	121.903	-0.10475		-0.10475	75th Percentile
74		299-E27-8	1/4/10 9:48	121.9	-0.10775		0.0035	IQR
75		299-E27-9	1/4/10 9:44	121.903	-0.10475			
76		299-E33-14	1/4/10 8:10	121.898	-0.10975			
77		299-E33-37	1/4/10 9:58	121.902	-0.10575			
78		299-E34-10	1/4/10 10:09	121.903	-0.10475			
79		299-E34-9	1/4/10 10:13	121.898	-0.10975			
80								
81		299-E27-17	1/20/10 12:32	121.889	-0.006375	Potential Outlier	-0.00138	25th Percentile
82		299-E27-18	1/20/10 12:47	121.895	-0.000375		0.001875	75th Percentile
83		299-E27-8	1/20/10 12:25	121.894	-0.001375		0.00325	IQR
84		299-E27-9	1/20/10 12:17	121.901	0.005625			
85		299-E33-14	1/20/10 13:12	121.895	-0.000375			
86		299-E33-37	1/20/10 12:53	121.894	-0.001375			
87		299-E34-10	1/20/10 12:40	121.898	0.002625			
88		299-E34-9	1/20/10 13:03	121.897	0.001625			
89								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H
90		299-E27-17	2/18/10 10:10	121.872	-0.132375	Potential Outlier	-0.12612	25th Percentile
91		299-E27-18	2/18/10 10:19	121.881	-0.123375		-0.12237	75th Percentile
92		299-E27-8	2/18/10 9:56	121.88	-0.124375		0.00375	IQR
93		299-E27-9	2/18/10 9:29	122.883	0.878625	Potential Outlier		
94		299-E33-14	2/18/10 10:28	121.876	-0.128375			
95		299-E33-37	2/18/10 10:15	121.882	-0.122375			
96		299-E34-10	2/18/10 10:02	121.882	-0.122375			
97		299-E34-9	2/18/10 10:24	121.879	-0.125375			
98								
99		299-E27-17	3/10/10 10:37	121.859	-0.072875	Potential Outlier	-0.05988	25th Percentile
100		299-E27-18	3/10/10 10:49	121.877	-0.054875		-0.05463	75th Percentile
101		299-E27-8	3/10/10 10:57	121.873	-0.058875		0.00525	IQR
102		299-E27-9	3/10/10 11:02	122.349	0.417125	Potential Outlier		
103		299-E33-14	3/10/10 10:14	121.869	-0.062875			
104		299-E33-37	3/10/10 10:44	121.876	-0.055875			
105		299-E34-10	3/10/10 10:30	121.878	-0.053875			
106		299-E34-9	3/10/10 10:21	121.874	-0.057875			
107								
108		299-E27-17	5/23/10 7:54	119.856	-1.61325	Potential Outlier	-0.0465	25th Percentile
109		299-E27-18	5/23/10 7:38	121.874	0.40475		0.405	75th Percentile
110		299-E27-8	5/23/10 8:10	121.875	0.40575		0.4515	IQR
111		299-E27-9	5/23/10 8:19	121.603	0.13375			
112		299-E33-14	5/23/10 7:00	121.926	0.45675			
113		299-E33-37	5/23/10 7:29	121.868	0.39875			
114		299-E34-10	5/23/10 7:21	121.87	0.40075			
115		299-E34-9	5/23/10 7:10	120.882	-0.58725			
116								
117		299-E27-17	6/30/10 10:05	121.857	-0.009125		-0.00238	25th Percentile
118		299-E27-18	6/30/10 10:36	121.871	0.004875		0.004125	75th Percentile
119		299-E27-8	6/30/10 9:57	121.87	0.003875		0.0065	IQR
120		299-E27-9	6/30/10 9:52	121.871	0.004875			
121		299-E33-14	6/30/10 10:50	121.856	-0.010125			
122		299-E33-37	6/30/10 10:30	121.87	0.003875			
123		299-E34-10	6/30/10 10:20	121.868	0.001875			
124		299-E34-9	6/30/10 10:59	121.866	-0.000125			
125								
126		299-E27-17	7/13/10 11:06	121.857	-0.010375	Potential Outlier	-0.00012	25th Percentile
127		299-E27-18	7/13/10 10:39	121.871	0.003625		0.003625	75th Percentile
128		299-E27-8	7/13/10 10:51	121.869	0.001625		0.00375	IQR
129		299-E27-9	7/13/10 10:58	121.869	0.001625			
130		299-E33-14	7/13/10 10:16	121.862	-0.005375			
131		299-E33-37	7/13/10 10:32	121.871	0.003625			
132		299-E34-10	7/13/10 11:11	121.871	0.003625			
133		299-E34-9	7/13/10 10:25	121.869	0.001625			
134								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H
135		299-E27-17	8/23/10 10:20	121.83	-0.014125	Potential Outlier	-0.00037	25th Percentile
136		299-E27-18	8/23/10 10:38	121.848	0.003875		0.003875	75th Percentile
137		299-E27-8	8/23/10 10:15	121.846	0.001875		0.00425	IQR
138		299-E27-9	8/23/10 10:11	121.849	0.004875			
139		299-E33-14	8/23/10 10:50	121.84	-0.004125			
140		299-E33-37	8/23/10 10:33	121.848	0.003875			
141		299-E34-10	8/23/10 10:27	121.847	0.002875			
142		299-E34-9	8/23/10 10:44	121.845	0.000875			
143								
144		299-E27-17	9/17/10 7:46	121.852	-0.01	Potential Outlier	-0.002	25th Percentile
145		299-E27-18	9/17/10 8:00	121.865	0.003		0.003	75th Percentile
146		299-E27-8	9/17/10 7:38	121.863	0.001		0.005	IQR
147		299-E27-9	9/17/10 7:33	121.869	0.007			
148		299-E33-14	9/17/10 8:09	121.857	-0.005			
149		299-E33-37	9/17/10 7:56	121.864	0.002			
150		299-E34-10	9/17/10 7:51	121.865	0.003			
151		299-E34-9	9/17/10 8:05	121.861	-0.001			
152								
153		299-E27-17	1/4/11 11:31	121.862	-0.000375		-0.00162	25th Percentile
154		299-E27-18	1/4/11 11:47	121.866	0.003625		0.002125	75th Percentile
155		299-E27-8	1/4/11 11:19	121.866	0.003625		0.00375	IQR
156		299-E27-9	1/4/11 11:01	121.861	-0.001375			
157		299-E33-14	1/4/11 12:04	121.857	-0.005375			
158		299-E33-37	1/4/11 11:56	121.863	0.000625			
159		299-E34-10	1/4/11 11:39	121.864	0.001625			
160		299-E34-9	1/4/11 12:13	121.86	-0.002375			
161								
162		299-E27-17	2/11/11 9:28	121.84	-0.009625		-0.00887	25th Percentile
163		299-E27-18	2/11/11 9:04	121.85	0.000375		0.000625	75th Percentile
164		299-E27-8	2/11/11 9:36	121.841	-0.008625		0.0095	IQR
165		299-E27-9	2/11/11 10:00	121.883	0.033375	Potential Outlier		
166		299-E33-14	2/11/11 8:47	121.839	-0.010625			
167		299-E33-37	2/11/11 8:36	121.851	0.001375			
168		299-E34-10	2/11/11 9:23	121.845	-0.004625			
169		299-E34-9	2/11/11 8:56	121.848	-0.001625			
170								
171		299-E27-17	3/21/11 9:07	121.824	-0.006		-0.00225	25th Percentile
172		299-E27-18	3/21/11 9:15	121.834	0.004		0.00325	75th Percentile
173		299-E27-8	3/21/11 9:02	121.828	-0.002		0.0055	IQR
174		299-E27-9	3/21/11 8:53	121.83	0			
175		299-E33-14	3/21/11 9:27	121.827	-0.003			
176		299-E33-37	3/21/11 9:19	121.833	0.003			
177		299-E34-10	3/21/11 9:11	121.834	0.004			
178		299-E34-9	3/21/11 9:23	121.83	0			
179								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H
180		299-E27-17	5/25/11 10:36	121.821	0.001		-0.002	25th Percentile
181		299-E27-18	5/25/11 10:58	121.822	0.002		0.00125	75th Percentile
182		299-E27-8	5/25/11 10:29	121.818	-0.002		0.00325	IQR
183		299-E27-9	5/25/11 10:18	121.821	0.001			
184		299-E33-14	5/25/11 11:09	121.817	-0.003			
185		299-E33-37	5/25/11 10:52	121.822	0.002			
186		299-E34-10	5/25/11 10:46	121.821	0.001			
187		299-E34-9	5/25/11 11:04	121.818	-0.002			
188								
189		299-E27-17	7/14/11 9:58	121.806	-0.006125		-0.00137	25th Percentile
190		299-E27-18	7/14/11 10:20	121.815	0.002875		0.002125	75th Percentile
191		299-E27-8	7/14/11 9:52	121.813	0.000875		0.0035	IQR
192		299-E27-9	7/14/11 9:41	121.812	-0.000125			
193		299-E33-14	7/14/11 11:15	121.807	-0.005125			
194		299-E33-37	7/14/11 10:15	121.816	0.003875			
195		299-E34-10	7/14/11 10:04	121.814	0.001875			
196		299-E34-9	7/14/11 10:09	121.814	0.001875			
197								
198		299-E27-17	8/15/11 9:40	121.804	-0.015875	Potential Outlier	-0.00112	25th Percentile
199		299-E27-18	8/15/11 10:06	121.824	0.004125		0.003375	75th Percentile
200		299-E27-8	8/15/11 9:33	121.819	-0.000875		0.0045	IQR
201		299-E27-9	8/15/11 9:26	121.823	0.003125			
202		299-E33-14	8/15/11 10:29	121.818	-0.001875			
203		299-E33-37	8/15/11 10:00	121.823	0.003125			
204		299-E34-10	8/15/11 9:45	121.825	0.005125			
205		299-E34-9	8/15/11 10:21	121.823	0.003125			
206								
207		299-E27-17	9/26/11 9:11	121.818	-0.010375	Potential Outlier	0.000125	25th Percentile
208		299-E27-18	9/26/11 9:31	121.832	0.003625		0.001875	75th Percentile
209		299-E27-8	9/26/11 8:56	121.827	-0.001375		0.00175	IQR
210		299-E27-9	9/26/11 9:02	121.829	0.000625			
211		299-E33-14	9/26/11 9:41	121.83	0.001625			
212		299-E33-37	9/26/11 9:35	121.831	0.002625			
213		299-E34-10	9/26/11 9:17	121.83	0.001625			
214		299-E34-9	9/26/11 9:25	121.83	0.001625			
215								
216		299-E27-17	11/30/11 10:17	121.813	-0.020375	Potential Outlier	0.000625	25th Percentile
217		299-E27-18	11/30/11 10:30	121.839	0.005625		0.004125	75th Percentile
218		299-E27-8	11/30/11 10:12	121.834	0.000625		0.0035	IQR
219		299-E27-9	11/30/11 9:01	121.834	0.000625			
220		299-E33-14	11/30/11 10:41	121.835	0.001625			
221		299-E33-37	11/30/11 10:26	121.839	0.005625			
222		299-E34-10	11/30/11 10:22	121.836	0.002625			
223		299-E34-9	11/30/11 10:36	121.837	0.003625			
224								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H
225		299-E27-17	12/29/11 10:46	121.816	-0.01625	Potential Outlier	-0.00025	25th Percentile
226		299-E27-18	12/29/11 11:18	121.837	0.00475		0.00375	75th Percentile
227		299-E27-8	12/29/11 10:36	121.832	-0.00025		0.004	IQR
228		299-E27-9	12/29/11 10:30	121.832	-0.00025			
229		299-E33-14	12/29/11 13:33	121.836	0.00375			
230		299-E33-37	12/29/11 11:05	121.836	0.00375			
231		299-E34-10	12/29/11 10:52	121.836	0.00375			
232		299-E34-9	12/29/11 10:57	121.833	0.00075			
233								
234		299-E27-17	1/25/12 10:36	121.806	-0.04175		-0.015	25th Percentile
235		299-E27-18	1/25/12 10:56	121.834	-0.01375		0.0045	75th Percentile
236		299-E27-8	1/25/12 10:29	121.838	-0.00975		0.0195	IQR
237		299-E27-9	1/25/12 9:01	121.91	0.06225	Potential Outlier		
238		299-E33-14	1/25/12 11:09	121.838	-0.00975			
239		299-E33-37	1/25/12 10:50	121.829	-0.01875			
240		299-E34-10	1/25/12 10:42	121.841	-0.00675			
241		299-E34-9	1/25/12 11:04	121.886	0.03825	Potential Outlier		
242								
243		299-E27-17	2/28/12 11:12	121.817	-0.003		-0.003	25th Percentile
244		299-E27-18	2/28/12 11:30	121.822	0.002		0.00225	75th Percentile
245		299-E27-8	2/28/12 11:05	121.817	-0.003		0.00525	IQR
246		299-E27-9	2/28/12 8:33	121.822	0.002			
247		299-E33-14	2/28/12 11:44	121.817	-0.003			
248		299-E33-37	2/28/12 11:24	121.823	0.003			
249		299-E34-10	2/28/12 11:18	121.819	-0.001			
250		299-E34-9	2/28/12 11:37	121.823	0.003			
251								
252		299-E27-17	4/18/12 9:00	121.79	-0.021875	Potential Outlier	-0.00938	25th Percentile
253		299-E27-18	4/18/12 9:11	121.805	-0.006875		-0.00663	75th Percentile
254		299-E27-8	4/18/12 8:53	121.801	-0.010875		0.00275	IQR
255		299-E27-9	4/18/12 9:35	121.881	0.069125	Potential Outlier		
256		299-E33-14	4/18/12 9:22	121.805	-0.006875			
257		299-E33-37	4/18/12 9:08	121.803	-0.008875			
258		299-E34-10	4/18/12 9:04	121.806	-0.005875			
259		299-E34-9	4/18/12 9:17	121.804	-0.007875			
260								
261		299-E27-17	6/14/12 13:03	121.791	-0.029625		-0.02688	25th Percentile
262		299-E27-18	6/14/12 12:56	121.794	-0.026625		-0.02163	75th Percentile
263		299-E27-8	6/14/12 11:59	121.797	-0.023625		0.00525	IQR
264		299-E27-9	6/14/12 11:54	121.793	-0.027625			
265		299-E33-14	6/14/12 13:09	121.994	0.173375	Potential Outlier		
266		299-E33-37	6/14/12 12:51	121.802	-0.018625			
267		299-E34-10	6/14/12 12:44	121.798	-0.022625			
268		299-E34-9	6/14/12 13:14	121.796	-0.024625			
269								

