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Remedial Investigation/Feasibility Study for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units

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Appendix C

Supporting Information for Wells and Boreholes

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C1 Introduction

This appendix provides supporting information for wells and boreholes installed for the remedial investigation.

The sampling and analysis plan (SAP) for 100-F wells and boreholes (*Sampling and Analysis Plan for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units Remedial Investigation/Feasibility Study* [DOE/RL-2009-43]) specified requirements for soil and water sampling during drilling. Occasionally, conditions in the field prevented sample collection. Other problems sometimes occurred after sample collection that prevented analysis. The tables in this appendix list the sampling requirements and whether results for chemical and physical analyses were received. In cases where the results are not available, the tables specify the reason.

The following tables specify the status of samples from groundwater monitoring wells:

- 199-F5-52 (C7790): Table C-1
- 199-F5-53 (C7791): Table C-2
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The following tables specify the status of samples from vadose zone boreholes:

- C7970: Table C-4
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For the vadose zone boreholes, physical property samples were required only at changes in geologic formations. Two of the boreholes encountered only the Hanford formation, so only one physical property sample per borehole was required. The other borehole required a physical property sample from the Hanford formation and the Ringold Formation upper mud (RUM) unit.

Details of drilling, geology, and additional information are available in borehole summary reports (*Borehole Summary Report for the Installation of Three Groundwater Wells in the 100-FR-3 Area to Support RI/FS* [SGW-49445]; *Borehole Summary Report for the Installation of 2 Temporary Monitoring Wells and 1 Characterization Borehole within the 100-FR-3 Area in Support of the Integrated 100 Area Remedial Investigation/Feasibility Study, FY2010-2011* [SGW-50130]).

This appendix also includes three environmental calculations: *Analysis of Slug Test Data at the 100-FR-3 Operable Unit* (ECF-100FR3-11-0146) and *Aquifer Test Analyses for Wells 199-B2-15 and 199-F5-53* (ECF-HANFORD-11-0149), and *Hydraulic Gradients in 100-FR-3, 2010 and 2011* (ECF-100FR3-12-0028).

Table C-1. Characterization Sample Status for Well 199-F5-52 (C7790)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
15 ft above WT	24.5 - 27.0	X	X	X	X	B26RY4	
						B26T18	
						B26T19	
						B26T04	
10 ft above WT	29.8 - 31.3	X	X	X	X	B26T20	
						B26T21	
						B26T05	
5 ft above WT	34.8 - 36.5	X	X	X		B26RY5	Insufficient sample volume for physical properties
						B26T22	
						B26T23	
						B26T06	
						B26T25	
						B26T07	
2 ft above WT	37.3 - 39.0	X	X	X	X	B26T30	
						B26T31	
						B26T10	
At WT	40.1 - 42.6	X	X	X	X	B26RY7	
						B26T32	
						B26T33	
						B26T11	
None	42.4 - 44.9				X	B26T34	Extra sample; overlaps previous interval
						B26T35	
						B26T12	
5 ft below WT	49.3 - 51.8	X	X	X	X	B26T44	
						B26T45	
						B26T17	

Table C-1. Characterization Sample Status for Well 199-F5-52 (C7790)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
Bottom of unconfined aquifer	63.3 - 65.8	X	X	X	X	B26TB3	
						B26TB7	
						B26TC1	
5 feet into RUM	71.3 - 73.8	X	X	X	X	B26TB4	
						B26TB8	
						B26TC2	
Number of intervals sampled		8	8	8	8		

Bold outlines indicate some or all required results not available.

Depth to water 45 ft

Depth to RUM 66 ft

Rec'd = received

Req'd = required

RUM = Ringold Formation upper mud unit

SAP = sampling and analysis plan

WT = water table

Table C-2. Characterization Sample Status for Well 199-F5-53 (C7791)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
15 ft above WT	22.6 - 25.1	X	X	X	X	B27395	
						B27356	
						B27369	
						B27382	
10 ft above WT	28.2 - 30.7	X	X	X	X	B27357	
						B28MY9	
						B27370	
						B27383	
5 ft above WT	32.5 - 35.0	X	X	X		B27396	Insufficient sample volume for physical property analyses.
						B27359	
						B28N00	
						B27372	
						B27385	
						B27360	
						B28N01	
						B27386	
2 ft above WT	35.5 - 38.0	X	X	X	X	B27361	
						B28N02	
						B27374	
						B27387	
At WT	38.2 - 40.1	X	X	X	X	B27397	
						B27362	
						B28N03	
						B27375	
						B27388	

Table C-2. Characterization Sample Status for Well 199-F5-53 (C7791)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
5 ft below WT	43.4 - 45.9	X	X	X		B27368	Insufficient sample volume for physical property analyses.
						B28N12	
						B27381	
						B27394	
Bottom of unconfined aquifer	52.3 - 54.8	X	X	X	X	B273B2	
Top non-water-bearing RUM unit	55.1 - 57.6	X	X	X		B273B3	Insufficient sample volume for physical property analyses.
						B273B4	
Middle non-water-bearing RUM unit	81.8 - 83.9	X	X	X	X	B273B5	
Bottom non-water-bearing RUM unit	102.5 - 105.0	X	X	X	X	B273B6	
Number of intervals sampled		10	10	10	7		

Bold outlines indicate some or all required results not available.

Depth to water 38.7 ft

Depth to RUM 54.5 ft

Rec'd = received

Req'd = required

RUM = Ringold Formation upper mud unit

SAP = sampling and analysis plan

WT = water table

Table C-3. Characterization Sample Status for Well 199-F5-54 (C7792)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
none	21.6 - 24.1		X		X	B26Y55	
						B26Y75	
						B26Y86	
						B26Y60	
15 ft above WT	26.4 - 28.2	X	X	X		B26Y73	Insufficient sample volume for physical property analyses.
						B26Y88	
						B26Y62	
none	30.7 - 32.2		X		X	B26Y56	
						B26Y76	
						B26Y89	
						B26Y63	
10 ft above WT	33.0 - 34.5	X	X	X		B26Y77	Insufficient sample volume for physical property analyses.
						B26Y90	
						B26Y64	
5 ft above WT	36.1 - 38.6	X	X	X		B26Y57	Insufficient sample volume for physical property analyses.
						B26Y78	
						B26Y91	
						B26Y65	
						B26Y74	
						B26Y87	
						B26Y61	
2 ft above WT	38.5 - 41.0	X	X	X	X	B26Y80	
						B26Y93	
						B26Y67	
At WT	40.8 - 43.3	X	X	X	X	B26Y58	
						B26Y81	
						B26Y94	
						B26Y68	

Table C-3. Characterization Sample Status for Well 199-F5-54 (C7792)

Sample Purpose (SAP Requirement)	Sample Depth (ft)	Chemical Analyses		Physical Properties		Sample No.	Comment
		Req'd?	Rec'd?	Req'd?	Rec'd?		
5 ft below WT	47.1 - 49.6	X	X	X	X	B26Y82	Insufficient sample volume for moisture analyses.
						B26Y95	
						B26Y69	
None	57.0 - 59.0		X		X	B26YX1	This one taken as “bottom of unconfined aquifer.”
						B264K6	
None	63.9 - 66.4		X			B273B7	
						B273B8	
Bottom of unconfined aquifer	67.0 - 69.0	X	X	X		B27PX9	Physical properties not requested. 57- to 59-ft sample intended as “bottom of aquifer.”
						B27PY1	
						B27PY0	
5 feet into RUM	74.9 - 77.4	X	X	X	X	B26YX3	
						B264K7	
Number of intervals sampled		8	12	8	7		

Bold outlines indicate some or all required results not available.

Depth to water 42.4 ft

Depth to RUM 69.8 ft

Rec’d = received

Req’d = required

RUM = Ringold Formation upper mud unit

SAP = sampling and analysis plan

WT = water table

Table C-4. Characterization Sample Status for Borehole C7970

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample No.	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
I-001	15.0 - 17.5	15.4 - 17.9	X	X			B28NV9(RS)	
							B28NM7(VOA)	
							B28NP0	
							B28NR3	
							B28NT6	
I-002	20.0 - 22.5	20.0 - 22.7	X	X			B28NM8(VOA)	
							B28NP1	
							B28NR4	
							B28NT7	
							B2BXR1(RS)	
							B28NW9(VOA)	
							B28NX1	
							B28NX0	
I-003	25.0 - 27.5	24.6 - 27.1	X	X	X		B28NW0(RS)	Insufficient sample volume for physical property analyses.
							B28NM9(VOA)	
							B28NP2	
							B28NR5	
							B28NT8	
I-004	30.0 - 32.5	29.4 - 319	X	X			B28NN0(VOA)	
							B28NP3	
							B28NR6	
							B28NT9	
I-005	35.0 - 37.5	34.4 - 36.9	X	X			B28NW1(RS)	
							B28NN1(VOA)	
							B28NP4	
							B28NR7	
							B28NV0	

Table C-4. Characterization Sample Status for Borehole C7970

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample No.	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
I-006	37.5 - 40.0	37.5 - 40.0	X	X			B28NN2	
							B28NP5	
							B28NR8	
							B28NV1	
I-007	40.0 - 42.5	39.5 - 42.0	X	X			B28NW2	
							B28NN3	
							B28NP6	
							B28NR9	
							B28NV2	
I-014	Top of water table (~45 ft)	42.2 - 43.5	X	X			B28NW5	
							B28NN9	
							B28NR2	
							B28NT5	
							B28NV8	
I-015	5 ft into water table (~50 ft)	46.4 - 48.4	X	X			B28NM6	
							B28NX2	
Number of intervals sampled			9	9	1	0		

Bold outlines indicate some or all required results not available.

Depth to water 42.3 ft

Bgs = below ground surface

Rec'd = received

Req'd = required

SAP = sampling and analysis plan

Table C-5. Characterization Sample Status for Borehole C7971

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample HEIS#	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
I-001	17.5 - 20.0	17.3 - 19.8	X	X			B28VL5	
							B28VL7	
							B28VL8	
							B28VL9	
							B28VL6	
I-002	20.0 - 22.5	19.7 - 22.2	X	X			B28VM2	
							B28VM3	
							B28VM4	
							B28VM1	
I-003	25.0 - 27.5	25.3 - 27.8	X	X			B28VN1	
							B28VN3	
							B28VN4	
							B28VN5	
							B28VN2	
							B28VM6	
							B28VM7	
							B28VM5	
I-007	37.5-40	--			X			Not collected because water table was higher than expected.
I-012	Top of water table (~45.0 ft)	26.0 - 28.5	X	X			B28VV0	
							B28VV1	
							B28VV2	
							B2B6M3	
I-013S	5 ft into water table(~45 ft)	29.0 - 31.5	X	X	X	X	B28VT8	RUM
							B28VT9	
							B28VV4	
							B28VV3	

Table C-5. Characterization Sample Status for Borehole C7971

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample HEIS#	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
	30-32.5							In SAP but not needed because of geology
	32.5-35							In SAP but not needed because of geology
	35-37.5							In SAP but not needed because of geology
	37.5-40							In SAP but not needed because of geology
Number of intervals sampled			5	5	2	1		

Bold outlines indicate some or all required results not available.

Depth to water 26.2 ft

bgs = below ground surface

HEIS = Hanford Environmental Information System

Rec'd = received

Req'd = required

Req't = requirement

RUM = Ringold Formation upper mud

SAP = sampling and analysis plan

Table C-6. Characterization Sample Status for Borehole C7972

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample HEIS#	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
I-001	20.0 - 22.5	21.1 - 23.6	X	X			B29386(RS)	
							B29388(VOA)	
							B29389	
							B29390	
							B29387	
I-002	25.0 - 27.5	25.3 - 26.8	X	X			B29392(VOA)	
							B29393	
							B29394	
							B29391	
I-003	30.0 - 32.5	30.4 - 31.4	X	X			B29396	
							B29398	
							B29399	
							B293B0	
							B29397	
							B293B2	
							B293P4	
							B293B1	
I-004	35.0 - 37.5	35.1 - 36.1	X	X			B293B8	
							B293B9	
							B293C0	
							B293B7	
I-005	37.5 - 40.0	37.6 - 38.6	X	X			B293C1	
							B293C3	
							B293C4	
							B293C5	
							B293C2	

Table C-6. Characterization Sample Status for Borehole C7972

Sample Interval	Sample Depth (ft bgs)		Chemical Analyses		Physical Properties		Sample HEIS#	Comment
	SAP Req't	Actual	Req'd?	Rec'd?	Req'd?	Rec'd?		
I-006	40.0 - 42.5	40.5 - 42.0	X	X			B293C7	
							B293C8	
							B293C9	
							B293C6	
							B293D1	
							B293D2	
							B293D0	
I-008	Top of water table (~45 ft)	42.5 - 45.0	X	X			B293F0	
							B293F1	
							B293F2	
							B293D9	
I-012	Formation change	--			X			Not collected; borehole did not hit RUM. No physical property sample collected from Hanford formation either.
I-013	5 ft into water table (~50 ft)	48.4 - 50.9	X	X			B293H9	
							B293H8	
Number of intervals sampled			8	8	1	0		

Bold outlines indicate some or all required results not available.

Depth to water 43.5 ft

bgs = below ground surface

HEIS = Hanford Environmental Information System

Rec'd = received

Req'd = required

Req't = requirement

RUM = Ringold Formation upper mud unit

SAP = sampling and analysis plan

C2 References

DOE/RL-2009-43, 2010, *Sampling and Analysis Plan for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units Remedial Investigation/Feasibility Study*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://www2.hanford.gov/arpir/?content=findpage&AKey=1006220803.

ECF-100FR3-11-0146, 2011, *Analysis of Slug Test Data at the 100-FR-3 Operable Unit*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.

ECF-HANFORD-11-0149, 2011, *Aquifer Test Analyses for Wells 199-B2-15 and 199-F5-53*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.

ECF-100FR3-12-0028, 2012, *Hydraulic Gradients in 100-FR-3, 2010 and 2011* CH2M HILL Plateau Remediation Company, Richland, Washington.

SGW-49445, 2011, *Borehole Summary Report for the Installation of Three Groundwater Wells in the 100-FR-3 Area to Support RI/FS*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.

SGW-50130, 2011, *Borehole Summary Report for the Installation of 2 Temporary Monitoring Wells and 1 Characterization Borehole within the 100-FR-3 Area in Support of the Integrated 100 Area Remedial Investigation/Feasibility Study*, FY2010-2011, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington.

CH2MHILL Plateau Remediation Company

Environmental Calculation Cover Page

Part 1: Completed by the Responsible Manager

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Preparer: LC Swanson	**Basis of Qualification: Senior Hydrogeologist**
Checker: MJ Hartman	**Basis of Qualification: Senior Hydrogeologist**
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1 Purpose

The purpose of this environmental calculation is to estimate the transmissivity and hydraulic conductivity for two wells screened in the Ringold Formation Upper Mud Unit (RUM) in the 100-BC-5 and 100-FR-3 Operable Units using data collected from constant rate discharge tests. Figure 1 is a location map for these wells.

Constant rate discharge tests were required by the sampling and analysis plans to characterize the hydraulic conductivity of the aquifer in these operable units (*Sampling and Analysis Plan for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units Remedial Investigation/Feasibility Study,* DOE/RL-2009-44, Rev. 0; and *Sampling and Analysis Plan for the 100-FR-1, 100-FR-2, 100-FR-3, 100-IU-2, and 100-IU-6 Operable Units Remedial Investigation/Feasibility Study,* DOE/RL-2009-43, Rev. 0).

2 Background

Wells 199-B2-15 and 199-F5-53 were drilled into the RUM in FY2011 and FY2010, respectively, and then completed in the first water producing zone within or below the top of the RUM. The selected depth of completion for the screens was based on geologic logs and the driller's observations. Both wells were screened over a 10-ft section with a 0.010 inch slot opening and a 20-40 mesh filter pack. The filter pack extended 5-ft above the top of the screen and 22 ft below the bottom of the screen at 199-B2-15 and 10 ft below the bottom of the screen at 199-F5-53. Well as-builts are provided in Appendix A. Borehole logs can be found in *Borehole Summary Report for the Installation of 6 Wells in the 100-BC-5 Operable Unit to Support RI/FS* (SGW-49672) and *Borehole Summary Report for the Installation of Three Groundwater Wells in the 100-FR-3 Area to Support RI/FS* (SGW-49445).

The aquifer tests were conducted on March 21, 2011 and March 24, 2011 at wells 199-B2-15 and 199-F5-53, respectively. Well 199-B2-15 was pumped for 358 minutes at 4.42 gallons per minute (gpm) and well 199-F5-53 was pumped for 329 minutes at 2 gpm. During the 199-B2-15 test, water levels also were measured in adjacent well 199-B2-14, which is screened in the upper portion of the unconfined aquifer. Well 199-B2-14 is 13.4 ft from the pumping well. Aquifer test data for Wells 199-B2-14 and 199-B2-15 are found in Appendix B. The aquifer test data for Well 199-F4-53 is found in Appendix C.

3 Methodology

Two methods were used to calculate the transmissivities at wells 199-B2-15 and 199-F5-53. The Cooper-Jacob straight-line method (1946) was used to estimate the transmissivity (hydraulic conductivity) from the constant rate pumping test at 199-B2-15. The procedure for this analysis is described by authors such as Kruseman and de Ridder (1994), Todd (1980), and Kresic (1997). This method is applicable to confined aquifers and in some cases to unconfined aquifers. For these cases the test analysis was for a confined aquifer.

The transmissivity at 199-F5-53 was estimated from the transmissivity determined at 199-B2-15 by comparing specific capacities at a given time. This less rigorous approach for 199-F5-53 was used because of the difficulty in removing extraneous river effects from the pumping test data which resulted in difficulties in applying the Cooper-Jacob straight-line method. Variations in the river level affected both the drawdown and the recovery period data at 199-F5-53. For example, the drawdown as shown in Figure 2 is very flat or slightly declining toward the end of the test where a straight-line match would normally occur.

In addition, a closer look at the data over the test period (Figure 3) shows somewhat systematic changes in the water level at the end of the test. These variations may be the result of very small changes in pumping rate (only 2 gpm). Considering 19 ft of drawdown at 2 gpm, a change in the pumping rate of only 0.1 gpm would potentially cause 0.95 ft of water level change.

Changes in river levels were less predominant during the 199-B2-15 drawdown period, so the straight-line method of analysis appeared to be applicable.

A pressure derivative analysis was also applied to the data at 199-B2-15 to determine when radial flow was occurring. Validating this test assumption as noted in the next section is important for identifying which portion of the drawdown data are amenable to a straight-line match (Spane and Wurstner, 1993).

The final step prior to carrying out the calculation for transmissivity was to determine if there were any barometric effects during the test. No significant changes in the water level response were attributed to barometric pressure changes at 199-B2-15 (Figure 4). This graph includes in the baseline water level data at this well; the river level change during the baseline period; a water level corrected for river level changes; and barometric pressure changes during this same time. After removing river level changes (the resulting light blue line), there are no obvious remaining dynamic responses to barometric pressure variations. This analysis was done using the approach and program described in PNNL-19775 (Mackley et al., 2010). Because a different methodological approach was used at 199-F5-53, a response to barometric pressure is less of a concern. Collection of baseline water level data at 199-F5-53 did not occur because of restricted well access and time constraints for completing the test.

4 Assumptions and Inputs

The assumptions that pertain to the Cooper-Jacob method of analysis are given in Kruseman and de Ridder (1994). These are as follows:

- The aquifer is confined
  - infinite in areal extent (seemingly)
  - homogeneous, isotropic, and of uniform thickness
- Prior to pumping the piezometric surface is horizontal
- Pumping occurs at a constant rate
- The well screen is fully penetrating
- Flow to the well is horizontal (radial)
- Groundwater is instantaneously removed from storage during discharge
- The diameter of the well is small (well storage can be neglected)
- Groundwater flow to the well is transient (unsteady state)
- Values of the argument of the well function are small, i.e., $u<0.1$ (practical limit)

While some of these assumptions are not fully met (homogenous/ isotropic) it has been shown that they have a relatively minor affect on the test results or in other cases they can be compensated for in the analysis and their effect taken into account. Of particular importance are the requirements to hold the rate of pumping constant; that groundwater flow is radial for that portion of the test data that is analyzed; and that the critical time is satisfied. These assumptions were met as the pumping rates were held constant during the test, flow was determined to be radial in the later time data using the pressure derivative analysis, and the critical time was satisfied as shown in the calculation below.

The specific capacity method used for 199-F5-53 assumes that the transmissivity at one well can be used to estimate the transmissivity at another well if the well losses are equivalent between two wells; the

specific capacities between the wells can be determined at equivalent pumping times; and the geology is similar between the two sites. Based on the borehole logs the hydrogeology is similar between 199-B2-15 and 199-F5-53 as both wells were completed in the first water producing zone below the top of the RUM. Both wells should have similar well efficiencies given that the same materials and development processes was used when they were built (screen length of 10-ft; 10-slot well screen; 20-40 mesh filter pack). The well as-builts are provided in Appendix A.

There is less confidence in the pumping test results for 199-F5-53 because water levels were strongly influenced by river level changes during the course of the test. The river level was declining rapidly at the beginning of the test and then increased toward the end. These affects could not be removed. River level changes probably generated over 0.25 ft of fluctuation in well water levels (Figure 3). The results from the specific capacity method should be treated as being approximate because of these uncertainties in the data quality. Additional testing to obtain better estimates of hydraulic conductivity could be accomplished with a follow-up pumping test and/or slug test at this well.

5 Software Applications

Microsoft Excel®[1] 2010 was used to match a best fit line to the drawdown data for 199-B2-15.

6 Calculation

<u>199-B2-15 Cooper-Jacob Method</u>

According to Todd 1980, the Cooper-Jacob equation for drawdown in a well is:

$$s = \frac{2.3Q}{4\pi T} \log \frac{2.25Tt_0}{r^2 S} \qquad \text{(Equation 1)}$$

Where s = drawdown; Q = pumping rate; T = transmissivity; S = storativity; t_0 = initial time; r = well radius.

This equation can be rearranged and simplified and the transmissivity calculated from:

$$T = \frac{2.30Q}{4\pi \Delta s} \qquad \text{(Equation 2)}$$

where Δs is the change in drawdown per log cycle. The hydraulic conductivity is related to the transmissivity as K = T/b, where K = the hydraulic conductivity and b = the aquifer thickness (Freeze and Cherry, 1979).

Because of assumptions inherent in this method, test data are only valid after a certain period of time after the test starts (critical time). The equation for determining this is:

$$t_c = \frac{r^2 S}{2.25Tu} \qquad \text{(Equation 3)}$$

Where t_c is the critical time; r = well radius; S = storage coefficient; T = transmissivity; and u = 0.1. For pumping wells of a small diameter this assumption is generally met very early in the test.

[1] Microsoft Excel is a registered product of the Microsoft Corporation.

Another assumption for this method is that the well fully penetrates the aquifer. In cases where it doesn't it is common practice to assume that the length of the well screen is equivalent to the thickness of the aquifer for purposes of calculating the hydraulic conductivity. In general the effective aquifer thickness is greater than the assumed length of the screen, meaning the estimated hydraulic conductivity is lower than the true value. Determining the effective thickness of the aquifer is also complicated by the ratio of vertical hydraulic conductivity to horizontal conductivity (K_D)in the aquifer. The smaller the ratio the closer the estimate approaches the actual hydraulic conductivity (Bair and Lahm, 1996).

River effects during the period of time when this test was underway at 199-B2-15 were relatively minor. Figure 5 is a plot of river level changes compared to the water level changes during the test. The water level response in the well appears to lag any river changes by about one hour. Because the river levels were relatively constant before and during the test, it was assumed there was only a minor effect on the test data.

The data from the aquifer test were plotted on a semi-log graph along with the pressure derivative of the data (Figure 6). The pressure derivative was determined using the DERIV software reported in Spane and Wurstner (1993).

The change in drawdown per log cycle (*Δs or ds)* was determined by matching a best fit line to that portion of the data where radial flow is present, which occurs between about 75 and about 200 minutes into the test. The drawdown data, pressure derivative, and best fit line are shown on Figure 6. Matching a best fit line to this portion of the data and extrapolating the drawdown data over one log-cycle of time provide the change in drawdown needed to solve Equation 2.

For the test at 199-B2-15 we have:

Δs = 1.59 ft/log cycle
Q = 4.42 gpm

This gives a transmissivity and hydraulic conductivity (assuming b = 10 ft) of:

T = 98 ft^2/d
K = 9.8 ft/d

The critical time is calculated using Equation 3 assuming the following additional input. This calculation shows that using the data from 75 to 200 minutes is valid for this analytical method.

S = 0.005 (taken from Freeze and Cherry, 1979, for a confined aquifer); r = 1 ft; u = 0.1 (Kruseman and de Ridder, 1994).

t_c = 0.33 minutes

During the 199-B2-15 test, water levels also were measured in adjacent well 199-B2-14, which is screened in the upper portion of the unconfined aquifer. This well is situated 13.4 ft from the pumping well. No obvious water level response during the pumping period was observed at 199-B2-14 (Figure 7). However, during the recovery period, an apparent slight increase of less than 0.1 inches was recorded in the observation well. This change is shown in Figure 8.

To further evaluate this apparent change, a best fit trend line was matched to the water level data from the start of recovery (pump-off) over the next 70 minutes. The water level during this period seems to have

increased about 0.08 inches. A trend line was also fitted to the water level data from about 200 to 350 minutes into pumping (the test ended at 358 minutes). A visual comparison of these trend lines indicates a difference in overall slope, implying that something affected the water level in the observation well during the recovery period.

The timing of this change is interesting because it seems to have started just after the pump went off, as would be expected and implying some hydraulic connected between the wells. However other data seem contrary to this conclusion. For example, there is no distinct water level change in the observation well during the entire 358 minutes of pumping. If these wells are in hydraulic communication, some water level change should have occurred. Another factor that may have affected the water level at this time was the increasing river levels just before and during the recovery. Yet during the pumping portion of the test the river stage was declining with no obvious corresponding change in the water level in the observation well. It seems counter intuitive that there a response to river stage during the recovery period but not during the pumping period relative to river stage changes. The cause for this apparent increase in the water level is currently unknown.

<u>199-F5-53 Specific Capacity Method</u>

The following equation was used for estimating the transmissivity at 199-F5-53 using the specific capacities calculated for 199-F5-53 and 199-B2-15 and is derived from Equation 3.

$$\frac{Q/s_{F5\text{-}53}}{Q/s_{B2\text{-}15}} = \frac{T_{F5\text{-}53}}{T_{B2\text{-}15}} \qquad \text{(Equation 4)}$$

Where Q = pumping rate; s = the drawdown at some time; Q/s = specific capacity; and T = transmissivity. Given that the specific capacity is known at both wells after equivalent times of pumping, and the transmissivity is known at 199-B2-15, the transmissivity for 199-F5-53 can be calculated using Equation 4. From the constant rate pumping test data at both wells after pumping for 329 minutes:

<u>199-B2-15</u>

- Q/s = 4.42 gpm / 15.88 ft = 0.278 gpm/ft
- T = 98 ft^2/d (from the pumping test analysis for 199-B2-15)

<u>199-F5-53</u>

- Q/s = 2 gpm / 18.93 ft = 0.106 gpm/ft (Figure 2)

The transmissivity and hydraulic conductivity at 199-F5-53 are estimated as (assuming b = 10 ft):

T = 40 (37) ft^2/d
K = 4 (3.7) ft/d

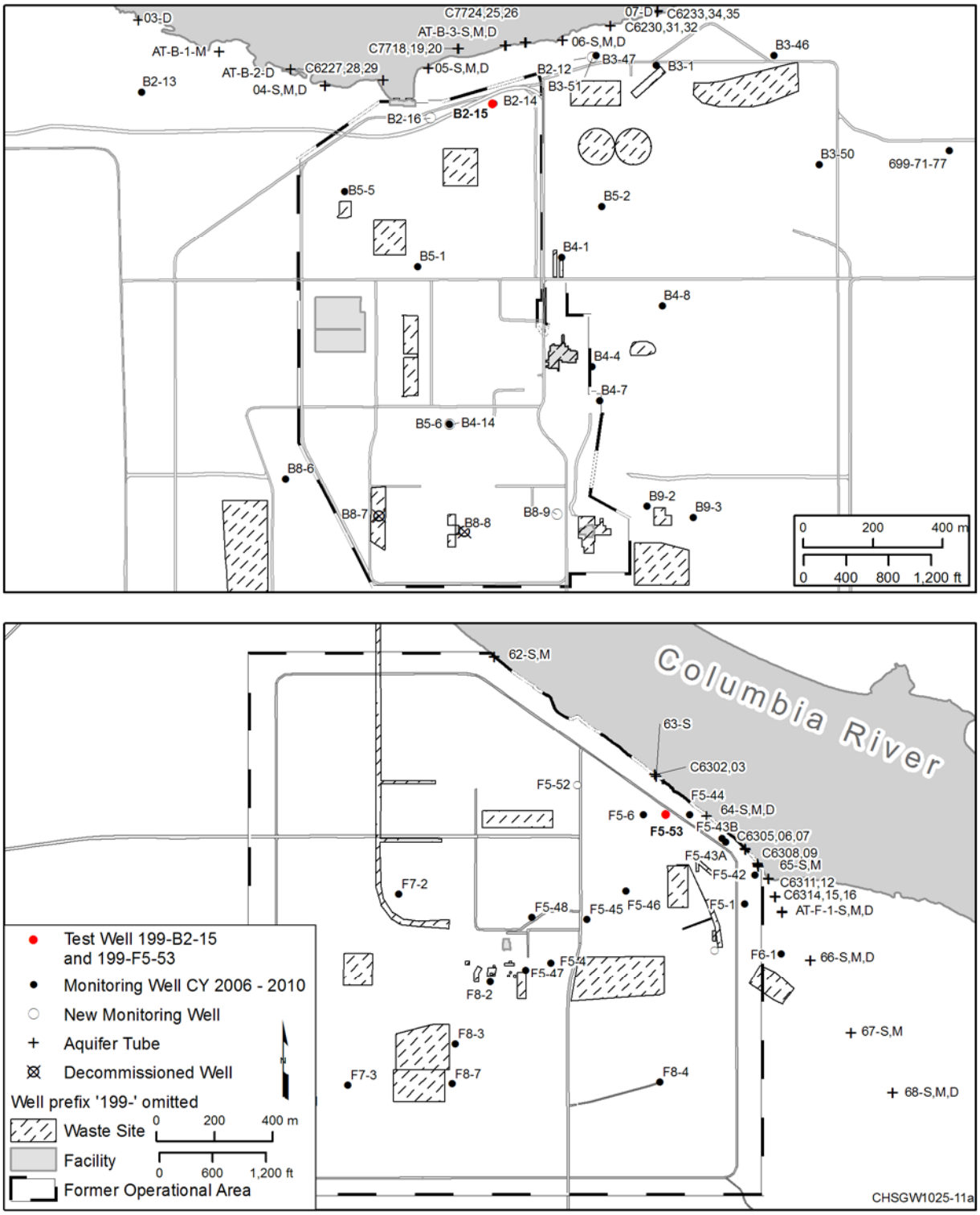

Figure 1. Well Location Map for Test Wells 199-B2-15 and 199-F5-53

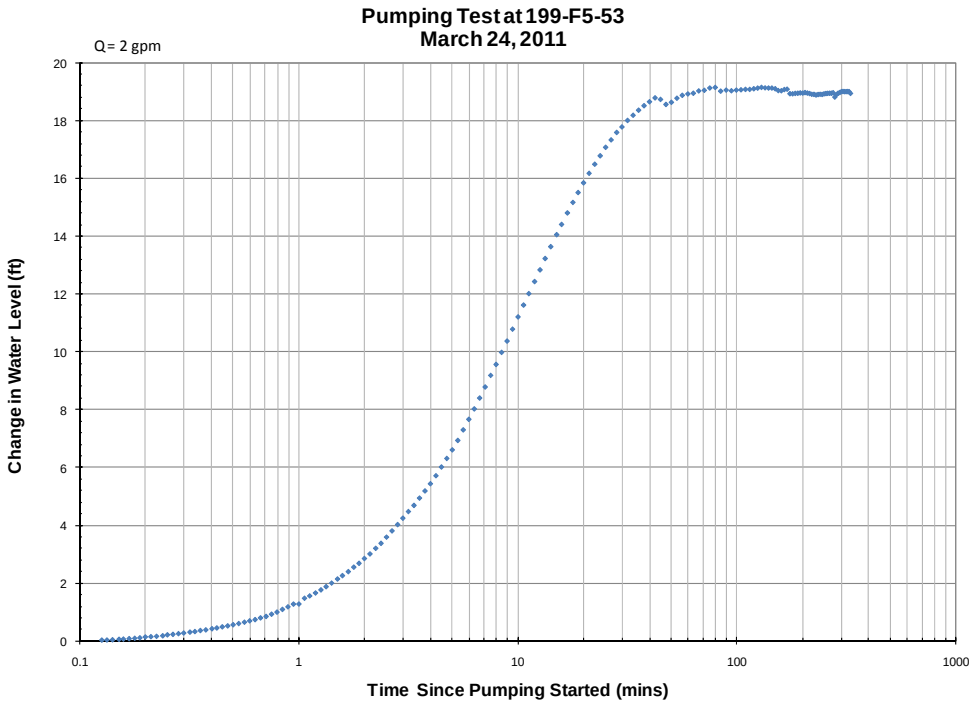

Figure 2. Water Level Response during Pumping Test at 199-F5-53

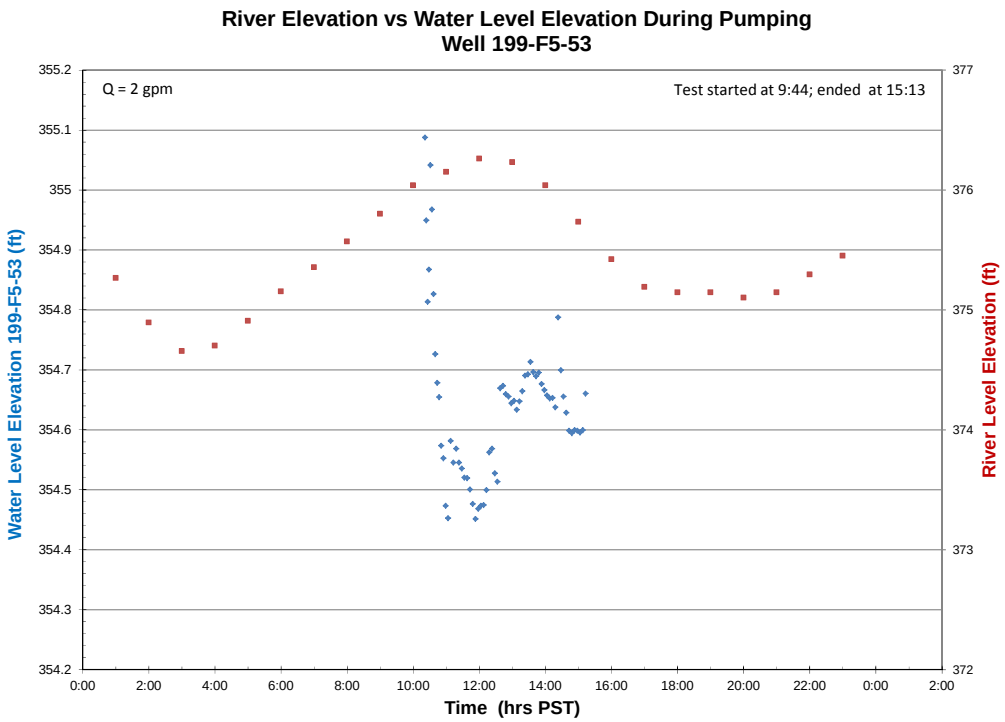

Figure 3. River Level Changes and Water Level Changes during Pumping Test at 199-F5-53

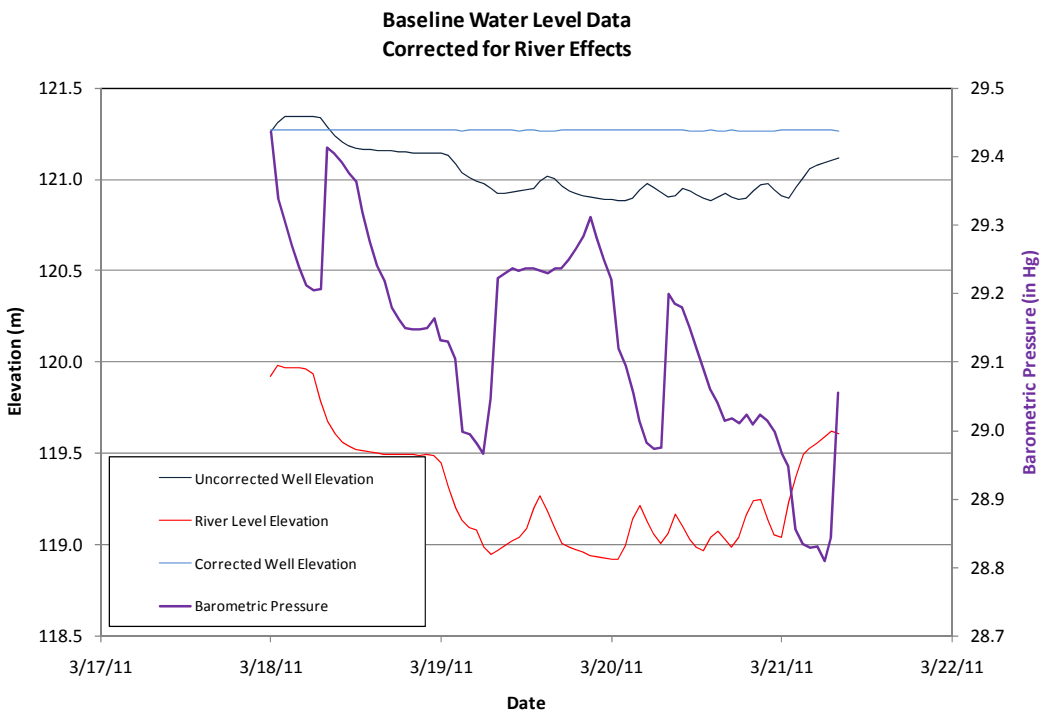

Figure 4. Baseline Water Level Data Corrected for River Level Changes at 199-B2-15