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H
270		299-E27-17	7/30/12 8:58	121.79	-0.009875	Potential Outlier	-0.00087	25th Percentile
271		299-E27-18	7/30/12 8:47	121.804	0.004125		0.002375	75th Percentile
272		299-E27-8	7/30/12 9:04	121.799	-0.000875		0.00325	IQR
273		299-E27-9	7/30/12 9:20	121.799	-0.000875			
274		299-E33-14	7/30/12 8:13	121.8	0.000125			
275		299-E33-37	7/30/12 8:23	121.803	0.003125			
276		299-E34-10	7/30/12 8:39	121.802	0.002125			
277		299-E34-9	7/30/12 8:30	121.802	0.002125			
278								
279		299-E27-17	9/11/12 8:08	121.787	-0.017375	Potential Outlier	-0.00062	25th Percentile
280		299-E27-18	9/11/12 7:56	121.809	0.004625		0.004625	75th Percentile
281		299-E27-8	9/11/12 8:16	121.804	-0.000375		0.00525	IQR
282		299-E27-9	9/11/12 8:28	121.803	-0.001375			
283		299-E33-14	9/11/12 7:20	121.806	0.001625			
284		299-E33-37	9/11/12 7:47	121.81	0.005625			
285		299-E34-10	9/11/12 7:36	121.809	0.004625			
286		299-E34-9	9/11/12 7:28	121.807	0.002625			