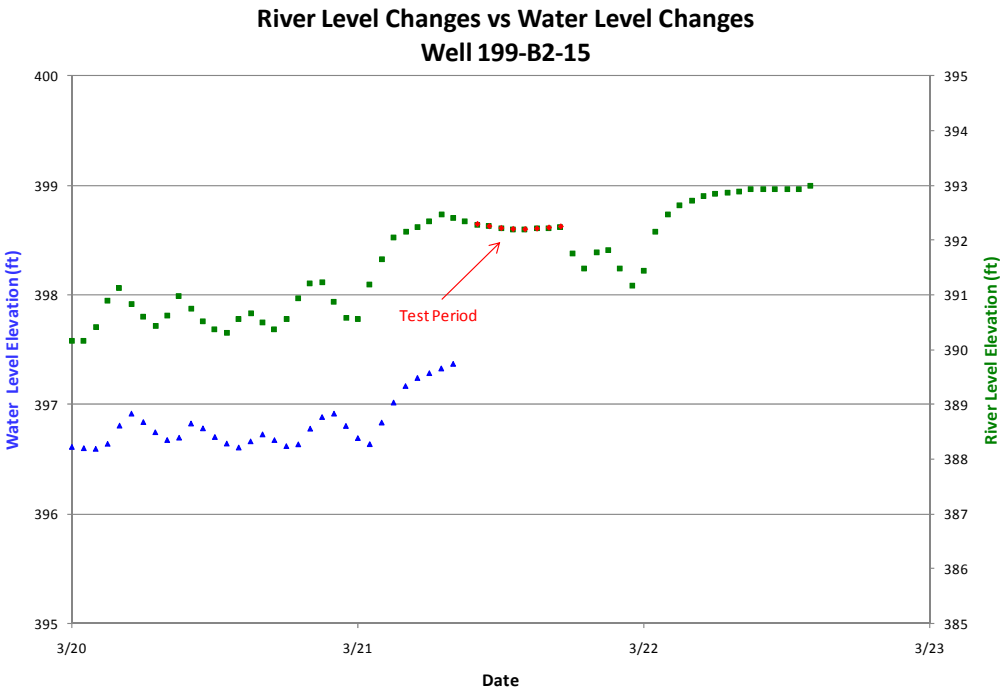

Figure 5. River Level Changes during the Pumping Test at 199-B2-15

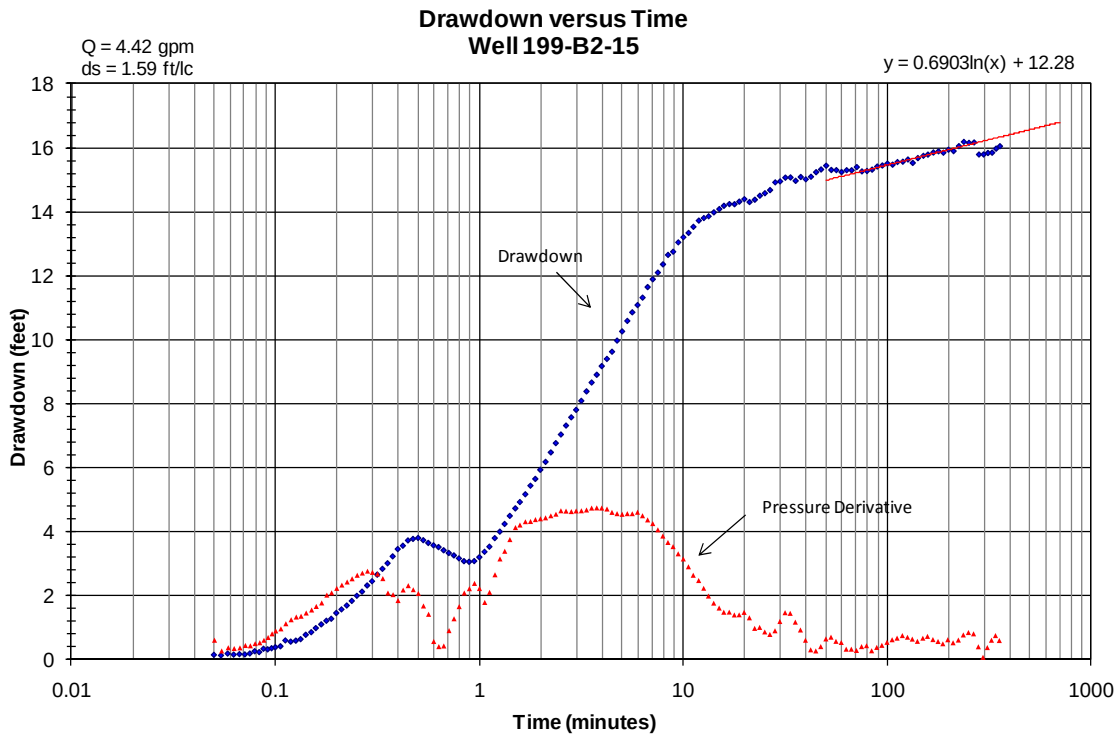

Figure 6. Drawdown, Pressure Derivative, and Best Fit Line at 199-B2-15

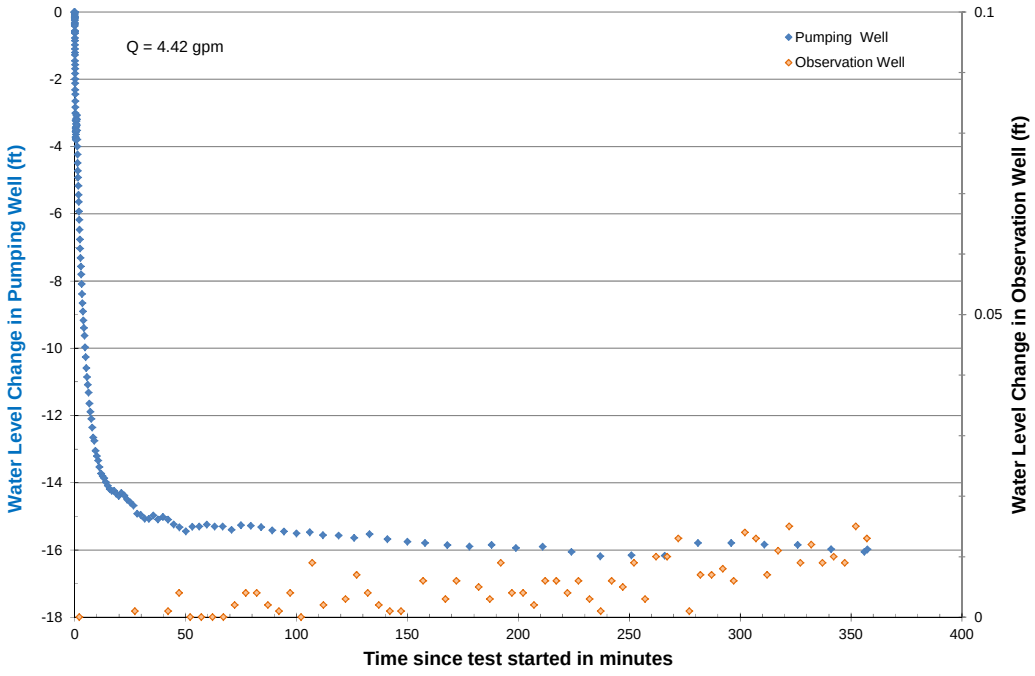

Figure 7. Water Level Change in Observation Well 199-B2-14 and Well 199-B2-15 during Pumping

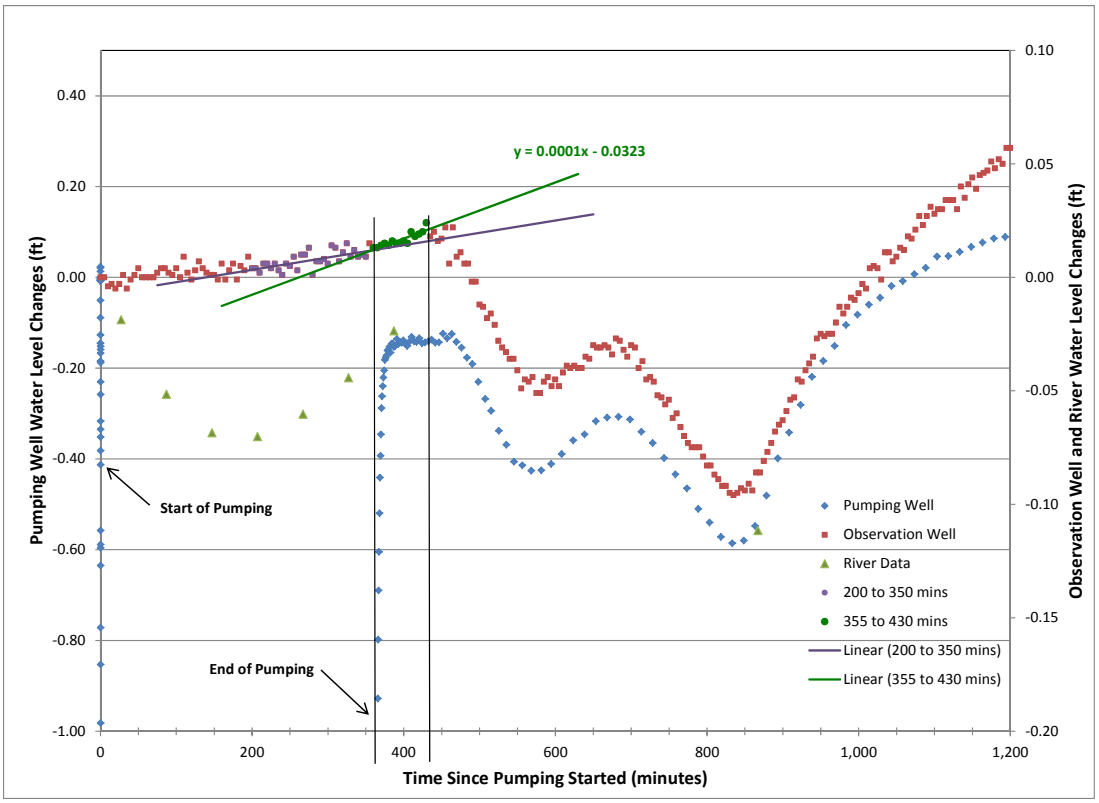

Figure 8. Water Level Changes in the Pumping Well, Observation Well and River during the Pumping and Recovery Period. Note the Trend Lines in the Observation Well before and after Pumping

7 Results

The transmissivity, hydraulic conductivity, and other relevant test data for these analyses at 199-B2-15 and 199-F5-53 are summarized as follows:

Table 1. Summary of Test Results for the Constant Rate Pumping Tests.

Well	Transmissivity (ft2/d)	Assumed Aquifer Thickness (ft)	Hydraulic Conductivity (ft/d)	Discharge Rate (gpm)	Maximum Drawdown (ft)
199-B2-15	98	10	9.8	4.42	15.88
199-F5-53	40	10	4	2	18.93

The hydraulic conductivity result for 199-F5-53 is less certain because of substantial river level fluctuations during the test which masked the drawdown data and so required a different method of analysis.

The aquifer thickness at both wells was assumed to be the length of the well screen. In reality the effective aquifer thickness is greater than 10 ft due to the filter pack above and below the well screen. The hydraulic conductivity will be over-estimated for this reason.

8 References

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Appendix A

As-Builts for

Wells 199-B2-14, 199-B2-15, and 199-F5-53

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WELL SUMMARY SHEET	Start Date: 1/19/10 Finish Date: 2/24/10	Page 1 of 2
Well ID: C7665	Well Name: 199-B2-14	
Location: 200m E of 181B building	Project: 100 BC RI/FS expansion	
Prepared By: Ryan Brauchla — Date: 2/24/10	Reviewed By: L. D. Walker — Date: 3/12/10	
Signature: [signature]	Signature: [signature]	

CONSTRUCTION DATA

Description	Diagram
6-in Concrete Pad	
LW 3-12-10 ~~6~~ 8-in I.D. Type 304L Stainless Steel Protective Casing: 3.0 ft above ground surface	
Portland Cement Type I/II: 0 - 9.6 ft bgs	
6-in I.D. Stainless Steel Type 304(~~316~~L, Schedule 10 Permanent Casing: + 2.0 - 41.89 ft bgs ↳ ags (LW 3-12-10)	
Granular Bentonite Crumbles: 9.6 - 33.9 ft bgs	
3/8-in Bentonite Pellets: 33.9 - 37.0 ft bgs	
Static Water Level 45.8 ft bgs (2/24/10)	
LW 3-12-10 wire-wrapped 6-in I.D. ~~sch. 10~~, 304L Stainless Steel, 20 Slot (0.020-in) Screen: 41.89 - 66.89 ft bgs	
10-20 Mesh Colorado Silica Sand: 37.0 - 75.7 ft bgs	
6-in, I.D. 304L Stainless Steel End Cap: 66.89 - 71.91 ft bgs	
3/8-in Coated Bentonite Pellets: 75.7 - 80.7 ft bgs	
Primary Filter Pack: 10-20 Mesh Colorado Silica Sand: 80.7 - 149.6 ft bgs	

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
0		0 - 1 Crushed Gravel
		1 - 4 Gravelly Sandy Silt (gsM)
		4 - 7 Gravelly Silt (gM)
10		7 - 28 Gravel (G)
20		
30		28 - 39 Silty Sandy Gravel (msG)
40		39 - 45 Silty Gravel (mG)
		45 - 50 Sandy Gravel (sG)
50		50 - 73 Silty Sandy Gravel (msG)
60		
70		
		73 - 82 Silty Gravel (mG)
80		
		82 - 96 Silty Sandy Gravel (msG)

WELL SUMMARY SHEET		Start Date: 1/19/10 Finish Date: 2/24/10	Page 2 of 2
Well ID: C7665		Well Name: 199-B2-14	
Location: 200m E of 181B building		Project: 100 BC RI/FS Expansion	
Prepared By: Ryan W. Brauchla	Date: 2/24/10	Reviewed By: L.D. Walker	Date: 3/12/10
Signature: Ryan W Brauchla		Signature: L D Walker	

CONSTRUCTION DATA

Description	Diagram
Primary Filter Pack: 10-20 Mesh Colorado Silica Sand: 80.7 - 149.6 ft bgs	
Native Slough: 149.6 - 152.3 ft bgs	
Borehole drilled with 10 3/4" O.D. casing to 152.3 ft bgs	

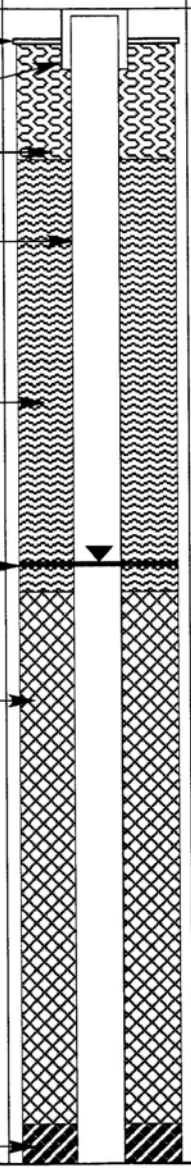
GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
90		82 - 96 Silty Sandy Gravel (msG)
		96 -103 Sandy Gravel (sG)
100		
		103 -107 Gravelly Sand (gS)
		107 -110 Sand (S)
110		110-138 Silty Sandy Gravel (msG)
120		
130		
		138 - 143.7 Silty Gravel (mG)
140		
		143.7 - 152.3 Mud (M)
150		
		Total Depth Drilled: 152.3 ft bgs (2/16/10)
160		
170		

WELL SUMMARY SHEET		Start Date: 11/9/10 Finish Date: 1/19/10	Page 1 of 3
Well ID: C7783		Well Name: 199-B2-15	
Location: 15 ft West of 199-B2-14		Project: Support 100-BC-5 RI/FS	
Prepared By: Kim Schuyler	Date: 1/19/10	Reviewed By: L. D. Walker	Date: 2-9-11
Signature: for K. Schuyler		Signature:	

CONSTRUCTION DATA

Description	Diagram
6-in Concrete Pad	
6-in I.D. Stainless Steel Type 316/316L Protective Casing: 3.0 ft above ground surface	
Portland Cement Type I/II: 0 - 9.8 ft bgs	
4-in I.D. Stainless Steel Type 316/316L, Schedule 10 Permanent Casing: + 1.6 - 158.51 ft bgs	
Granular Bentonite Crumbles: 9.8 - 43.7 ft bgs	
Static Water Level: 41.7 ft bgs (1/31/11)	
Bentonite Pellets: 43.7 - 85.1 ft bgs	
All temporary drill casing was removed from the ground. All depths are in feet below ground surface.	
Borehole drilled with 11 3/4 -inch O.D. casing. 0.0 - 148.9 ft bgs	
Borehole drilled with 8 5/8 -inch O.D. casing. 0.0 - 189.2 ft bgs	
Bentonite Slurry: 85.1 - 122.8 ft bgs	



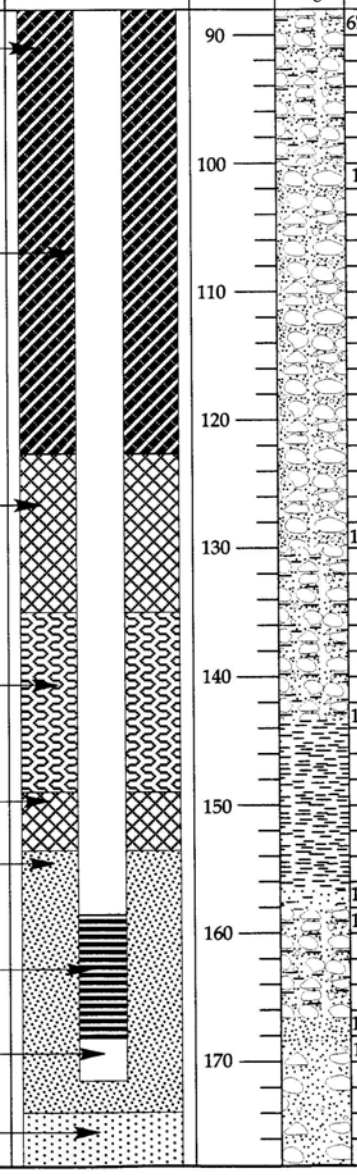
GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
0		0 - 0.5' Gravel (G) - Drill Pad
		0.5 - 3 Gravelly Silty Sand (gmS)
		3 - 8' Gravelly Sandy Silt (gsM)
		3.5' Large Boulder
		8 - 31.5' Silty Sandy Gravel (msG)
10		
20		
30		31.5 - 67.5' Sandy Gravel (sG)
40		
		48' Large Basalt Boulder
		52' Large Boulder
50		
		55' Large Basalt Boulder
60		
		67.5 - 100' Silty Sandy Gravel (msG)
70		
80		

WELL SUMMARY SHEET		Start Date: 11/9/10 Finish Date: 1/19/10	Page 2 of 3
Well ID: C7783		Well Name: 199-B2-15	
Location: 15 ft West of 199-B2-14		Project: Support 100-BC-5 RI/FS	
Prepared By: Kim Schuyler	Date: 1/19/10	Reviewed By: L. D. Walker	Date: 2-9-11
Signature: for K. Schuyler		Signature:	

CONSTRUCTION DATA

Description	Diagram
Bentonite Slurry: 85.1 - 122.8 ft bgs	
4-in I.D. Stainless Steel Type 316/316L, Schedule 10 Permanent Casing: + 1.6 - 158.51 ft bgs	
Bentonite Pellets: 122.8 - 135.3 ft bgs	
Cement Grout Seal: 135.3 - 149.0 ft bgs	
Bentonite Pellets: 149.0 - 153.5 ft bgs	
Primary Filter pack 20 - 40 Mesh Colorado Silica Sand: 153.5 - 173.9 ft bgs	
4-in I.D. Stainless Steel Type 316/316L Continuous Wire-Wrap, 10 Slot (0.010-in) Screen: 158.51 - 168.56 ft bgs	
4-in, I.D. Stainless Steel Type 316/316L, Schedule 10 End Cap: 168.56 - 171.55 ft bgs	
Sand Backfill 10-20 Mesh Colorado Silica Sand: 173.9 - 190.5 ft bgs	

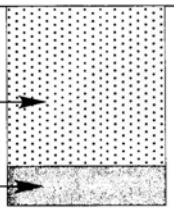


GEOLOGIC/HYDROLOGIC DATA

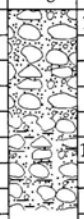
Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
90		67.5 - 100' Silty Sandy Gravel (msG)
100		100 - 130' Sandy Gravel (sG)
110		
120		
130		130 - 143.7' Silty Sandy Gravel (msG)
140		143.7 - 156.5 Mud (M) Ringold Upper Mud
150		
160		156.5 -158' Silty Sand (mS) 158 -166.5' Silty Sandy Gravel (msG)
170		166.5 -168.2' Sand (S) 168.2 -178' Gravelly Sand (gS)

WELL SUMMARY SHEET		Start Date: 11/9/10 Finish Date: 1/19/10	Page 3 of 3
Well ID: C7783		Well Name: 199-B2-15	
Location: 15 ft West of 199-B2-14		Project: Support 100-BC-5 RI/FS	
Prepared By: Kim Schuyler	Date: 1/19/10	Reviewed By: L. D. Walker	Date: 2-9-11
Signature: D Walker for K. Schuyler		Signature: D Walker	

CONSTRUCTION DATA

Description	Diagram
Sand Backfill 10-20 Mesh Colorado Silica Sand: 173.9 - 190.5 ft bgs	
Natural slough: 190.5 - 193.8 ft bgs	
All temporary drill casing was removed from the ground. All depths are in feet below ground surface. Borehole drilled with 11 3/4 -inch O.D. casing. 0.0 - 148.9 ft bgs Borehole drilled with 8 5/8 -inch O.D. casing. 0.0 - 189.2 ft bgs	

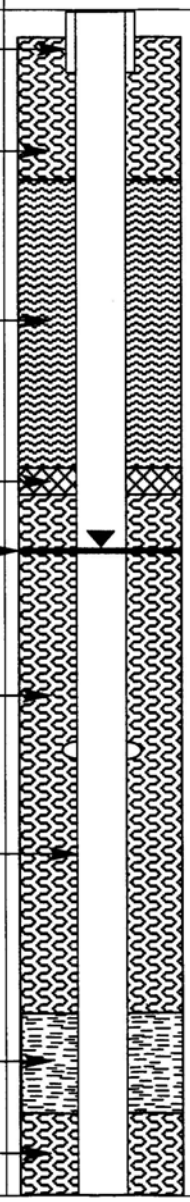
GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
180		178 -186.5' Sandy Gravel (sG)
190		186.5 -193.8' Silty Sandy Gravel (msG)
		Total Depth: 193.8' (12/15/10)
200		
210		
220		
230		
240		
250		
260		

WELL SUMMARY SHEET		Start Date: 9/20/10 Finish Date: 12/16/10	Page 1 of 2
Well ID: C7791		Well Name: 199-F5-53	
Location: 660 meters NE of F Reactor		Project: 3 Wells in 100-FR-3 RI/FS	
Prepared By: Ryan W. Brauchla	Date: 12/20/10	Reviewed By: L.D. Walker	Date: 12/27/10
Signature: Ryan W Brauchla		Signature: LD Walker	

CONSTRUCTION DATA

Description	Diagram
Stainless Steel Protective Casing: 3.1 ft above ground surface	
Type I/II Portland Cement Grout: 0 - 10.6 ft bgs	
#8 Granular Bentonite Crumbles: 10.6 - 32.4 ft bgs	
3/8-in Bentonite Pellets: 32.4 - 35.0 ft bgs	
Static Water Level: 38.8 ft bgs (12/16/10)	
Neat Grout: 35.0 - 74.5 ft bgs	
6-in I.D., Schedule 10, Type 316/316L, Stainless Steel Permanent Casing: 1.94 ft ags - 95.06 ft bgs	
Natural Slough: 74.5 - 82.1 ft bgs	
Neat Grout: 82.1 - 90.1 ft bgs	

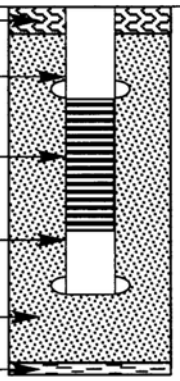


GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
0		0-1 Gravel Drill Pad (G)
		1-9 Sandy Gravel (sG)
10		9-13 Silty Sand (mS)
		13-40 Sandy Gravel (sG)
20		
30		
40		40-44 Gravel (G)
		44-48 Sandy Gravel (sG)
50		48-54.5 Sand (S)
		54.5-64 Clayey Silt (M)
60		
		64-68 Clayey Silty Sand (mS)
		68-116 Silt (M)
70		
		74-76 Caliche
80		

WELL SUMMARY SHEET		Start Date: 9/20/10 Finish Date: 12/16/10	Page 2 of 2
Well ID: C7791		Well Name: 199-F5-53	
Location: 660 meters NE of F Reactor		Project: 3 Wells in 100-FR-3 RI/FS	
Prepared By: Ryan W. Brauchla	Date: 12/20/10	Reviewed By: L. D. Walker	Date: 12/27/10
Signature: Ryan W. Brauchla		Signature: D Walker	

CONSTRUCTION DATA

Description	Diagram
Neat Grout: 82.1 - 90.1 ft bgs 6-in I.D., Schedule 10, Type 316/316L, Stainless Steel Permanent Casing: 1.94 ft ags - 95.06 ft bgs 6-in I.D., ~~Schedule 10~~, Type 316/316L, Stainless Steel 10-slot Screen: 95.06 - 105.06 ft bgs 6-in I.D., Schedule 10S, Type 316/316L, Stainless Steel Sump: 105.06 - 110.06 ft bgs Primary Filter Pack 20-40 Mesh Colorado Silica Sand: 90.1 - 115.0 ft bgs Natural Slough: 115.0 - 116.0 ft bgs	

cont. wire wrap cw 12/27/10

GEOLOGIC/HYDROLOGIC DATA

Depth in Feet	Graphic Log	Lithologic Description/Groundwater Sample Depths (ft bgs)
90		68-116 Silt (M)
100		Water producing zone ~ 101' bgs cw 12-27-10
110		
		TD = 116.0 ft bgs (12-03-2010)
120		
130		
140		
150		
160		
170		

Borehole drilled with 10 3/4-inch O.D. casing from 0 to 55.7.

Borehole drilled with 13 5/8-inch O.D casing from 55.7 to 110.0.

Borehole drilled with a 9 inch diameter hard tool from 110.0 to 116.0.

All depths are in feet below ground surface.

All temporary drill casing was removed from the ground.

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Appendix B

Aquifer Test Data for Wells 199-B2-14 and 199-B2-15

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CH2MHILL
Plateau Remediation Company

Well Pumping Test at 199-B2-15 (C7783)

Summary of test data

Well Configuration for Test

Date of Test	3/21/2011	
Completed Depth	174.20	ft toc
D-T-B at Test start	174.20	ft toc
D-T-W at Test start	44.61	ft toc
D-T-B at Test end	174.20	ft toc
D-T-W at Test end	N/M	ft toc
Stick up	2.43	ft above gs
Casing size & material	6" ss	
Screen type	Wire wrap	
Opening size	0.01	
Depth Top of screen	158.51	ft toc
Depth Bottom of screen	168.56	ft toc
Screen Length	10.05	ft
Pump Intake	168.60	ft toc
Test Information		
Pump rate	4.42	gpm
Pumping time	358	minutes
Total Gallons Pumped	1582	gal

N/M = not measured

Formation Information

Description	Depth (bgs)
Top of RUM	143.70
Bottom of RUM	156.50
Silty Sand	156.5 -158
Silty Sandy Gravel	158 - 166.5
Sand	166.5 - 168.2
Gravelly Sand	168.2 - 178

Well Production Testing

Baseline Data

RawFile: 199-B2-15 baseline 15Mar11_2011-03-21_16-53-28-265.wsl

Device Level TROLL 700
Site 100-BC
Serial Number 112651
Log Name 199-B2-15 baseline 15Mar11

File Name: 199-B2-14 obs well 15Mar11_2011-03-21_17-07-18-687.wsl

Device Level TROLL 500
Site 100-BC
Serial Number 108079
Log Name 199-B2-14 obs well 15Mar11

Pumping Well 199-B2-15		Elevation	Observation Well B2-14		Elevation
Date Time	Depth (ft)	meters	Date Time	Depth (ft)	meters
3/15/2011 10:15	16.863127	121.444	3/15/2011 11:00	13.99805	120.432
3/15/2011 10:30	16.853579	121.441	3/15/2011 11:15	13.99387	120.431
3/15/2011 10:45	16.829311	121.434	3/15/2011 11:30	13.98447	120.428
3/15/2011 11:00	16.801926	121.426	3/15/2011 11:45	13.98316	120.427
3/15/2011 11:15	16.765903	121.415	3/15/2011 12:00	13.97571	120.425
3/15/2011 11:30	16.732542	121.405	3/15/2011 12:15	13.97471	120.425
3/15/2011 11:45	16.707266	121.397	3/15/2011 12:30	13.96965	120.423
3/15/2011 12:00	16.671581	121.386	3/15/2011 12:45	13.96787	120.423
3/15/2011 12:15	16.660204	121.383	3/15/2011 13:00	13.96482	120.422
3/15/2011 12:30	16.639336	121.376	3/15/2011 13:15	13.97576	120.425
3/15/2011 12:45	16.624718	121.372	3/15/2011 13:30	13.97044	120.424
3/15/2011 13:00	16.632917	121.374	3/15/2011 13:45	13.97218	120.424
3/15/2011 13:15	16.644171	121.378	3/15/2011 14:00	13.95948	120.420
3/15/2011 13:30	16.656656	121.381	3/15/2011 14:15	13.96147	120.421
3/15/2011 13:45	16.65494	121.381	3/15/2011 14:30	13.95411	120.419
3/15/2011 14:00	16.640564	121.377	3/15/2011 14:45	13.94563	120.416
3/15/2011 14:15	16.622629	121.371	3/15/2011 15:00	13.94614	120.416
3/15/2011 14:30	16.609339	121.367	3/15/2011 15:15	13.95621	120.419
3/15/2011 14:45	16.593624	121.362	3/15/2011 15:30	13.94706	120.416
3/15/2011 15:00	16.603344	121.365	3/15/2011 15:45	13.95921	120.420
3/15/2011 15:15	16.617863	121.370	3/15/2011 16:00	13.97324	120.424
3/15/2011 15:30	16.636827	121.375	3/15/2011 16:15	13.96738	120.423
3/15/2011 15:45	16.679543	121.388	3/15/2011 16:30	13.98956	120.429
3/15/2011 16:00	16.726173	121.403	3/15/2011 16:45	13.99426	120.431
3/15/2011 16:15	16.773901	121.417	3/15/2011 17:00	14.00067	120.433
3/15/2011 16:30	16.833384	121.435	3/15/2011 17:15	13.99629	120.431
3/15/2011 16:45	16.870226	121.447	3/15/2011 17:30	13.99244	120.430
3/15/2011 17:00	16.872675	121.447	3/15/2011 17:45	13.98154	120.427
3/15/2011 17:15	16.86092	121.444	3/15/2011 18:00	13.97832	120.426
3/15/2011 17:30	16.836811	121.436	3/15/2011 18:15	13.97989	120.426
3/15/2011 17:45	16.809519	121.428	3/15/2011 18:30	13.97036	120.424
3/15/2011 18:00	16.78014	121.419	3/15/2011 18:45	13.96783	120.423

3/15/2011 18:15	16.755299	121.412	3/15/2011 19:00	13.96787	120.423
3/15/2011 18:30	16.747345	121.409	3/15/2011 19:15	13.96545	120.422
3/15/2011 18:45	16.744606	121.408	3/15/2011 19:30	13.9637	120.422
3/15/2011 19:00	16.740252	121.407	3/15/2011 19:45	13.95555	120.419
3/15/2011 19:15	16.723848	121.402	3/15/2011 20:00	13.95494	120.419
3/15/2011 19:30	16.711679	121.398	3/15/2011 20:15	13.95411	120.419
3/15/2011 19:45	16.698273	121.394	3/15/2011 20:30	13.95986	120.420
3/15/2011 20:00	16.703779	121.396	3/15/2011 20:45	13.96464	120.422
3/15/2011 20:15	16.728373	121.403	3/15/2011 21:00	13.98728	120.429
3/15/2011 20:30	16.770971	121.416	3/15/2011 21:15	13.98565	120.428
3/15/2011 20:45	16.814171	121.429	3/15/2011 21:30	13.99034	120.430
3/15/2011 21:00	16.863617	121.445	3/15/2011 21:45	13.98251	120.427
3/15/2011 21:15	16.891867	121.453	3/15/2011 22:00	13.96932	120.423
3/15/2011 21:30	16.887114	121.452	3/15/2011 22:15	13.97415	120.425
3/15/2011 21:45	16.85811	121.443	3/15/2011 22:30	13.95769	120.420
3/15/2011 22:00	16.82922	121.434	3/15/2011 22:45	13.95416	120.419
3/15/2011 22:15	16.803511	121.426	3/15/2011 23:00	13.94972	120.417
3/15/2011 22:30	16.768393	121.416	3/15/2011 23:15	13.94567	120.416
3/15/2011 22:45	16.734858	121.405	3/15/2011 23:30	13.93139	120.412
3/15/2011 23:00	16.707203	121.397	3/15/2011 23:45	13.92159	120.409
3/15/2011 23:15	16.682112	121.389	3/16/2011 0:00	13.90818	120.405
3/15/2011 23:30	16.648024	121.379	3/16/2011 0:15	13.9023	120.403
3/15/2011 23:45	16.601465	121.365	3/16/2011 0:30	13.8882	120.399
3/16/2011 0:00	16.548712	121.349	3/16/2011 0:45	13.87905	120.396
3/16/2011 0:15	16.499758	121.334	3/16/2011 1:00	13.88177	120.397
3/16/2011 0:30	16.454231	121.320	3/16/2011 1:15	13.86717	120.392
3/16/2011 0:45	16.423771	121.310	3/16/2011 1:30	13.85343	120.388
3/16/2011 1:00	16.383999	121.298	3/16/2011 1:45	13.85172	120.387
3/16/2011 1:15	16.356697	121.290	3/16/2011 2:00	13.83828	120.383
3/16/2011 1:30	16.329525	121.282	3/16/2011 2:15	13.83918	120.384
3/16/2011 1:45	16.310675	121.276	3/16/2011 2:30	13.83525	120.382
3/16/2011 2:00	16.280935	121.267	3/16/2011 2:45	13.84311	120.385
3/16/2011 2:15	16.275919	121.265	3/16/2011 3:00	13.8418	120.384
3/16/2011 2:30	16.297701	121.272	3/16/2011 3:15	13.84807	120.386
3/16/2011 2:45	16.322784	121.280	3/16/2011 3:30	13.85473	120.388
3/16/2011 3:00	16.347637	121.287	3/16/2011 3:45	13.86217	120.391
3/16/2011 3:15	16.385323	121.299	3/16/2011 4:00	13.87433	120.394
3/16/2011 3:30	16.42535	121.311	3/16/2011 4:15	13.87106	120.393
3/16/2011 3:45	16.47356	121.326	3/16/2011 4:30	13.88294	120.397
3/16/2011 4:00	16.511141	121.337	3/16/2011 4:45	13.8802	120.396
3/16/2011 4:15	16.553366	121.350	3/16/2011 5:00	13.89303	120.400
3/16/2011 4:30	16.590319	121.361	3/16/2011 5:15	13.8929	120.400
3/16/2011 4:45	16.626549	121.372	3/16/2011 5:30	13.88046	120.396
3/16/2011 5:00	16.651577	121.380	3/16/2011 5:45	13.88245	120.397
3/16/2011 5:15	16.673243	121.387	3/16/2011 6:00	13.88146	120.396
3/16/2011 5:30	16.694548	121.393	3/16/2011 6:15	13.89234	120.400
3/16/2011 5:45	16.701817	121.395	3/16/2011 6:30	13.89564	120.401
3/16/2011 6:00	16.715155	121.399	3/16/2011 6:45	13.8946	120.400
3/16/2011 6:15	16.730452	121.404	3/16/2011 7:00	13.88985	120.399
3/16/2011 6:30	16.74563	121.409	3/16/2011 7:15	13.89234	120.400
3/16/2011 6:45	16.750603	121.410	3/16/2011 7:30	13.89495	120.401
3/16/2011 7:00	16.748323	121.409	3/16/2011 7:45	13.89159	120.400

3/16/2011 7:15	16.755251	121.412	3/16/2011 8:00	13.8909	120.399
3/16/2011 7:30	16.767906	121.415	3/16/2011 8:15	13.89577	120.401
3/16/2011 7:45	16.777534	121.418	3/16/2011 8:30	13.90035	120.402
3/16/2011 8:00	16.779903	121.419	3/16/2011 8:45	13.89904	120.402
3/16/2011 8:15	16.787855	121.421	3/16/2011 9:00	13.89982	120.402
3/16/2011 8:30	16.795067	121.424	3/16/2011 9:15	13.90174	120.403
3/16/2011 8:45	16.799114	121.425	3/16/2011 9:30	13.90191	120.403
3/16/2011 9:00	16.805727	121.427	3/16/2011 9:45	13.89957	120.402
3/16/2011 9:15	16.810469	121.428	3/16/2011 10:00	13.90109	120.402
3/16/2011 9:30	16.814999	121.430	3/16/2011 10:15	13.89851	120.402
3/16/2011 9:45	16.813431	121.429	3/16/2011 10:30	13.89316	120.400
3/16/2011 10:00	16.811848	121.429	3/16/2011 10:45	13.88545	120.398
3/16/2011 10:15	16.788548	121.422	3/16/2011 11:00	13.87327	120.394
3/16/2011 10:30	16.767176	121.415	3/16/2011 11:15	13.86426	120.391
3/16/2011 10:45	16.739096	121.407	3/16/2011 11:30	13.84754	120.386
3/16/2011 11:00	16.681932	121.389	3/16/2011 11:45	13.84049	120.384
3/16/2011 11:15	16.62636	121.372	3/16/2011 12:00	13.83292	120.382
3/16/2011 11:30	16.556061	121.351	3/16/2011 12:15	13.83083	120.381
3/16/2011 11:45	16.511509	121.337	3/16/2011 12:30	13.83294	120.382
3/16/2011 12:00	16.489389	121.330	3/16/2011 12:45	13.81412	120.376
3/16/2011 12:15	16.455458	121.320	3/16/2011 13:00	13.80955	120.375
3/16/2011 12:30	16.426691	121.311	3/16/2011 13:15	13.7974	120.371
3/16/2011 12:45	16.391325	121.301	3/16/2011 13:30	13.78473	120.367
3/16/2011 13:00	16.352163	121.289	3/16/2011 13:45	13.78003	120.366
3/16/2011 13:15	16.318621	121.278	3/16/2011 14:00	13.77089	120.363
3/16/2011 13:30	16.276169	121.265	3/16/2011 14:15	13.7573	120.359
3/16/2011 13:45	16.246799	121.257	3/16/2011 14:30	13.75705	120.359
3/16/2011 14:00	16.213242	121.246	3/16/2011 14:45	13.75469	120.358
3/16/2011 14:15	16.179363	121.236	3/16/2011 15:00	13.75208	120.357
3/16/2011 14:30	16.161095	121.230	3/16/2011 15:15	13.74124	120.354
3/16/2011 14:45	16.134935	121.222	3/16/2011 15:30	13.72479	120.349
3/16/2011 15:00	16.119268	121.218	3/16/2011 15:45	13.72165	120.348
3/16/2011 15:15	16.106871	121.214	3/16/2011 16:00	13.72152	120.348
3/16/2011 15:30	16.077736	121.205	3/16/2011 16:15	13.71134	120.345
3/16/2011 15:45	16.069902	121.203	3/16/2011 16:30	13.70742	120.343
3/16/2011 16:00	16.054777	121.198	3/16/2011 16:45	13.70324	120.342
3/16/2011 16:15	16.038504	121.193	3/16/2011 17:00	13.69709	120.340
3/16/2011 16:30	16.036299	121.192	3/16/2011 17:15	13.68836	120.338
3/16/2011 16:45	16.015743	121.186	3/16/2011 17:30	13.67961	120.335
3/16/2011 17:00	16.008396	121.184	3/16/2011 17:45	13.67739	120.334
3/16/2011 17:15	15.988699	121.178	3/16/2011 18:00	13.66994	120.332
3/16/2011 17:30	15.979932	121.175	3/16/2011 18:15	13.66277	120.330
3/16/2011 17:45	15.981651	121.176	3/16/2011 18:30	13.65441	120.327
3/16/2011 18:00	15.96056	121.169	3/16/2011 18:45	13.65532	120.328
3/16/2011 18:15	15.947213	121.165	3/16/2011 19:00	13.64736	120.325
3/16/2011 18:30	15.943539	121.164	3/16/2011 19:15	13.64122	120.323
3/16/2011 18:45	15.939989	121.163	3/16/2011 19:30	13.64329	120.324
3/16/2011 19:00	15.942242	121.164	3/16/2011 19:45	13.64265	120.324
3/16/2011 19:15	15.947501	121.165	3/16/2011 20:00	13.63822	120.322
3/16/2011 19:30	15.959868	121.169	3/16/2011 20:15	13.63025	120.320
3/16/2011 19:45	15.971255	121.173	3/16/2011 20:30	13.63091	120.320
3/16/2011 20:00	15.976703	121.174	3/16/2011 20:45	13.63691	120.322