Figure H-3. Estimate of the Error in the Measured Hydraulic Heads for LLWMA-2 (cont'd.)

	A	B	C	D	E	F	G	H	I
1	Error Estimation								
2									
3									
4					Final error estimate for IDF/PUREX (1.65 * standard deviation):		=ROUND(1.65*STDEV(F9:F19,F21:F31,F33:F43,F69:F79,F81:F91,F105:F115,F117:F127,F141:F151,F153:F163,F165:F175,F261:F271),3)	m	
5									
6							Outliers in red		
7									
8		Well Name	Date/Time (PST)	Measured Hydraulic Head (m NAVD88) New RP, Gyro Corrected, & BP Adjusted	Predicted Hydraulic Head (m NAVD88)	Difference (m)	Potential Outlier Identification by IQR Method		
9		299-E17-18			=ROUND(H14+H15*VLOOKUP(B9,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B9,Wells!$B$6:$O$16,5),3)	=D9-E9	=IF(OR(F9<H9-1.5*H11,F9>H10+1.5*H11),"Potential Outlier","")	=PERCENTILE(F9:F19,0.25)	25th Percentile
10		299-E17-21			=ROUND(H14+H15*VLOOKUP(B10,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B10,Wells!$B$6:$O$16,5),3)	=D10-E10	=IF(OR(F10<H9-1.5*H11,F10>H10+1.5*H11),"Potential Outlier","")	=PERCENTILE(F9:F19,0.75)	75th Percentile
11		299-E17-22			=ROUND(H14+H15*VLOOKUP(B11,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B11,Wells!$B$6:$O$16,5),3)	=D11-E11	=IF(OR(F11<H9-1.5*H11,F11>H10+1.5*H11),"Potential Outlier","")	=H10-H9	IQR
12		299-E17-23			=ROUND(H14+H15*VLOOKUP(B12,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B12,Wells!$B$6:$O$16,5),3)	=D12-E12	=IF(OR(F12<H9-1.5*H11,F12>H10+1.5*H11),"Potential Outlier","")		
13		299-E17-25			=ROUND(H14+H15*VLOOKUP(B13,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B13,Wells!$B$6:$O$16,5),3)	=D13-E13	=IF(OR(F13<H9-1.5*H11,F13>H10+1.5*H11),"Potential Outlier","")	*Regression Coefficients:*	
14		299-E24-16			=ROUND(H14+H15*VLOOKUP(B14,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B14,Wells!$B$6:$O$16,5),3)	=D14-E14	=IF(OR(F14<H9-1.5*H11,F14>H10+1.5*H11),"Potential Outlier","")		b0
15		299-E24-18			=ROUND(H14+H15*VLOOKUP(B15,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B15,Wells!$B$6:$O$16,5),3)	=D15-E15	=IF(OR(F15<H9-1.5*H11,F15>H10+1.5*H11),"Potential Outlier","")		b1
16		299-E24-21			=ROUND(H14+H15*VLOOKUP(B16,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B16,Wells!$B$6:$O$16,5),3)	=D16-E16	=IF(OR(F16<H9-1.5*H11,F16>H10+1.5*H11),"Potential Outlier","")		b2
17		299-E24-24			=ROUND(H14+H15*VLOOKUP(B17,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B17,Wells!$B$6:$O$16,5),3)	=D17-E17	=IF(OR(F17<H9-1.5*H11,F17>H10+1.5*H11),"Potential Outlier","")		
18		299-E25-36			=ROUND(H14+H15*VLOOKUP(B18,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B18,Wells!$B$6:$O$16,5),3)	=D18-E18	=IF(OR(F18<H9-1.5*H11,F18>H10+1.5*H11),"Potential Outlier","")		
19		699-37-47A			=ROUND(H14+H15*VLOOKUP(B19,Wells!$B$6:$O$16,4)+H16*VLOOKUP(B19,Wells!$B$6:$O$16,5),3)	=D19-E19	=IF(OR(F19<H9-1.5*H11,F19>H10+1.5*H11),"Potential Outlier","")		

Figure H-4. Spreadsheet for Estimating the Error in the Measured Hydraulic Heads for IDF/PUREX with Formulas Displayed