3/16/2011 20:15	15.987712	121.178	3/16/2011 21:00	13.64957	120.326
3/16/2011 20:30	16.01305	121.185	3/16/2011 21:15	13.65192	120.327
3/16/2011 20:45	16.048542	121.196	3/16/2011 21:30	13.66015	120.329
3/16/2011 21:00	16.112047	121.215	3/16/2011 21:45	13.6552	120.328
3/16/2011 21:15	16.170431	121.233	3/16/2011 22:00	13.65545	120.328
3/16/2011 21:30	16.217794	121.248	3/16/2011 22:15	13.65192	120.327
3/16/2011 21:45	16.242851	121.255	3/16/2011 22:30	13.64422	120.324
3/16/2011 22:00	16.24765	121.257	3/16/2011 22:45	13.63522	120.321
3/16/2011 22:15	16.243959	121.256	3/16/2011 23:00	13.63154	120.320
3/16/2011 22:30	16.216808	121.247	3/16/2011 23:15	13.62788	120.319
3/16/2011 22:45	16.196617	121.241	3/16/2011 23:30	13.62215	120.317
3/16/2011 23:00	16.172506	121.234	3/16/2011 23:45	13.6138	120.315
3/16/2011 23:15	16.155338	121.229	3/17/2011 0:00	13.60803	120.313
3/16/2011 23:30	16.133308	121.222	3/17/2011 0:15	13.60844	120.313
3/16/2011 23:45	16.114092	121.216	3/17/2011 0:30	13.61054	120.314
3/17/2011 0:00	16.098831	121.211	3/17/2011 0:45	13.62072	120.317
3/17/2011 0:15	16.123808	121.219	3/17/2011 1:00	13.6227	120.318
3/17/2011 0:30	16.159657	121.230	3/17/2011 1:15	13.63418	120.321
3/17/2011 0:45	16.213747	121.246	3/17/2011 1:30	13.64174	120.323
3/17/2011 1:00	16.27286	121.264	3/17/2011 1:45	13.64658	120.325
3/17/2011 1:15	16.326092	121.281	3/17/2011 2:00	13.65153	120.326
3/17/2011 1:30	16.378475	121.297	3/17/2011 2:15	13.66093	120.329
3/17/2011 1:45	16.42523	121.311	3/17/2011 2:30	13.66446	120.330
3/17/2011 2:00	16.470657	121.325	3/17/2011 2:45	13.66917	120.332
3/17/2011 2:15	16.504288	121.335	3/17/2011 3:00	13.67047	120.332
3/17/2011 2:30	16.548382	121.348	3/17/2011 3:15	13.67739	120.334
3/17/2011 2:45	16.580948	121.358	3/17/2011 3:30	13.68066	120.335
3/17/2011 3:00	16.604029	121.365	3/17/2011 3:45	13.67909	120.335
3/17/2011 3:15	16.630892	121.374	3/17/2011 4:00	13.6907	120.338
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3/19/2011 8:45	15.161244	120.926	3/19/2011 9:30	13.00077	120.128
3/19/2011 9:00	15.15376	120.923	3/19/2011 9:45	12.99672	120.127
3/19/2011 9:15	15.15816	120.925	3/19/2011 10:00	12.98877	120.124
3/19/2011 9:30	15.16355	120.926	3/19/2011 10:15	12.98811	120.124
3/19/2011 9:45	15.167711	120.928	3/19/2011 10:30	12.98548	120.123
3/19/2011 10:00	15.179088	120.931	3/19/2011 10:45	12.97322	120.120
3/19/2011 10:15	15.18178	120.932	3/19/2011 11:00	12.97244	120.119
3/19/2011 10:30	15.178843	120.931	3/19/2011 11:15	12.96944	120.118
3/19/2011 10:45	15.183611	120.932	3/19/2011 11:30	12.96618	120.118
3/19/2011 11:00	15.189238	120.934	3/19/2011 11:45	12.97061	120.119
3/19/2011 11:15	15.203562	120.939	3/19/2011 12:00	12.96761	120.118
3/19/2011 11:30	15.209188	120.940	3/19/2011 12:15	12.95822	120.115
3/19/2011 11:45	15.229377	120.946	3/19/2011 12:30	12.9522	120.113
3/19/2011 12:00	15.220572	120.944	3/19/2011 12:45	12.94908	120.112
3/19/2011 12:15	15.227793	120.946	3/19/2011 13:00	12.94281	120.110
3/19/2011 12:30	15.237944	120.949	3/19/2011 13:15	12.94477	120.111
3/19/2011 12:45	15.243819	120.951	3/19/2011 13:30	12.93709	120.109
3/19/2011 13:00	15.252633	120.954	3/19/2011 13:45	12.94607	120.111

3/19/2011 13:15	15.285303	120.963	3/19/2011 14:00	12.94334	120.111
3/19/2011 13:30	15.311537	120.971	3/19/2011 14:15	12.94007	120.110
3/19/2011 13:45	15.344776	120.982	3/19/2011 14:30	12.94856	120.112
3/19/2011 14:00	15.369119	120.989	3/19/2011 14:45	12.94293	120.110
3/19/2011 14:15	15.399297	120.998	3/19/2011 15:00	12.9449	120.111
3/19/2011 14:30	15.434664	121.009	3/19/2011 15:15	12.94842	120.112
3/19/2011 14:45	15.451605	121.014	3/19/2011 15:30	12.93472	120.108
3/19/2011 15:00	15.467504	121.019	3/19/2011 15:45	12.93053	120.107
3/19/2011 15:15	15.491616	121.026	3/19/2011 16:00	12.92153	120.104
3/19/2011 15:30	15.475787	121.022	3/19/2011 16:15	12.90289	120.098
3/19/2011 15:45	15.452531	121.014	3/19/2011 16:30	12.89545	120.096
3/19/2011 16:00	15.414643	121.003	3/19/2011 16:45	12.88863	120.094
3/19/2011 16:15	15.379767	120.992	3/19/2011 17:00	12.8757	120.090
3/19/2011 16:30	15.3526	120.984	3/19/2011 17:15	12.87375	120.089
3/19/2011 16:45	15.325683	120.976	3/19/2011 17:30	12.86226	120.086
3/19/2011 17:00	15.296852	120.967	3/19/2011 17:45	12.85952	120.085
3/19/2011 17:15	15.277348	120.961	3/19/2011 18:00	12.84438	120.080
3/19/2011 17:30	15.238226	120.949	3/19/2011 18:15	12.83902	120.079
3/19/2011 17:45	15.218122	120.943	3/19/2011 18:30	12.82975	120.076
3/19/2011 18:00	15.192542	120.935	3/19/2011 18:45	12.83088	120.076
3/19/2011 18:15	15.182512	120.932	3/19/2011 19:00	12.81944	120.073
3/19/2011 18:30	15.164406	120.927	3/19/2011 19:15	12.81261	120.071
3/19/2011 18:45	15.159879	120.925	3/19/2011 19:30	12.80325	120.068
3/19/2011 19:00	15.152782	120.923	3/19/2011 19:45	12.79881	120.066
3/19/2011 19:15	15.144231	120.920	3/19/2011 20:00	12.79307	120.065
3/19/2011 19:30	15.137987	120.919	3/19/2011 20:15	12.78302	120.062
3/19/2011 19:45	15.128189	120.916	3/19/2011 20:30	12.77787	120.060
3/19/2011 20:00	15.118393	120.913	3/19/2011 20:45	12.77035	120.058
3/19/2011 20:15	15.117421	120.912	3/19/2011 21:00	12.76135	120.055
3/19/2011 20:30	15.103354	120.908	3/19/2011 21:15	12.75382	120.053
3/19/2011 20:45	15.099547	120.907	3/19/2011 21:30	12.75586	120.053
3/19/2011 21:00	15.097101	120.906	3/19/2011 21:45	12.74829	120.051
3/19/2011 21:15	15.082427	120.902	3/19/2011 22:00	12.74053	120.049
3/19/2011 21:30	15.077161	120.900	3/19/2011 22:15	12.73288	120.046
3/19/2011 21:45	15.072876	120.899	3/19/2011 22:30	12.72662	120.044
3/19/2011 22:00	15.064676	120.896	3/19/2011 22:45	12.72139	120.043
3/19/2011 22:15	15.062596	120.896	3/19/2011 23:00	12.71728	120.042
3/19/2011 22:30	15.055376	120.893	3/19/2011 23:15	12.71265	120.040
3/19/2011 22:45	15.051463	120.892	3/19/2011 23:30	12.70717	120.039
3/19/2011 23:00	15.050969	120.892	3/19/2011 23:45	12.70063	120.037
3/19/2011 23:15	15.041548	120.889	3/20/2011 0:00	12.69385	120.034
3/19/2011 23:30	15.043142	120.890	3/20/2011 0:15	12.69064	120.034
3/19/2011 23:45	15.039342	120.889	3/20/2011 0:30	12.68523	120.032
3/20/2011 0:00	15.035552	120.887	3/20/2011 0:45	12.67597	120.029
3/20/2011 0:15	15.031881	120.886	3/20/2011 1:00	12.67074	120.027
3/20/2011 0:30	15.029188	120.885	3/20/2011 1:15	12.67315	120.028
3/20/2011 0:45	15.024058	120.884	3/20/2011 1:30	12.6633	120.025
3/20/2011 1:00	15.023446	120.884	3/20/2011 1:45	12.65887	120.024
3/20/2011 1:15	15.018912	120.882	3/20/2011 2:00	12.64973	120.021
3/20/2011 1:30	15.022464	120.883	3/20/2011 2:15	12.6475	120.020
3/20/2011 1:45	15.018912	120.882	3/20/2011 2:30	12.63954	120.018
3/20/2011 2:00	15.018057	120.882	3/20/2011 2:45	12.64241	120.019

3/20/2011 2:15	15.015247	120.881	3/20/2011 3:00	12.63823	120.018
3/20/2011 2:30	15.018548	120.882	3/20/2011 3:15	12.64542	120.020
3/20/2011 2:45	15.03213	120.886	3/20/2011 3:30	12.64712	120.020
3/20/2011 3:00	15.06407	120.896	3/20/2011 3:45	12.65164	120.022
3/20/2011 3:15	15.108727	120.910	3/20/2011 4:00	12.6556	120.023
3/20/2011 3:30	15.151191	120.923	3/20/2011 4:15	12.66095	120.024
3/20/2011 3:45	15.195754	120.936	3/20/2011 4:30	12.65978	120.024
3/20/2011 4:00	15.23036	120.947	3/20/2011 4:45	12.65978	120.024
3/20/2011 4:15	15.26426	120.957	3/20/2011 5:00	12.66387	120.025
3/20/2011 4:30	15.30047	120.968	3/20/2011 5:15	12.6593	120.024
3/20/2011 4:45	15.327391	120.976	3/20/2011 5:30	12.65343	120.022
3/20/2011 5:00	15.340247	120.980	3/20/2011 5:45	12.64176	120.019
3/20/2011 5:15	15.333933	120.978	3/20/2011 6:00	12.63249	120.016
3/20/2011 5:30	15.316996	120.973	3/20/2011 6:15	12.62192	120.013
3/20/2011 5:45	15.294724	120.966	3/20/2011 6:30	12.62053	120.012
3/20/2011 6:00	15.263035	120.957	3/20/2011 6:45	12.60873	120.009
3/20/2011 6:15	15.243084	120.951	3/20/2011 7:00	12.60094	120.006
3/20/2011 6:30	15.221548	120.944	3/20/2011 7:15	12.59963	120.006
3/20/2011 6:45	15.194873	120.936	3/20/2011 7:30	12.58994	120.003
3/20/2011 7:00	15.169789	120.928	3/20/2011 7:45	12.57897	119.999
3/20/2011 7:15	15.156081	120.924	3/20/2011 8:00	12.57401	119.998
3/20/2011 7:30	15.139577	120.919	3/20/2011 8:15	12.57022	119.997
3/20/2011 7:45	15.118038	120.912	3/20/2011 8:30	12.56356	119.995
3/20/2011 8:00	15.098706	120.907	3/20/2011 8:45	12.56135	119.994
3/20/2011 8:15	15.087074	120.903	3/20/2011 9:00	12.56026	119.994
3/20/2011 8:30	15.08316	120.902	3/20/2011 9:15	12.56695	119.996
3/20/2011 8:45	15.094793	120.905	3/20/2011 9:30	12.57273	119.998
3/20/2011 9:00	15.119868	120.913	3/20/2011 9:45	12.57339	119.998
3/20/2011 9:15	15.148985	120.922	3/20/2011 10:00	12.57387	119.998
3/20/2011 9:30	15.189238	120.934	3/20/2011 10:15	12.57231	119.997
3/20/2011 9:45	15.225469	120.945	3/20/2011 10:30	12.56277	119.995
3/20/2011 10:00	15.249694	120.953	3/20/2011 10:45	12.56189	119.994
3/20/2011 10:15	15.255202	120.954	3/20/2011 11:00	12.55562	119.992
3/20/2011 10:30	15.246671	120.952	3/20/2011 11:15	12.54622	119.989
3/20/2011 10:45	15.222779	120.944	3/20/2011 11:30	12.53915	119.987
3/20/2011 11:00	15.205397	120.939	3/20/2011 11:45	12.53225	119.985
3/20/2011 11:15	15.185574	120.933	3/20/2011 12:00	12.52374	119.983
3/20/2011 11:30	15.168101	120.928	3/20/2011 12:15	12.51734	119.981
3/20/2011 11:45	15.144334	120.921	3/20/2011 12:30	12.51212	119.979
3/20/2011 12:00	15.12586	120.915	3/20/2011 12:45	12.50573	119.977
3/20/2011 12:15	15.108483	120.910	3/20/2011 13:00	12.50142	119.976
3/20/2011 12:30	15.09491	120.905	3/20/2011 13:15	12.48705	119.971
3/20/2011 12:45	15.079856	120.901	3/20/2011 13:30	12.49073	119.973
3/20/2011 13:00	15.066024	120.897	3/20/2011 13:45	12.48732	119.972
3/20/2011 13:15	15.04571	120.890	3/20/2011 14:00	12.48119	119.970
3/20/2011 13:30	15.037021	120.888	3/20/2011 14:15	12.47846	119.969
3/20/2011 13:45	15.040323	120.889	3/20/2011 14:30	12.47715	119.968
3/20/2011 14:00	15.029927	120.886	3/20/2011 14:45	12.46748	119.965
3/20/2011 14:15	15.039839	120.889	3/20/2011 15:00	12.47649	119.968
3/20/2011 14:30	15.042524	120.889	3/20/2011 15:15	12.47337	119.967
3/20/2011 14:45	15.054283	120.893	3/20/2011 15:30	12.47322	119.967
3/20/2011 15:00	15.086095	120.903	3/20/2011 15:45	12.47622	119.968

3/20/2011 15:15	15.112278	120.911
3/20/2011 15:30	15.139563	120.919
3/20/2011 15:45	15.146779	120.921
3/20/2011 16:00	15.14937	120.922
3/20/2011 16:15	15.142384	120.920
3/20/2011 16:30	15.12759	120.915
3/20/2011 16:45	15.11155	120.911
3/20/2011 17:00	15.097837	120.906
3/20/2011 17:15	15.084379	120.902
3/20/2011 17:30	15.066879	120.897
3/20/2011 17:45	15.054283	120.893
3/20/2011 18:00	15.042524	120.889
3/20/2011 18:15	15.03727	120.888
3/20/2011 18:30	15.027472	120.885
3/20/2011 18:45	15.037631	120.888
3/20/2011 19:00	15.059419	120.895
3/20/2011 19:15	15.09674	120.906
3/20/2011 19:30	15.134792	120.918
3/20/2011 19:45	15.168464	120.928
3/20/2011 20:00	15.202734	120.938
3/20/2011 20:15	15.231	120.947
3/20/2011 20:30	15.257317	120.955
3/20/2011 20:45	15.282125	120.963
3/20/2011 21:00	15.30892	120.971
3/20/2011 21:15	15.332101	120.978
3/20/2011 21:30	15.344161	120.981
3/20/2011 21:45	15.343797	120.981
3/20/2011 22:00	15.340916	120.980
3/20/2011 22:15	15.318954	120.974
3/20/2011 22:30	15.2831	120.963
3/20/2011 22:45	15.256061	120.955
3/20/2011 23:00	15.227335	120.946
3/20/2011 23:15	15.190102	120.934
3/20/2011 23:30	15.165139	120.927
3/20/2011 23:45	15.14546	120.921
3/21/2011 0:00	15.116691	120.912
3/21/2011 0:15	15.099673	120.907
3/21/2011 0:30	15.077161	120.900
3/21/2011 0:45	15.063945	120.896
3/21/2011 1:00	15.060883	120.895
3/21/2011 1:15	15.09405	120.905
3/21/2011 1:30	15.139577	120.919
3/21/2011 1:45	15.196712	120.936
3/21/2011 2:00	15.258787	120.955
3/21/2011 2:15	15.311244	120.971
3/21/2011 2:30	15.364044	120.987
3/21/2011 2:45	15.402111	120.999
3/21/2011 3:00	15.441319	121.011
3/21/2011 3:15	15.470941	121.020
3/21/2011 3:30	15.513887	121.033
3/21/2011 3:45	15.557703	121.047
3/21/2011 4:00	15.593188	121.057
3/20/2011 16:00	12.4706	119.966
3/20/2011 16:15	12.46852	119.966
3/20/2011 16:30	12.45978	119.963
3/20/2011 16:45	12.45377	119.961
3/20/2011 17:00	12.45038	119.960
3/20/2011 17:15	12.4445	119.958
3/20/2011 17:30	12.43927	119.957
3/20/2011 17:45	12.43106	119.954
3/20/2011 18:00	12.4257	119.953
3/20/2011 18:15	12.42557	119.953
3/20/2011 18:30	12.41291	119.949
3/20/2011 18:45	12.41552	119.950
3/20/2011 19:00	12.41838	119.951
3/20/2011 19:15	12.41408	119.949
3/20/2011 19:30	12.42283	119.952
3/20/2011 19:45	12.42061	119.951
3/20/2011 20:00	12.42427	119.952
3/20/2011 20:15	12.43341	119.955
3/20/2011 20:30	12.43484	119.956
3/20/2011 20:45	12.43432	119.955
3/20/2011 21:00	12.4351	119.956
3/20/2011 21:15	12.44098	119.957
3/20/2011 21:30	12.4402	119.957
3/20/2011 21:45	12.4402	119.957
3/20/2011 22:00	12.42871	119.954
3/20/2011 22:15	12.421	119.951
3/20/2011 22:30	12.415	119.950
3/20/2011 22:45	12.4086	119.948
3/20/2011 23:00	12.39724	119.944
3/20/2011 23:15	12.39098	119.942
3/20/2011 23:30	12.38248	119.940
3/20/2011 23:45	12.37425	119.937
3/21/2011 0:00	12.37347	119.937
3/21/2011 0:15	12.36433	119.934
3/21/2011 0:30	12.36198	119.933
3/21/2011 0:45	12.3535	119.931
3/21/2011 1:00	12.34881	119.929
3/21/2011 1:15	12.35389	119.931
3/21/2011 1:30	12.36159	119.933
3/21/2011 1:45	12.37125	119.936
3/21/2011 2:00	12.38013	119.939
3/21/2011 2:15	12.38118	119.939
3/21/2011 2:30	12.39058	119.942
3/21/2011 2:45	12.39424	119.943
3/21/2011 3:00	12.40742	119.947
3/21/2011 3:15	12.41095	119.948
3/21/2011 3:30	12.41578	119.950
3/21/2011 3:45	12.41956	119.951
3/21/2011 4:00	12.42426	119.952
3/21/2011 4:15	12.43328	119.955
3/21/2011 4:30	12.4321	119.955
3/21/2011 4:45	12.43969	119.957

3/21/2011 4:15	15.622437	121.066	3/21/2011 5:00	12.43994	119.957
3/21/2011 4:30	15.63846	121.071	3/21/2011 5:15	12.43915	119.957
3/21/2011 4:45	15.65779	121.077	3/21/2011 5:30	12.44437	119.958
3/21/2011 5:00	15.666846	121.080	3/21/2011 5:45	12.4462	119.959
3/21/2011 5:15	15.681291	121.084	3/21/2011 6:00	12.44686	119.959
3/21/2011 5:30	15.69243	121.088	3/21/2011 6:15	12.44764	119.959
3/21/2011 5:45	15.702829	121.091	3/21/2011 6:30	12.45508	119.962
3/21/2011 6:00	15.710663	121.093	3/21/2011 6:45	12.45535	119.962
3/21/2011 6:15	15.717635	121.095	3/21/2011 7:00	12.45653	119.962
3/21/2011 6:30	15.735384	121.101	3/21/2011 7:15	12.45861	119.963
3/21/2011 6:45	15.746516	121.104	3/21/2011 7:30	12.46319	119.964
3/21/2011 7:00	15.754224	121.106	3/21/2011 7:45	12.46632	119.965
3/21/2011 7:15	15.762913	121.109	3/21/2011 8:00	12.46945	119.966
3/21/2011 7:30	15.783853	121.115	3/21/2011 8:15	12.46762	119.966
3/21/2011 7:45	15.785791	121.116	3/21/2011 8:30	12.46802	119.966
3/21/2011 8:00	15.796692	121.119	3/21/2011 8:45	12.4688	119.966
3/21/2011 8:15	15.803683	121.121	3/21/2011 9:00	12.47233	119.967

Well Pumping Test at 199-B2-15 (C7783)

Pumping Well Data

RawFile: 199-B2-15 const disch 21Mar11_Append_2011-03-22_16-20-13-546.wsl
Device: Level TROLL 700
Site: 100-BC
Device sn: 112651
Log name: 199-B2-15 const disch 21Mar11
Test started: 3/21/2011 10:32
Test stopped: 3/21/2011 16:30

Date	Elapsed Time (sec)	Elapsed Time (min)	Head Feet H2O	Drawdwn Feet H2O	Elevation meters
3/21/11 10:32	0	0.0			
3/21/11 10:32	0.1	0.0	62.27	0.00	121.41087
3/21/11 10:32	0.3	0.0	62.267	0.00	121.40996
3/21/11 10:32	0.5	0.0	62.266	0.00	121.40965
3/21/11 10:32	0.8	0.0	62.262	-0.01	121.40843
3/21/11 10:32	1.0	0.0	62.283	0.01	121.41483
3/21/11 10:32	1.3	0.0	62.291	0.02	121.41727
3/21/11 10:32	1.5	0.0	62.264	-0.01	121.40904
3/21/11 10:32	1.8	0.0	62.263	-0.01	121.40874
3/21/11 10:32	2.0	0.0	62.263	-0.01	121.40874
3/21/11 10:32	2.3	0.0	62.293	0.02	121.41788
3/21/11 10:32	2.5	0.0	62.219	-0.05	121.39533
3/21/11 10:32	2.8	0.0	62.181	-0.09	121.38374
3/21/11 10:32	3.0	0.1	62.125	-0.15	121.36668
3/21/11 10:32	3.3	0.1	62.143	-0.13	121.37216
3/21/11 10:32	3.5	0.1	62.085	-0.19	121.35448
3/21/11 10:32	3.8	0.1	62.118	-0.15	121.36454
3/21/11 10:32	4.0	0.1	62.103	-0.17	121.35997
3/21/11 10:32	4.3	0.1	62.111	-0.16	121.36241

3/21/11 10:32	4.5	0.1	62.082	-0.19	121.35357
3/21/11 10:32	4.8	0.1	62.012	-0.26	121.33223
3/21/11 10:32	5.0	0.1	62.04	-0.23	121.34077
3/21/11 10:32	5.3	0.1	61.935	-0.34	121.30876
3/21/11 10:32	5.5	0.1	61.953	-0.32	121.31425
3/21/11 10:32	5.8	0.1	61.918	-0.35	121.30358
3/21/11 10:32	6.0	0.1	61.888	-0.38	121.29444
3/21/11 10:32	6.4	0.1	61.857	-0.41	121.28499
3/21/11 10:32	6.7	0.1	61.674	-0.60	121.22921
3/21/11 10:32	7.1	0.1	61.712	-0.56	121.24079
3/21/11 10:32	7.6	0.1	61.681	-0.59	121.23134
3/21/11 10:32	8.0	0.1	61.635	-0.64	121.21732
3/21/11 10:32	8.5	0.1	61.498	-0.77	121.17557
3/21/11 10:32	9.0	0.2	61.417	-0.85	121.15088
3/21/11 10:32	9.5	0.2	61.288	-0.98	121.11156
3/21/11 10:32	10.1	0.2	61.171	-1.10	121.0759
3/21/11 10:33	10.7	0.2	61.059	-1.21	121.04176
3/21/11 10:33	11.3	0.2	60.996	-1.27	121.02256
3/21/11 10:33	11.9	0.2	60.815	-1.46	120.96739
3/21/11 10:33	12.7	0.2	60.704	-1.57	120.93356
3/21/11 10:33	13.4	0.2	60.582	-1.69	120.89637
3/21/11 10:33	14.2	0.2	60.438	-1.83	120.85248
3/21/11 10:33	15.1	0.3	60.277	-1.99	120.80341
3/21/11 10:33	16.0	0.3	60.148	-2.12	120.76409
3/21/11 10:33	16.9	0.3	59.956	-2.31	120.70556
3/21/11 10:33	17.9	0.3	59.823	-2.45	120.66503
3/21/11 10:33	19.0	0.3	59.616	-2.65	120.60193
3/21/11 10:33	20.1	0.3	59.434	-2.84	120.54646
3/21/11 10:33	21.3	0.4	59.261	-3.01	120.49373
3/21/11 10:33	22.6	0.4	59.045	-3.23	120.42789
3/21/11 10:33	23.9	0.4	58.817	-3.45	120.3584
3/21/11 10:33	25.3	0.4	58.712	-3.56	120.32639
3/21/11 10:33	26.8	0.4	58.546	-3.72	120.2758
3/21/11 10:33	28.4	0.5	58.499	-3.77	120.26147
3/21/11 10:33	30.1	0.5	58.469	-3.80	120.25233
3/21/11 10:33	31.9	0.5	58.539	-3.73	120.27366
3/21/11 10:33	33.7	0.6	58.625	-3.65	120.29988
3/21/11 10:33	35.8	0.6	58.699	-3.57	120.32243
3/21/11 10:33	37.9	0.6	58.755	-3.52	120.3395
3/21/11 10:33	40.1	0.7	58.855	-3.42	120.36998
3/21/11 10:33	42.5	0.7	58.938	-3.33	120.39528
3/21/11 10:33	45.0	0.8	59.014	-3.26	120.41844
3/21/11 10:33	47.6	0.8	59.107	-3.16	120.44679
3/21/11 10:33	50.5	0.8	59.194	-3.08	120.47331
3/21/11 10:33	53.5	0.9	59.216	-3.05	120.48001
3/21/11 10:33	56.6	0.9	59.192	-3.08	120.4727
3/21/11 10:33	60.0	1.0	59.071	-3.20	120.43582
3/21/11 10:33	63.6	1.1	58.902	-3.37	120.38431
3/21/11 10:33	67.2	1.1	58.742	-3.53	120.33554
3/21/11 10:34	71.4	1.2	58.474	-3.80	120.25385
3/21/11 10:34	75.6	1.3	58.272	-4.00	120.19228
3/21/11 10:34	79.8	1.3	58.031	-4.24	120.11882

3/21/11 10:34	84.6	1.4	57.778	-4.49	120.04171
3/21/11 10:34	90.0	1.5	57.544	-4.73	119.97039
3/21/11 10:34	94.8	1.6	57.346	-4.92	119.91004
3/21/11 10:34	100.8	1.7	57.103	-5.17	119.83597
3/21/11 10:34	106.8	1.8	56.834	-5.44	119.75398
3/21/11 10:34	112.8	1.9	56.622	-5.65	119.68936
3/21/11 10:34	119.4	2.0	56.336	-5.93	119.60219
3/21/11 10:34	126.6	2.1	56.09	-6.18	119.52721
3/21/11 10:35	134.4	2.2	55.793	-6.48	119.43668
3/21/11 10:35	142.2	2.4	55.503	-6.77	119.34829
3/21/11 10:35	150.6	2.5	55.233	-7.04	119.26599
3/21/11 10:35	159.6	2.7	54.954	-7.32	119.18096
3/21/11 10:35	169.2	2.8	54.696	-7.57	119.10232
3/21/11 10:35	178.8	3.0	54.462	-7.81	119.03099
3/21/11 10:35	189.6	3.2	54.18	-8.09	118.94504
3/21/11 10:36	201.0	3.4	53.884	-8.39	118.85482
3/21/11 10:36	213.0	3.6	53.607	-8.66	118.77039
3/21/11 10:36	225.6	3.8	53.365	-8.91	118.69663
3/21/11 10:36	238.8	4.0	53.094	-9.18	118.61403
3/21/11 10:37	253.2	4.2	52.87	-9.40	118.54575
3/21/11 10:37	268.2	4.5	52.644	-9.63	118.47687
3/21/11 10:37	283.8	4.7	52.296	-9.97	118.3708
3/21/11 10:37	300.6	5.0	52.008	-10.26	118.28301
3/21/11 10:38	318.6	5.3	51.681	-10.59	118.18334
3/21/11 10:38	337.2	5.6	51.411	-10.86	118.10105
3/21/11 10:38	357.6	6.0	51.184	-11.09	118.03186
3/21/11 10:39	378.6	6.3	50.952	-11.32	117.96115
3/21/11 10:39	400.8	6.7	50.622	-11.65	117.86056
3/21/11 10:39	424.8	7.1	50.378	-11.89	117.78619
3/21/11 10:40	450.0	7.5	50.169	-12.10	117.72249
3/21/11 10:40	476.4	7.9	49.911	-12.36	117.64385
3/21/11 10:41	504.6	8.4	49.615	-12.66	117.55363
3/21/11 10:41	534.6	8.9	49.516	-12.75	117.52345
3/21/11 10:42	566.4	9.4	49.223	-13.05	117.43415
3/21/11 10:42	600.0	10.0	49.063	-13.21	117.38538
3/21/11 10:43	636.0	10.6	48.927	-13.34	117.34393
3/21/11 10:44	672.0	11.2	48.738	-13.53	117.28632
3/21/11 10:44	714.0	11.9	48.543	-13.73	117.22688
3/21/11 10:45	756.0	12.6	48.463	-13.81	117.2025
3/21/11 10:46	798.0	13.3	48.407	-13.86	117.18543
3/21/11 10:46	846.0	14.1	48.284	-13.99	117.14794
3/21/11 10:47	900.1	15.0	48.182	-14.09	117.11685
3/21/11 10:48	948.0	15.8	48.081	-14.19	117.08606
3/21/11 10:49	1008	16.8	48.026	-14.24	117.0693
3/21/11 10:50	1068	17.8	48.029	-14.24	117.07022
3/21/11 10:51	1128	18.8	47.949	-14.32	117.04583
3/21/11 10:52	1194	19.9	47.871	-14.40	117.02206
3/21/11 10:53	1266	21.1	47.963	-14.31	117.0501
3/21/11 10:55	1344	22.4	47.889	-14.38	117.02754
3/21/11 10:56	1422	23.7	47.765	-14.51	116.98975
3/21/11 10:57	1506	25.1	47.687	-14.58	116.96597
3/21/11 10:59	1596	26.6	47.588	-14.68	116.9358

3/21/11 11:01	1692	28.2	47.347	-14.92	116.86234
3/21/11 11:02	1788	29.8	47.316	-14.95	116.85289
3/21/11 11:04	1896	31.6	47.2	-15.07	116.81754
3/21/11 11:06	2010	33.5	47.193	-15.08	116.8154
3/21/11 11:08	2130	35.5	47.298	-14.97	116.84741
3/21/11 11:10	2256	37.6	47.179	-15.09	116.81114
3/21/11 11:12	2388	39.8	47.251	-15.02	116.83308
3/21/11 11:15	2532	42.2	47.171	-15.10	116.8087
3/21/11 11:17	2682	44.7	47.028	-15.24	116.76511
3/21/11 11:20	2838	47.3	46.944	-15.33	116.73951
3/21/11 11:22	3006	50.1	46.825	-15.45	116.70324
3/21/11 11:25	3186	53.1	46.96	-15.31	116.74438
3/21/11 11:29	3372	56.2	46.965	-15.31	116.74591
3/21/11 11:32	3576	59.6	47.025	-15.25	116.7642
3/21/11 11:35	3786	63.1	46.966	-15.30	116.74621
3/21/11 11:39	4008	66.8	46.969	-15.30	116.74713
3/21/11 11:43	4248	70.8	46.869	-15.40	116.71665
3/21/11 11:47	4500	75.0	47.004	-15.27	116.7578
3/21/11 11:52	4764	79.4	46.991	-15.28	116.75383
3/21/11 11:56	5046	84.1	46.949	-15.32	116.74103
3/21/11 12:01	5346	89.1	46.852	-15.42	116.71147
3/21/11 12:07	5664	94.4	46.819	-15.45	116.70141
3/21/11 12:12	6000	100.0	46.76	-15.51	116.68342
3/21/11 12:18	6360	106.0	46.794	-15.48	116.69379
3/21/11 12:24	6720	112.0	46.71	-15.56	116.66818
3/21/11 12:31	7140	119.0	46.7	-15.57	116.66514
3/21/11 12:38	7560	126.0	46.631	-15.64	116.6441
3/21/11 12:45	7980	133.0	46.737	-15.53	116.67641
3/21/11 12:53	8460	141.0	46.587	-15.68	116.63069
3/21/11 13:02	9000	150.0	46.516	-15.75	116.60905
3/21/11 13:10	9480	158.0	46.478	-15.79	116.59747
3/21/11 13:20	10080	168.0	46.412	-15.86	116.57735
3/21/11 13:30	10680	178.0	46.375	-15.90	116.56608
3/21/11 13:40	11280	188.0	46.419	-15.85	116.57949
3/21/11 13:51	11940	199.0	46.326	-15.94	116.55114
3/21/11 14:03	12660	211.0	46.369	-15.90	116.56425
3/21/11 14:16	13440	224.0	46.214	-16.06	116.517
3/21/11 14:29	14220	237.0	46.08	-16.19	116.47616
3/21/11 14:43	15060	251.0	46.111	-16.16	116.48561
3/21/11 14:58	15960	266.0	46.098	-16.17	116.48165
3/21/11 15:13	16860	281.0	46.475	-15.80	116.59656
3/21/11 15:28	17760	296.0	46.474	-15.80	116.59625
3/21/11 15:43	18660	311.0	46.428	-15.84	116.58223
3/21/11 15:58	19560	326.0	46.417	-15.85	116.57888
3/21/11 16:13	20460	341.0	46.292	-15.98	116.54078
3/21/11 16:28	21360	356.0	46.215	-16.06	116.51731
3/21/11 16:30	21442	357.37	46.286	-15.98	116.53895
3/21/11 16:30	21442	357.37	46.295	-15.98	116.54169
3/21/11 16:30	21443	357.38	46.311	-15.96	116.54657
3/21/11 16:30	21443	357.38	46.286	-15.98	116.53895
3/21/11 16:30	21443	357.39	46.298	-15.97	116.54261
3/21/11 16:30	21443	357.39	46.347	-15.92	116.55754

3/21/11 16:30	21444	357.39	46.354	-15.92	116.55968
3/21/11 16:30	21444	357.40	46.409	-15.86	116.57644
3/21/11 16:30	21444	357.40	46.413	-15.86	116.57766
3/21/11 16:30	21444	357.41	46.523	-15.75	116.61119
3/21/11 16:30	21445	357.41	46.413	-15.86	116.57766
3/21/11 16:30	21445	357.41	46.358	-15.91	116.56089
3/21/11 16:30	21445	357.42	46.4	-15.87	116.5737
3/21/11 16:30	21445	357.42	46.423	-15.85	116.58071
3/21/11 16:30	21446	357.43	46.458	-15.81	116.59137
3/21/11 16:30	21446	357.43	46.476	-15.79	116.59686
3/21/11 16:30	21446	357.44	46.512	-15.76	116.60783
3/21/11 16:30	21446	357.44	46.539	-15.73	116.61606
3/21/11 16:30	21447	357.44	46.564	-15.71	116.62368
3/21/11 16:30	21447	357.45	46.586	-15.68	116.63039
3/21/11 16:30	21447	357.45	46.606	-15.66	116.63648
3/21/11 16:30	21447	357.46	46.637	-15.63	116.64593
3/21/11 16:30	21448	357.46	46.652	-15.62	116.65051
3/21/11 16:30	21448	357.46	46.674	-15.60	116.65721
3/21/11 16:30	21448	357.47	46.698	-15.57	116.66453
3/21/11 16:30	21448	357.47	46.732	-15.54	116.67489
3/21/11 16:30	21449	357.48	46.771	-15.50	116.68678
3/21/11 16:30	21449	357.49	46.806	-15.46	116.69744
3/21/11 16:30	21450	357.49	46.836	-15.43	116.70659
3/21/11 16:30	21450	357.50	46.884	-15.39	116.72122
3/21/11 16:30	21451	357.51	46.931	-15.34	116.73554
3/21/11 16:30	21451	357.52	46.981	-15.29	116.75078
3/21/11 16:30	21452	357.53	47.024	-15.25	116.76389
3/21/11 16:30	21452	357.54	47.079	-15.19	116.78066
3/21/11 16:30	21453	357.55	47.136	-15.13	116.79803
3/21/11 16:30	21453	357.56	47.19	-15.08	116.81449
3/21/11 16:30	21454	357.57	47.264	-15.01	116.83704
3/21/11 16:30	21455	357.58	47.306	-14.96	116.84984
3/21/11 16:30	21456	357.59	47.375	-14.90	116.87088
3/21/11 16:30	21456	357.61	47.447	-14.82	116.89282
3/21/11 16:30	21457	357.62	47.518	-14.75	116.91446
3/21/11 16:30	21458	357.63	47.602	-14.67	116.94007
3/21/11 16:30	21459	357.65	47.683	-14.59	116.96475
3/21/11 16:30	21460	357.67	47.795	-14.48	116.99889
3/21/11 16:30	21461	357.68	47.861	-14.41	117.01901
3/21/11 16:30	21462	357.70	47.961	-14.31	117.04949
3/21/11 16:30	21463	357.72	48.059	-14.21	117.07936
3/21/11 16:30	21465	357.74	48.167	-14.10	117.11228
3/21/11 16:30	21466	357.77	48.279	-13.99	117.14642
3/21/11 16:30	21467	357.79	48.388	-13.88	117.17964
3/21/11 16:30	21469	357.82	48.515	-13.76	117.21835
3/21/11 16:30	21470	357.84	48.629	-13.64	117.2531
3/21/11 16:30	21472	357.87	48.78	-13.49	117.29912
3/21/11 16:30	21474	357.90	48.924	-13.35	117.34301
3/21/11 16:30	21476	357.93	49.067	-13.20	117.3866
3/21/11 16:30	21478	357.96	49.22	-13.05	117.43323
3/21/11 16:30	21480	358.00	49.39	-12.88	117.48505
3/21/11 16:30	21482	358.04	49.56	-12.71	117.53686