	A	B	C	D	E	F	G	H	I
1	Error Estimation								
2									
3									
4			Error estimate for IDF/PUREX (1.65 * standard deviation):				0.019	m	
5									
6							Outliers in red		
7									
8		Well Name	Date/Time (PST)	Measured Hydraulic Head (m NAVD88) New RP, Gyro Corrected, & BP Adjusted	Predicted Hydraulic Head (m NAVD88)	Difference (m)	Potential Outlier Identification by IQR Method		
9		299-E17-18	6/16/08 9:13	121.958	121.972	-0.014	Potential Outlier	-0.0015	25th Percentile
10		299-E17-21	6/16/08 8:38	121.988	121.989	-0.001		0.002	75th Percentile
11		299-E17-22	6/16/08 9:25	121.978	121.976	0.002		0.0035	IQR
12		299-E17-23	6/16/08 9:00	121.979	121.981	-0.002			
13		299-E17-25	6/16/08 8:48	121.985	121.984	0.001		*Regression Coefficients:*	
14		299-E24-16	6/16/08 9:35	121.993	121.971	0.022	Potential Outlier	131.7451048	b0
15		299-E24-18	6/16/08 10:50	121.968	121.976	-0.008	Potential Outlier	-1.48024E-05	b1
16		299-E24-21	6/16/08 11:07	121.975	121.974	0.001		-9.32179E-06	b2
17		299-E24-24	6/16/08 10:27	121.989	121.983	0.006			
18		299-E25-36	6/16/08 10:10	121.964	121.964	0.000			
19		699-37-47A	6/16/08 9:53	121.97	121.968	0.002			
20									
21		299-E17-18	8/1/08 8:03	121.943	121.951	-0.008		-0.002	25th Percentile
22		299-E17-21	8/1/08 7:30	121.963	121.961	0.002		0.007	75th Percentile
23		299-E17-22	8/1/08 8:12	121.964	121.956	0.008		0.009	IQR
24		299-E17-23	8/1/08 7:40	121.951	121.953	-0.002			
25		299-E17-25	8/1/08 7:21	121.975	121.955	0.020		*Regression Coefficients:*	
26		299-E24-16	8/1/08 8:37	121.991	121.957	0.034	Potential Outlier	127.2344128	b0
27		299-E24-18	8/1/08 8:52	121.954	121.962	-0.008		-1.2419E-05	b1
28		299-E24-21	8/1/08 8:47	121.971	121.965	0.006		1.37585E-05	b2
29		299-E24-24	8/1/08 9:08	121.965	121.967	-0.002			
30		299-E25-36	8/1/08 8:24	121.954	121.954	0.000			
31		699-37-47A	8/1/08 7:51	121.945	121.942	0.003			
32									
33		299-E17-18	8/29/08 9:03	121.941	121.949	-0.008		-0.002	25th Percentile
34		299-E17-21	8/29/08 7:36	121.979	121.973	0.006		0.005	75th Percentile
35		299-E17-22	8/29/08 9:10	121.957	121.954	0.003		0.007	IQR
36		299-E17-23	8/29/08 8:03	121.962	121.961	0.001			
37		299-E17-25	8/29/08 7:48	121.962	121.965	-0.003		*Regression Coefficients:*	
38		299-E24-16	8/29/08 8:55	121.98	121.948	0.032	Potential Outlier	135.2166747	b0
39		299-E24-18	8/29/08 8:39	121.946	121.955	-0.009		-2.06457E-05	b1
40		299-E24-21	8/29/08 8:30	121.957	121.953	0.004		-1.03139E-05	b2
41		299-E24-24	8/29/08 9:25	121.964	121.965	-0.001			
42		299-E25-36	8/29/08 8:21	121.945	121.939	0.006			
43		699-37-47A	8/29/08 8:13	121.944	121.943	0.001			
44									

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX

	A	B	C	D	E	F	G	H	I
45		299-E17-18	9/10/08 9:27	121.937	#VALUE!	#VALUE!	#VALUE!	#VALUE!	25th Percentile
46		299-E17-21	9/10/08 9:01	122.154	#VALUE!	#VALUE!	#VALUE!	#VALUE!	75th Percentile
47		299-E17-22	9/10/08 9:25	121.966	#VALUE!	#VALUE!	#VALUE!	#VALUE!	IQR
48		299-E17-23	9/10/08 9:18	121.952	#VALUE!	#VALUE!	#VALUE!		
49		299-E17-25	9/10/08 9:11	121.963	#VALUE!	#VALUE!	#VALUE!	*Regression Coefficients:*	
50		299-E24-16	9/10/08 9:46	121.959	#VALUE!	#VALUE!	#VALUE!	No valid result	b0
51		299-E24-18	9/10/08 10:34	121.946	#VALUE!	#VALUE!	#VALUE!	No valid result	b1
52		299-E24-21	9/10/08 10:50	121.96	#VALUE!	#VALUE!	#VALUE!	No valid result	b2
53		299-E24-24	9/10/08 10:22	121.955	#VALUE!	#VALUE!	#VALUE!		
54		299-E25-36	9/10/08 10:07	121.944	#VALUE!	#VALUE!	#VALUE!		
55		699-37-47A	9/10/08 9:58	121.946	#VALUE!	#VALUE!	#VALUE!		
56									
57		299-E17-18	10/23/08 13:58	121.947	121.955	-0.008		-0.001	25th Percentile
58		299-E17-21	10/23/08 13:10	121.983	121.978	0.005		0.0055	75th Percentile
59		299-E17-22	10/23/08 13:38	121.962	121.959	0.003		0.0065	IQR
60		299-E17-23	10/23/08 14:05	122.079	121.967	0.112	Potential Outlier		
61		299-E17-25	10/23/08 13:05	121.97	121.971	-0.001		*Regression Coefficients:*	
62		299-E24-16	10/23/08 13:47	121.978	121.951	0.027	Potential Outlier	135.387274	b0
63		299-E24-18	10/23/08 13:22	121.949	121.958	-0.009		-1.97236E-05	b1
64		299-E24-21	10/23/08 13:32	121.958	121.955	0.003		-1.54637E-05	b2
65		299-E24-24	10/23/08 13:25	121.967	121.968	-0.001			
66		299-E25-36	10/23/08 14:17	121.948	121.942	0.006			
67		699-37-47A	10/23/08 14:12	121.95	121.949	0.001			
68									
69		299-E17-18	11/26/08 10:25	121.937	121.945	-0.008		-0.0015	25th Percentile
70		299-E17-21	11/26/08 8:56	121.955	121.957	-0.002		0.006	75th Percentile
71		299-E17-22	11/26/08 10:32	121.951	121.947	0.004		0.0075	IQR
72		299-E17-23	11/26/08 9:24	121.941	121.951	-0.010			
73		299-E17-25	11/26/08 9:08	121.964	121.953	0.011		*Regression Coefficients:*	
74		299-E24-16	11/26/08 10:15	121.982	121.944	0.038	Potential Outlier	128.5705601	b0
75		299-E24-18	11/26/08 9:48	121.946	121.947	-0.001		-9.9181E-06	b1
76		299-E24-21	11/26/08 9:55	121.954	121.946	0.008		-6.819E-06	b2
77		299-E24-24	11/26/08 8:44	121.953	121.952	0.001			
78		299-E25-36	11/26/08 10:50	121.938	121.939	-0.001			
79		699-37-47A	11/26/08 11:03	121.942	121.942	0.000			
80									
81		299-E17-18	12/22/08 12:31	121.929	121.933	-0.004		-0.002	25th Percentile
82		299-E17-21	12/22/08 12:54	121.946	121.948	-0.002		0.007	75th Percentile
83		299-E17-22	12/22/08 12:36	121.94	121.938	0.002		0.009	IQR
84		299-E17-23	12/22/08 12:43	121.948	121.938	0.010			
85		299-E17-25	12/22/08 12:50	121.971	121.941	0.030	Potential Outlier	*Regression Coefficients:*	
86		299-E24-16	12/22/08 12:21	121.97	121.936	0.034	Potential Outlier	130.6682952	b0
87		299-E24-18	12/22/08 12:05	121.93	121.943	-0.013		-1.64734E-05	b1
88		299-E24-21	12/22/08 12:08	121.942	121.944	-0.002		5.46708E-06	b2
89		299-E24-24	12/22/08 12:00	121.954	121.95	0.004			
90		299-E25-36	12/22/08 13:21	121.93	121.931	-0.001			
91		699-37-47A	12/22/08 13:26	121.927	121.924	0.003			
92									