3/21/11 16:30	21485	358.08	49.755	-12.52	117.5963
3/21/11 16:30	21487	358.12	49.947	-12.32	117.65482
3/21/11 16:30	21490	358.16	50.128	-12.14	117.70999
3/21/11 16:31	21493	358.21	50.319	-11.95	117.76821
3/21/11 16:31	21496	358.26	50.533	-11.74	117.83343
3/21/11 16:31	21499	358.31	50.738	-11.53	117.89592
3/21/11 16:31	21502	358.37	50.966	-11.30	117.96541
3/21/11 16:31	21506	358.43	51.206	-11.06	118.03856
3/21/11 16:31	21509	358.49	51.445	-10.83	118.11141
3/21/11 16:31	21514	358.56	51.714	-10.56	118.1934
3/21/11 16:31	21518	358.63	51.961	-10.31	118.26869
3/21/11 16:31	21522	358.70	52.223	-10.05	118.34855
3/21/11 16:31	21527	358.78	52.503	-9.77	118.43389
3/21/11 16:31	21532	358.87	52.808	-9.46	118.52685
3/21/11 16:31	21537	358.95	53.078	-9.19	118.60915
3/21/11 16:31	21543	359.05	53.429	-8.84	118.71614
3/21/11 16:31	21549	359.15	53.705	-8.57	118.80026
3/21/11 16:32	21555	359.25	54.003	-8.27	118.89109
3/21/11 16:32	21562	359.36	54.311	-7.96	118.98497
3/21/11 16:32	21569	359.48	54.65	-7.62	119.0883
3/21/11 16:32	21577	359.61	54.992	-7.28	119.19254
3/21/11 16:32	21584	359.74	55.32	-6.95	119.29251
3/21/11 16:32	21593	359.88	55.656	-6.61	119.39492
3/21/11 16:32	21602	360.03	55.994	-6.28	119.49795
3/21/11 16:33	21611	360.19	56.343	-5.93	119.60432
3/21/11 16:33	21621	360.35	56.665	-5.61	119.70247
3/21/11 16:33	21632	360.53	57.012	-5.26	119.80823
3/21/11 16:33	21643	360.72	57.354	-4.92	119.91248
3/21/11 16:33	21655	360.92	57.688	-4.58	120.01428
3/21/11 16:33	21668	361.13	58.011	-4.26	120.11273
3/21/11 16:34	21681	361.35	58.325	-3.95	120.20844
3/21/11 16:34	21695	361.59	58.641	-3.63	120.30475
3/21/11 16:34	21710	361.84	58.942	-3.33	120.3965
3/21/11 16:34	21726	362.10	59.22	-3.05	120.48123
3/21/11 16:35	21743	362.38	59.502	-2.77	120.56719
3/21/11 16:35	21761	362.68	59.771	-2.50	120.64918
3/21/11 16:35	21779	362.99	60.008	-2.26	120.72141
3/21/11 16:36	21800	363.33	60.253	-2.02	120.79609
3/21/11 16:36	21821	363.68	60.471	-1.80	120.86254
3/21/11 16:36	21843	364.05	60.672	-1.60	120.9238
3/21/11 16:37	21867	364.45	60.876	-1.39	120.98598
3/21/11 16:37	21892	364.87	61.048	-1.22	121.03841
3/21/11 16:38	21919	365.31	61.2	-1.07	121.08474
3/21/11 16:38	21947	365.78	61.342	-0.93	121.12802
3/21/11 16:39	21977	366.28	61.472	-0.80	121.16764
3/21/11 16:39	22009	366.81	61.58	-0.69	121.20056
3/21/11 16:40	22042	367.37	61.665	-0.61	121.22647
3/21/11 16:40	22078	367.97	61.75	-0.52	121.25238
3/21/11 16:41	22114	368.57	61.829	-0.44	121.27646
3/21/11 16:42	22156	369.27	61.877	-0.39	121.29109
3/21/11 16:42	22198	369.97	61.924	-0.35	121.30541
3/21/11 16:43	22240	370.67	61.982	-0.29	121.32309

3/21/11 16:44	22288	371.47	62.008	-0.26	121.33101
3/21/11 16:45	22342	372.37	62.03	-0.24	121.33772
3/21/11 16:45	22390	373.17	62.049	-0.22	121.34351
3/21/11 16:46	22450	374.17	62.065	-0.21	121.34839
3/21/11 16:47	22510	375.17	62.088	-0.18	121.3554
3/21/11 16:48	22570	376.17	62.093	-0.18	121.35692
3/21/11 16:50	22636	377.27	62.098	-0.17	121.35845
3/21/11 16:51	22708	378.47	62.109	-0.16	121.3618
3/21/11 16:52	22786	379.77	62.111	-0.16	121.36241
3/21/11 16:53	22864	381.07	62.117	-0.15	121.36424
3/21/11 16:55	22948	382.47	62.104	-0.17	121.36028
3/21/11 16:56	23038	383.97	62.124	-0.15	121.36637
3/21/11 16:58	23134	385.57	62.124	-0.15	121.36637
3/21/11 16:59	23230	387.17	62.117	-0.15	121.36424
3/21/11 17:01	23338	388.97	62.119	-0.15	121.36485
3/21/11 17:03	23452	390.87	62.134	-0.14	121.36942
3/21/11 17:05	23572	392.87	62.123	-0.15	121.36607
3/21/11 17:07	23698	394.97	62.127	-0.14	121.36729
3/21/11 17:09	23830	397.17	62.126	-0.14	121.36698
3/21/11 17:12	23974	399.57	62.131	-0.14	121.3685
3/21/11 17:14	24124	402.07	62.123	-0.15	121.36607
3/21/11 17:17	24280	404.67	62.119	-0.15	121.36485
3/21/11 17:20	24448	407.47	62.128	-0.14	121.36759
3/21/11 17:23	24628	410.47	62.139	-0.13	121.37094
3/21/11 17:26	24814	413.57	62.129	-0.14	121.3679
3/21/11 17:29	25018	416.97	62.128	-0.14	121.36759
3/21/11 17:33	25228	420.47	62.136	-0.13	121.37003
3/21/11 17:36	25450	424.17	62.125	-0.15	121.36668
3/21/11 17:40	25690	428.17	62.127	-0.14	121.36729
3/21/11 17:45	25942	432.37	62.129	-0.14	121.3679
3/21/11 17:49	26206	436.77	62.133	-0.14	121.36911
3/21/11 17:54	26488	441.47	62.126	-0.14	121.36698
3/21/11 17:59	26788	446.47	62.127	-0.14	121.36729
3/21/11 18:04	27106	451.77	62.146	-0.12	121.37308
3/21/11 18:10	27442	457.37	62.136	-0.13	121.37003
3/21/11 18:16	27802	463.37	62.145	-0.13	121.37277
3/21/11 18:22	28162	469.37	62.128	-0.14	121.36759
3/21/11 18:29	28582	476.37	62.115	-0.16	121.36363
3/21/11 18:36	29002	483.37	62.093	-0.18	121.35692
3/21/11 18:43	29422	490.37	62.079	-0.19	121.35266
3/21/11 18:51	29902	498.37	62.04	-0.23	121.34077
3/21/11 19:00	30442	507.37	62.002	-0.27	121.32919
3/21/11 19:08	30922	515.37	61.976	-0.29	121.32126
3/21/11 19:18	31522	525.37	61.932	-0.34	121.30785
3/21/11 19:28	32122	535.37	61.901	-0.37	121.2984
3/21/11 19:38	32722	545.37	61.864	-0.41	121.28712
3/21/11 19:49	33382	556.37	61.856	-0.41	121.28468
3/21/11 20:01	34102	568.37	61.844	-0.43	121.28103
3/21/11 20:14	34882	581.37	61.845	-0.43	121.28133
3/21/11 20:27	35662	594.37	61.859	-0.41	121.2856
3/21/11 20:41	36502	608.37	61.881	-0.39	121.2923
3/21/11 20:56	37402	623.37	61.911	-0.36	121.30145

3/21/11 21:11	38302	638.37	61.924	-0.35	121.30541
3/21/11 21:26	39202	653.37	61.953	-0.32	121.31425
3/21/11 21:41	40102	668.37	61.961	-0.31	121.31669
3/21/11 21:56	41002	683.37	61.963	-0.31	121.3173
3/21/11 22:11	41902	698.37	61.957	-0.31	121.31547
3/21/11 22:26	42802	713.37	61.93	-0.34	121.30724
3/21/11 22:41	43702	728.37	61.905	-0.37	121.29962
3/21/11 22:56	44602	743.37	61.872	-0.40	121.28956
3/21/11 23:11	45502	758.37	61.836	-0.43	121.27859
3/21/11 23:26	46402	773.37	61.805	-0.47	121.26914
3/21/11 23:41	47302	788.37	61.76	-0.51	121.25542
3/21/11 23:56	48202	803.37	61.73	-0.54	121.24628
3/22/11 0:11	49102	818.37	61.698	-0.57	121.23653
3/22/11 0:26	50002	833.37	61.684	-0.59	121.23226
3/22/11 0:41	50902	848.37	61.69	-0.58	121.23409
3/22/11 0:56	51802	863.37	61.722	-0.55	121.24384
3/22/11 1:11	52702	878.37	61.789	-0.48	121.26426
3/22/11 1:26	53602	893.37	61.871	-0.40	121.28926
3/22/11 1:41	54502	908.37	61.928	-0.34	121.30663
3/22/11 1:56	55402	923.37	61.989	-0.28	121.32522
3/22/11 2:11	56302	938.37	62.051	-0.22	121.34412
3/22/11 2:26	57202	953.37	62.086	-0.18	121.35479
3/22/11 2:41	58102	968.37	62.119	-0.15	121.36485
3/22/11 2:56	59002	983.37	62.165	-0.11	121.37887
3/22/11 3:11	59902	998.37	62.188	-0.08	121.38588
3/22/11 3:26	60802	1013.37	62.21	-0.06	121.39258
3/22/11 3:41	61702	1028.37	62.225	-0.05	121.39716
3/22/11 3:56	62602	1043.37	62.251	-0.02	121.40508
3/22/11 4:11	63502	1058.37	62.262	-0.01	121.40843
3/22/11 4:26	64402	1073.37	62.277	0.01	121.41301
3/22/11 4:41	65302	1088.37	62.291	0.02	121.41727
3/22/11 4:56	66202	1103.37	62.316	0.05	121.42489
3/22/11 5:11	67102	1118.37	62.317	0.05	121.4252
3/22/11 5:26	68002	1133.37	62.326	0.06	121.42794
3/22/11 5:41	68902	1148.37	62.337	0.07	121.43129
3/22/11 5:56	69802	1163.37	62.347	0.08	121.43434
3/22/11 6:11	70702	1178.37	62.356	0.09	121.43708
3/22/11 6:26	71602	1193.37	62.359	0.09	121.438

Well Pumping Test
Observation Well Data

RawFile:
199-B2-14 obs well 21Mar11 5min_2011-03-21_20-13-57-531.wsl

Device:	Level TROLL 500
Site:	100-BC
Device sn:	108079
Log name:	199-B2-14 obs well 21Mar11 5min
Xducer Start:	3/21/2011 10:30
Xducer stopped:	3/21/2011 12:10
Test start:	3/21/11 10:32
Recovery Start:	3/21/11 16:30

Date Time	Elapsed Time (sec)	Elapsed Time (min)	Head Feet H2O	Elevation meters	Change in Head (ft)
3/21/11 10:30	0	0			
3/21/11 10:30	1	0.1	12.474	119.649	0.000
3/21/11 10:35	300	5	12.474	119.649	0.000
3/21/11 10:40	600	10	12.47	119.648	-0.004
3/21/11 10:45	900	15	12.471	119.648	-0.003
3/21/11 10:50	1200	20	12.469	119.647	-0.005
3/21/11 10:55	1500	25	12.471	119.648	-0.003
3/21/11 11:00	1800	30	12.475	119.649	0.001
3/21/11 11:05	2100	35	12.469	119.647	-0.005
3/21/11 11:10	2400	40	12.473	119.649	-0.001
3/21/11 11:15	2700	45	12.475	119.649	0.001
3/21/11 11:20	3000	50	12.478	119.650	0.004
3/21/11 11:25	3300	55	12.474	119.649	0.000
3/21/11 11:30	3600	60	12.474	119.649	0.000
3/21/11 11:35	3900	65	12.474	119.649	0.000
3/21/11 11:40	4200	70	12.474	119.649	0.000
3/21/11 11:45	4500	75	12.476	119.650	0.002
3/21/11 11:50	4800	80	12.478	119.650	0.004
3/21/11 11:55	5100	85	12.478	119.650	0.004
3/21/11 12:00	5400	90	12.476	119.650	0.002
3/21/11 12:05	5700	95	12.475	119.649	0.001
3/21/11 12:10	6000	100	12.478	119.650	0.004
3/21/11 12:15	6300	105	12.47	119.649	0.000
3/21/11 12:20	6600	110	12.48	119.652	0.009
3/21/11 12:25	6900	115	12.48	119.650	0.002
3/21/11 12:30	7200	120	12.47	119.649	-0.001
3/21/11 12:35	7500	125	12.48	119.650	0.003
3/21/11 12:40	7800	130	12.48	119.651	0.007
3/21/11 12:45	8100	135	12.48	119.650	0.004
3/21/11 12:50	8400	140	12.48	119.650	0.002
3/21/11 12:55	8700	145	12.48	119.649	0.001
3/21/11 13:00	9000	150	12.48	119.649	0.001
3/21/11 13:05	9300	155	12.47	119.649	-0.001
3/21/11 13:10	9600	160	12.48	119.651	0.006
3/21/11 13:15	9900	165	12.47	119.649	-0.001
3/21/11 13:20	10200	170	12.48	119.650	0.003
3/21/11 13:25	10500	175	12.48	119.651	0.006
3/21/11 13:30	10800	180	12.47	119.649	-0.001
3/21/11 13:35	11100	185	12.48	119.651	0.005
3/21/11 13:40	11400	190	12.48	119.650	0.003
3/21/11 13:45	11700	195	12.48	119.652	0.009
3/21/11 13:50	12000	200	12.48	119.650	0.004
3/21/11 13:55	12300	205	12.48	119.650	0.004
3/21/11 14:00	12600	210	12.48	119.650	0.002
3/21/11 14:05	12900	215	12.48	119.651	0.006
3/21/11 14:10	13200	220	12.48	119.651	0.006
3/21/11 14:15	13500	225	12.48	119.650	0.004
3/21/11 14:20	13800	230	12.48	119.651	0.006
3/21/11 14:25	14100	235	12.48	119.650	0.003
3/21/11 14:30	14400	240	12.48	119.649	0.001

3/21/11 14:35	14700	245	12.48	119.651	0.006
3/21/11 14:40	15000	250	12.48	119.651	0.005
3/21/11 14:45	15300	255	12.48	119.652	0.009
3/21/11 14:50	15600	260	12.48	119.650	0.003
3/21/11 14:55	15900	265	12.48	119.652	0.010
3/21/11 15:00	16200	270	12.48	119.652	0.010
3/21/11 15:05	16500	275	12.49	119.653	0.013
3/21/11 15:10	16800	280	12.48	119.649	0.001
3/21/11 15:15	17100	285	12.48	119.651	0.007
3/21/11 15:20	17400	290	12.48	119.651	0.007
3/21/11 15:25	17700	295	12.48	119.651	0.008
3/21/11 15:30	18000	300	12.48	119.651	0.006
3/21/11 15:35	18300	305	12.49	119.653	0.014
3/21/11 15:40	18600	310	12.49	119.653	0.013
3/21/11 15:45	18900	315	12.48	119.651	0.007
3/21/11 15:50	19200	320	12.49	119.652	0.011
3/21/11 15:55	19500	325	12.49	119.654	0.015
3/21/11 16:00	19800	330	12.48	119.652	0.009
3/21/11 16:05	20100	335	12.49	119.653	0.012
3/21/11 16:10	20400	340	12.48	119.652	0.009
3/21/11 16:15	20700	345	12.48	119.652	0.010
3/21/11 16:20	21000	350	12.48	119.652	0.009
3/21/11 16:25	21300	355	12.49	119.654	0.015
3/21/11 16:30	21600	360	12.49	119.653	0.013
3/21/11 16:35	21900	365	12.49	119.653	0.013
3/21/11 16:40	22200	370	12.49	119.653	0.014
3/21/11 16:45	22500	375	12.49	119.654	0.015
3/21/11 16:50	22800	380	12.49	119.653	0.014
3/21/11 16:55	23100	385	12.49	119.654	0.016
3/21/11 17:00	23400	390	12.49	119.654	0.015
3/21/11 17:05	23700	395	12.49	119.654	0.015
3/21/11 17:10	24000	400	12.49	119.654	0.016
3/21/11 17:15	24300	405	12.49	119.654	0.015
3/21/11 17:20	24600	410	12.49	119.655	0.020
3/21/11 17:25	24900	415	12.49	119.654	0.018
3/21/11 17:30	25200	420	12.49	119.655	0.019
3/21/11 17:35	25500	425	12.49	119.655	0.020
3/21/11 17:40	25800	430	12.50	119.656	0.024
3/21/11 17:45	26100	435	12.49	119.654	0.018
3/21/11 17:50	26400	440	12.49	119.655	0.020
3/21/11 17:55	26700	445	12.49	119.654	0.016
3/21/11 18:00	27000	450	12.49	119.654	0.017
3/21/11 18:05	27300	455	12.50	119.656	0.022
3/21/11 18:10	27600	460	12.48	119.651	0.006
3/21/11 18:15	27900	465	12.50	119.656	0.022
3/21/11 18:20	28200	470	12.48	119.652	0.009
3/21/11 18:25	28500	475	12.49	119.652	0.011
3/21/11 18:30	28800	480	12.48	119.651	0.006
3/21/11 18:35	29100	485	12.48	119.651	0.006
3/21/11 18:40	29400	490	12.47	119.648	-0.002
3/21/11 18:45	29700	495	12.47	119.648	-0.002
3/21/11 18:50	30000	500	12.46	119.645	-0.012

3/21/11 18:55	30300	505	12.46	119.645	-0.013
3/21/11 19:00	30600	510	12.46	119.643	-0.018
3/21/11 19:05	30900	515	12.46	119.644	-0.016
3/21/11 19:10	31200	520	12.45	119.643	-0.021
3/21/11 19:15	31500	525	12.45	119.640	-0.028
3/21/11 19:20	31800	530	12.44	119.640	-0.031
3/21/11 19:25	32100	535	12.44	119.639	-0.033
3/21/11 19:30	32400	540	12.44	119.638	-0.036
3/21/11 19:35	32700	545	12.44	119.638	-0.036
3/21/11 19:40	33000	550	12.43	119.636	-0.041
3/21/11 19:45	33300	555	12.43	119.634	-0.049
3/21/11 19:50	33600	560	12.43	119.635	-0.045
3/21/11 19:55	33900	565	12.43	119.635	-0.046
3/21/11 20:00	34200	570	12.43	119.636	-0.044
3/21/11 20:05	34500	575	12.42	119.633	-0.051
3/21/11 20:10	34800	580	12.42	119.633	-0.051
3/21/11 20:15	35100	585	12.43	119.635	-0.046
3/21/11 20:20	35400	590	12.43	119.636	-0.044
3/21/11 20:25	35700	595	12.43	119.634	-0.048
3/21/11 20:30	36000	600	12.43	119.635	-0.045
3/21/11 20:35	36300	605	12.43	119.634	-0.048
3/21/11 20:40	36600	610	12.43	119.636	-0.042
3/21/11 20:45	36900	615	12.44	119.637	-0.039
3/21/11 20:50	37200	620	12.434	119.637	-0.040
3/21/11 20:55	37500	625	12.435	119.637	-0.039
3/21/11 21:00	37800	630	12.434	119.637	-0.040
3/21/11 21:05	38100	635	12.434	119.637	-0.040
3/21/11 21:10	38400	640	12.439	119.638	-0.035
3/21/11 21:15	38700	645	12.438	119.638	-0.036
3/21/11 21:20	39000	650	12.444	119.640	-0.030
3/21/11 21:25	39300	655	12.443	119.640	-0.031
3/21/11 21:30	39600	660	12.443	119.640	-0.031
3/21/11 21:35	39900	665	12.444	119.640	-0.030
3/21/11 21:40	40200	670	12.443	119.640	-0.031
3/21/11 21:45	40500	675	12.44	119.639	-0.034
3/21/11 21:50	40800	680	12.447	119.641	-0.027
3/21/11 21:55	41100	685	12.446	119.640	-0.028
3/21/11 22:00	41400	690	12.442	119.639	-0.032
3/21/11 22:05	41700	695	12.439	119.638	-0.035
3/21/11 22:10	42000	700	12.444	119.640	-0.030
3/21/11 22:15	42300	705	12.443	119.640	-0.031
3/21/11 22:20	42600	710	12.434	119.637	-0.040
3/21/11 22:25	42900	715	12.437	119.638	-0.037
3/21/11 22:30	43200	720	12.429	119.635	-0.045
3/21/11 22:35	43500	725	12.43	119.636	-0.044
3/21/11 22:40	43800	730	12.428	119.635	-0.046
3/21/11 22:45	44100	735	12.422	119.633	-0.052
3/21/11 22:50	44400	740	12.421	119.633	-0.053
3/21/11 22:55	44700	745	12.418	119.632	-0.056
3/21/11 23:00	45000	750	12.42	119.633	-0.054
3/21/11 23:05	45300	755	12.412	119.630	-0.062
3/21/11 23:10	45600	760	12.414	119.631	-0.060

3/21/11 23:15	45900	765	12.408	119.629	-0.066
3/21/11 23:20	46200	770	12.404	119.628	-0.070
3/21/11 23:25	46500	775	12.401	119.627	-0.073
3/21/11 23:30	46800	780	12.399	119.626	-0.075
3/21/11 23:35	47100	785	12.399	119.626	-0.075
3/21/11 23:40	47400	790	12.399	119.626	-0.075
3/21/11 23:45	47700	795	12.395	119.625	-0.079
3/21/11 23:50	48000	800	12.391	119.624	-0.083
3/21/11 23:55	48300	805	12.391	119.624	-0.083
3/22/11 0:00	48600	810	12.387	119.622	-0.087
3/22/11 0:05	48900	815	12.385	119.622	-0.089
3/22/11 0:10	49200	820	12.382	119.621	-0.092
3/22/11 0:15	49500	825	12.382	119.621	-0.092
3/22/11 0:20	49800	830	12.379	119.620	-0.095
3/22/11 0:25	50100	835	12.378	119.620	-0.096
3/22/11 0:30	50400	840	12.379	119.620	-0.095
3/22/11 0:35	50700	845	12.381	119.621	-0.093
3/22/11 0:40	51000	850	12.38	119.620	-0.094
3/22/11 0:45	51300	855	12.383	119.621	-0.091
3/22/11 0:50	51600	860	12.38	119.620	-0.094
3/22/11 0:55	51900	865	12.388	119.623	-0.086
3/22/11 1:00	52200	870	12.388	119.623	-0.086
3/22/11 1:05	52500	875	12.393	119.624	-0.081
3/22/11 1:10	52800	880	12.397	119.626	-0.077
3/22/11 1:15	53100	885	12.401	119.627	-0.073
3/22/11 1:20	53400	890	12.406	119.628	-0.068
3/22/11 1:25	53700	895	12.409	119.629	-0.065
3/22/11 1:30	54000	900	12.411	119.630	-0.063
3/22/11 1:35	54300	905	12.415	119.631	-0.059
3/22/11 1:40	54600	910	12.42	119.633	-0.054
3/22/11 1:45	54900	915	12.421	119.633	-0.053
3/22/11 1:50	55200	920	12.429	119.635	-0.045
3/22/11 1:55	55500	925	12.428	119.635	-0.046
3/22/11 2:00	55800	930	12.433	119.636	-0.041
3/22/11 2:05	56100	935	12.436	119.637	-0.038
3/22/11 2:10	56400	940	12.439	119.638	-0.035
3/22/11 2:15	56700	945	12.447	119.641	-0.027
3/22/11 2:20	57000	950	12.449	119.641	-0.025
3/22/11 2:25	57300	955	12.448	119.641	-0.026
3/22/11 2:30	57600	960	12.449	119.641	-0.025
3/22/11 2:35	57900	965	12.449	119.641	-0.025
3/22/11 2:40	58200	970	12.454	119.643	-0.020
3/22/11 2:45	58500	975	12.461	119.645	-0.013
3/22/11 2:50	58800	980	12.458	119.644	-0.016
3/22/11 2:55	59100	985	12.461	119.645	-0.013
3/22/11 3:00	59400	990	12.465	119.646	-0.009
3/22/11 3:05	59700	995	12.464	119.646	-0.010
3/22/11 3:10	60000	1000	12.467	119.647	-0.007
3/22/11 3:15	60300	1005	12.471	119.648	-0.003
3/22/11 3:20	60600	1010	12.469	119.647	-0.005
3/22/11 3:25	60900	1015	12.478	119.650	0.004
3/22/11 3:30	61200	1020	12.479	119.651	0.005

3/22/11 3:35	61500	1025	12.478	119.650	0.004
3/22/11 3:40	61800	1030	12.473	119.649	-0.001
3/22/11 3:45	62100	1035	12.485	119.652	0.011
3/22/11 3:50	62400	1040	12.485	119.652	0.011
3/22/11 3:55	62700	1045	12.481	119.651	0.007
3/22/11 4:00	63000	1050	12.483	119.652	0.009
3/22/11 4:05	63300	1055	12.487	119.653	0.013
3/22/11 4:10	63600	1060	12.486	119.653	0.012
3/22/11 4:15	63900	1065	12.492	119.654	0.018
3/22/11 4:20	64200	1070	12.491	119.654	0.017
3/22/11 4:25	64500	1075	12.495	119.655	0.021
3/22/11 4:30	64800	1080	12.501	119.657	0.027
3/22/11 4:35	65100	1085	12.497	119.656	0.023
3/22/11 4:40	65400	1090	12.501	119.657	0.027
3/22/11 4:45	65700	1095	12.505	119.658	0.031
3/22/11 4:50	66000	1100	12.502	119.658	0.028
3/22/11 4:55	66300	1105	12.504	119.658	0.030
3/22/11 5:00	66600	1110	12.504	119.658	0.030
3/22/11 5:05	66900	1115	12.508	119.659	0.034
3/22/11 5:10	67200	1120	12.508	119.659	0.034
3/22/11 5:15	67500	1125	12.508	119.659	0.034
3/22/11 5:20	67800	1130	12.504	119.658	0.030
3/22/11 5:25	68100	1135	12.514	119.661	0.040
3/22/11 5:30	68400	1140	12.509	119.660	0.035
3/22/11 5:35	68700	1145	12.515	119.661	0.041
3/22/11 5:40	69000	1150	12.518	119.662	0.044
3/22/11 5:45	69300	1155	12.513	119.661	0.039
3/22/11 5:50	69600	1160	12.519	119.663	0.045
3/22/11 5:55	69900	1165	12.52	119.663	0.046
3/22/11 6:00	70200	1170	12.521	119.663	0.047
3/22/11 6:05	70500	1175	12.525	119.665	0.051
3/22/11 6:10	70800	1180	12.522	119.664	0.048
3/22/11 6:15	71100	1185	12.526	119.665	0.052
3/22/11 6:20	71400	1190	12.524	119.664	0.050
3/22/11 6:25	71700	1195	12.531	119.666	0.057
3/22/11 6:30	72000	1200	12.531	119.666	0.057
3/22/11 6:35	72300	1205	12.531	119.666	0.057
3/22/11 6:40	72600	1210	12.534	119.667	0.060
3/22/11 6:45	72900	1215	12.53	119.666	0.056
3/22/11 6:50	73200	1220	12.534	119.667	0.060
3/22/11 6:55	73500	1225	12.531	119.666	0.057
3/22/11 7:00	73800	1230	12.536	119.668	0.062
3/22/11 7:05	74100	1235	12.539	119.669	0.065
3/22/11 7:10	74400	1240	12.537	119.668	0.063
3/22/11 7:15	74700	1245	12.538	119.668	0.064
3/22/11 7:20	75000	1250	12.543	119.670	0.069
3/22/11 7:25	75300	1255	12.544	119.670	0.070
3/22/11 7:30	75600	1260	12.544	119.670	0.070
3/22/11 7:35	75900	1265	12.541	119.669	0.067
3/22/11 7:40	76200	1270	12.546	119.671	0.072
3/22/11 7:45	76500	1275	12.541	119.669	0.067
3/22/11 7:50	76800	1280	12.545	119.671	0.071

3/22/11 7:55	77100	1285	12.547	119.671	0.073
3/22/11 8:00	77400	1290	12.549	119.672	0.075
3/22/11 8:05	77700	1295	12.553	119.673	0.079
3/22/11 8:10	78000	1300	12.547	119.671	0.073
3/22/11 8:15	78300	1305	12.554	119.673	0.080
3/22/11 8:20	78600	1310	12.555	119.674	0.081
3/22/11 8:25	78900	1315	12.554	119.673	0.080
3/22/11 8:30	79200	1320	12.546	119.671	0.072
3/22/11 8:35	79500	1325	12.549	119.672	0.075
3/22/11 8:40	79800	1330	12.553	119.673	0.079
3/22/11 8:45	80100	1335	12.557	119.674	0.083
3/22/11 8:50	80400	1340	12.558	119.675	0.084
3/22/11 8:55	80700	1345	12.556	119.674	0.082
3/22/11 9:00	81000	1350	12.559	119.675	0.085
3/22/11 9:05	81300	1355	12.56	119.675	0.086
3/22/11 9:10	81600	1360	12.563	119.676	0.089
3/22/11 9:15	81900	1365	12.56	119.675	0.086
3/22/11 9:20	82200	1370	12.569	119.678	0.095
3/22/11 9:25	82500	1375	12.563	119.676	0.089
3/22/11 9:30	82800	1380	12.57	119.678	0.096
3/22/11 9:35	83100	1385	12.567	119.677	0.093
3/22/11 9:40	83400	1390	12.575	119.680	0.101
3/22/11 9:45	83700	1395	12.576	119.680	0.102
3/22/11 9:50	84000	1400	12.57	119.678	0.096
3/22/11 9:55	84300	1405	12.572	119.679	0.098
3/22/11 10:00	84600	1410	12.576	119.680	0.102
3/22/11 10:05	84900	1415	12.573	119.679	0.099
3/22/11 10:10	85200	1420	12.575	119.680	0.101
3/22/11 10:15	85500	1425	12.582	119.682	0.108
3/22/11 10:20	85800	1430	12.579	119.681	0.105
3/22/11 10:25	86100	1435	12.575	119.680	0.101
3/22/11 10:30	86400	1440	12.585	119.683	0.111
3/22/11 10:35	86700	1445	12.576	119.680	0.102
3/22/11 10:40	87000	1450	12.581	119.682	0.107
3/22/11 10:45	87300	1455	12.585	119.683	0.111
3/22/11 10:50	87600	1460	12.588	119.684	0.114
3/22/11 10:55	87900	1465	12.593	119.685	0.119

100-BC-5 River Station Data

Date/Time	Elev (m)	Elev (ft)	Date/Time	Elev (m)	Elev (ft)
3/1/11 0:00	120.0839	393.976	3/16/11 13:00	119.6675	392.610
3/1/11 1:00	120.103	394.039	3/16/11 14:00	119.6047	392.404
3/1/11 2:00	120.2052	394.374	3/16/11 15:00	119.5638	392.270
3/1/11 3:00	120.3181	394.744	3/16/11 16:00	119.5255	392.144
3/1/11 4:00	120.4564	395.198	3/16/11 17:00	119.4931	392.038
3/1/11 5:00	120.4589	395.206	3/16/11 18:00	119.5024	392.068
3/1/11 6:00	120.4085	395.041	3/16/11 19:00	119.5417	392.197
3/1/11 7:00	120.4726	395.251	3/16/11 20:00	119.69	392.684

3/1/11 8:00	120.5646	395.553	3/16/11 21:00	119.7678	392.939
3/1/11 9:00	120.6123	395.710	3/16/11 22:00	119.6831	392.661
3/1/11 10:00	120.5538	395.518	3/16/11 23:00	119.6427	392.529
3/1/11 11:00	120.539	395.469	3/17/11 0:00	119.8218	393.116
3/1/11 12:00	120.5947	395.652	3/17/11 1:00	119.9687	393.598
3/1/11 13:00	120.6132	395.713	3/17/11 2:00	120.0643	393.912
3/1/11 14:00	120.4997	395.340	3/17/11 3:00	120.1115	394.067
3/1/11 15:00	120.4257	395.097	3/17/11 4:00	120.1459	394.179
3/1/11 16:00	120.4012	395.017	3/17/11 5:00	120.1524	394.201
3/1/11 17:00	120.3627	394.891	3/17/11 6:00	120.1607	394.228
3/1/11 18:00	120.2914	394.657	3/17/11 7:00	120.1725	394.267
3/1/11 19:00	120.2782	394.614	3/17/11 8:00	120.1758	394.278
3/1/11 20:00	120.2466	394.510	3/17/11 9:00	120.181	394.295
3/1/11 21:00	120.1464	394.181	3/17/11 10:00	120.1558	394.212
3/1/11 22:00	120.0703	393.931	3/17/11 11:00	120.045	393.848
3/1/11 23:00	120.0258	393.785	3/17/11 12:00	119.9382	393.498
3/2/11 0:00	120.0039	393.714	3/17/11 13:00	119.786	392.999
3/2/11 1:00	119.9284	393.466	3/17/11 14:00	119.6969	392.706
3/2/11 2:00	119.7295	392.813	3/17/11 15:00	119.6295	392.485
3/2/11 3:00	119.7437	392.860	3/17/11 16:00	119.6177	392.447
3/2/11 4:00	120.0339	393.812	3/17/11 17:00	119.6754	392.636
3/2/11 5:00	120.2314	394.460	3/17/11 18:00	119.8187	393.106
3/2/11 6:00	120.3394	394.814	3/17/11 19:00	119.9434	393.515
3/2/11 7:00	120.3951	394.997	3/17/11 20:00	120.0115	393.739
3/2/11 8:00	120.3941	394.994	3/17/11 21:00	119.8805	393.309
3/2/11 9:00	120.3267	394.773	3/17/11 22:00	119.7493	392.878
3/2/11 10:00	120.2921	394.659	3/17/11 23:00	119.7726	392.955
3/2/11 11:00	120.1711	394.262	3/18/11 0:00	119.922	393.445
3/2/11 12:00	120.2779	394.613	3/18/11 1:00	119.9794	393.633
3/2/11 13:00	120.259	394.551	3/18/11 2:00	119.9722	393.610
3/2/11 14:00	120.2905	394.654	3/18/11 3:00	119.9698	393.602
3/2/11 15:00	120.1929	394.334	3/18/11 4:00	119.9692	393.600
3/2/11 16:00	120.1095	394.060	3/18/11 5:00	119.9654	393.587
3/2/11 17:00	120.0452	393.849	3/18/11 6:00	119.9385	393.499
3/2/11 18:00	119.9871	393.658	3/18/11 7:00	119.7898	393.011
3/2/11 19:00	119.9683	393.597	3/18/11 8:00	119.6759	392.637
3/2/11 20:00	119.9887	393.664	3/18/11 9:00	119.6053	392.406
3/2/11 21:00	119.973	393.612	3/18/11 10:00	119.5586	392.253
3/2/11 22:00	120.0497	393.864	3/18/11 11:00	119.5389	392.188
3/2/11 23:00	120.1154	394.079	3/18/11 12:00	119.5225	392.134
3/3/11 0:00	120.118	394.088	3/18/11 13:00	119.5132	392.104
3/3/11 1:00	120.1759	394.278	3/18/11 14:00	119.5075	392.085
3/3/11 2:00	120.1846	394.306	3/18/11 15:00	119.5047	392.076
3/3/11 3:00	120.2548	394.537	3/18/11 16:00	119.4975	392.052
3/3/11 4:00	120.3198	394.750	3/18/11 17:00	119.4946	392.043
3/3/11 5:00	120.2886	394.648	3/18/11 18:00	119.4934	392.039
3/3/11 6:00	120.3087	394.714	3/18/11 19:00	119.4925	392.036
3/3/11 7:00	120.2759	394.606	3/18/11 20:00	119.4959	392.047
3/3/11 8:00	120.2876	394.644	3/18/11 21:00	119.4909	392.031
3/3/11 9:00	120.2301	394.456	3/18/11 22:00	119.494	392.041
3/3/11 10:00	120.1346	394.142	3/18/11 23:00	119.4897	392.027
3/3/11 11:00	120.0771	393.954	3/19/11 0:00	119.445	391.880

3/3/11 12:00	120.1298	394.127	3/19/11 1:00	119.3152	391.454
3/3/11 13:00	120.1941	394.338	3/19/11 2:00	119.2009	391.079
3/3/11 14:00	120.357	394.872	3/19/11 3:00	119.1325	390.855
3/3/11 15:00	120.3142	394.732	3/19/11 4:00	119.0933	390.726
3/3/11 16:00	120.2607	394.556	3/19/11 5:00	119.0777	390.675
3/3/11 17:00	120.2342	394.469	3/19/11 6:00	118.9871	390.378
3/3/11 18:00	120.1579	394.219	3/19/11 7:00	118.9473	390.247
3/3/11 19:00	120.2965	394.674	3/19/11 8:00	118.9657	390.307
3/3/11 20:00	120.4551	395.194	3/19/11 9:00	118.9962	390.407
3/3/11 21:00	120.5636	395.550	3/19/11 10:00	119.0208	390.488
3/3/11 22:00	120.6257	395.754	3/19/11 11:00	119.0417	390.557
3/3/11 23:00	120.6641	395.880	3/19/11 12:00	119.0888	390.711
3/4/11 0:00	120.6673	395.890	3/19/11 13:00	119.198	391.070
3/4/11 1:00	120.5794	395.602	3/19/11 14:00	119.2669	391.296
3/4/11 2:00	120.5203	395.408	3/19/11 15:00	119.1884	391.038
3/4/11 3:00	120.5113	395.378	3/19/11 16:00	119.0931	390.725
3/4/11 4:00	120.5095	395.372	3/19/11 17:00	119.0092	390.450
3/4/11 5:00	120.5135	395.385	3/19/11 18:00	118.9906	390.389
3/4/11 6:00	120.5117	395.380	3/19/11 19:00	118.9766	390.343
3/4/11 7:00	120.5112	395.378	3/19/11 20:00	118.9599	390.288
3/4/11 8:00	120.5012	395.345	3/19/11 21:00	118.9438	390.236
3/4/11 9:00	120.4008	395.016	3/19/11 22:00	118.9363	390.211
3/4/11 10:00	120.3674	394.906	3/19/11 23:00	118.9292	390.188
3/4/11 11:00	120.2457	394.507	3/20/11 0:00	118.924	390.171
3/4/11 12:00	120.1611	394.229	3/20/11 1:00	118.924	390.171
3/4/11 13:00	120.0648	393.913	3/20/11 2:00	118.9957	390.406
3/4/11 14:00	119.9849	393.651	3/20/11 3:00	119.1441	390.893
3/4/11 15:00	120.0001	393.701	3/20/11 4:00	119.2144	391.123
3/4/11 16:00	120.0145	393.748	3/20/11 5:00	119.1278	390.839
3/4/11 17:00	120.033	393.809	3/20/11 6:00	119.0588	390.613
3/4/11 18:00	120.05	393.865	3/20/11 7:00	119.0051	390.437
3/4/11 19:00	120.0638	393.910	3/20/11 8:00	119.0595	390.615
3/4/11 20:00	120.0664	393.919	3/20/11 9:00	119.1688	390.974
3/4/11 21:00	120.0686	393.926	3/20/11 10:00	119.0984	390.743
3/4/11 22:00	120.0979	394.022	3/20/11 11:00	119.0298	390.518
3/4/11 23:00	120.2094	394.388	3/20/11 12:00	118.9872	390.378
3/5/11 0:00	120.283	394.629	3/20/11 13:00	118.9694	390.320
3/5/11 1:00	120.3245	394.765	3/20/11 14:00	119.0426	390.560
3/5/11 2:00	120.3499	394.849	3/20/11 15:00	119.076	390.669
3/5/11 3:00	120.363	394.892	3/20/11 16:00	119.025	390.502
3/5/11 4:00	120.3685	394.910	3/20/11 17:00	118.9862	390.375
3/5/11 5:00	120.3697	394.914	3/20/11 18:00	119.0401	390.552
3/5/11 6:00	120.3628	394.891	3/20/11 19:00	119.1591	390.942
3/5/11 7:00	120.3559	394.868	3/20/11 20:00	119.2412	391.211
3/5/11 8:00	120.3569	394.872	3/20/11 21:00	119.2447	391.223
3/5/11 9:00	120.2978	394.678	3/20/11 22:00	119.137	390.869
3/5/11 10:00	120.1697	394.258	3/20/11 23:00	119.052	390.591
3/5/11 11:00	120.0929	394.006	3/21/11 0:00	119.0404	390.552
3/5/11 12:00	120.0007	393.703	3/21/11 1:00	119.2378	391.200
3/5/11 13:00	119.978	393.629	3/21/11 2:00	119.375	391.650
3/5/11 14:00	119.9869	393.658	3/21/11 3:00	119.4959	392.047
3/5/11 15:00	119.9927	393.677	3/21/11 4:00	119.5296	392.157