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX (cont'd.)

	A	B	C	D	E	F	G	H	I
93		299-E17-18	1/26/09 10:27	121.911	#VALUE!	#VALUE!	#VALUE!	#VALUE!	25th Percentile
94		299-E17-21	1/26/09 9:29	121.937	#VALUE!	#VALUE!	#VALUE!	#VALUE!	75th Percentile
95		299-E17-22	1/26/09 10:21	121.934	#VALUE!	#VALUE!	#VALUE!	#VALUE!	IQR
96		299-E17-23	1/26/09 9:41	121.917	#VALUE!	#VALUE!	#VALUE!		
97		299-E17-25	1/26/09 9:34	121.935	#VALUE!	#VALUE!	#VALUE!	*Regression Coefficients:*	
98		299-E24-16	1/26/09 10:14	121.935	#VALUE!	#VALUE!	#VALUE!	No valid result	b0
99		299-E24-18	1/26/09 9:54	121.914	#VALUE!	#VALUE!	#VALUE!	No valid result	b1
100		299-E24-21	1/26/09 9:59	121.931	#VALUE!	#VALUE!	#VALUE!	No valid result	b2
101		299-E24-24	1/26/09 10:06	121.929	#VALUE!	#VALUE!	#VALUE!		
102		299-E25-36	1/26/09 10:34	121.918	#VALUE!	#VALUE!	#VALUE!		
103		699-37-47A	1/26/09 10:39	121.919	#VALUE!	#VALUE!	#VALUE!		
104									
105		299-E17-18	2/5/09 9:41	121.912	121.916	-0.004		-0.0015	25th Percentile
106		299-E17-21	2/5/09 9:18	121.947	121.95	-0.003		0.009	75th Percentile
107		299-E17-22	2/5/09 9:47	121.921	121.922	-0.001		0.0105	IQR
108		299-E17-23	2/5/09 9:32	121.937	121.935	0.002			
109		299-E17-25	2/5/09 9:26	121.94	121.94	0.000		*Regression Coefficients:*	
110		299-E24-16	2/5/09 9:58	121.952	121.91	0.042	Potential Outlier	141.149203	b0
111		299-E24-18	2/5/09 8:59	121.918	121.92	-0.002		-2.74568E-05	b1
112		299-E24-21	2/5/09 9:05	121.928	121.915	0.013		-2.54745E-05	b2
113		299-E24-24	2/5/09 8:50	121.938	121.933	0.005			
114		299-E25-36	2/5/09 10:13	121.92	121.897	0.023			
115		699-37-47A	2/5/09 10:06	121.913	121.91	0.003			
116									
117		299-E17-18	3/24/09 12:21	121.893	121.907	-0.014	Potential Outlier	-0.004	25th Percentile
118		299-E17-21	3/24/09 12:55	121.922	121.926	-0.004		0.002	75th Percentile
119		299-E17-22	3/24/09 12:35	121.916	121.911	0.005		0.006	IQR
120		299-E17-23	3/24/09 12:15	121.918	121.917	0.001			
121		299-E17-25	3/24/09 12:09	121.923	121.92	0.003		*Regression Coefficients:*	
122		299-E24-16	3/24/09 12:28	121.93	121.905	0.025	Potential Outlier	132.6461459	b0
123		299-E24-18	3/24/09 11:40	121.899	121.911	-0.012		-1.63832E-05	b1
124		299-E24-21	3/24/09 11:35	121.909	121.909	0.000		-9.74596E-06	b2
125		299-E24-24	3/24/09 11:20	121.917	121.919	-0.002			
126		299-E25-36	3/24/09 12:50	121.898	121.898	0.000			
127		699-37-47A	3/24/09 12:43	121.898	121.902	-0.004			
128									
129		299-E17-18	6/29/09 11:50	121.964	121.978	-0.014		-0.014	25th Percentile
130		299-E17-21	6/29/09 12:37	121.976	121.995	-0.019		0	75th Percentile
131		299-E17-22	6/29/09 11:41	121.984	121.98	0.004		0.014	IQR
132		299-E17-23	6/29/09 12:15	121.987	121.988	-0.001			
133		299-E17-25	6/29/09 12:22	121.99	121.99	0.000		*Regression Coefficients:*	
134		299-E24-16	6/29/09 11:33	121.995	121.973	0.022	Potential Outlier	131.9097431	b0
135		299-E24-18	6/29/09 11:19	121.964	121.978	-0.014		-1.30893E-05	b1
136		299-E24-21	6/29/09 11:26	121.972	121.974	-0.002		-1.7793E-05	b2
137		299-E24-24	6/29/09 11:03	121.933	121.984	-0.051	Potential Outlier		
138		299-E25-36	6/29/09 12:07	121.966	121.966	0.000			
139		699-37-47A	6/29/09 12:00	121.975	121.976	-0.001			
140									

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX (cont'd.)