3/5/11 16:00	120.0014	393.705	3/21/11 5:00	119.5558	392.243
3/5/11 17:00	120.0065	393.722	3/21/11 6:00	119.5896	392.354
3/5/11 18:00	120.0048	393.717	3/21/11 7:00	119.622	392.461
3/5/11 19:00	120.0116	393.739	3/21/11 8:00	119.6062	392.409
3/5/11 20:00	120.0133	393.744	3/21/11 9:00	119.5884	392.350
3/5/11 21:00	120.0066	393.722	3/21/11 10:00	119.5702	392.291
3/5/11 22:00	120.0024	393.709	3/21/11 11:00	119.5588	392.253
3/5/11 23:00	120.0041	393.714	3/21/11 12:00	119.5488	392.220
3/6/11 0:00	120.0049	393.717	3/21/11 13:00	119.5436	392.203
3/6/11 1:00	120.0775	393.955	3/21/11 14:00	119.5431	392.202
3/6/11 2:00	120.1481	394.187	3/21/11 15:00	119.5461	392.212
3/6/11 3:00	120.194	394.337	3/21/11 16:00	119.551	392.228
3/6/11 4:00	120.2285	394.450	3/21/11 17:00	119.5573	392.248
3/6/11 5:00	120.2444	394.503	3/21/11 18:00	119.4066	391.754
3/6/11 6:00	120.2552	394.538	3/21/11 19:00	119.3218	391.476
3/6/11 7:00	120.1779	394.284	3/21/11 20:00	119.4141	391.779
3/6/11 8:00	120.0785	393.958	3/21/11 21:00	119.4277	391.823
3/6/11 9:00	120.1922	394.331	3/21/11 22:00	119.3235	391.481
3/6/11 10:00	120.3462	394.837	3/21/11 23:00	119.2264	391.163
3/6/11 11:00	120.4542	395.191	3/22/11 0:00	119.3109	391.440
3/6/11 12:00	120.5003	395.342	3/22/11 1:00	119.5305	392.160
3/6/11 13:00	120.5109	395.377	3/22/11 2:00	119.6223	392.462
3/6/11 14:00	120.5176	395.399	3/22/11 3:00	119.674	392.631
3/6/11 15:00	120.516	395.394	3/22/11 4:00	119.7033	392.727
3/6/11 16:00	120.5063	395.362	3/22/11 5:00	119.7286	392.810
3/6/11 17:00	120.5211	395.410	3/22/11 6:00	119.7387	392.844
3/6/11 18:00	120.4743	395.257	3/22/11 7:00	119.7454	392.865
3/6/11 19:00	120.4114	395.051	3/22/11 8:00	119.7542	392.894
3/6/11 20:00	120.463	395.220	3/22/11 9:00	119.7655	392.931
3/6/11 21:00	120.3947	394.996	3/22/11 10:00	119.7655	392.931
3/6/11 22:00	120.2432	394.499	3/22/11 11:00	119.7662	392.934
3/6/11 23:00	120.157	394.216	3/22/11 12:00	119.7648	392.929
3/7/11 0:00	120.1057	394.048	3/22/11 13:00	119.767	392.936
3/7/11 1:00	120.1947	394.340	3/22/11 14:00	119.7822	392.986
3/7/11 2:00	120.2894	394.650	3/22/11 15:00	119.783	392.989
3/7/11 3:00	120.3279	394.777	3/22/11 16:00	119.8454	393.194
3/7/11 4:00	120.3513	394.853	3/22/11 17:00	119.8801	393.307
3/7/11 5:00	120.329	394.780	3/22/11 18:00	120.0229	393.776
3/7/11 6:00	120.3394	394.814	3/22/11 19:00	120.1231	394.105
3/7/11 7:00	120.3383	394.811	3/22/11 20:00	120.1846	394.306
3/7/11 8:00	120.3547	394.865	3/22/11 21:00	120.2094	394.388
3/7/11 9:00	120.3182	394.745	3/22/11 22:00	120.0989	394.025
3/7/11 10:00	120.1515	394.198	3/22/11 23:00	120.0105	393.735
3/7/11 11:00	120.1543	394.207	3/23/11 0:00	119.9665	393.591
3/7/11 12:00	120.192	394.331	3/23/11 1:00	119.9782	393.629
3/7/11 13:00	120.1878	394.317	3/23/11 2:00	119.8641	393.255
3/7/11 14:00	120.198	394.350	3/23/11 3:00	119.9099	393.405
3/7/11 15:00	120.1676	394.251	3/23/11 4:00	119.9544	393.551
3/7/11 16:00	120.0895	393.994	3/23/11 5:00	119.9999	393.700
3/7/11 17:00	120.0272	393.790	3/23/11 6:00	119.8853	393.324
3/7/11 18:00	120.1173	394.086	3/23/11 7:00	119.8771	393.298
3/7/11 19:00	120.2243	394.437	3/23/11 8:00	120.0144	393.748

3/7/11 20:00	120.2496	394.520	3/23/11 9:00	120.0131	393.744
3/7/11 21:00	120.1412	394.164	3/23/11 10:00	120.1633	394.237
3/7/11 22:00	119.9779	393.628	3/23/11 11:00	120.2546	394.536
3/7/11 23:00	119.8819	393.313	3/23/11 12:00	120.2884	394.647
3/8/11 0:00	119.9023	393.380	3/23/11 13:00	120.3364	394.804
3/8/11 1:00	119.9627	393.578	3/23/11 14:00	120.3727	394.924
3/8/11 2:00	120.1206	394.096	3/23/11 15:00	120.3711	394.918
3/8/11 3:00	120.2327	394.464	3/23/11 16:00	120.3832	394.958
3/8/11 4:00	120.2816	394.625	3/23/11 17:00	120.3831	394.958
3/8/11 5:00	120.279	394.616	3/23/11 18:00	120.3371	394.807
3/8/11 6:00	120.2349	394.471	3/23/11 19:00	120.2888	394.648
3/8/11 7:00	120.2198	394.422	3/23/11 20:00	120.3616	394.887
3/8/11 8:00	120.2462	394.509	3/23/11 21:00	120.3053	394.702
3/8/11 9:00	120.258	394.547	3/23/11 22:00	120.1544	394.207
3/8/11 10:00	120.2107	394.392	3/23/11 23:00	119.9852	393.652
3/8/11 11:00	120.0948	394.012	3/24/11 0:00	119.8843	393.321
3/8/11 12:00	120.0056	393.719	3/24/11 1:00	119.9353	393.489
3/8/11 13:00	119.9774	393.627	3/24/11 2:00	120.0892	393.993
3/8/11 14:00	119.8965	393.361	3/24/11 3:00	120.2146	394.405
3/8/11 15:00	119.8456	393.194	3/24/11 4:00	120.2736	394.598
3/8/11 16:00	119.807	393.068	3/24/11 5:00	120.3081	394.712
3/8/11 17:00	119.787	393.002	3/24/11 6:00	120.4242	395.093
3/8/11 18:00	119.7716	392.951	3/24/11 7:00	120.5039	395.354
3/8/11 19:00	119.7842	392.993	3/24/11 8:00	120.5543	395.519
3/8/11 20:00	119.8469	393.198	3/24/11 9:00	120.5821	395.611
3/8/11 21:00	119.8378	393.169	3/24/11 10:00	120.5691	395.568
3/8/11 22:00	119.7953	393.029	3/24/11 11:00	120.4818	395.281
3/8/11 23:00	119.7987	393.040	3/24/11 12:00	120.3128	394.727
3/9/11 0:00	119.7971	393.035	3/24/11 13:00	120.1752	394.276
3/9/11 1:00	119.7795	392.977	3/24/11 14:00	120.079	393.960
3/9/11 2:00	119.8208	393.113	3/24/11 15:00	120.0798	393.963
3/9/11 3:00	119.8665	393.263	3/24/11 16:00	120.173	394.268
3/9/11 4:00	119.9894	393.666	3/24/11 17:00	120.1118	394.068
3/9/11 5:00	120.0859	393.983	3/24/11 18:00	120.1284	394.122
3/9/11 6:00	120.0722	393.938	3/24/11 19:00	120.2057	394.376
3/9/11 7:00	119.9546	393.552	3/24/11 20:00	120.29	394.652
3/9/11 8:00	119.8853	393.324	3/24/11 21:00	120.3352	394.801
3/9/11 9:00	119.9325	393.479	3/24/11 22:00	120.3341	394.797
3/9/11 10:00	119.9481	393.531	3/24/11 23:00	120.312	394.724
3/9/11 11:00	119.8722	393.281	3/25/11 0:00	120.2666	394.575
3/9/11 12:00	119.9023	393.380	3/25/11 1:00	120.2468	394.510
3/9/11 13:00	120.0843	393.977	3/25/11 2:00	120.1138	394.074
3/9/11 14:00	120.1654	394.243	3/25/11 3:00	120.0946	394.011
3/9/11 15:00	120.1454	394.178	3/25/11 4:00	120.0211	393.770
3/9/11 16:00	120.1515	394.198	3/25/11 5:00	119.939	393.501
3/9/11 17:00	120.236	394.475	3/25/11 6:00	119.896	393.360
3/9/11 18:00	120.2997	394.684	3/25/11 7:00	120.0254	393.784
3/9/11 19:00	120.3409	394.819	3/25/11 8:00	120.1118	394.068
3/9/11 20:00	120.4069	395.036	3/25/11 9:00	120.2333	394.466
3/9/11 21:00	120.4479	395.170	3/25/11 10:00	120.2773	394.611
3/9/11 22:00	120.4753	395.260	3/25/11 11:00	120.363	394.892
3/9/11 23:00	120.4811	395.279	3/25/11 12:00	120.4197	395.078

3/10/11 0:00	120.4217	395.084	3/25/11 13:00	120.3705	394.916
3/10/11 1:00	120.4603	395.211	3/25/11 14:00	120.175	394.275
3/10/11 2:00	120.4759	395.262	3/25/11 15:00	120.0134	393.745
3/10/11 3:00	120.4259	395.098	3/25/11 16:00	119.92	393.438
3/10/11 4:00	120.4323	395.119	3/25/11 17:00	119.944	393.517
3/10/11 5:00	120.3744	394.929	3/25/11 18:00	120.0658	393.917
3/10/11 6:00	120.2977	394.677	3/25/11 19:00	120.1862	394.312
3/10/11 7:00	120.1949	394.340	3/25/11 20:00	120.2667	394.576
3/10/11 8:00	120.1374	394.152	3/25/11 21:00	120.2937	394.664
3/10/11 9:00	120.0551	393.882	3/25/11 22:00	120.3505	394.851
3/10/11 10:00	119.9927	393.677	3/25/11 23:00	120.3958	394.999
3/10/11 11:00	119.9709	393.605	3/26/11 0:00	120.2729	394.596
3/10/11 12:00	120.0323	393.807	3/26/11 1:00	120.0889	393.992
3/10/11 13:00	120.002	393.707	3/26/11 2:00	119.9718	393.608
3/10/11 14:00	119.9643	393.584	3/26/11 3:00	119.9009	393.376
3/10/11 15:00	119.9395	393.502	3/26/11 4:00	119.8588	393.238
3/10/11 16:00	119.9141	393.419	3/26/11 5:00	119.8381	393.170
3/10/11 17:00	119.9749	393.618	3/26/11 6:00	119.8234	393.121
3/10/11 18:00	120.1245	394.109	3/26/11 7:00	119.8183	393.105
3/10/11 19:00	120.3589	394.878	3/26/11 8:00	119.8163	393.098
3/10/11 20:00	120.4622	395.217	3/26/11 9:00	119.9502	393.537
3/10/11 21:00	120.4483	395.172	3/26/11 10:00	120.0505	393.866
3/10/11 22:00	120.3852	394.965	3/26/11 11:00	120.1088	394.058
3/10/11 23:00	120.3213	394.755	3/26/11 12:00	120.1394	394.158
3/11/11 0:00	120.2874	394.644	3/26/11 13:00	120.1355	394.145
3/11/11 1:00	120.2519	394.527	3/26/11 14:00	120.0397	393.831
3/11/11 2:00	120.3308	394.786	3/26/11 15:00	119.9627	393.578
3/11/11 3:00	120.3064	394.706	3/26/11 16:00	119.9243	393.452
3/11/11 4:00	120.2423	394.496	3/26/11 17:00	119.8732	393.285
3/11/11 5:00	120.3348	394.799	3/26/11 18:00	119.878	393.301
3/11/11 6:00	120.4046	395.028	3/26/11 19:00	119.9028	393.382
3/11/11 7:00	120.3883	394.975	3/26/11 20:00	119.9374	393.495
3/11/11 8:00	120.2766	394.608	3/26/11 21:00	119.9683	393.597
3/11/11 9:00	120.2771	394.610	3/26/11 22:00	119.9581	393.563
3/11/11 10:00	120.3857	394.966	3/26/11 23:00	119.9335	393.483
3/11/11 11:00	120.3721	394.922	3/27/11 0:00	119.912	393.412
3/11/11 12:00	120.2663	394.574	3/27/11 1:00	119.9021	393.380
3/11/11 13:00	120.1993	394.355	3/27/11 2:00	119.8884	393.335
3/11/11 14:00	120.1559	394.212	3/27/11 3:00	119.9002	393.373
3/11/11 15:00	120.1315	394.132	3/27/11 4:00	119.9331	393.481
3/11/11 16:00	120.0992	394.026	3/27/11 5:00	119.9199	393.438
3/11/11 17:00	120.0129	393.743	3/27/11 6:00	119.9097	393.405
3/11/11 18:00	119.9497	393.536	3/27/11 7:00	119.8958	393.359
3/11/11 19:00	119.9258	393.457	3/27/11 8:00	119.8833	393.318
3/11/11 20:00	119.9324	393.479	3/27/11 9:00	119.8104	393.079
3/11/11 21:00	119.9131	393.416	3/27/11 10:00	119.7387	392.844
3/11/11 22:00	120.0324	393.807	3/27/11 11:00	119.6931	392.694
3/11/11 23:00	120.1856	394.310	3/27/11 12:00	119.6672	392.609
3/12/11 0:00	120.2095	394.388	3/27/11 13:00	119.6626	392.594
3/12/11 1:00	120.1774	394.283	3/27/11 14:00	119.6423	392.527
3/12/11 2:00	120.0851	393.980	3/27/11 15:00	119.6341	392.500
3/12/11 3:00	120.0567	393.887	3/27/11 16:00	119.6254	392.472

3/12/11 4:00	120.1562	394.213	3/27/11 17:00	119.6246	392.469
3/12/11 5:00	120.3478	394.842	3/27/11 18:00	119.6241	392.468
3/12/11 6:00	120.4582	395.204	3/27/11 19:00	119.6308	392.490
3/12/11 7:00	120.4438	395.157	3/27/11 20:00	119.7231	392.792
3/12/11 8:00	120.4823	395.283	3/27/11 21:00	119.8437	393.188
3/12/11 9:00	120.5801	395.604	3/27/11 22:00	119.8444	393.190
3/12/11 10:00	120.6335	395.779	3/27/11 23:00	119.8255	393.128
3/12/11 11:00	120.664	395.879	3/28/11 0:00	119.8536	393.220
3/12/11 12:00	120.6337	395.780	3/28/11 1:00	119.819	393.107
3/12/11 13:00	120.5191	395.404	3/28/11 2:00	119.8121	393.084
3/12/11 14:00	120.3887	394.976	3/28/11 3:00	119.7763	392.967
3/12/11 15:00	120.3015	394.690	3/28/11 4:00	119.7687	392.942
3/12/11 16:00	120.2076	394.382	3/28/11 5:00	119.7894	393.010
3/12/11 17:00	120.1576	394.218	3/28/11 6:00	119.8066	393.066
3/12/11 18:00	120.2549	394.537	3/28/11 7:00	119.8074	393.069
3/12/11 19:00	120.4211	395.082	3/28/11 8:00	119.8261	393.130
3/12/11 20:00	120.4943	395.323	3/28/11 9:00	119.7999	393.044
3/12/11 21:00	120.4033	395.024	3/28/11 10:00	119.725	392.799
3/12/11 22:00	120.2736	394.598	3/28/11 11:00	119.6362	392.507
3/12/11 23:00	120.206	394.377	3/28/11 12:00	119.5559	392.244
3/13/11 0:00	120.1691	394.256	3/28/11 13:00	119.4893	392.025
3/13/11 1:00	120.1086	394.057	3/28/11 14:00	119.4517	391.902
3/13/11 3:00	120.089	393.993	3/28/11 15:00	119.4291	391.828
3/13/11 3:00	120.2383	394.483	3/28/11 16:00	119.4114	391.770
3/13/11 4:00	120.353	394.859	3/28/11 17:00	119.4247	391.813
3/13/11 5:00	120.4599	395.210	3/28/11 18:00	119.4862	392.015
3/13/11 6:00	120.4907	395.311	3/28/11 19:00	119.661	392.589
3/13/11 7:00	120.5357	395.458	3/28/11 20:00	119.7814	392.984
3/13/11 8:00	120.5469	395.495	3/28/11 21:00	119.8146	393.093
3/13/11 9:00	120.5293	395.437	3/28/11 22:00	119.7225	392.790
3/13/11 10:00	120.5159	395.393	3/28/11 23:00	119.8327	393.152
3/13/11 11:00	120.4528	395.186	3/29/11 0:00	119.7683	392.941
3/13/11 12:00	120.3763	394.935	3/29/11 1:00	119.7198	392.781
3/13/11 13:00	120.2604	394.555	3/29/11 2:00	119.7199	392.782
3/13/11 14:00	120.1508	394.196	3/29/11 3:00	119.8331	393.153
3/13/11 15:00	120.0789	393.960	3/29/11 4:00	119.9272	393.462
3/13/11 16:00	120.0413	393.836	3/29/11 5:00	119.9737	393.615
3/13/11 17:00	120.1304	394.129	3/29/11 6:00	119.9788	393.631
3/13/11 18:00	120.2339	394.468	3/29/11 7:00	120.0027	393.710
3/13/11 19:00	120.1602	394.226	3/29/11 8:00	120.0024	393.709
3/13/11 20:00	120.1291	394.124	3/29/11 9:00	119.9259	393.458
3/13/11 21:00	120.0871	393.987	3/29/11 10:00	119.8927	393.349
3/13/11 22:00	120.0523	393.872	3/29/11 11:00	119.93	393.471
3/13/11 23:00	120.0354	393.817	3/29/11 12:00	120.0872	393.987
3/14/11 0:00	119.9452	393.521	3/29/11 13:00	120.1875	394.316
3/14/11 1:00	120.0036	393.713	3/29/11 14:00	120.2614	394.558
3/14/11 2:00	120.1555	394.211	3/29/11 15:00	120.3034	394.696
3/14/11 3:00	120.2179	394.416	3/29/11 16:00	120.1837	394.303
3/14/11 4:00	120.227	394.446	3/29/11 17:00	120.0378	393.825
3/14/11 5:00	120.1726	394.267	3/29/11 18:00	119.9236	393.450
3/14/11 6:00	120.1685	394.254	3/29/11 19:00	119.8521	393.216
3/14/11 7:00	120.2623	394.561	3/29/11 20:00	119.8797	393.306

3/14/11 8:00	120.3245	394.765	3/29/11 21:00	119.8847	393.323
3/14/11 9:00	120.2721	394.594	3/29/11 22:00	119.8436	393.188
3/14/11 10:00	120.0844	393.978	3/29/11 23:00	119.8013	393.049
3/14/11 11:00	119.9694	393.600	3/30/11 0:00	119.7894	393.010
3/14/11 12:00	119.94	393.504	3/30/11 1:00	119.8694	393.272
3/14/11 13:00	119.9817	393.641	3/30/11 2:00	119.9299	393.471
3/14/11 14:00	120.0324	393.807	3/30/11 3:00	119.8666	393.263
3/14/11 15:00	120.0234	393.778	3/30/11 4:00	119.9904	393.669
3/14/11 16:00	120.0439	393.845	3/30/11 5:00	120.1518	394.199
3/14/11 17:00	120.0453	393.849	3/30/11 6:00	120.2463	394.509
3/14/11 18:00	120.0412	393.836	3/30/11 7:00	120.2953	394.670
3/14/11 19:00	119.9965	393.689	3/30/11 8:00	120.3369	394.806
3/14/11 20:00	120.079	393.960	3/30/11 9:00	120.3582	394.876
3/14/11 21:00	119.9872	393.659	3/30/11 10:00	120.3709	394.918
3/14/11 22:00	119.9232	393.449	3/30/11 11:00	120.4042	395.027
3/14/11 23:00	119.9317	393.477	3/30/11 12:00	120.4877	395.301
3/15/11 0:00	119.8948	393.356	3/30/11 13:00	120.5345	395.454
3/15/11 1:00	119.9488	393.533	3/30/11 14:00	120.5565	395.527
3/15/11 2:00	119.94	393.504	3/30/11 15:00	120.5134	395.385
3/15/11 3:00	120.0329	393.809	3/30/11 16:00	120.5164	395.395
3/15/11 4:00	120.2051	394.374	3/30/11 17:00	120.4236	395.091
3/15/11 5:00	120.2979	394.678	3/30/11 18:00	120.2439	394.501
3/15/11 6:00	120.242	394.495	3/30/11 19:00	120.1212	394.098
3/15/11 7:00	120.1576	394.218	3/30/11 20:00	120.0331	393.809
3/15/11 8:00	120.1414	394.165	3/30/11 21:00	119.9709	393.605
3/15/11 9:00	120.2077	394.382	3/30/11 22:00	119.9418	393.510
3/15/11 10:00	120.114	394.075	3/30/11 23:00	119.8945	393.355
3/15/11 11:00	120.0258	393.785	3/31/11 0:00	119.9197	393.437
3/15/11 12:00	120.0092	393.731	3/31/11 1:00	120.0284	393.794
3/15/11 13:00	120.0011	393.704	3/31/11 2:00	120.0278	393.792
3/15/11 14:00	119.9837	393.647	3/31/11 3:00	120.1134	394.073
3/15/11 15:00	120.1187	394.090	3/31/11 4:00	120.1853	394.309
3/15/11 16:00	120.1988	394.353	3/31/11 5:00	120.2156	394.408
3/15/11 17:00	120.0982	394.023	3/31/11 6:00	120.2413	394.492
3/15/11 18:00	120.0881	393.990	3/31/11 7:00	120.2855	394.637
3/15/11 19:00	120.0677	393.923	3/31/11 8:00	120.3809	394.950
3/15/11 20:00	120.2155	394.408	3/31/11 9:00	120.3623	394.889
3/15/11 21:00	120.1449	394.176	3/31/11 10:00	120.3782	394.942
3/15/11 22:00	120.0413	393.836	3/31/11 11:00	120.3973	395.004
3/15/11 23:00	119.9037	393.385	3/31/11 12:00	120.3613	394.886
3/16/11 0:00	119.7957	393.031	3/31/11 13:00	120.2265	394.444
3/16/11 1:00	119.7284	392.810	3/31/11 14:00	120.1721	394.265
3/16/11 2:00	119.811	393.081	3/31/11 15:00	120.2693	394.584
3/16/11 3:00	119.9607	393.572	3/31/11 16:00	120.4036	395.025
3/16/11 4:00	120.0563	393.885	3/31/11 17:00	120.4655	395.228
3/16/11 5:00	120.0978	394.022	3/31/11 18:00	120.4108	395.049
3/16/11 6:00	120.1215	394.099	3/31/11 19:00	120.3149	394.734
3/16/11 7:00	120.1423	394.168	3/31/11 20:00	120.2305	394.457
3/16/11 8:00	120.1574	394.217	3/31/11 21:00	120.2487	394.517
3/16/11 9:00	120.1423	394.168	3/31/11 22:00	120.2847	394.635
3/16/11 10:00	120.0167	393.756	3/31/11 23:00	120.3616	394.887
3/16/11 11:00	119.8795	393.305	4/1/11 0:00	120.4955	395.326

3/16/11 12:00	119.775	392.963

Appendix C

Aquifer Test Data for Well 199-F5-53

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Well Configuration for Test

Date of Test	3/24/2011	
Completed Depth	112.79	ft toc
D-T-B at Test start	112.80	ft toc
D-T-W at Test start	39.52	ft toc
D-T-B at Test end	112.80	ft toc
D-T-W at Test end	N/M	ft toc
Stick up	2.73	ft above gs
Casing size & material	6" ss	
Screen type	Wire wrap	
Opening size	0.01	
Depth Top of screen	97.79	ft toc
Depth Bottom of screen	107.79	ft toc
Screen Length	10	ft
Pump Intake	100	ft toc
Test Results		
Pump rate	2.00	gpm
Drawdown	18.93	ft
Pumping time	329	minutes
Total Gallons Pumped	658	gal

N/M = not measured

Formation information

Description	Depth (bgs)
Top of RUM	54.5
Caliche	74-76
Water bearing zone	101
Bottom of RUM	116

Well Pumping Test at 199-F5-53 (C7791)

RawFile:	199-F5-53 Const Dis test 24Mar11_Append_2011-03-25_16-59-42-703.wsl		
Device	Level TROLL 700		
Site	FR-3		
Serial Number	173810		
Log Name	199-F5-53 Const Dis test 24Mar11		**Recovery Test**
Start Pumping:	3/24/2011 9:44	Test started:	3/24/2011 15:01
Test stopped:	3/24/2011 15:01	Test stopped:	3/25/2011 8:59

Date/Time	Elapsed Time (sec)	Elapsed Time (min)	Head Feet H2O	ds (ft)	Elevation meters
3/24/2011 9:45	1	1	61.508	0	113.871
3/24/2011 9:46	82.87	1.381	61.586	0.078	113.848
3/24/2011 9:46	83.12	1.385	61.58	0.072	113.873
3/24/2011 9:46	83.37	1.389	61.581	0.073	113.871
3/24/2011 9:46	83.62	1.394	61.58	0.072	113.872
3/24/2011 9:46	83.87	1.398	61.579	0.071	113.872
3/24/2011 9:46	84.12	1.402	61.574	0.066	113.873
3/24/2011 9:46	84.37	1.406	61.577	0.069	113.870
3/24/2011 9:46	84.62	1.41	61.599	0.091	113.865
3/24/2011 9:46	84.92	1.415	61.591	0.083	113.874
3/24/2011 9:46	85.16	1.419	61.591	0.083	113.871
3/24/2011 9:46	85.38	1.423	61.587	0.079	113.873
3/24/2011 9:46	85.62	1.427	61.588	0.08	113.871
3/24/2011 9:46	85.87	1.431	61.589	0.081	113.871
3/24/2011 9:46	86.12	1.435	61.587	0.079	113.872
3/24/2011 9:46	86.37	1.439	61.585	0.077	113.872
3/24/2011 9:46	86.62	1.444	61.585	0.077	113.871
3/24/2011 9:46	86.87	1.448	61.584	0.076	113.872
3/24/2011 9:46	87.12	1.452	61.589	0.081	113.870
3/24/2011 9:46	87.37	1.456	61.587	0.079	113.872
3/24/2011 9:46	87.62	1.46	61.587	0.079	113.871
3/24/2011 9:46	87.87	1.464	61.587	0.079	113.871
3/24/2011 9:46	88.12	1.469	61.593	0.085	113.869
3/24/2011 9:46	88.37	1.473	61.606	0.098	113.867
3/24/2011 9:46	88.62	1.477	61.598	0.09	113.874
3/24/2011 9:46	88.87	1.481	61.595	0.087	113.872
3/24/2011 9:46	89.23	1.487	61.6	0.092	113.870
3/24/2011 9:46	89.59	1.493	61.538	0.03	113.890
3/24/2011 9:46	90.01	1.5	61.537	0.029	113.872
3/24/2011 9:46	90.44	1.507	61.567	0.059	113.862
3/24/2011 9:46	90.86	1.514	61.564	0.056	113.872
3/24/2011 9:46	91.33	1.522	61.555	0.047	113.874
3/24/2011 9:46	91.94	1.532	61.539	0.031	113.876
3/24/2011 9:46	92.35	1.539	61.532	0.024	113.873
3/24/2011 9:46	92.95	1.549	61.517	0.009	113.876
3/24/2011 9:46	93.55	1.559	61.504	-0.004	113.875
3/24/2011 9:46	94.15	1.569	61.488	-0.02	113.876
3/24/2011 9:46	94.81	1.58	61.459	-0.049	113.880
3/24/2011 9:46	95.53	1.592	61.449	-0.059	113.874
3/24/2011 9:46	96.31	1.605	61.437	-0.071	113.875
3/24/2011 9:46	97.19	1.62	61.417	-0.091	113.877
3/24/2011 9:46	97.93	1.632	61.384	-0.124	113.881
3/24/2011 9:46	98.83	1.647	61.369	-0.139	113.876
3/24/2011 9:46	99.79	1.663	61.344	-0.164	113.879
3/24/2011 9:46	100.75	1.679	61.322	-0.186	113.878
3/24/2011 9:46	101.94	1.699	61.292	-0.216	113.880
3/24/2011 9:46	102.97	1.716	61.272	-0.236	113.877
3/24/2011 9:46	104.17	1.736	61.237	-0.271	113.882

3/24/2011 9:46	105.43	1.757	61.213	-0.295	113.879
3/24/2011 9:46	106.94	1.782	61.176	-0.332	113.883
3/24/2011 9:46	108.19	1.803	61.148	-0.36	113.880
3/24/2011 9:46	109.69	1.828	61.11	-0.398	113.883
3/24/2011 9:46	111.25	1.854	61.076	-0.432	113.882
3/24/2011 9:46	112.93	1.882	61.035	-0.473	113.884
3/24/2011 9:46	114.73	1.912	60.995	-0.513	113.883
3/24/2011 9:46	116.68	1.945	60.948	-0.56	113.886
3/24/2011 9:46	118.63	1.977	60.901	-0.607	113.886
3/24/2011 9:47	120.73	2.012	60.858	-0.65	113.884
3/24/2011 9:47	122.95	2.049	60.799	-0.709	113.889
3/24/2011 9:47	125.35	2.089	60.747	-0.761	113.887
3/24/2011 9:47	127.87	2.131	60.671	-0.837	113.894
3/24/2011 9:47	130.51	2.175	60.599	-0.909	113.893
3/24/2011 9:47	133.33	2.222	60.505	-1.003	113.900
3/24/2011 9:47	136.33	2.272	60.417	-1.091	113.898
3/24/2011 9:47	139.51	2.325	60.322	-1.186	113.900
3/24/2011 9:47	142.87	2.381	60.319	-1.189	113.872
3/24/2011 9:47	146.47	2.441	60.12	-1.388	113.932
3/24/2011 9:47	150.07	2.501	60.038	-1.47	113.896
3/24/2011 9:47	154.27	2.571	59.937	-1.571	113.902
3/24/2011 9:47	158.47	2.641	59.831	-1.677	113.904
3/24/2011 9:47	162.67	2.711	59.72	-1.788	113.905
3/24/2011 9:47	167.47	2.791	59.594	-1.914	113.910
3/24/2011 9:47	172.87	2.881	59.453	-2.055	113.914
3/24/2011 9:47	177.67	2.961	59.336	-2.172	113.907
3/24/2011 9:48	183.67	3.061	59.199	-2.309	113.913
3/24/2011 9:48	189.67	3.161	59.043	-2.465	113.919
3/24/2011 9:48	195.67	3.261	58.91	-2.598	113.912
3/24/2011 9:48	202.27	3.371	58.745	-2.763	113.922
3/24/2011 9:48	209.47	3.491	58.586	-2.922	113.920
3/24/2011 9:48	217.28	3.621	58.392	-3.116	113.930
3/24/2011 9:48	225.07	3.751	58.219	-3.289	113.924
3/24/2011 9:48	233.47	3.891	58.005	-3.503	113.937
3/24/2011 9:49	242.47	4.041	57.789	-3.719	113.937
3/24/2011 9:49	252.27	4.205	57.57	-3.938	113.938
3/24/2011 9:49	261.76	4.363	57.348	-4.16	113.939
3/24/2011 9:49	272.47	4.541	57.12	-4.388	113.941
3/24/2011 9:49	283.87	4.731	56.908	-4.6	113.936
3/24/2011 9:49	295.87	4.931	56.654	-4.854	113.949
3/24/2011 9:50	308.47	5.141	56.406	-5.102	113.947
3/24/2011 9:50	321.76	5.363	56.157	-5.351	113.947
3/24/2011 9:50	336.07	5.601	55.88	-5.628	113.956
3/24/2011 9:50	351.07	5.851	55.578	-5.93	113.963
3/24/2011 9:51	366.76	6.113	55.282	-6.226	113.962
3/24/2011 9:51	383.47	6.391	54.985	-6.523	113.962
3/24/2011 9:51	401.47	6.691	54.66	-6.848	113.970
3/24/2011 9:51	420.07	7.001	54.293	-7.215	113.983
3/24/2011 9:52	440.47	7.341	53.929	-7.579	113.982
3/24/2011 9:52	461.47	7.691	53.567	-7.941	113.982
3/24/2011 9:53	483.67	8.061	53.193	-8.315	113.985
3/24/2011 9:53	507.67	8.461	52.81	-8.698	113.988

3/24/2011 9:53	532.87	8.881	52.409	-9.099	113.994
3/24/2011 9:54	559.27	9.321	52.031	-9.477	113.987
3/24/2011 9:54	587.47	9.791	51.612	-9.896	113.999
3/24/2011 9:55	617.47	10.291	51.222	-10.286	113.990
3/24/2011 9:55	649.27	10.821	50.809	-10.699	113.997
3/24/2011 9:56	682.87	11.381	50.384	-11.124	114.001
3/24/2011 9:56	718.87	11.981	49.975	-11.533	113.996
3/24/2011 9:57	755.01	12.583	49.58	-11.928	113.992
3/24/2011 9:58	796.87	13.281	49.161	-12.347	113.999
3/24/2011 9:58	838.87	13.981	48.757	-12.751	113.994
3/24/2011 9:59	880.87	14.681	48.366	-13.142	113.990
3/24/2011 10:00	928.87	15.481	47.957	-13.551	113.996
3/24/2011 10:01	982.93	16.382	47.54	-13.968	113.998
3/24/2011 10:02	1030.87	17.181	47.185	-14.323	113.980
3/24/2011 10:03	1090.87	18.181	46.788	-14.72	113.992
3/24/2011 10:04	1150.87	19.181	46.424	-15.084	113.982
3/24/2011 10:05	1210.87	20.181	46.082	-15.426	113.976
3/24/2011 10:06	1276.87	21.281	45.745	-15.763	113.974
3/24/2011 10:07	1348.87	22.481	45.417	-16.091	113.971
3/24/2011 10:08	1426.87	23.781	45.102	-16.406	113.967
3/24/2011 10:10	1504.87	25.081	44.812	-16.696	113.960
3/24/2011 10:11	1588.87	26.481	44.517	-16.991	113.961
3/24/2011 10:12	1678.87	27.981	44.261	-17.247	113.949
3/24/2011 10:14	1774.87	29.581	44.003	-17.505	113.950
3/24/2011 10:16	1870.87	31.181	43.812	-17.696	113.930
3/24/2011 10:17	1978.87	32.981	43.589	-17.919	113.939
3/24/2011 10:19	2092.87	34.881	43.408	-18.1	113.926
3/24/2011 10:21	2212.87	36.881	43.234	-18.274	113.924
3/24/2011 10:23	2338.87	38.981	43.08	-18.428	113.918
3/24/2011 10:26	2470.87	41.181	42.942	-18.566	113.913
3/24/2011 10:28	2614.87	43.581	42.806	-18.702	113.913
3/24/2011 10:31	2764.87	46.081	42.86	-18.648	113.855
3/24/2011 10:33	2920.87	48.681	43.034	-18.474	113.818
3/24/2011 10:36	3088.87	51.481	42.96	-18.548	113.894
3/24/2011 10:39	3268.87	54.481	42.819	-18.689	113.914
3/24/2011 10:42	3454.87	57.581	42.719	-18.789	113.902
3/24/2011 10:45	3658.87	60.981	42.671	-18.837	113.886
3/24/2011 10:49	3868.87	64.481	42.647	-18.861	113.879
3/24/2011 10:53	4090.87	68.181	42.566	-18.942	113.896
3/24/2011 10:57	4330.87	72.181	42.545	-18.963	113.878
3/24/2011 11:01	4582.87	76.381	42.466	-19.042	113.895
3/24/2011 11:05	4846.87	80.781	42.445	-19.063	113.878
3/24/2011 11:10	5128.87	85.481	42.574	-18.934	113.832
3/24/2011 11:15	5428.87	90.481	42.538	-18.97	113.882
3/24/2011 11:20	5728.87	95.481	42.561	-18.947	113.864
3/24/2011 11:25	6028.87	100.481	42.538	-18.97	113.878
3/24/2011 11:30	6328.87	105.481	42.528	-18.98	113.874
3/24/2011 11:35	6628.87	110.481	42.513	-18.995	113.876
3/24/2011 11:40	6928.87	115.481	42.512	-18.996	113.872
3/24/2011 11:45	7228.87	120.481	42.493	-19.015	113.877
3/24/2011 11:50	7528.87	125.481	42.469	-19.039	113.879
3/24/2011 11:55	7828.87	130.481	42.444	-19.064	113.879