	A	B	C	D	E	F	G	H	I
141		299-E17-18	9/22/09 7:50	121.917	121.932	-0.015		-0.006	25th Percentile
142		299-E17-21	9/22/09 7:58	121.954	121.956	-0.002		0.004	75th Percentile
143		299-E17-22	9/22/09 7:43	121.94	121.936	0.004		0.01	IQR
144		299-E17-23	9/22/09 8:09	121.944	121.945	-0.001			
145		299-E17-25	9/22/09 8:05	121.956	121.948	0.008		*Regression Coefficients:*	
146		299-E24-16	9/22/09 7:33	121.952	121.928	0.024	Potential Outlier	135.6167022	b0
147		299-E24-18	9/22/09 7:15	121.92	121.936	-0.016		-2.00706E-05	b1
148		299-E24-21	9/22/09 7:27	121.932	121.932	0.000		-1.58512E-05	b2
149		299-E24-24	9/22/09 7:06	121.94	121.945	-0.005			
150		299-E25-36	9/22/09 8:23	121.923	121.919	0.004			
151		699-37-47A	9/22/09 8:14	121.92	121.927	-0.007			
152									
153		299-E17-18	12/30/09 8:53	121.872	121.881	-0.009		-0.0045	25th Percentile
154		299-E17-21	12/30/09 10:10	121.912	121.91	0.002		0.004	75th Percentile
155		299-E17-22	12/30/09 9:13	121.887	121.888	-0.001		0.0085	IQR
156		299-E17-23	12/30/09 8:39	121.898	121.894	0.004			
157		299-E17-25	12/30/09 8:23	121.903	121.899	0.004		*Regression Coefficients:*	
158		299-E24-16	12/30/09 9:02	121.9	121.881	0.019	Potential Outlier	138.5643281	b0
159		299-E24-18	12/30/09 9:33	121.877	121.891	-0.014		-2.70993E-05	b1
160		299-E24-21	12/30/09 9:26	121.891	121.889	0.002		-8.12906E-06	b2
161		299-E24-24	12/30/09 9:56	121.897	121.903	-0.006			
162		299-E25-36	12/30/09 11:12	121.876	121.869	0.007			
163		699-37-47A	12/30/09 10:25	121.868	121.871	-0.003			
164									
165		299-E17-18	3/16/10 7:41	121.841	121.861	-0.020	Potential Outlier	-0.006	25th Percentile
166		299-E17-21	3/16/10 7:10	121.882	121.879	0.003		0.003	75th Percentile
167		299-E17-22	3/16/10 8:54	121.858	121.864	-0.006		0.009	IQR
168		299-E17-23	3/16/10 7:31	121.865	121.871	-0.006			
169		299-E17-25	3/16/10 7:22	121.877	121.874	0.003		*Regression Coefficients:*	
170		299-E24-16	3/16/10 7:53	121.889	121.858	0.031	Potential Outlier	132.5119677	b0
171		299-E24-18	3/16/10 9:09	121.848	121.863	-0.015		-1.53716E-05	b1
172		299-E24-21	3/16/10 8:40	121.86	121.86	0.000		-1.34016E-05	b2
173		299-E24-24	3/16/10 8:30	121.872	121.871	0.001			
174		299-E25-36	3/16/10 8:16	121.852	121.85	0.002			
175		699-37-47A	3/16/10 8:06	121.86	121.857	0.003			
176									
177		299-E17-18	6/30/10 8:55	121.84	#VALUE!	#VALUE!	#VALUE!	#VALUE!	25th Percentile
178		299-E17-21	6/30/10 10:01	121.86	#VALUE!	#VALUE!	#VALUE!	#VALUE!	75th Percentile
179		299-E17-22	6/30/10 8:44	121.864	#VALUE!	#VALUE!	#VALUE!	#VALUE!	IQR
180		299-E17-23	6/30/10 9:35	121.856	#VALUE!	#VALUE!	#VALUE!		
181		299-E17-25	6/30/10 9:44	121.867	#VALUE!	#VALUE!	#VALUE!	*Regression Coefficients:*	
182		299-E24-16	6/30/10 8:35	121.866	#VALUE!	#VALUE!	#VALUE!	No valid result	b0
183		299-E24-18	6/30/10 8:17	121.845	#VALUE!	#VALUE!	#VALUE!	No valid result	b1
184		299-E24-21	6/30/10 8:27	121.857	#VALUE!	#VALUE!	#VALUE!	No valid result	b2
185		299-E24-24	6/30/10 7:57	121.854	#VALUE!	#VALUE!	#VALUE!		
186		299-E25-36	6/30/10 9:25	121.845	#VALUE!	#VALUE!	#VALUE!		
187		699-37-47A	6/30/10 9:04	121.841	#VALUE!	#VALUE!	#VALUE!		
188									

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX (cont'd.)

	A	B	C	D	E	F	G	H	I
189		299-E17-18	9/14/10 8:43	121.821	121.834	-0.013	Potential Outlier	-0.001	25th Percentile
190		299-E17-21	NM	NM	121.847	NM	NM	0	75th Percentile
191		299-E17-22	9/14/10 10:16	121.836	121.836	0.000		0.001	IQR
192		299-E17-23	9/14/10 9:05	121.841	121.841	0.000			
193		299-E17-25	9/14/10 9:12	121.843	121.843	0.000		*Regression Coefficients:*	
194		299-E24-16	9/14/10 10:09	121.848	121.832	0.016	Potential Outlier	128.9823531	b0
195		299-E24-18	9/14/10 9:45	121.824	121.836	-0.012	Potential Outlier	-1.03324E-05	b1
196		299-E24-21	9/14/10 9:51	121.833	121.834	-0.001		-8.92512E-06	b2
197		299-E24-24	9/14/10 9:34	121.841	121.841	0.000			
198		299-E25-36	9/14/10 8:56	121.828	121.827	0.001			
199		699-37-47A	9/14/10 10:25	121.831	121.832	-0.001			
200									
201		299-E17-18	3/18/11 8:47	121.814	121.823	-0.009		-0.00375	25th Percentile
202		299-E17-21	3/18/11 8:06	121.848	121.844	0.004		0.004	75th Percentile
203		299-E17-22	3/18/11 8:36	121.823	121.827	-0.004		0.00775	IQR
204		299-E17-23	3/18/11 8:24	121.831	121.834	-0.003			
205		299-E17-25	3/18/11 8:11	121.839	121.837	0.002		*Regression Coefficients:*	
206		299-E24-16	3/18/11 9:41	121.858	121.82	0.038	Potential Outlier	133.720602	b0
207		299-E24-18	3/18/11 9:52	121.822	121.827	-0.005		-1.79087E-05	b1
208		299-E24-21	3/18/11 10:13	121.829	121.825	0.004		-1.18282E-05	b2
209		299-E24-24	NM	NM	121.836	NM	NM		
210		299-E25-36	3/18/11 10:35	121.816	121.812	0.004			
211		699-37-47A	3/18/11 10:24	121.823	121.818	0.005			
212									
213		299-E17-18	6/20/11 13:05	121.79	121.8	-0.010		-0.00375	25th Percentile
214		299-E17-21	6/20/11 12:31	121.825	121.824	0.001		0.00375	75th Percentile
215		299-E17-22	6/20/11 13:41	121.809	121.806	0.003		0.0075	IQR
216		299-E17-23	6/20/11 12:42	121.805	121.81	-0.005			
217		299-E17-25	6/20/11 12:37	121.82	121.814	0.006		*Regression Coefficients:*	
218		299-E24-16	6/20/11 13:11	121.82	121.802	0.018	Potential Outlier	135.8355865	b0
219		299-E24-18	6/20/11 12:15	121.798	121.811	-0.013		-2.4314E-05	b1
220		299-E24-21	6/20/11 13:18	121.811	121.811	0.000		-3.88432E-07	b2
221		299-E24-24	NM	NM	121.822	NM	NM		
222		299-E25-36	6/20/11 12:58	121.795	121.793	0.002			
223		699-37-47A	6/20/11 12:50	121.793	121.789	0.004			
224									
225		299-E17-18	9/22/11 7:43	121.788	121.802	-0.014	Potential Outlier	-0.00175	25th Percentile
226		299-E17-21	9/22/11 7:11	121.822	121.823	-0.001		0.00075	75th Percentile
227		299-E17-22	9/22/11 8:27	121.808	121.807	0.001		0.0025	IQR
228		299-E17-23	9/22/11 7:25	121.809	121.811	-0.002			
229		299-E17-25	9/22/11 7:19	121.816	121.814	0.002		*Regression Coefficients:*	
230		299-E24-16	9/22/11 7:50	121.822	121.804	0.018	Potential Outlier	133.7664881	b0
231		299-E24-18	9/22/11 8:05	121.797	121.811	-0.014	Potential Outlier	-2.07598E-05	b1
232		299-E24-21	9/22/11 7:58	121.812	121.812	0.000		-1.88125E-07	b2
233		299-E24-24	NM	NM	121.821	NM	NM		
234		299-E25-36	9/22/11 8:36	121.795	121.796	-0.001			
235		699-37-47A	9/22/11 7:33	121.793	121.793	0.000			
236									

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX (cont'd.)

	A	B	C	D	E	F	G	H	I
237		299-E17-18	12/29/11 8:20	121.803	121.804	-0.001		-0.003	25th Percentile
238		299-E17-21	12/29/11 9:02	121.827	121.829	-0.002		0.002	75th Percentile
239		299-E17-22	12/29/11 8:14	121.814	121.812	0.002		0.005	IQR
240		299-E17-23	12/29/11 8:52	121.815	121.813	0.002			
241		299-E17-25	12/29/11 8:46	121.82	121.818	0.002		*Regression Coefficients:*	
242		299-E24-16	12/29/11 8:08	121.816	121.809	0.007		135.9773243	b0
243		299-E24-18	12/29/11 7:44	121.8	121.819	-0.019	Potential Outlier	-2.61862E-05	b1
244		299-E24-21	12/29/11 8:01	121.815	121.821	-0.006		6.56434E-06	b2
245		299-E24-24	12/29/11 8:36	122.81	121.831	0.979	Potential Outlier		
246		299-E25-36	12/29/11 9:10	121.8	121.8	0.000			
247		699-37-47A	12/29/11 9:18	121.787	121.791	-0.004			
248									
249		299-E17-18	6/22/12 9:48	121.76	#VALUE!	#VALUE!	#VALUE!	#VALUE!	25th Percentile
250		299-E17-21	6/22/12 9:50	121.562	#VALUE!	#VALUE!	#VALUE!	#VALUE!	75th Percentile
251		299-E17-22	6/22/12 9:22	121.78	#VALUE!	#VALUE!	#VALUE!	#VALUE!	IQR
252		299-E17-23	6/22/12 9:35	121.779	#VALUE!	#VALUE!	#VALUE!		
253		299-E17-25	6/22/12 9:40	121.791	#VALUE!	#VALUE!	#VALUE!	*Regression Coefficients:*	
254		299-E24-16	6/22/12 9:11	121.798	#VALUE!	#VALUE!	#VALUE!	No valid result	b0
255		299-E24-18	6/22/12 8:51	121.768	#VALUE!	#VALUE!	#VALUE!	No valid result	b1
256		299-E24-21	6/22/12 8:48	121.777	#VALUE!	#VALUE!	#VALUE!	No valid result	b2
257		299-E24-24	6/22/12 8:39	121.792	#VALUE!	#VALUE!	#VALUE!		
258		299-E25-36	6/22/12 10:09	121.767	#VALUE!	#VALUE!	#VALUE!		
259		699-37-47A	6/22/12 10:13	121.569	#VALUE!	#VALUE!	#VALUE!		
260									
261		299-E17-18	9/12/12 12:01	121.77	121.784	-0.014		-0.0045	25th Percentile
262		299-E17-21	9/12/12 11:42	121.804	121.804	0.000		0.004	75th Percentile
263		299-E17-22	9/12/12 12:12	121.796	121.79	0.006		0.0085	IQR
264		299-E17-23	9/12/12 11:55	121.793	121.792	0.001			
265		299-E17-25	9/12/12 11:46	121.805	121.795	0.010		*Regression Coefficients:*	
266		299-E24-16	9/12/12 12:23	121.803	121.787	0.016		133.3838441	b0
267		299-E24-18	9/12/12 13:11	121.78	121.795	-0.015		-2.11203E-05	b1
268		299-E24-21	9/12/12 13:17	121.798	121.796	0.002		4.04507E-06	b2
269		299-E24-24	9/12/12 12:58	121.8	121.805	-0.005			
270		299-E25-36	9/12/12 12:37	121.779	121.78	-0.001			
271		699-37-47A	9/12/12 12:45	121.77	121.774	-0.004			

Figure H-5. Estimate of the Error in the Measured Hydraulic Heads for IDF/PUREX (cont'd.)

Appendix I

Hanford Information Systems Inventory Documentation for MRCX

HISI ID: 3385 Acronym: MRCX

Last Updated: 01/30/2013	Core Information		
Acronym:	MRCX	Title:	Multiple Regression Excel Removal River Stage
Purpose/Scope:	Multiple Regression in Excel for Removal of River Stage Effects from Water Levels		
Operational Date:	01/30/2013	Status: Operational	Support Level:
Owning Company:	CH2M HILL PLATEAU REMEDIATION COMPANY	Non Hanford?: No	
Base:	Standalone	Type:	Utility Calculation Software
Date Owner Reviewed:		Breadth Of Usage:	Single Workgroup
Date CIO Approved Use:	Not Required	Number of Users:	2
Date SME Approved Use: (Connell, Carl W)		Uses Database?:	No
Comments:			
Configuration Mgt Path:	CHPRC-MRCX-3385	Configuration Mgt Approach:	Specified in CHPRC-01954, MRCX Software Management Plan
Home Page:			