3/24/2011 12:00	8128.87	135.481	42.461	-19.047	113.866
3/24/2011 12:05	8428.87	140.481	42.466	-19.042	113.870
3/24/2011 12:10	8728.87	145.481	42.467	-19.041	113.871
3/24/2011 12:15	9028.87	150.481	42.492	-19.016	113.864
3/24/2011 12:20	9328.87	155.481	42.555	-18.953	113.852
3/24/2011 12:25	9628.87	160.481	42.561	-18.947	113.869
3/24/2011 12:30	9928.87	165.481	42.52	-18.988	113.884
3/24/2011 12:35	10228.87	170.481	42.506	-19.002	113.876
3/24/2011 12:40	10528.87	175.481	42.662	-18.846	113.824
3/24/2011 12:45	10828.87	180.481	42.666	-18.842	113.870
3/24/2011 12:50	11128.87	185.481	42.652	-18.856	113.876
3/24/2011 12:55	11428.87	190.481	42.648	-18.86	113.873
3/24/2011 13:00	11728.87	195.481	42.637	-18.871	113.875
3/24/2011 13:05	12028.87	200.481	42.641	-18.867	113.870
3/24/2011 13:10	12328.87	205.481	42.626	-18.882	113.876
3/24/2011 13:15	12628.87	210.481	42.64	-18.868	113.867
3/24/2011 13:20	12928.87	215.481	42.657	-18.851	113.866
3/24/2011 13:25	13228.87	220.481	42.683	-18.825	113.863
3/24/2011 13:30	13528.87	225.481	42.685	-18.823	113.871
3/24/2011 13:35	13828.87	230.481	42.706	-18.802	113.865
3/24/2011 13:40	14128.87	235.481	42.689	-18.819	113.876
3/24/2011 13:45	14428.87	240.481	42.682	-18.826	113.873
3/24/2011 13:50	14728.87	245.481	42.688	-18.82	113.869
3/24/2011 13:55	15028.87	250.481	42.669	-18.839	113.877
3/24/2011 14:00	15328.87	255.481	42.659	-18.849	113.874
3/24/2011 14:05	15628.87	260.481	42.65	-18.858	113.874
3/24/2011 14:10	15928.87	265.481	42.645	-18.863	113.873
3/24/2011 14:15	16228.87	270.481	42.646	-18.862	113.871
3/24/2011 14:20	16528.87	275.481	42.63	-18.878	113.876
3/24/2011 14:25	16828.87	280.481	42.78	-18.728	113.826
3/24/2011 14:30	17128.87	285.481	42.692	-18.816	113.898
3/24/2011 14:35	17428.87	290.481	42.648	-18.86	113.885
3/24/2011 14:40	17728.87	295.481	42.621	-18.887	113.880
3/24/2011 14:45	18028.87	300.481	42.591	-18.917	113.880
3/24/2011 14:50	18328.87	305.481	42.587	-18.921	113.873
3/24/2011 14:55	18628.87	310.481	42.592	-18.916	113.870
3/24/2011 15:00	18928.87	315.481	42.653	-18.855	113.853
3/24/2011 15:02	19050.52	317.509	42.835	-18.673	113.816
3/24/2011 15:02	19050.77	317.513	42.827	-18.681	113.874
3/24/2011 15:02	19051.03	317.517	42.834	-18.674	113.869
3/24/2011 15:02	19051.28	317.521	42.833	-18.675	113.872
3/24/2011 15:02	19051.53	317.525	42.837	-18.671	113.870
3/24/2011 15:02	19051.78	317.53	42.835	-18.673	113.872
3/24/2011 15:02	19052.03	317.534	42.832	-18.676	113.872
3/24/2011 15:02	19052.28	317.538	42.826	-18.682	113.873
3/24/2011 15:02	19052.53	317.542	42.857	-18.651	113.862
3/24/2011 15:02	19052.78	317.546	42.885	-18.623	113.863
3/24/2011 15:02	19053.03	317.55	42.852	-18.656	113.881
3/24/2011 15:02	19053.28	317.555	42.837	-18.671	113.876
3/24/2011 15:02	19053.53	317.559	42.845	-18.663	113.869
3/24/2011 15:02	19053.78	317.563	42.847	-18.661	113.871
3/24/2011 15:02	19054.03	317.567	42.855	-18.653	113.869

3/24/2011 15:02	19054.28	317.571	42.87	-18.638	113.867
3/24/2011 15:02	19054.53	317.575	42.866	-18.642	113.873
3/24/2011 15:02	19054.78	317.58	42.868	-18.64	113.871
3/24/2011 15:02	19055.03	317.584	42.873	-18.635	113.870
3/24/2011 15:02	19055.28	317.588	42.887	-18.621	113.867
3/24/2011 15:02	19055.53	317.592	42.885	-18.623	113.872
3/24/2011 15:02	19055.78	317.596	42.891	-18.617	113.869
3/24/2011 15:02	19056.03	317.6	42.894	-18.614	113.870
3/24/2011 15:02	19056.28	317.605	42.91	-18.598	113.866
3/24/2011 15:02	19056.53	317.609	42.911	-18.597	113.871
3/24/2011 15:02	19056.89	317.615	42.906	-18.602	113.873
3/24/2011 15:02	19057.25	317.621	42.926	-18.582	113.865
3/24/2011 15:02	19057.67	317.628	42.928	-18.58	113.871
3/24/2011 15:02	19058.09	317.635	42.934	-18.574	113.869
3/24/2011 15:02	19058.51	317.642	42.946	-18.562	113.868
3/24/2011 15:02	19058.99	317.65	42.956	-18.552	113.868
3/24/2011 15:02	19059.53	317.659	42.969	-18.539	113.867
3/24/2011 15:02	19060.01	317.667	42.979	-18.529	113.868
3/24/2011 15:02	19060.61	317.677	42.99	-18.518	113.868
3/24/2011 15:02	19061.21	317.687	43.002	-18.506	113.868
3/24/2011 15:02	19061.81	317.697	43.023	-18.485	113.865
3/24/2011 15:02	19062.47	317.708	43.028	-18.48	113.870
3/24/2011 15:02	19063.19	317.72	43.045	-18.463	113.866
3/24/2011 15:02	19063.97	317.733	43.061	-18.447	113.866
3/24/2011 15:02	19064.75	317.746	43.079	-18.429	113.866
3/24/2011 15:02	19065.59	317.76	43.096	-18.412	113.866
3/24/2011 15:02	19066.49	317.775	43.115	-18.393	113.866
3/24/2011 15:02	19067.45	317.791	43.134	-18.374	113.866
3/24/2011 15:02	19068.41	317.807	43.155	-18.353	113.865
3/24/2011 15:02	19069.49	317.825	43.177	-18.331	113.865
3/24/2011 15:02	19070.63	317.844	43.198	-18.31	113.865
3/24/2011 15:02	19071.83	317.864	43.22	-18.288	113.865
3/24/2011 15:02	19073.09	317.885	43.242	-18.266	113.865
3/24/2011 15:02	19074.41	317.907	43.269	-18.239	113.863
3/24/2011 15:02	19075.85	317.931	43.298	-18.21	113.862
3/24/2011 15:02	19077.35	317.956	43.324	-18.184	113.863
3/24/2011 15:02	19078.91	317.982	43.351	-18.157	113.863
3/24/2011 15:03	19080.59	318.01	43.381	-18.127	113.862
3/24/2011 15:03	19082.39	318.04	43.42	-18.088	113.859
3/24/2011 15:03	19084.25	318.071	43.452	-18.056	113.862
3/24/2011 15:03	19086.29	318.105	43.489	-18.019	113.860
3/24/2011 15:03	19088.39	318.14	43.538	-17.97	113.856
3/24/2011 15:03	19090.61	318.177	43.578	-17.93	113.859
3/24/2011 15:03	19093.01	318.217	43.623	-17.885	113.858
3/24/2011 15:03	19095.52	318.259	43.668	-17.84	113.858
3/24/2011 15:03	19098.17	318.303	43.713	-17.795	113.858
3/24/2011 15:03	19100.99	318.35	43.76	-17.748	113.857
3/24/2011 15:03	19103.99	318.4	43.812	-17.696	113.855
3/24/2011 15:03	19107.17	318.453	43.872	-17.636	113.853
3/24/2011 15:03	19110.52	318.509	43.936	-17.572	113.852
3/24/2011 15:03	19114.13	318.569	43.996	-17.512	113.853
3/24/2011 15:03	19117.72	318.629	44.06	-17.448	113.852

3/24/2011 15:03	19121.93	318.699	44.141	-17.367	113.847
3/24/2011 15:03	19126.13	318.769	44.214	-17.294	113.849
3/24/2011 15:03	19130.32	318.839	44.29	-17.218	113.848
3/24/2011 15:03	19135.13	318.919	44.371	-17.137	113.847
3/24/2011 15:04	19140.52	319.009	44.463	-17.045	113.843
3/24/2011 15:04	19145.32	319.089	44.548	-16.96	113.845
3/24/2011 15:04	19151.32	319.189	44.653	-16.855	113.839
3/24/2011 15:04	19157.39	319.29	44.767	-16.741	113.837
3/24/2011 15:04	19163.32	319.389	44.87	-16.638	113.840
3/24/2011 15:04	19169.93	319.499	44.969	-16.539	113.841
3/24/2011 15:04	19177.13	319.619	45.09	-16.418	113.834
3/24/2011 15:04	19184.93	319.749	45.22	-16.288	113.832
3/24/2011 15:04	19192.72	319.879	45.349	-16.159	113.832
3/24/2011 15:05	19201.13	320.019	45.488	-16.02	113.829
3/24/2011 15:05	19210.13	320.169	45.637	-15.871	113.826
3/24/2011 15:05	19219.72	320.329	45.791	-15.717	113.824
3/24/2011 15:05	19229.32	320.489	45.94	-15.568	113.826
3/24/2011 15:05	19240.12	320.669	46.115	-15.393	113.818
3/24/2011 15:05	19251.52	320.859	46.292	-15.216	113.817
3/24/2011 15:06	19263.52	321.059	46.471	-15.037	113.817
3/24/2011 15:06	19276.13	321.269	46.671	-14.837	113.810
3/24/2011 15:06	19289.32	321.489	46.873	-14.635	113.810
3/24/2011 15:06	19303.77	321.73	47.089	-14.419	113.805
3/24/2011 15:06	19318.77	321.979	47.299	-14.209	113.807
3/24/2011 15:07	19334.32	322.239	47.522	-13.986	113.803
3/24/2011 15:07	19351.12	322.519	47.76	-13.748	113.799
3/24/2011 15:07	19369.12	322.819	48.011	-13.497	113.795
3/24/2011 15:08	19387.72	323.129	48.268	-13.24	113.793
3/24/2011 15:08	19408.12	323.469	48.535	-12.973	113.790
3/24/2011 15:08	19429.25	323.821	48.815	-12.693	113.786
3/24/2011 15:09	19451.32	324.189	49.095	-12.413	113.786
3/24/2011 15:09	19475.32	324.589	49.395	-12.113	113.780
3/24/2011 15:10	19500.52	325.009	49.705	-11.803	113.777
3/24/2011 15:10	19526.93	325.449	50.016	-11.492	113.777
3/24/2011 15:10	19555.13	325.919	50.343	-11.165	113.772
3/24/2011 15:11	19585.13	326.419	50.676	-10.832	113.770
3/24/2011 15:11	19616.93	326.949	51.026	-10.482	113.765
3/24/2011 15:12	19650.52	327.509	51.378	-10.13	113.764
3/24/2011 15:13	19686.52	328.109	51.746	-9.762	113.759
3/24/2011 15:13	19722.52	328.709	52.099	-9.409	113.764
3/24/2011 15:14	19764.52	329.409	52.503	-9.005	113.748
3/24/2011 15:15	19806.52	330.109	52.897	-8.611	113.751
3/24/2011 15:15	19848.52	330.809	53.254	-8.254	113.762
3/24/2011 15:16	19896.52	331.609	53.641	-7.867	113.753
3/24/2011 15:17	19950.52	332.509	54.073	-7.435	113.740
3/24/2011 15:18	19998.52	333.309	54.429	-7.079	113.763
3/24/2011 15:19	20058.52	334.309	54.87	-6.638	113.737
3/24/2011 15:20	20118.52	335.309	55.269	-6.239	113.750
3/24/2011 15:21	20178.52	336.309	55.659	-5.849	113.752
3/24/2011 15:22	20244.52	337.409	56.06	-5.448	113.749
3/24/2011 15:23	20316.52	338.609	56.466	-5.042	113.748
3/24/2011 15:24	20394.52	339.909	56.864	-4.644	113.750

3/24/2011 15:26	20472.52	341.209	57.256	-4.252	113.752
3/24/2011 15:27	20556.52	342.609	57.633	-3.875	113.756
3/24/2011 15:29	20646.52	344.109	58.001	-3.507	113.759
3/24/2011 15:30	20742.52	345.709	58.364	-3.144	113.761
3/24/2011 15:32	20838.52	347.309	58.696	-2.812	113.770
3/24/2011 15:34	20946.52	349.109	59.041	-2.467	113.766
3/24/2011 15:36	21060.52	351.009	59.366	-2.142	113.772
3/24/2011 15:38	21180.52	353.009	59.673	-1.835	113.778
3/24/2011 15:40	21306.52	355.109	59.966	-1.542	113.782
3/24/2011 15:42	21438.52	357.309	60.238	-1.27	113.788
3/24/2011 15:44	21582.52	359.709	60.512	-0.996	113.788
3/24/2011 15:47	21732.52	362.209	60.759	-0.749	113.796
3/24/2011 15:49	21888.52	364.809	60.978	-0.53	113.805
3/24/2011 15:52	22056.52	367.609	61.19	-0.318	113.807
3/24/2011 15:55	22236.52	370.609	61.378	-0.13	113.814
3/24/2011 15:58	22422.52	373.709	61.537	0.029	113.823
3/24/2011 16:02	22626.52	377.109	61.685	0.177	113.826
3/24/2011 16:05	22836.52	380.609	61.817	0.309	113.831
3/24/2011 16:09	23058.52	384.309	61.934	0.426	113.836
3/24/2011 16:13	23298.52	388.309	62.016	0.508	113.846
3/24/2011 16:17	23550.52	392.509	62.111	0.603	113.842
3/24/2011 16:21	23814.52	396.909	62.179	0.671	113.851
3/24/2011 16:26	24096.52	401.609	62.245	0.737	113.851
3/24/2011 16:31	24396.52	406.609	62.284	0.776	113.859
3/24/2011 16:36	24696.52	411.609	62.33	0.822	113.857
3/24/2011 16:41	24996.52	416.609	62.363	0.855	113.861
3/24/2011 16:46	25296.52	421.609	62.388	0.88	113.864
3/24/2011 16:51	25596.52	426.609	62.425	0.917	113.860
3/24/2011 16:56	25896.52	431.609	62.436	0.928	113.868
3/24/2011 17:01	26196.52	436.609	62.45	0.942	113.867
3/24/2011 17:06	26496.52	441.609	62.458	0.95	113.869
3/24/2011 17:11	26796.52	446.609	62.481	0.973	113.864
3/24/2011 17:16	27096.52	451.609	62.489	0.981	113.869
3/24/2011 17:21	27396.52	456.609	62.499	0.991	113.868
3/24/2011 17:26	27696.52	461.609	62.495	0.987	113.873
3/24/2011 17:31	27996.52	466.609	62.507	0.999	113.868
3/24/2011 17:36	28296.52	471.609	62.502	0.994	113.873
3/24/2011 17:41	28596.52	476.609	62.503	0.995	113.871
3/24/2011 17:46	28896.52	481.609	62.522	1.014	113.866
3/24/2011 17:51	29196.52	486.609	62.527	1.019	113.870
3/24/2011 17:56	29496.52	491.609	62.516	1.008	113.875
3/24/2011 18:01	29796.52	496.609	62.527	1.019	113.868
3/24/2011 18:06	30096.52	501.609	62.516	1.008	113.875
3/24/2011 18:11	30396.52	506.609	62.52	1.012	113.870
3/24/2011 18:16	30696.52	511.609	62.519	1.011	113.872
3/24/2011 18:21	30996.52	516.609	62.536	1.028	113.866
3/24/2011 18:26	31296.52	521.609	62.521	1.013	113.876
3/24/2011 18:31	31596.52	526.609	62.527	1.019	113.869
3/24/2011 18:36	31896.52	531.609	62.536	1.028	113.869
3/24/2011 18:41	32196.52	536.609	62.541	1.033	113.870
3/24/2011 18:46	32496.52	541.609	62.532	1.024	113.874
3/24/2011 18:51	32796.52	546.609	62.545	1.037	113.867

3/24/2011 18:56	33096.52	551.609	62.532	1.024	113.875
3/24/2011 19:01	33396.52	556.609	62.532	1.024	113.871
3/24/2011 19:06	33696.52	561.609	62.531	1.023	113.872
3/24/2011 19:11	33996.52	566.609	62.537	1.029	113.869
3/24/2011 19:16	34296.52	571.609	62.549	1.041	113.868
3/24/2011 19:21	34596.52	576.609	62.545	1.037	113.873
3/24/2011 19:26	34896.52	581.609	62.539	1.031	113.873
3/24/2011 19:31	35196.52	586.609	62.544	1.036	113.870
3/24/2011 19:36	35496.52	591.609	62.555	1.047	113.868
3/24/2011 19:41	35796.52	596.609	62.542	1.034	113.875
3/24/2011 19:46	36096.52	601.609	62.546	1.038	113.870
3/24/2011 19:51	36396.52	606.609	62.549	1.041	113.870
3/24/2011 19:56	36696.52	611.609	62.547	1.039	113.872
3/24/2011 20:01	36996.52	616.609	62.548	1.04	113.871
3/24/2011 20:06	37296.52	621.609	62.546	1.038	113.872
3/24/2011 20:11	37596.52	626.609	62.548	1.04	113.871
3/24/2011 20:16	37896.52	631.609	62.551	1.043	113.870
3/24/2011 20:21	38196.52	636.609	62.546	1.038	113.873
3/24/2011 20:26	38496.52	641.609	62.561	1.053	113.867
3/24/2011 20:31	38796.52	646.609	62.545	1.037	113.876
3/24/2011 20:36	39096.52	651.609	62.549	1.041	113.870
3/24/2011 20:41	39396.52	656.609	62.548	1.04	113.872
3/24/2011 20:46	39696.52	661.609	62.552	1.044	113.870
3/24/2011 20:51	39996.52	666.609	62.55	1.042	113.872
3/24/2011 20:56	40296.52	671.609	62.564	1.056	113.867
3/24/2011 21:01	40596.52	676.609	62.555	1.047	113.874
3/24/2011 21:06	40896.52	681.609	62.555	1.047	113.871
3/24/2011 21:11	41196.52	686.609	62.558	1.05	113.870
3/24/2011 21:16	41496.52	691.609	62.555	1.047	113.872
3/24/2011 21:21	41796.52	696.609	62.557	1.049	113.871
3/24/2011 21:26	42096.52	701.609	62.558	1.05	113.871
3/24/2011 21:31	42396.52	706.609	62.562	1.054	113.870
3/24/2011 21:36	42696.52	711.609	62.572	1.064	113.868
3/24/2011 21:41	42996.52	716.609	62.566	1.058	113.873
3/24/2011 21:46	43296.52	721.609	62.563	1.055	113.872
3/24/2011 21:51	43596.52	726.609	62.565	1.057	113.871
3/24/2011 21:56	43896.52	731.609	62.571	1.063	113.869
3/24/2011 22:01	44196.52	736.609	62.571	1.063	113.871
3/24/2011 22:06	44496.52	741.609	62.567	1.059	113.873
3/24/2011 22:11	44796.52	746.609	62.569	1.061	113.871
3/24/2011 22:16	45096.52	751.609	62.571	1.063	113.871
3/24/2011 22:21	45396.52	756.609	62.57	1.062	113.872
3/24/2011 22:26	45696.52	761.609	62.57	1.062	113.871
3/24/2011 22:31	45996.52	766.609	62.576	1.068	113.869
3/24/2011 22:36	46296.52	771.609	62.575	1.067	113.872
3/24/2011 22:41	46596.52	776.609	62.575	1.067	113.871
3/24/2011 22:46	46896.52	781.609	62.577	1.069	113.871
3/24/2011 22:51	47196.52	786.609	62.579	1.071	113.871
3/24/2011 22:56	47496.52	791.609	62.583	1.075	113.870
3/24/2011 23:01	47796.52	796.609	62.584	1.076	113.871
3/24/2011 23:06	48096.52	801.609	62.586	1.078	113.871
3/24/2011 23:11	48396.52	806.609	62.589	1.081	113.870

3/24/2011 23:16	48696.52	811.609	62.59	1.082	113.871
3/24/2011 23:21	48996.52	816.609	62.596	1.088	113.869
3/24/2011 23:26	49296.52	821.609	62.595	1.087	113.872
3/24/2011 23:31	49596.52	826.609	62.598	1.09	113.870
3/24/2011 23:36	49896.52	831.609	62.602	1.094	113.870
3/24/2011 23:41	50196.52	836.609	62.603	1.095	113.871
3/24/2011 23:46	50496.52	841.609	62.609	1.101	113.869
3/24/2011 23:51	50796.52	846.609	62.608	1.1	113.872
3/24/2011 23:56	51096.52	851.609	62.609	1.101	113.871
3/25/2011 0:01	51396.52	856.609	62.611	1.103	113.871
3/25/2011 0:06	51696.52	861.609	62.616	1.108	113.870
3/25/2011 0:11	51996.52	866.609	62.622	1.114	113.869
3/25/2011 0:16	52296.52	871.609	62.622	1.114	113.871
3/25/2011 0:21	52596.52	876.609	62.625	1.117	113.870
3/25/2011 0:26	52896.52	881.609	62.624	1.116	113.872
3/25/2011 0:31	53196.52	886.609	62.625	1.117	113.871
3/25/2011 0:36	53496.52	891.609	62.624	1.116	113.872
3/25/2011 0:41	53796.52	896.609	62.626	1.118	113.871
3/25/2011 0:46	54096.52	901.609	62.625	1.117	113.872
3/25/2011 0:51	54396.52	906.609	62.63	1.122	113.870
3/25/2011 0:56	54696.52	911.609	62.634	1.126	113.870
3/25/2011 1:01	54996.52	916.609	62.636	1.128	113.871
3/25/2011 1:06	55296.52	921.609	62.636	1.128	113.871
3/25/2011 1:11	55596.52	926.609	62.634	1.126	113.872
3/25/2011 1:16	55896.52	931.609	62.639	1.131	113.870
3/25/2011 1:21	56196.52	936.609	62.641	1.133	113.871
3/25/2011 1:26	56496.52	941.609	62.636	1.128	113.873
3/25/2011 1:31	56796.52	946.609	62.643	1.135	113.869
3/25/2011 1:36	57096.52	951.609	62.644	1.136	113.871
3/25/2011 1:41	57396.52	956.609	62.64	1.132	113.873
3/25/2011 1:46	57696.52	961.609	62.646	1.138	113.869
3/25/2011 1:51	57996.52	966.609	62.648	1.14	113.871
3/25/2011 1:56	58296.52	971.609	62.645	1.137	113.872
3/25/2011 2:01	58596.52	976.609	62.645	1.137	113.871
3/25/2011 2:06	58896.52	981.609	62.643	1.135	113.872
3/25/2011 2:11	59196.52	986.609	62.649	1.141	113.869
3/25/2011 2:16	59496.52	991.609	62.646	1.138	113.872
3/25/2011 2:21	59796.52	996.609	62.649	1.141	113.870
3/25/2011 2:26	60096.52	1001.609	62.65	1.142	113.871
3/25/2011 2:31	60396.52	1006.609	62.648	1.14	113.872
3/25/2011 2:36	60696.52	1011.609	62.646	1.138	113.872
3/25/2011 2:41	60996.52	1016.609	62.647	1.139	113.871
3/25/2011 2:46	61296.52	1021.609	62.65	1.142	113.870
3/25/2011 2:51	61596.52	1026.609	62.652	1.144	113.871
3/25/2011 2:56	61896.52	1031.609	62.653	1.145	113.871
3/25/2011 3:01	62196.52	1036.609	62.656	1.148	113.870
3/25/2011 3:06	62496.52	1041.609	62.651	1.143	113.873
3/25/2011 3:11	62796.52	1046.609	62.651	1.143	113.871
3/25/2011 3:16	63096.52	1051.609	62.658	1.15	113.869
3/25/2011 3:21	63396.52	1056.609	62.661	1.153	113.870
3/25/2011 3:26	63696.52	1061.609	62.664	1.156	113.870
3/25/2011 3:31	63996.52	1066.609	62.655	1.147	113.874

3/25/2011 3:36	64296.52	1071.609	62.655	1.147	113.871
3/25/2011 3:41	64596.52	1076.609	62.658	1.15	113.870
3/25/2011 3:46	64896.52	1081.609	62.655	1.147	113.872
3/25/2011 3:51	65196.52	1086.609	62.659	1.151	113.870
3/25/2011 3:56	65496.52	1091.609	62.661	1.153	113.871
3/25/2011 4:01	65796.52	1096.609	62.66	1.152	113.872
3/25/2011 4:06	66096.52	1101.609	62.66	1.152	113.871
3/25/2011 4:11	66396.52	1106.609	62.646	1.138	113.876
3/25/2011 4:16	66696.52	1111.609	62.655	1.147	113.869
3/25/2011 4:21	66996.52	1116.609	62.655	1.147	113.871
3/25/2011 4:26	67296.52	1121.609	62.653	1.145	113.872
3/25/2011 4:31	67596.52	1126.609	62.66	1.152	113.869
3/25/2011 4:36	67896.52	1131.609	62.648	1.14	113.875
3/25/2011 4:41	68196.52	1136.609	62.651	1.143	113.870
3/25/2011 4:46	68496.52	1141.609	62.645	1.137	113.873
3/25/2011 4:51	68796.52	1146.609	62.649	1.141	113.870
3/25/2011 4:56	69096.52	1151.609	62.646	1.138	113.872
3/25/2011 5:01	69396.52	1156.609	62.653	1.145	113.869
3/25/2011 5:06	69696.52	1161.609	62.643	1.135	113.874
3/25/2011 5:11	69996.52	1166.609	62.646	1.138	113.870
3/25/2011 5:16	70296.52	1171.609	62.639	1.131	113.873
3/25/2011 5:21	70596.52	1176.609	62.644	1.136	113.870
3/25/2011 5:26	70896.52	1181.609	62.643	1.135	113.872
3/25/2011 5:31	71196.52	1186.609	62.642	1.134	113.872
3/25/2011 5:36	71496.52	1191.609	62.639	1.131	113.872
3/25/2011 5:41	71796.52	1196.609	62.636	1.128	113.872
3/25/2011 5:46	72096.52	1201.609	62.634	1.126	113.872
3/25/2011 5:51	72396.52	1206.609	62.638	1.13	113.870
3/25/2011 5:56	72696.52	1211.609	62.634	1.126	113.873
3/25/2011 6:01	72996.52	1216.609	62.635	1.127	113.871
3/25/2011 6:06	73296.52	1221.609	62.625	1.117	113.874
3/25/2011 6:11	73596.52	1226.609	62.623	1.115	113.872
3/25/2011 6:16	73896.52	1231.609	62.624	1.116	113.871
3/25/2011 6:21	74196.52	1236.609	62.621	1.113	113.872
3/25/2011 6:26	74496.52	1241.609	62.62	1.112	113.872
3/25/2011 6:31	74796.52	1246.609	62.615	1.107	113.873
3/25/2011 6:36	75096.52	1251.609	62.615	1.107	113.871
3/25/2011 6:41	75396.52	1256.609	62.617	1.109	113.871
3/25/2011 6:46	75696.52	1261.609	62.613	1.105	113.873
3/25/2011 6:51	75996.52	1266.609	62.614	1.106	113.871
3/25/2011 6:56	76296.52	1271.609	62.612	1.104	113.872
3/25/2011 7:01	76596.52	1276.609	62.607	1.099	113.873
3/25/2011 7:06	76896.52	1281.609	62.606	1.098	113.872
3/25/2011 7:11	77196.52	1286.609	62.606	1.098	113.871
3/25/2011 7:16	77496.52	1291.609	62.592	1.084	113.876
3/25/2011 7:21	77796.52	1296.609	62.598	1.09	113.869
3/25/2011 7:26	78096.52	1301.609	62.595	1.087	113.872
3/25/2011 7:31	78396.52	1306.609	62.598	1.09	113.870
3/25/2011 7:36	78696.52	1311.609	62.594	1.086	113.873
3/25/2011 7:41	78996.52	1316.609	62.59	1.082	113.873

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ECF-100FR3-11-0146, Rev 0

CH2MHILL
Plateau Remediation Company

Environmental Calculation Cover Page

Part 1: Completed by the Responsible Manager

Project: Soil and Groundwater Remediation — Date: 25 August, 2011

Calculation Title & Description: Analysis of Slug Test Data at the 100-FR-3 Operable Unit

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Checker: MJ Tonkin	Basis of Qualification: Team Leader
Senior Reviewer: CJ Neville	Basis of Qualification: Senior Hydrogeologist

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1. Purpose

The purpose of this environmental calculation brief is to present the analysis of slug tests performed in 2010 at wells in the 100-FR-3 Operable Unit. Withdrawal slug test data at eight wells are analyzed with AQTESOLV software. First-cut and refined estimates of hydraulic conductivity are provided.

2. Methodology

An effective initial displacement is estimated for each withdrawal test by back-fitting the measured displacement values to zero time. This effective initial displacement is compared with the theoretical initial displacement value for verification. The displacements are normalized by the effective initial displacement and analyzed using AQTESOLV aquifer test software which has computerized implementations of several analytical methods. A first-cut estimate of the hydraulic conductivity is estimated with the Cooper, Bredehoeft and Papadopulos [CBP] model (Cooper et al., 1967). A refined estimate is made with the Kansas Geological Survey [KGS] model for partial penetration (Hyder et al., 1994). Details regarding the two models are presented subsequently.

2.1 CBP Model

The CBP model considers a well that fully penetrates a 'Theissian aquifer' (infinite in areal extent, uniform and perfectly confined) (Cooper et al., 1967). The model has two important advantages over approximate methods such as those of Hvorslev (1951) and Bouwer and Rice (1976):

1. The model incorporates storage in the formation; and
2. The model incorporates a rigorous representation of the geometry of the tests.

The CBP model assumes purely radial flow which is strictly valid for a well penetrating the full thickness of an aquifer. For partially penetrating wells the assumption of purely radial flow is invalidated to some degree. In general, the error introduced by ignoring partial penetration is typically not very significant. If the length of the screen is greater than about 20 times the radius, then flow will be essentially radial. The errors introduced by neglecting vertical components of flow are further limited in vertically anisotropic aquifers in which the vertical hydraulic conductivity is lower than the horizontal.

The solution can be plotted as a set of type curves which show the variation of normalized displacement over time; each curve corresponding to a combination of transmissivity, storage coefficient, casing and screen radii. The aquifer parameters can be estimated by matching the type curve from the observed data with the library of analytical type curves. AQTESOLV provides the option of matching the curves visually or using automatic parameter-estimation methods.

2.2 KGS Model

The KGS models were developed for analyzing slug tests in wells that penetrate a portion of a perfectly confined or unconfined aquifer that is uniform, anisotropic and infinite in areal extent (Hyder et al., 1994). As with the CBP model, these models incorporate storage in the formation and are based on a correct fluid balance for the well screen; while also accommodating a well of any radius. They also consider two alternative boundary conditions for the top of the formation: no-flow (as with the CBP model) and constant-head.

The KGS models represent state-of-the-art in slug test interpretation. They are free of restrictive geometries and also free of questionable conceptions of hydraulic processes. AQTESOLV can estimate the aquifer parameters by the KGS model with the aid of automatic parameter-estimation methods.

Approximate methods of analysis, such as the Bouwer and Rice method, are not applied in this investigation. The CBP and KGS analyses are more rigorous, and have the advantage of being able to match the entire responses, instead of restricting attention to that portion of the data which appears to approximate a straight line

3. Software Applications, Descriptions, Installation & Checkout, and Statements of Validity

3.1 Description

AQTESOLV (Calculation Software)

- Software Title: AQTESOLV by HydroSolve Inc (www.aqtesolv.com); software for the design and analysis of aquifer tests in confined, unconfined, leaky and fractured aquifers.
- Software Version: Version 4.5 for windows.
- The software identified above was used consistent with intended use for and is a valid use of this software for the problem addressed in this application.
- The software was used within its limitations.

4. Calculation

The locations of the three wells are shown in Figure 4-1. The well/screen information is tabulated on Table 4-1. Appendix A includes a series of tables with data collected from the slug tests.

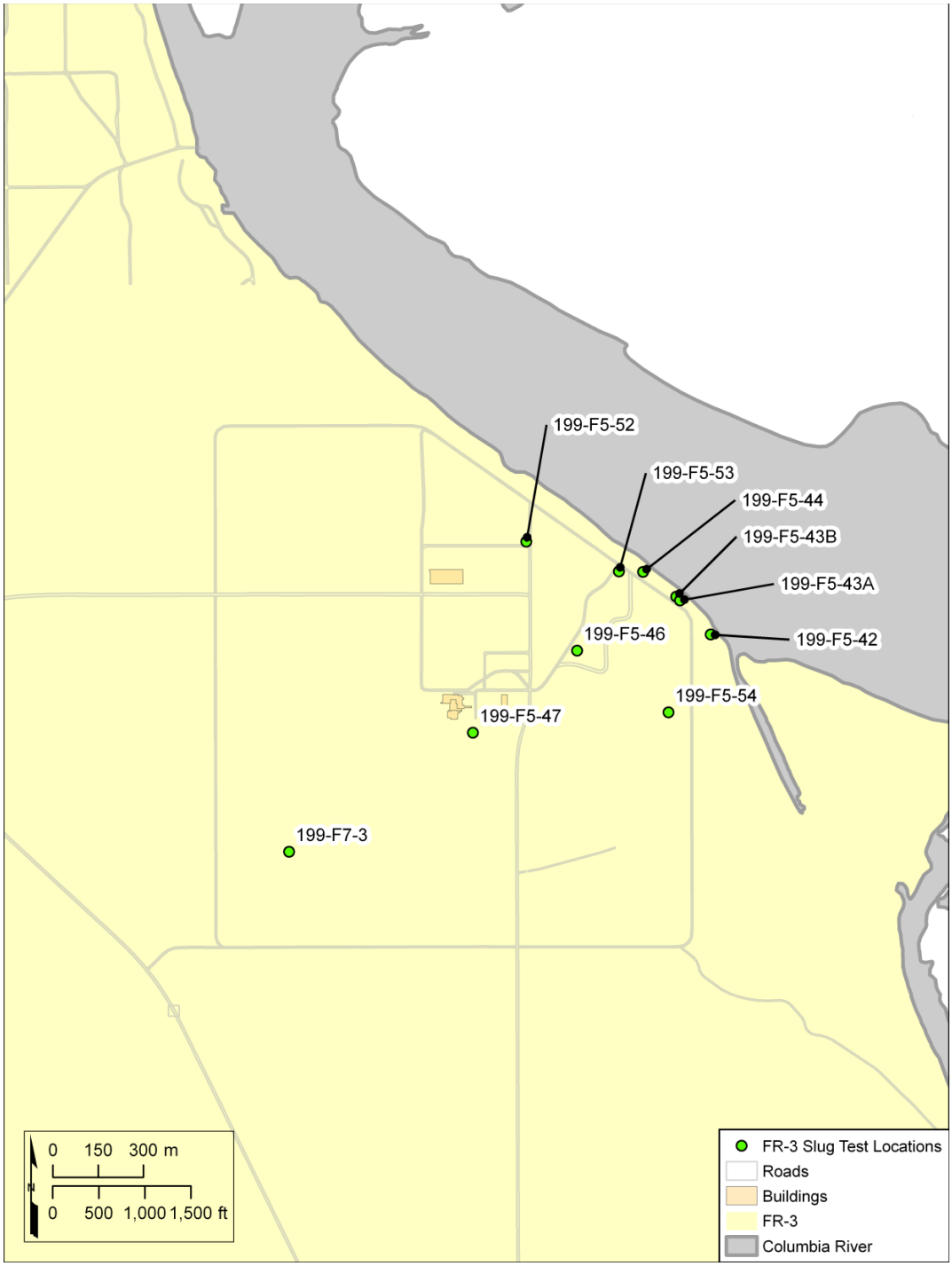

Figure 4-1. Well Locations

Table 1. Well and Screen Information

	199-F7-3	199-F5-47	199-F5-46	199-F5-44	199-F5-43B	199-F5-43A	199-F5-42	199-F5-52	199-F5-54	199-F5-53
Easting (m)	579884.71	580495.51	580841.34	581060.85	581170.92	581183.87	581285.48	580672.84	581145.49	580980.92
Northing (m)	147112.53	147508.45	147781.51	148043.20	147960.38	147948.07	147834.82	148143.45	147576.22	148044.25
Geologic unit tested	Hanford	Hanford	Hanford	Hanford	Ringold Upper Mud (RUM)	Hanford	Hanford	Hanford	Hanford	RUM
Land Surface Elevation (m)	120.49	127.84	127.19	122.85	120.43	120.61	119.36	127.36	126.29	124.72
Top of Ringold Upper Mud (m)	111.7	108.8	110.0	<107.9†	107.3	106.1	<108.6†	107.2	105.0	108.1
Water Table Elevation (m)	114.57	114.03	113.43	112.57	114.14	112.51	112.98	113.09	113.12	113.06
Screen Top Elevation (m)	115.28	115.77	114.8	114.41	76.29	114.48	114.70	115.20	114.67	95.75
Screen Bottom Elevation (m)	110.71	109.67	110.2	108.31	73.25	108.39	108.60	109.10	108.58	92.70
Casing Diameter (inches)	4	4	4	4	4	4	4	6	6	6
Borehole diameter (inches)	8	8	8	8	12/10	8	10/8	10.75	10.75	13.63/10.75

† Borehole did not reach RUM

4.1 Analysis of Slug Test Data at Well 199-F7-3

Two withdrawal tests at 199-F7-3 are analyzed here.

4.1.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The two withdrawal tests were conducted using the same slug. As shown in Figure 4-2, the responses for the two tests are essentially identical. This suggests that the tests are reproducible.

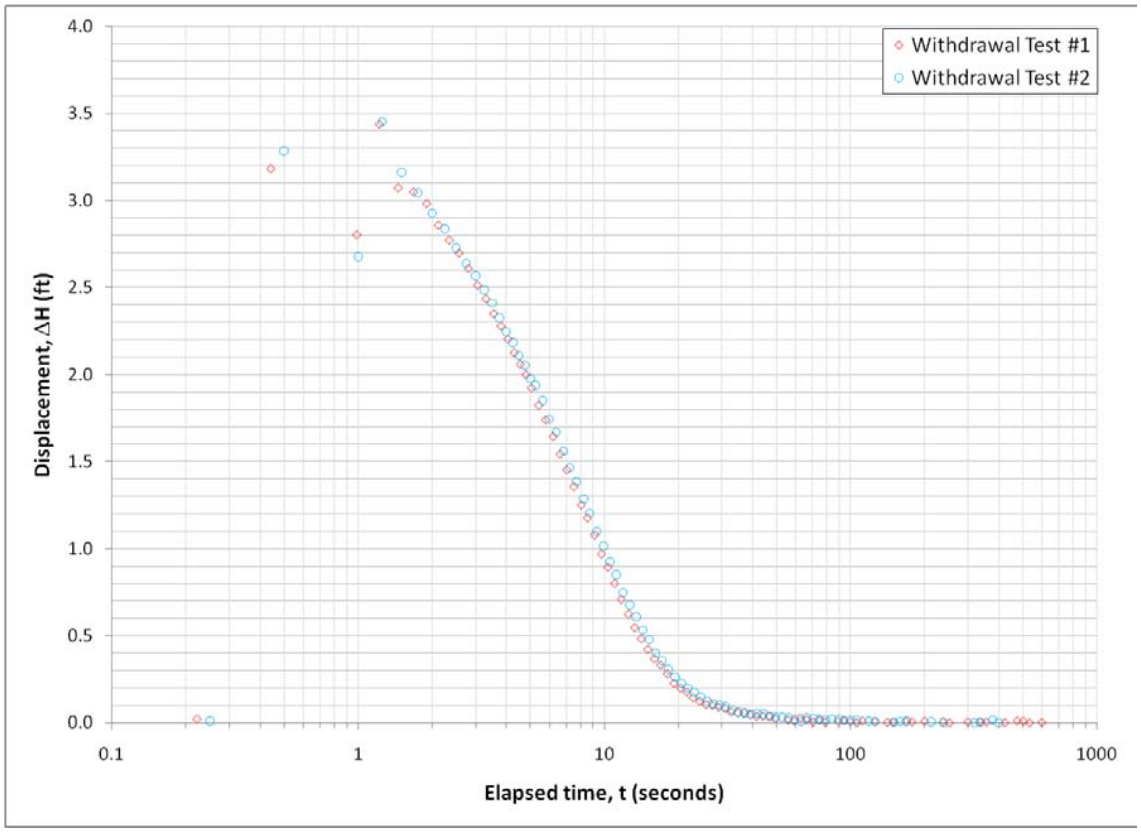

Figure 4-2. Displacements from Two Withdrawal Tests at 199-F7-3

4.1.2 Estimation of Effective Initial Displacement

For a slug volume (V) of 0.3276 ft^3 and a casing radius (r_c) of 2 inches, a, a theoretical initial displacement (H_0) of 3.75 ft is calculated ($H_0 = V/\pi r_c^2$). An effective initial displacement of 3.95 ft is estimated for both withdrawal tests, by back-fitting the observations to 0.0 elapsed time. The theoretical and effective initial displacements are relatively close, suggesting that the test data are reliable. Figure 4-3 illustrates the estimation of effective initial displacement.

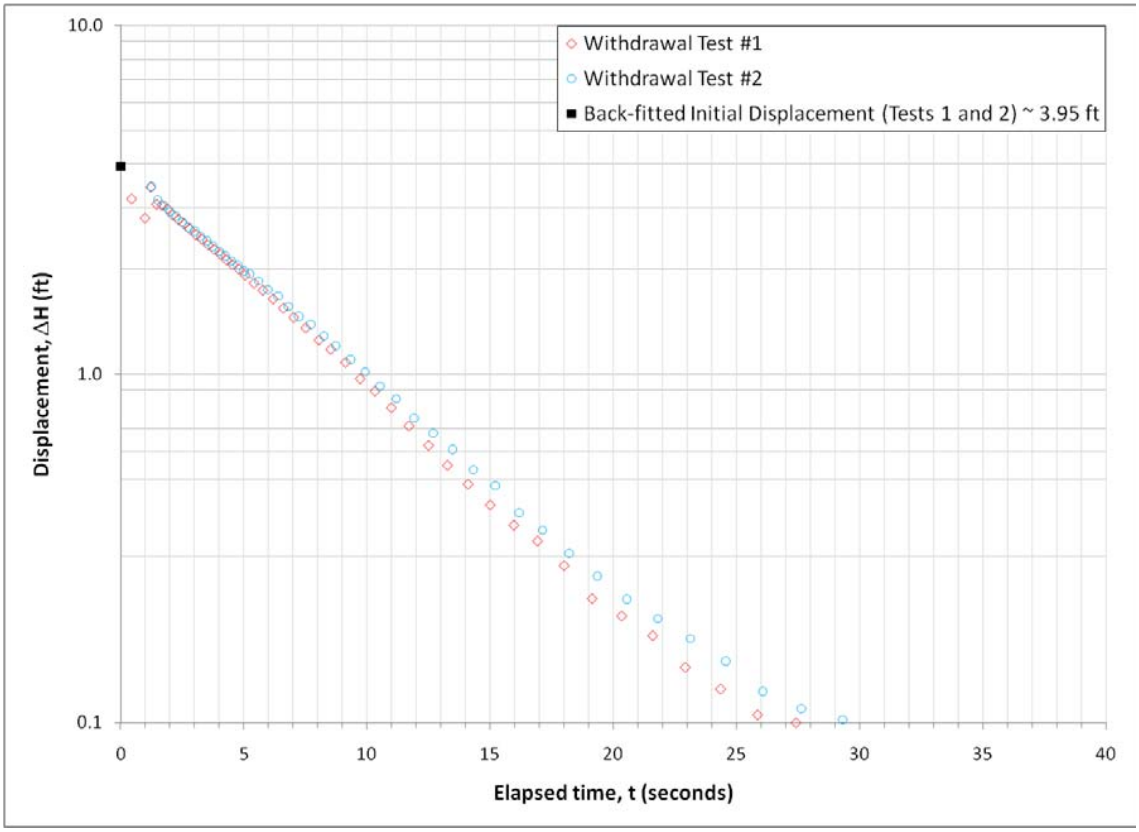

Figure 4-3. Estimation of Effective Initial Displacement at 199-F7-3

4.1.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by the respective effective initial displacement and shown in Figure 4-4. If the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. In this case however, that assessment cannot be made because of the noisy data in the first seconds of the test. The close correspondence of the two normalized displacement curves suggests that it is sufficient to analyze the data from only one of the withdrawal tests.

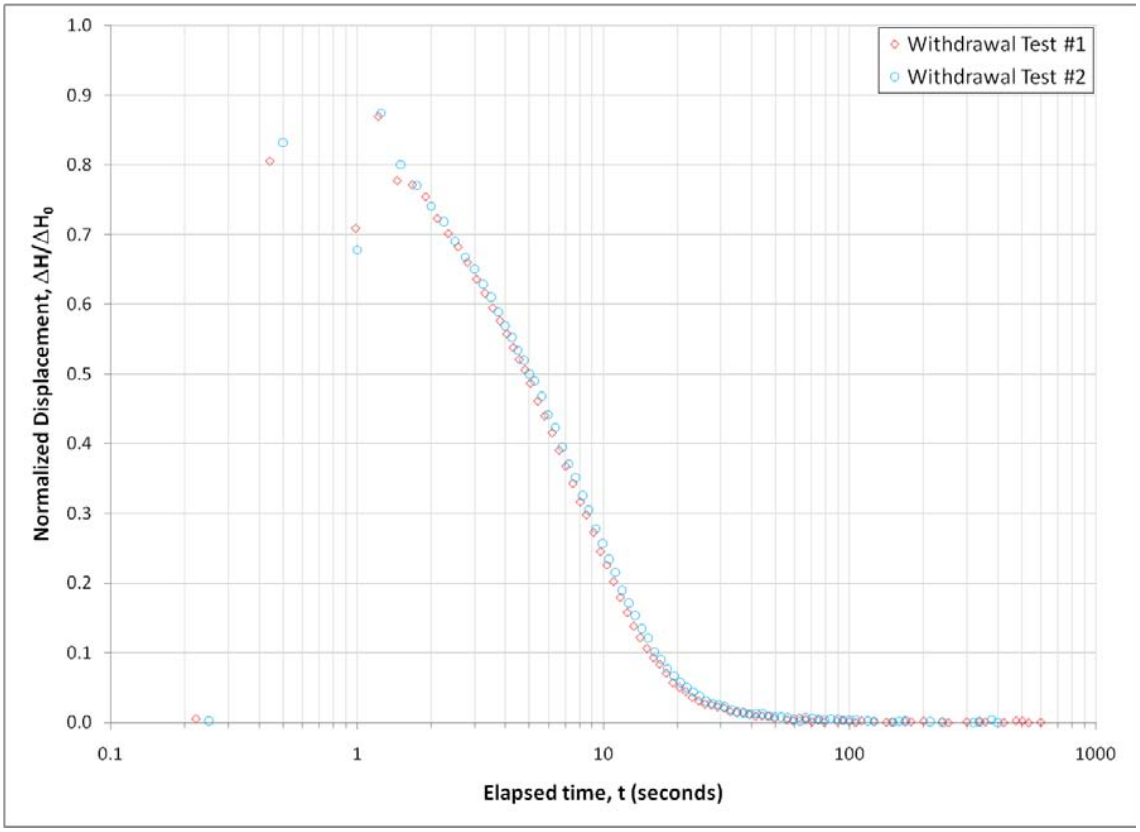

Figure 4-4. Normalized Displacement at 199-F7-3

4.1.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the first withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 91.8 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. This assumption is met in well 199-F7-3. The aquifer thickness above the RUM is 9.4 ft (~2.9 m), and the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **32 m/d or 3.7×10^{-4} m/s.** The CBP model fit is shown in Figure 4-5.

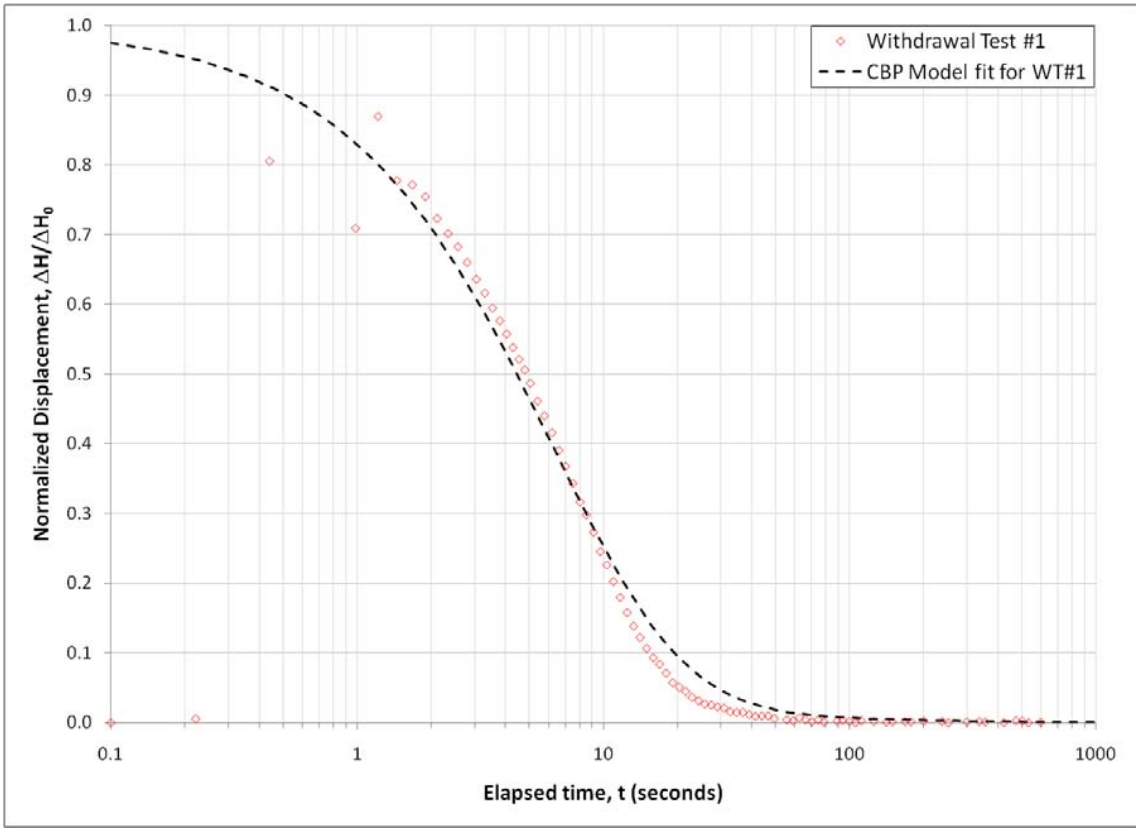

Figure 4-5. CBP Model Fit at 199-F7-3

4.1.5 Refined analysis

For a more refined analysis, the normalized displacements for the first withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 3.5×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **20 m/d** or 2.3×10^{-4} **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the submerged well screen length above the RUM (9.4 ft (~2.9 m)). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-6.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

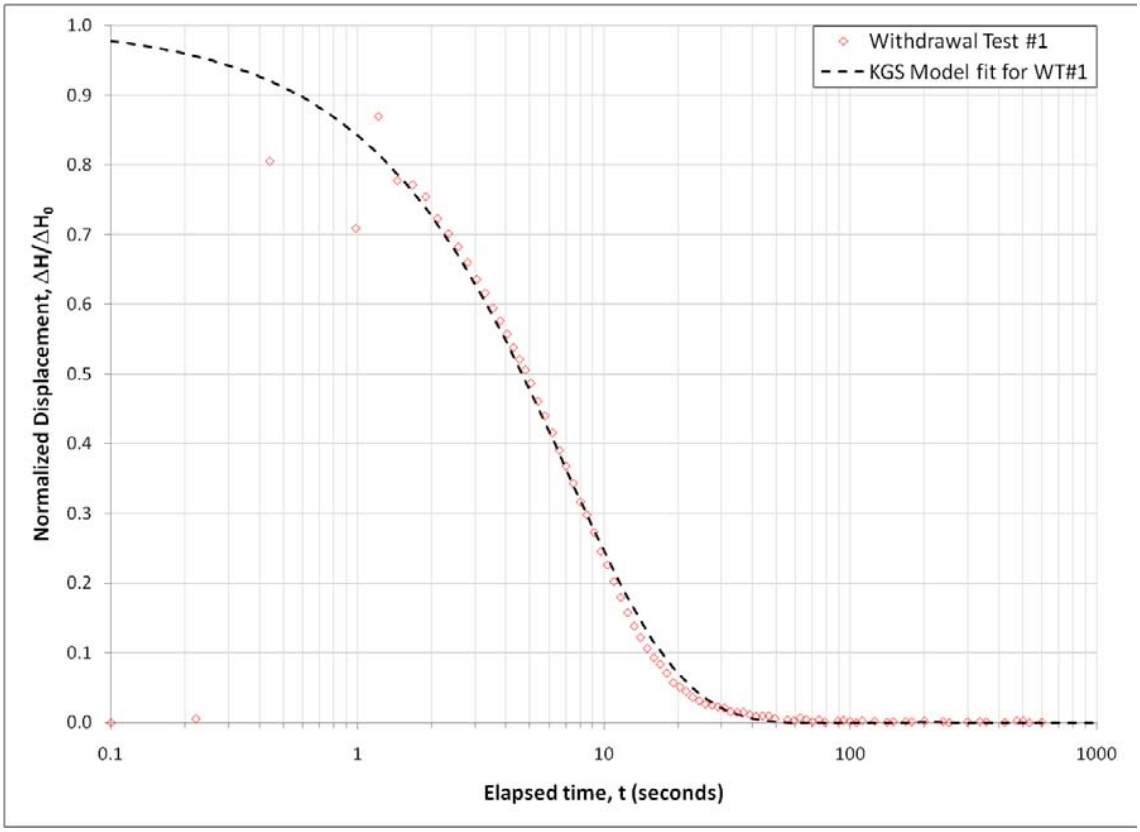

Figure 4-6. KGS Model Fit at 199-F7-3

4.2 Analysis of Slug Test Data at Well 199-F5-47

Two withdrawal tests at 199-F5-47 are analyzed in this section.

4.2.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The two withdrawal tests were conducted with a slug of volume 0.3276 ft^3.The displacements for each test are shown in Figure 4-7. The two tests are essentially identical after the first six seconds. In the first six seconds there are some differences between the two tests. This suggests that the latter parts of the tests are reproducible. To analyze the reproducibility of the earlier part, we will have to look at normalized displacements.

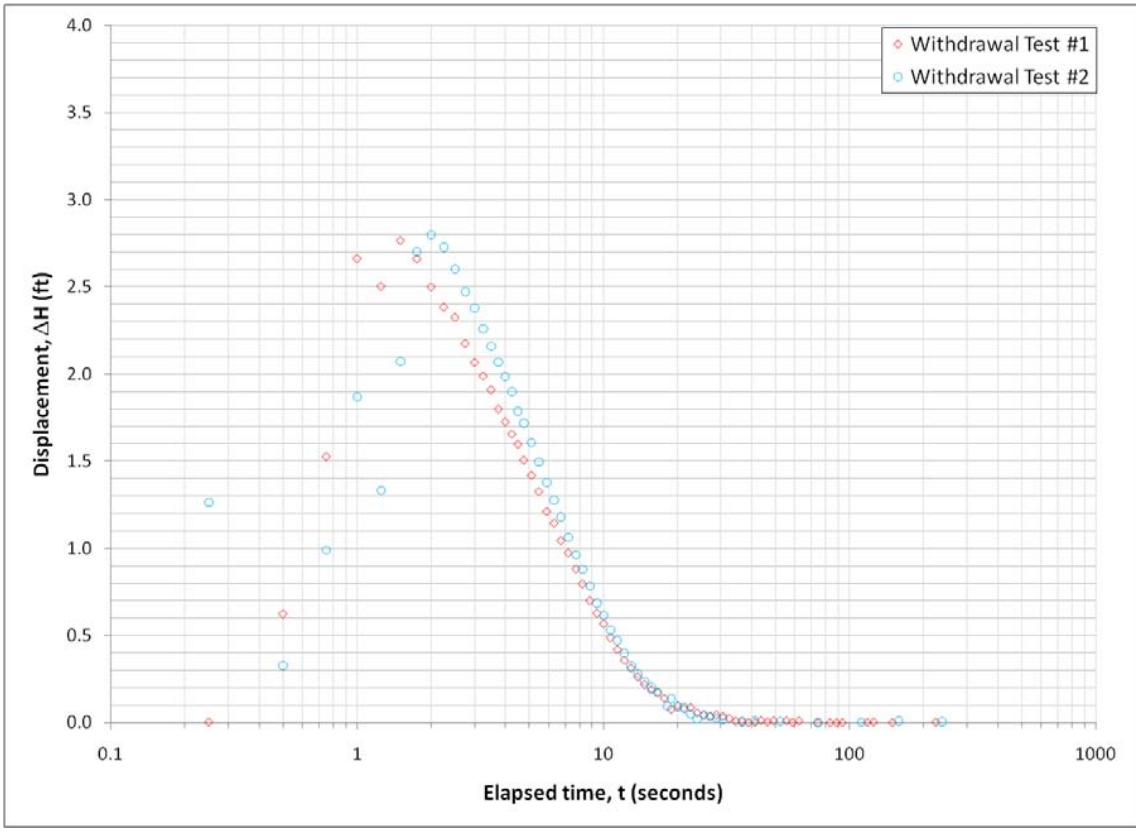

Figure 4-7. Displacements from Two Withdrawal Tests at 199-F5-47

4.2.2 Estimation of Effective Initial Displacement

For the two tests, a theoretical initial displacement of 3.75 ft is calculated for a slug volume of 0.3276 ft^3 and a casing radius of 2 inches. An effective initial displacement of 3.55 ft is estimated for the first test, by back-fitting the observations to 0.0 elapsed time. Using the same approach, an effective initial displacement of 3.95 ft is estimated for the second test.. The theoretical and effective initial displacements are close, suggesting that the test data are reliable.

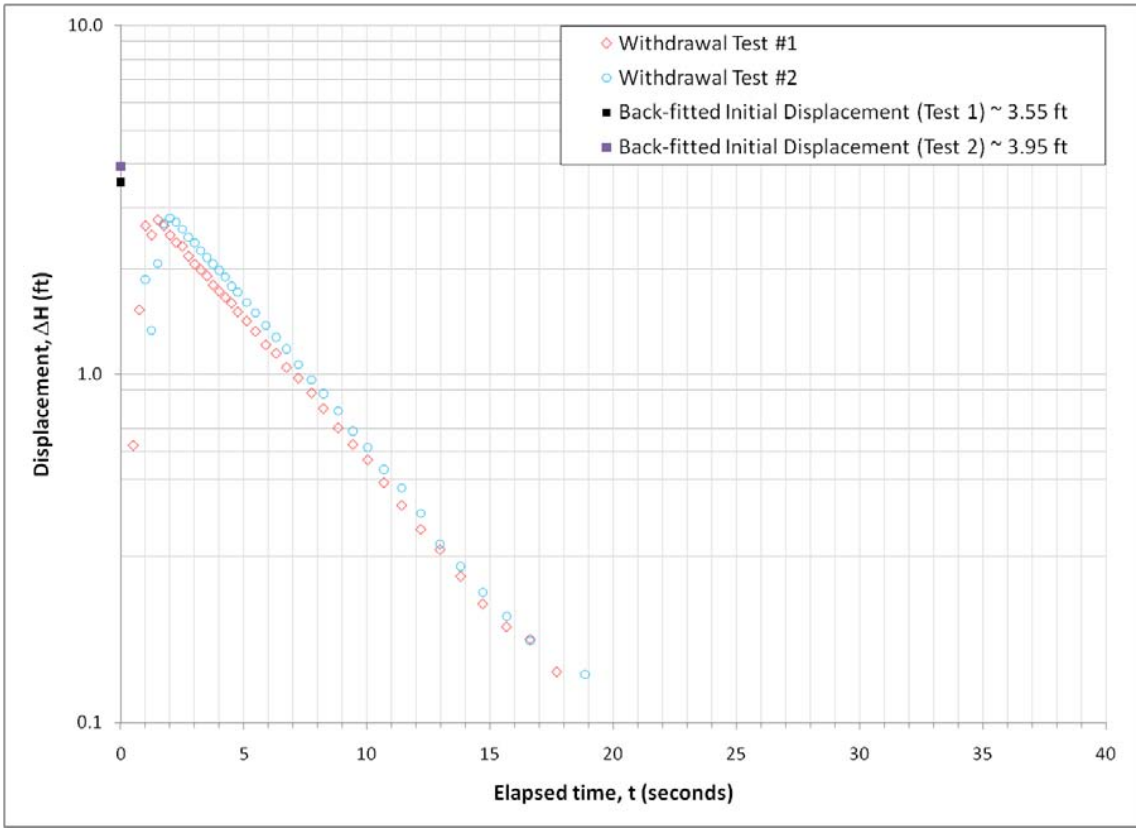

Figure 4-8. Estimation of Effective Initial Displacements at 199-F5-47

4.2.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by the respective effective initial displacement and shown in Figure 4-9. If the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. In this case however, that assessment cannot be made because of the noisy data in the first second. The close correspondence of the two normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The first withdrawal test is chosen for analysis.

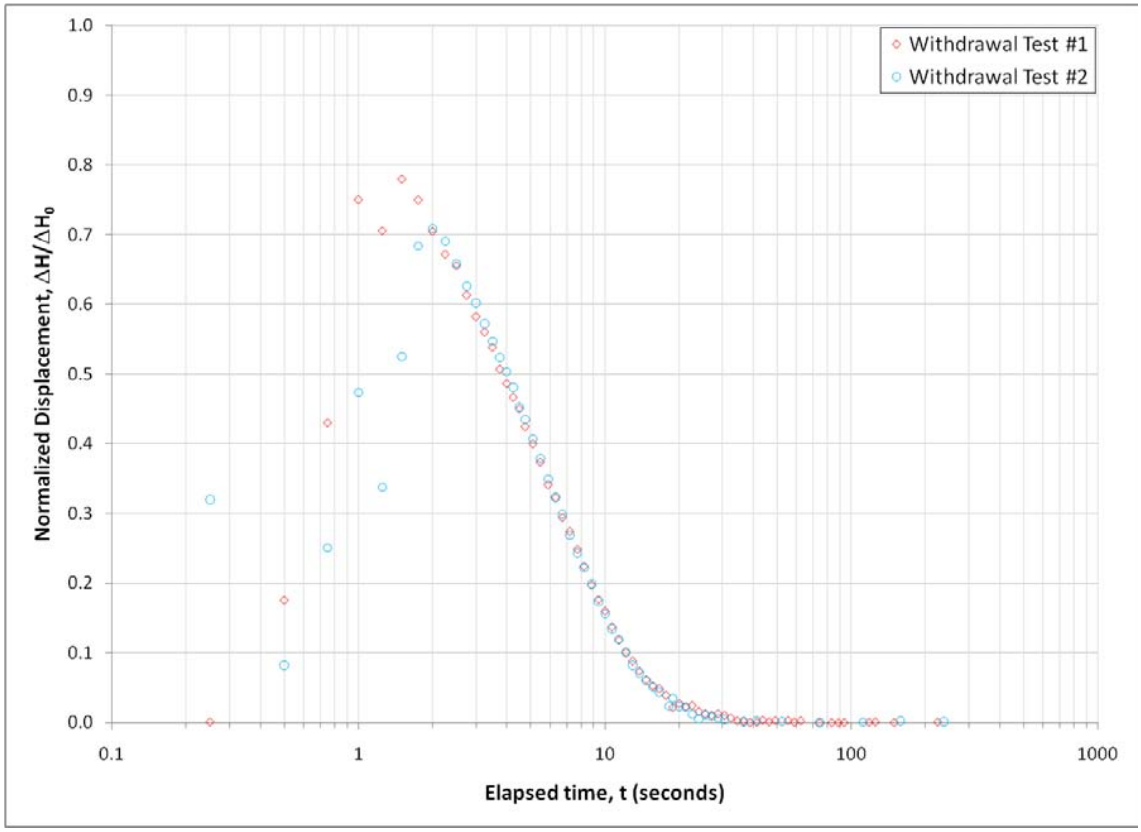

Figure 4-9. Normalized Displacements at 199-F5-47

4.2.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the first withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 115.1 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 14.3 ft (~4.4 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **26 m/d or 3.01×10^{-4} m/s.** The CBP model fit is shown in Figure 4-10.

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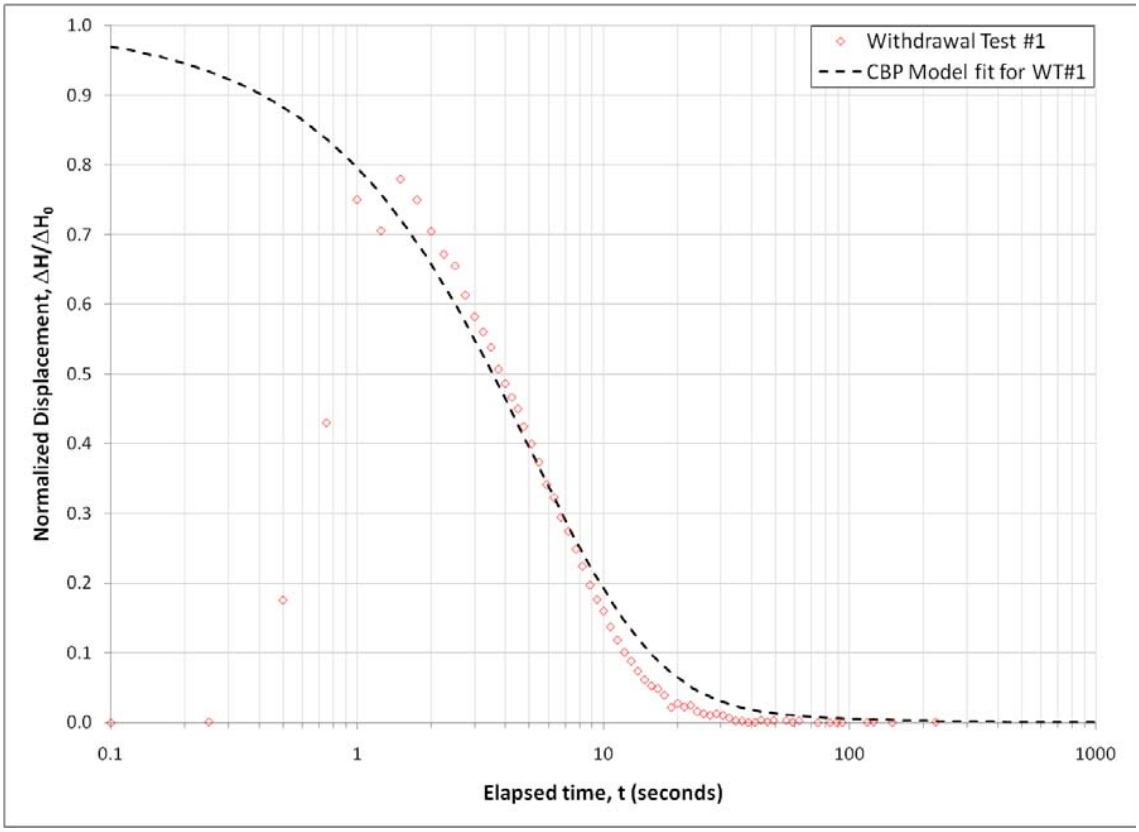

Figure 4-10. CBP Model Fit at 199-F5-47

4.2.5 Refined Analysis

For a more refined analysis, the normalized displacements for the first withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.3×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **23 m/d** or 2.7×10^{-4} **m/s**. Recognizing that the response is insensitive to the storage coefficient beyond a certain range, a consistent storage coefficient between the two methods is adopted. Hence, the specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (14.3 ft ~ 4.4 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-11.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

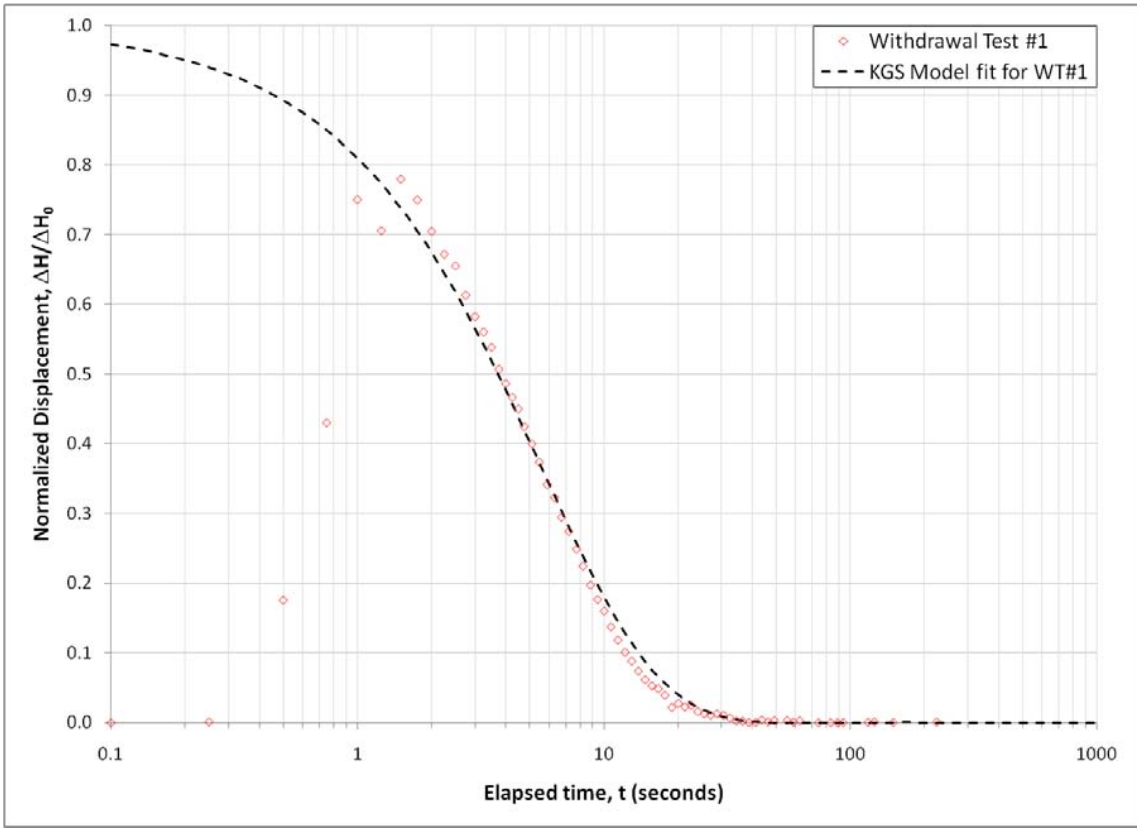

Figure 4-11. KGS Model Fit at 199-F5-47

4.3 Analysis of Slug Test Data at Well 199-F5-46

Two withdrawal tests at 199-F5-46 are analyzed in this section.

4.3.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The two withdrawal tests were conducted using the same slug. The responses for the two tests are consistent. Beyond about two seconds the displacements are essentially identical. This suggests that the tests are reproducible. The displacements are shown in Figure 4-12.

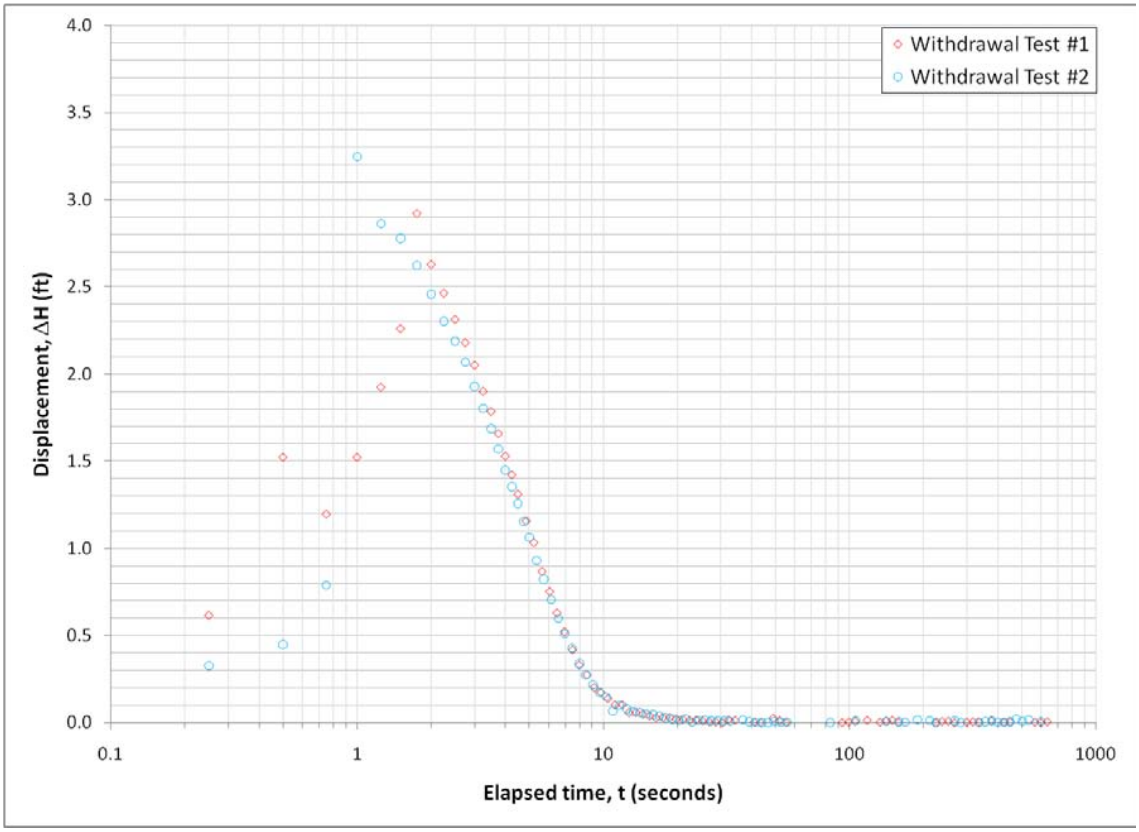

Figure 4-12. Displacements from Two Withdrawal Tests at 199-F5-46

4.3.2 Estimation of Effective Initial Displacement

A theoretical initial displacement of 3.75 ft is calculated for a slug volume of 0.3276 ft^3 and a casing radius of 2 inches. As shown in Figure 4-13, an effective initial displacement of 3.9 ft is estimated for the first withdrawal test, by back-fitting the observations to 0.0 elapsed time. Similarly, effective initial displacement of 3.8 ft is estimated for the second test. The theoretical and effective initial displacements are close, suggesting that the test data are reliable.

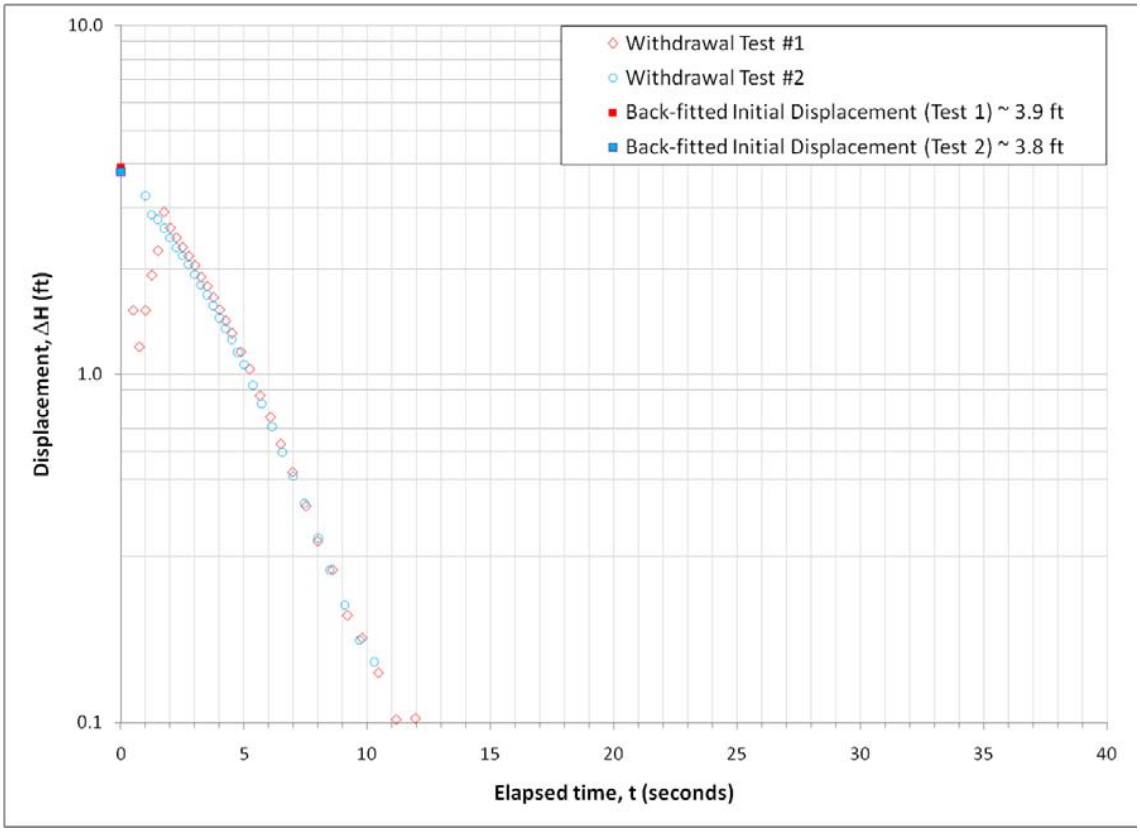

Figure 4-13. Estimation of Effective Initial Displacements at 199-F5-46

4.3.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by their effective initial displacements. As shown in Figure 4-14, the earliest data are somewhat noisy; however, the data exhibit a similar trend after about 2 seconds. The close correspondence of the two normalized displacement curves suggests that it is sufficient to analyze the data from only one of the withdrawal tests. The first withdrawal test is chosen for analysis. Ideally, the data should approach an asymptotic normalized displacement of 1.0 at the start of the test.. This serves as a check on the estimation of the effective initial displacement. However, the lack of good data at the beginning of these tests makes it hard to verify the asymptotic nature of the normalized displacements thereby bringing an element of uncertainty about the effective initial displacement.

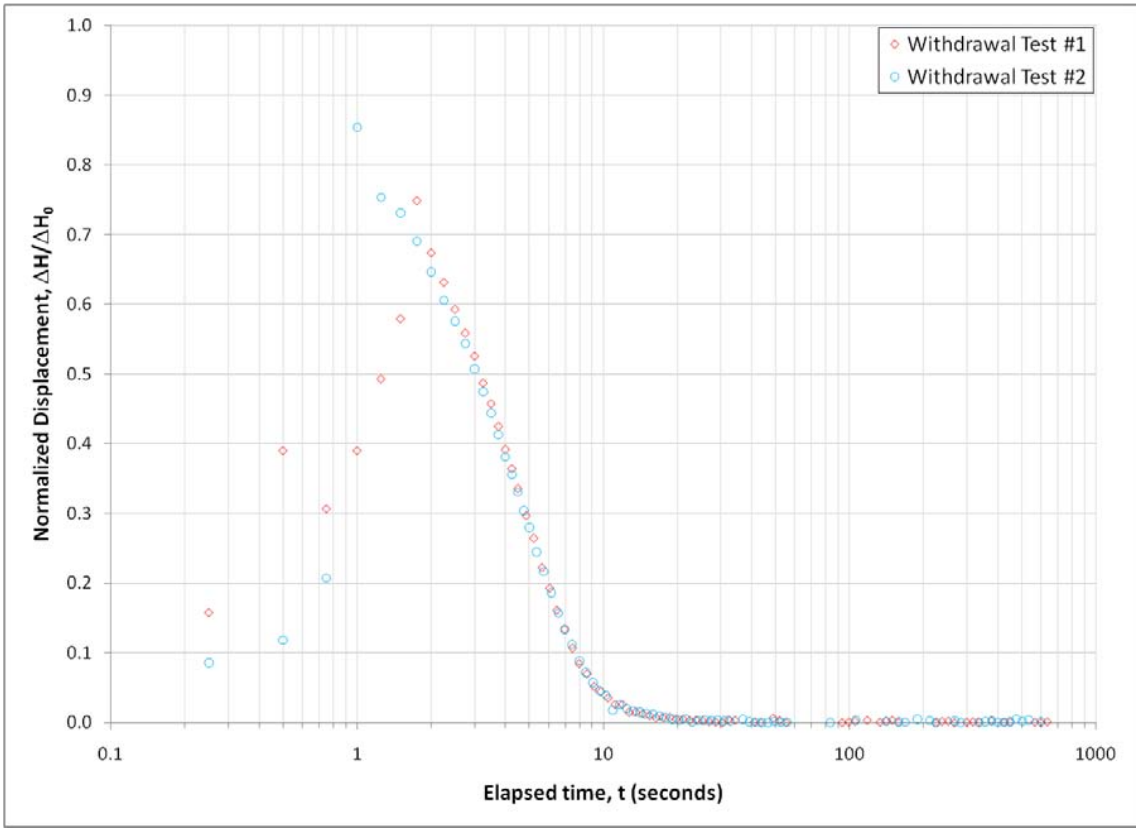

Figure 4-14. Normalized Displacements at 199-F5-46

4.3.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the first withdrawal test are fit with the CBP model. A match to the observations is achieved with a storage coefficient, S, of 10^{-5}, and a fitted transmissivity, T, of 162.3 m^2/d. The match obtained is poor in comparison with the CBP matches at the other locations. This could be due to an erroneous effective initial displacement. The CBP model assumes that the well penetrates the full thickness of the aquifer. This assumption is met for well 199-F5-46. The aquifer thickness is 10.58 ft (~ 3.2 m), so the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H of **50 m/d** or **5.8×10^{-4} m/s**. The CBP fit is shown in Figure 4-15.