Contacts (Hanford)			
Type	Primary?	Name/Organization/Phone	Email?
Other	Yes	NICHOLS, WILL E / INTRA - RISK & MODELING INTEGRATION 376-4553	Yes
Owner Manager	Yes	NICHOLS, WILL E / INTRA - RISK & MODELING INTEGRATION 376-4553	Yes
Project Lead	Yes	MCDONALD, JOHN P / CHPRC - GROUNDWATER SCIENCE 373-3727	Yes
Technical Support Manager	Yes	MCDONALD, JOHN P / CHPRC - GROUNDWATER SCIENCE 373-3727	Yes

Business Categories
Environmental

Hanford Interfaces

External Interfaces to non-Hanford Applications (i.e., for other contracts, other networks, non-HLAN)

Hosts

Software

Non-Hanford Contacts

Version Description

Software Grading Checklist

Software Grading Checklist

Question #	Question	Yes	No
	Is the Software Safety Software?		
S1.	Is the software Safety System Software? Software for a nuclear facility that performs a safety function as part of an system, structure, or component (SSC) and is cited in either (1) a DOE approved documented safety analysis or (2) an approved hazard analysis per DOE P 450.4, "Safety Management System Policy" dated 10-15-96, and the DEAR Clause.	☐	☑
S2.	Is the software Safety and Hazard Analysis Software and Design Software? Software that is used to classify, design, or analyze nuclear facilities. This software is not part of an SSC but helps to ensure the proper accident or hazards analysis of nuclear facilities or an SSC that performs a safety function.	☐	☑
S3.	Is the software Safety Management and Administrative Controls Software? Software that performs a hazard control function in support of nuclear facility or radiological safety management programs or Technical Safety Requirements or other software that performs a control function necessary to provide adequate protection from nuclear facility or radiological hazards. This software supports eliminating, limiting, or mitigating nuclear hazards to workers, the public, or the environment as addressed in 10 CFR 830, 10 CFR 835, and the DEAR ISMS clause.	☐	☑
	Detailed Information		
1.	Could software failure compromise a limiting condition of operation?	☐	☑

2.	Could software failure cause a reduction in the safety margin for a safety SSC that is cited in DOE approved documented safety analysis (DSA)?	☐	☑
3.	Could software failure cause a reduction in the safety margin for other systems such as toxic or chemical protection systems that are cited in either (a) a DOE approved documented safety analysis or (b) an approved hazard analysis per DOE P 450.1, "Environment, Safety, and Health Policy for the Department of Energy Complex" and the DEAR ISMS clause?	☐	☑
4.	Could software failure result in non-conservative safety analysis, design, or misclassification of facilities or SSCs?	☐	☑
5.	Is the software a safety management database used to aid in decision making whose failure could impact safety SSC operation?	☐	☑
6.	Could software failure result in incorrect analysis, design, monitoring, alarming, or recording of hazardous exposures to workers or public?	☐	☑
7.	Could software failure compromise the defense in depth capability of a nuclear facility?	☐	☑
8.	Could software failure cause a potential violation of regulatory permitting requirements?	☐	☑
9.	Could software failure affect environment, safety, health monitoring or alarming systems?	☐	☑
10.	Could software failure affect the safe operation of a SSC?	☐	☑
11.	Is this software used to support facility protection (i.e., security, fire, etc.) or determine, display, or implement emergency actions?	☐	☑
12.	Does the software perform nuclear material, hazardous chemical, or waste inventory tracking and/or accountability?	☐	☑
13.	Is the software used in support of a quality assurance program that implements a contractual requirement?	☑	☐
14.	Is the software used to support a legal, regulatory, or external milestone?	☑	☐
15.	Is the software used to engineer, analyze, or calculate general service facility equipment designs and/or configurations?	☐	☑
16.	Is this software used to determine, select, or evaluate remedial actions for cleanup of contaminated sites or facilities?	☑	☐
17.	Would a disruption of service, or software error or failure, result in costs greater than $100K to resolve?	☐	☑
18.	Is software lifecycle cost through the first year of maintenance greater than $250K?	☐	☑

19.	Does the software/system contain information that may be considered "controlled use"?	☐	☑
	Controlled Use Exemptions		
E3.	Exemption 3 - Statutory Exemption Definition: Exemption 3 is for information that is explicitly prohibited from disclosure, generally by federal law. Basing an OUO determination on Exemption 3 is very complex. Therefore, use of this exemption for Export Controlled Information (ECI) must be reviewed by an ECI Reviewer; all other Exemption 3 information should be reviewed by Legal Services.	☐	☑
E4.	Exemption 4 - Commercial/Proprietary Definition: Exemption 4 addresses trade secrets and commercial or financial information that the Federal government has obtained from persons or commercial entities and that is privileged or confidential. This exemption is intended to protect both the interests of the government and persons submitting information to the government.	☐	☑
E5.	Exemption 5 - Privileged Information Definition: Federal Government-generated information that would not be available by law other than through litigation, including letters, evaluations, plans, trade secrets, etc. are covered by Exemption 5. This exemption protects "intra-agency" and "inter-agency" communications, which has been interpreted by courts to include contractor privileged communications prepared under government direction or initiative (e.g., government funded).	☐	☑
E6.	Exemption 6 - Personal Privacy Definition: Exemption 6 protects personal information related to a specific individual that, if disclosed, might cause personal distress or embarrassment.	☐	☑
E7.	Exemption 7 - Law Enforcement Definition: Exemption 7 protects information compiled by an agency with the authority to enforce the law. It covers information compiled for law enforcement purposes regardless of the format of the information or how and where the information may be filed.	☐	☑
	Key Systems – Critical/Essential		
KC.	Key Critical Software. Is the application, data storage location (share area), or telecommunication service necessary to manage, monitor, and control during emergency and response situations including natural disasters, onsite unsafe conditions, re-establishing the safe work environment, avoiding imminent violation of safety and environmental requirements, or restore security systems when an alternate is not available? Requires immediate restore within 24 hours.	☐	☑
KE.	Key Essential Software. Is the application, data storage location (share area), or telecommunication service required for ensuring area, facility, business, or plant safety and those actions necessary for continuing productive operation supporting the Hanford site mission? Requires attention and restore within 48-72 hours.	☐	☑
	Nuclear Facilities		
NF1	Identify the specific nuclear facility or facilities where the application is used. If "Other" is selected, describe in the "Comments" section.		
Comments:			

SGC Concurrence

SME Concurrence Date:	01/08/2013	SME: Connell, Carl W
CIO Concurrence Date:	01/08/2013	Concurrence: Nelson, Ronald L
Reported As CPIC Investment:		
Comments or Additional Concurrences:		

Software Level/Risk

Measure	Rating
Business Category:	Environmental
Software Type:	Utility Calculation Software
Safety Software:	No
Safety Software Classification:	N/A
Grading Level:	D
Key System:	N/A
Controlled Use:	No
Controlled Use Exemptions:	

Authorized Users

Usage Log

Cyber Security Information

Local Admin Privileges Required To Install?	
Local Admin Privileges Required To Operate?	
Risk Assessment Number (CSRM-ID):	
Accreditation Boundary	

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