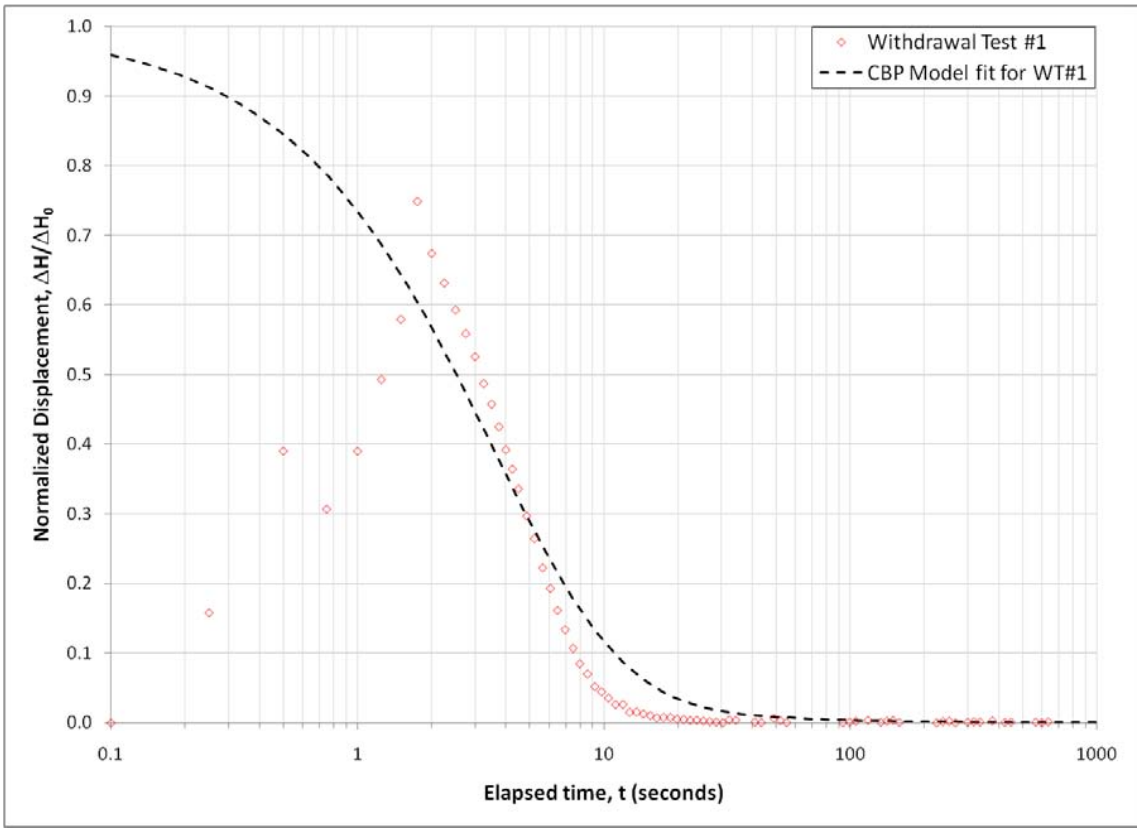

Figure 4-15. CBP Model Fit at 199-F5-46

4.3.5 Refined Analysis

For a more refined analysis, the normalized displacements for the first withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 3.1×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **40 m/d** or **4.63×10^{-4} m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (10.58 ft ~ 3.2 m). The estimated horizontal hydraulic conductivity value is 20% lower than the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-16.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

The dissipation portion of both withdrawal tests is preceded by a period of increasing displacements. Also, the theoretical fit does a poor job of matching the dissipation portion of the test. From past experience with similar tests in conductive (~ 10^{-3} m/s) formations, it is hypothesized that these tests may be 'gradual'. In a 'gradual' test, the time required for the generation of effective initial displacement (about 2 seconds in this case) is not significantly lower than the time for effective completion of the test (about 20 seconds in this case). An alternate method of estimating the effective initial displacement and thereby the hydraulic conductivity is presented in the subsequent sections.

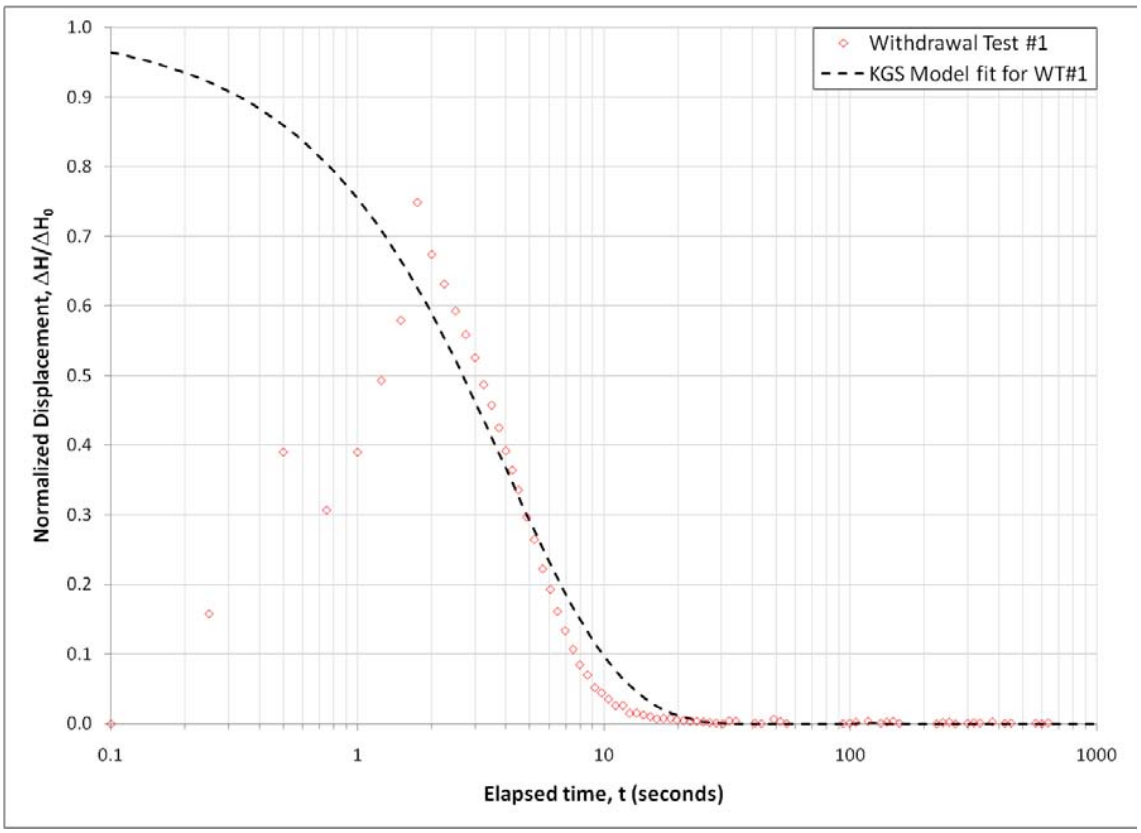

Figure 4-16. KGS Model Fit at 199-F5-46

4.3.6 Correction for 'Non-Instantaneous' Generation of Effective Initial Displacement

A revised starting time of 1.76 seconds is estimated by visually identifying the start of the 'dissipation' portion of the test. This is illustrated in Figure 4-17.

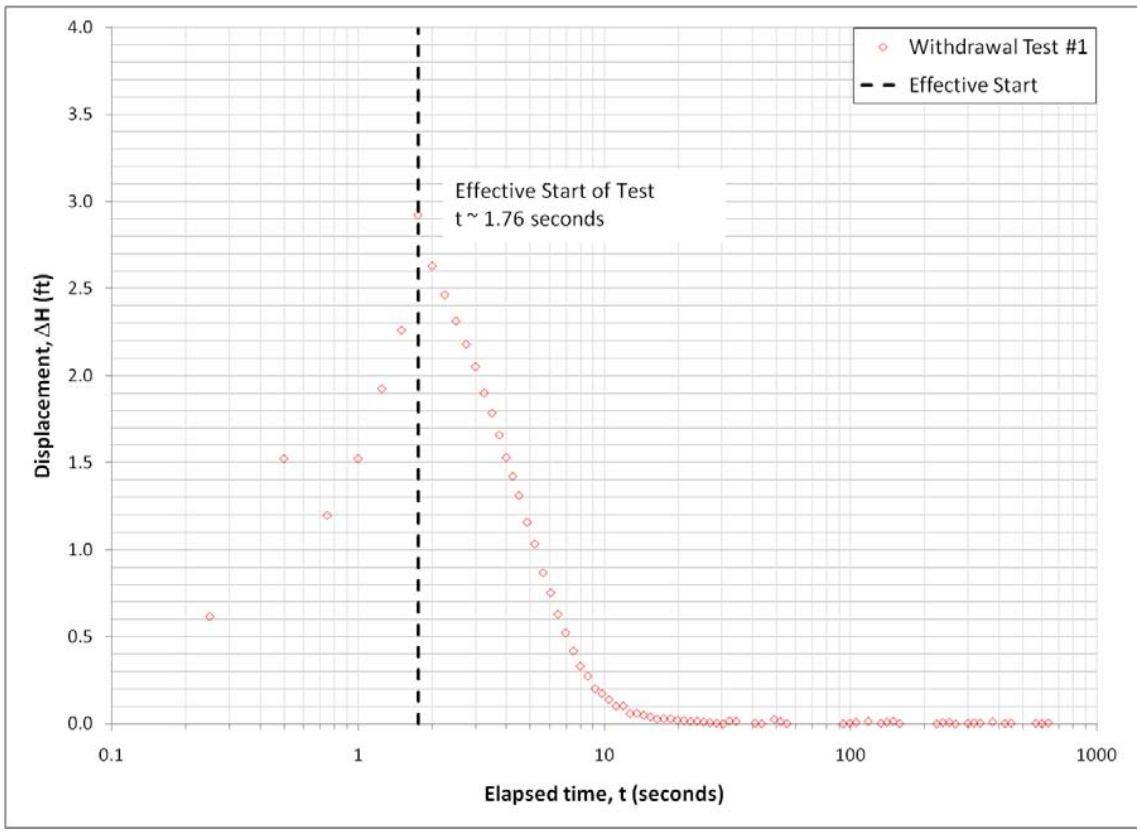

Figure 4-17.Estimation of Effective Starting Time at 199-F5-46

4.3.7 Estimation of Effective Initial Displacement Using Adjusted Elapsed Time

Adjusted elapsed time is calculated by subtracting the effective start time from the elapsed time. The displacements are plotted against the adjusted elapsed times in Figure 4-18. A revised effective initial displacement of 2.85 ft is estimated by back-fitting the observations to 0.0 elapsed time.

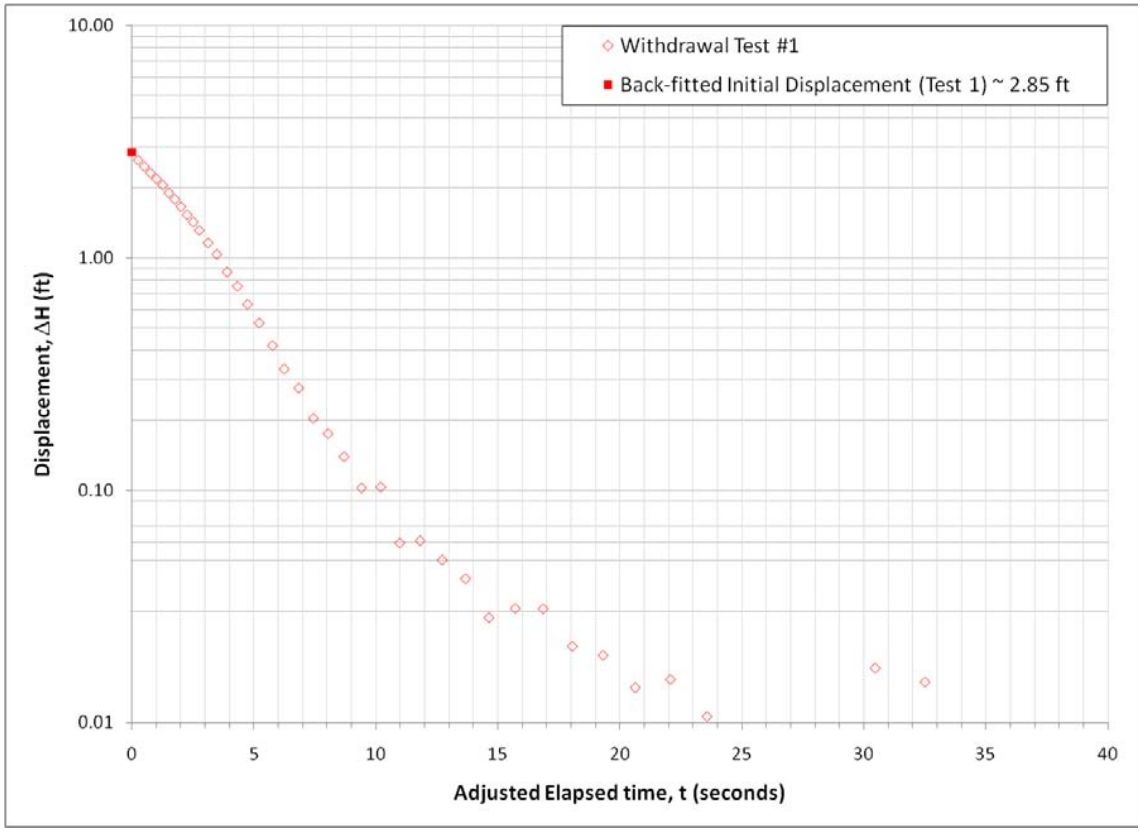

Figure 4-18. Estimation of Revised Effective Initial Displacement at 199-F5-46

4.3.8 Revised Normalized Displacement

The revised normalized displacements are calculated by dividing the displacements with the revised effective initial displacement. These revised normalized displacements are plotted against the adjusted elapsed time in Figure 4-19.

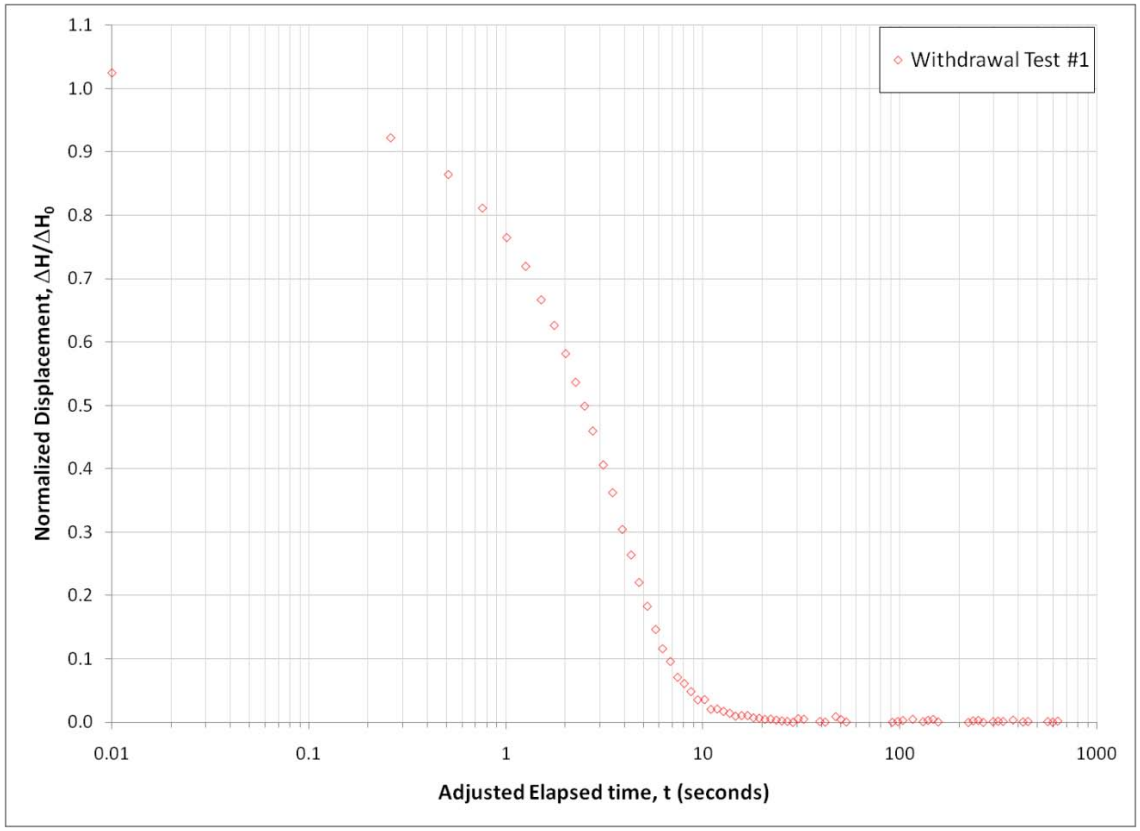

Figure 4-19. Revised Normalized Displacement at 199-F5-46

4.3.9 Revised Analysis

The revised normalized displacements are fit with the KGS model again. A good match to the observations is achieved with a specific storage, S_s, of 3.1×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **48 m/d** or 5.56×10^{-4} **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (10.58 ft ~ 3.2 m). The estimated horizontal hydraulic conductivity value of 48 m/d is not significantly different from the estimate of 40 m/d obtained from the first-cut analysis but the fit to the data is improved. The KGS model fit is shown in Figure 4-20.

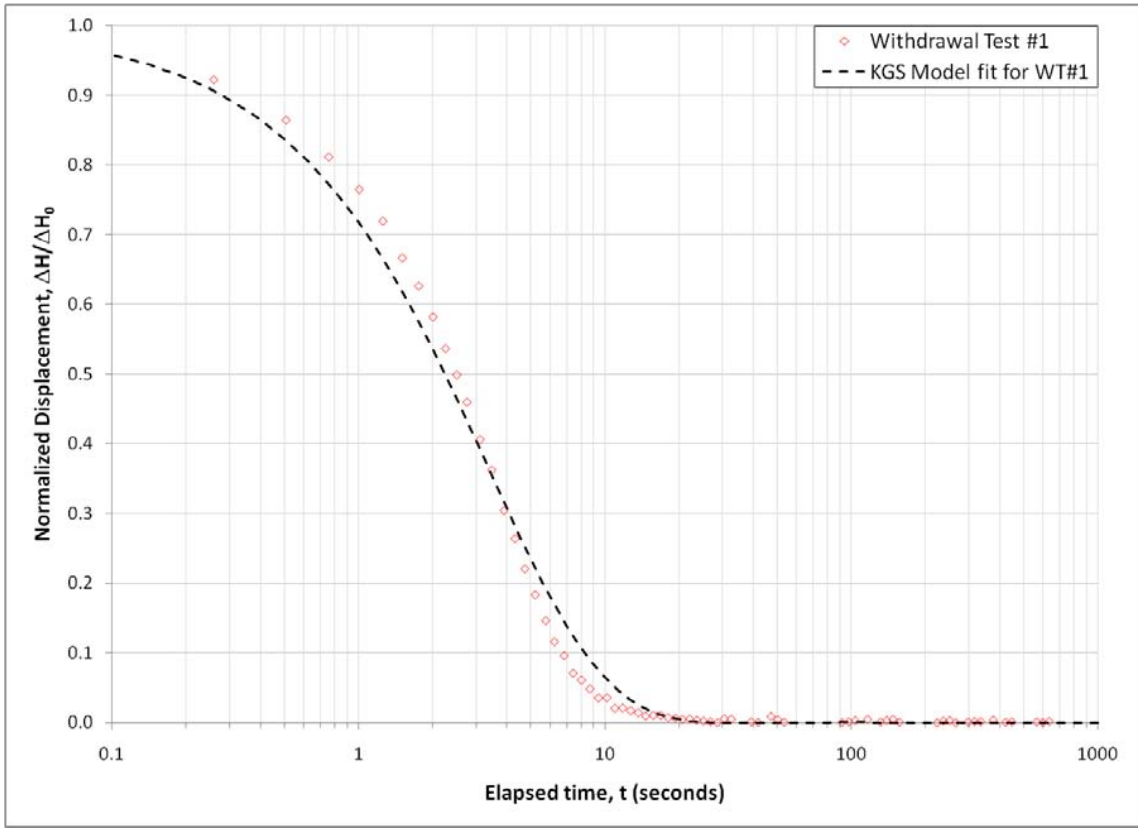

Figure 4-20. Revised KGS Model Fit at 199-F5-46

4.4 Analysis of Slug Test Data at Well 199-F5-44

Two withdrawal tests at 199-F5-44 are analyzed in this section.

4.4.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The two withdrawal tests were conducted with a slug of volume 0.3276 ft^3.The displacements for each test are shown in Figure 4-21. The responses for the two tests are essentially identical. This suggests that the tests are reproducible.

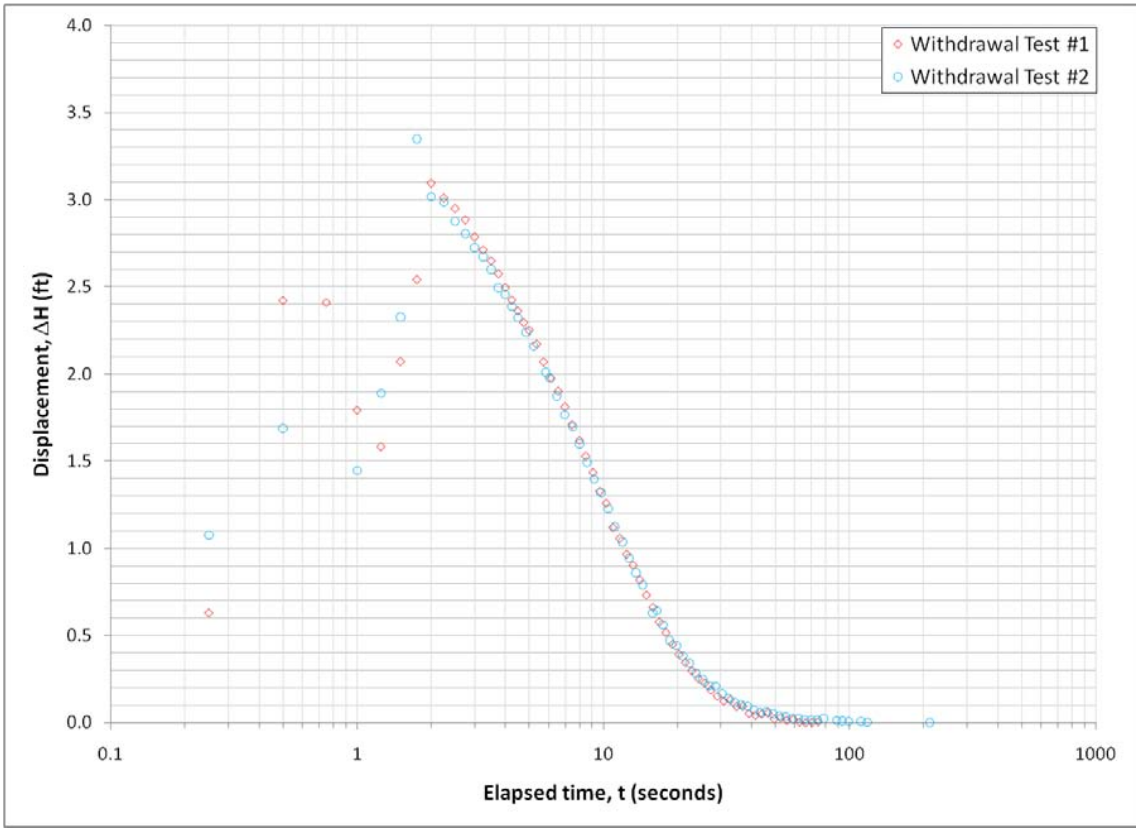

Figure 4-21. Displacements from Two Withdrawal Tests at 199-F5-44

4.4.2 Estimation of Effective Initial Displacement

For a slug volume (V) of 0.3276 ft^3 and a casing radius (r_c) of 2 inches, a theoretical initial displacement (H_0) of 3.75 ft is calculated ($H_0 = V/\pi r_c^2$). An effective initial displacement of 3.8 ft is estimated for both withdrawal tests, by back-fitting the observations to 0.0 elapsed time. The theoretical and effective initial displacements are relatively close, suggesting that the test data are reliable. Figure 4-22 illustrates the estimation of effective initial displacement.

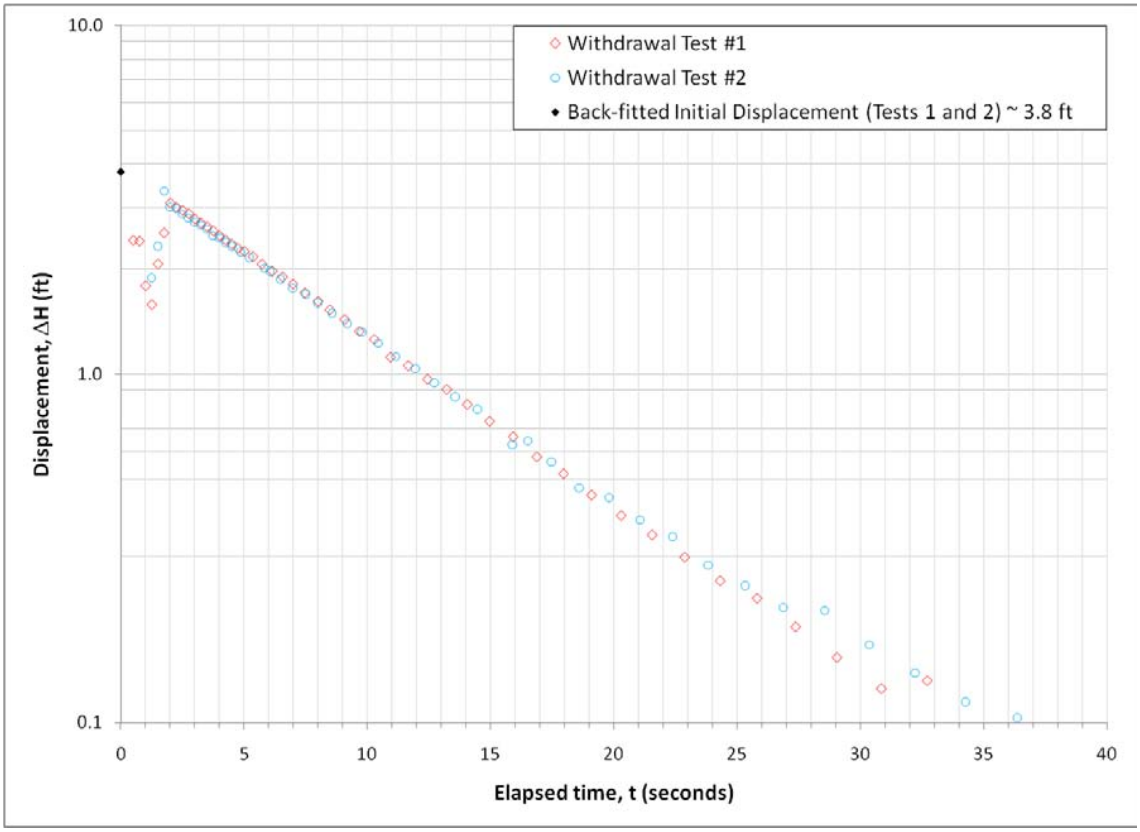

Figure 4-22. Estimation of Effective Initial Displacements at 199-F5-44

4.4.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by the effective initial displacements. As shown in Figure 4-23, the normalized displacements in the first two seconds are noisy. After two seconds, the two tests show very good agreement. The close correspondence of the two normalized displacement curves suggests that it is sufficient to analyze the data from only one of the withdrawal tests. The second withdrawal test is chosen for the analysis. Ideally, the data should approach an asymptotic normalized displacement of 1.0 at the start of the test. This serves as a check on the estimation of the effective initial displacement. However, the lack of good data at the beginning of these tests makes it hard to verify the asymptotic nature of the normalized displacements thereby bringing an element of uncertainty about the effective initial displacement.

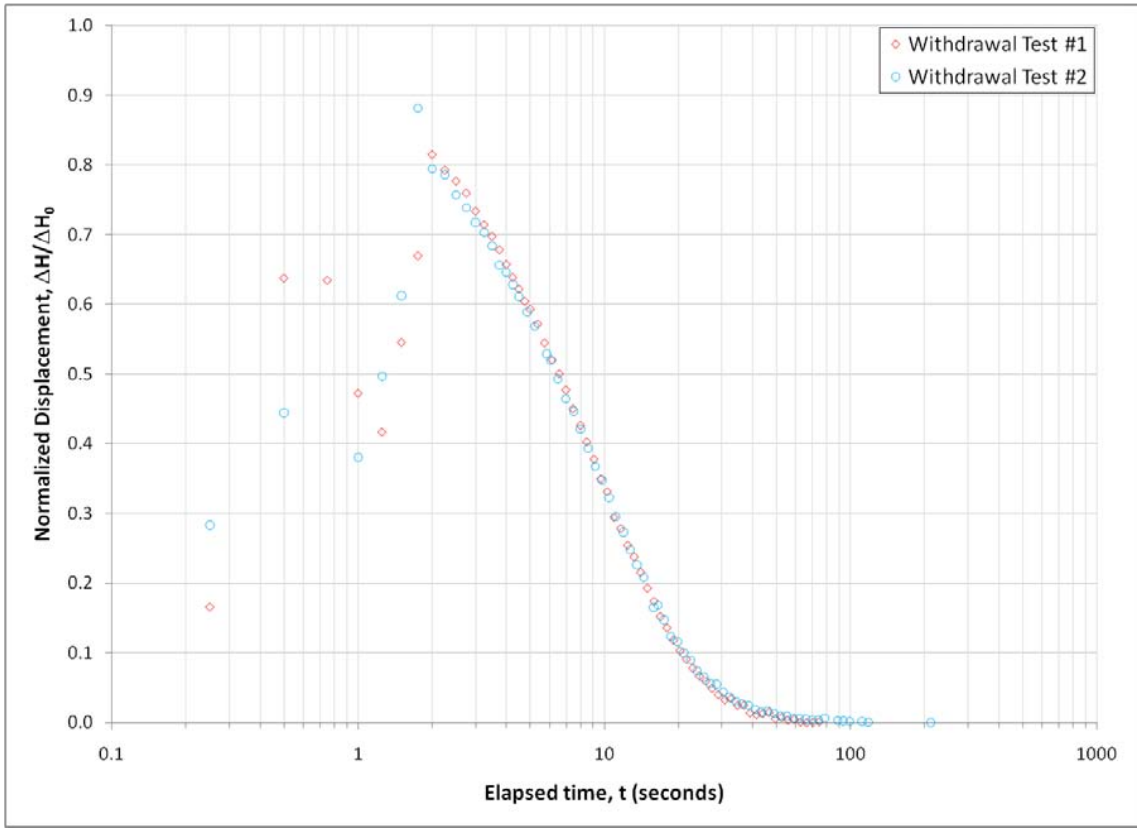

Figure 4-23. Normalized Displacements at 199-F5-44

4.4.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the second withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 68.7 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 13.96 ft (~4.3 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **16 m/d or 1.85×10^{-4} m/s.** The CBP model fit is shown in Figure 4-24.

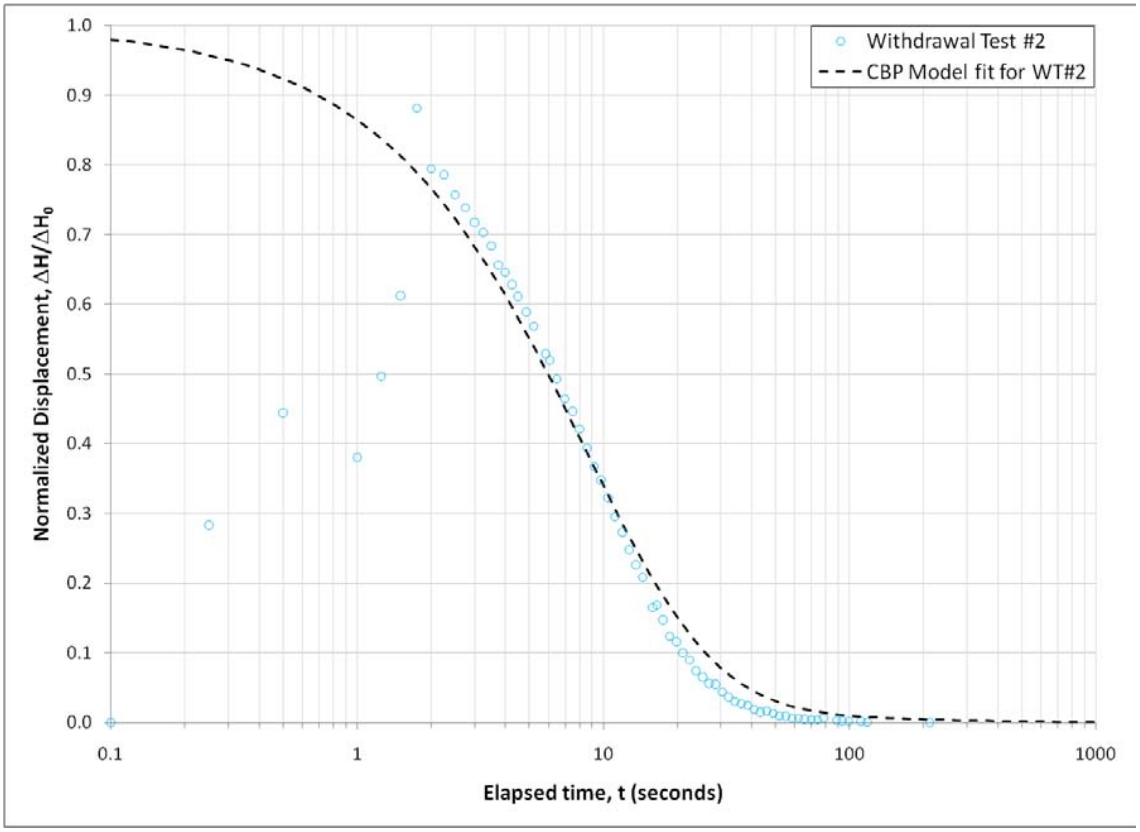

Figure 4-24. CBP Model Fit at 199-F5-44

4.4.5 Refined Analysis

For a more refined analysis, the normalized displacements for the second withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.4×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **13 m/d** or 1.5×10^{-4} **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (13.96 ft ~ 4.3 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-25.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

From past experience with similar tests in conductive (~ 10^{-3} m/s) formations, it is hypothesized that these tests may be 'gradual'. In a 'gradual' test, the time required for the generation of effective initial displacement (about 2 seconds in this case) is not significantly lower than the time for effective

completion of the test (about 100 seconds in this case). An alternate method of estimating the effective initial displacement and thereby the hydraulic conductivity is presented in the subsequent sections.

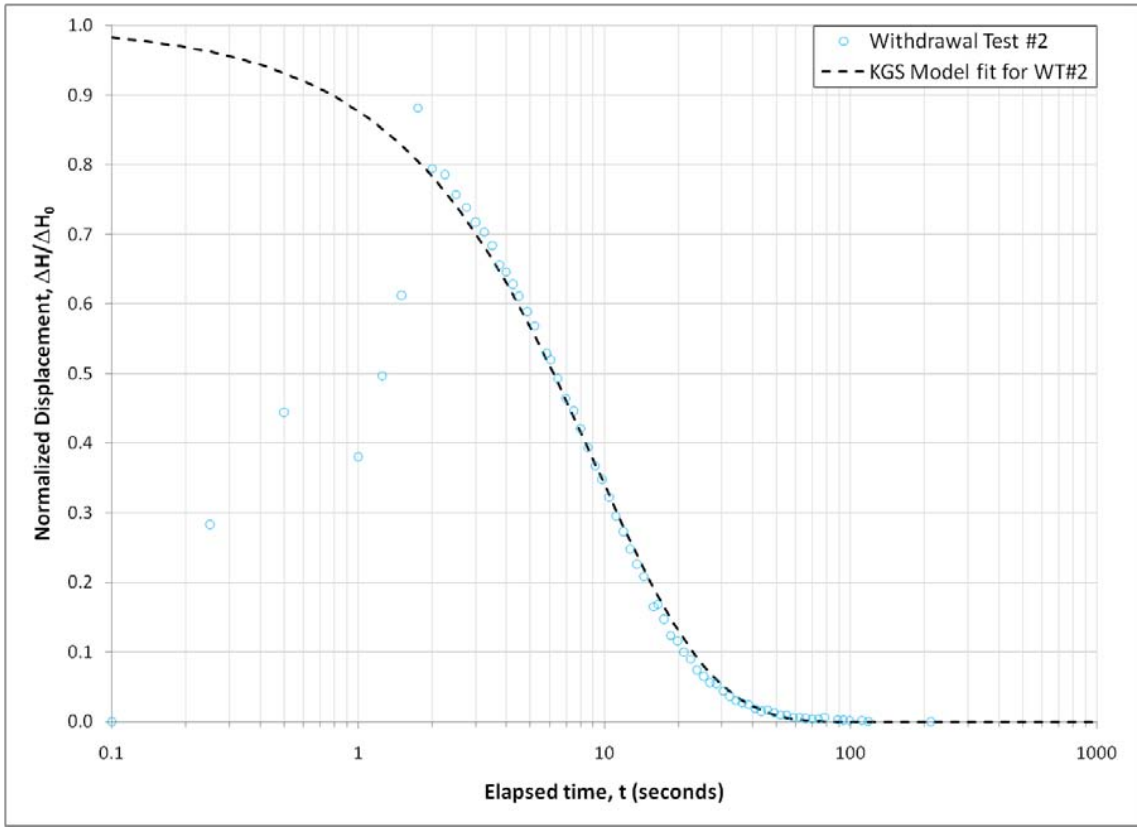

Figure 4-25. KGS Model Fit at 199-F5-44

4.4.6 Correction for 'Non-Instantaneous' Generation of Effective Initial Displacement

A revised starting time of 1.95 seconds is estimated by visually identifying the start of the 'dissipation' portion of the test. This is illustrated in Figure 4-26.

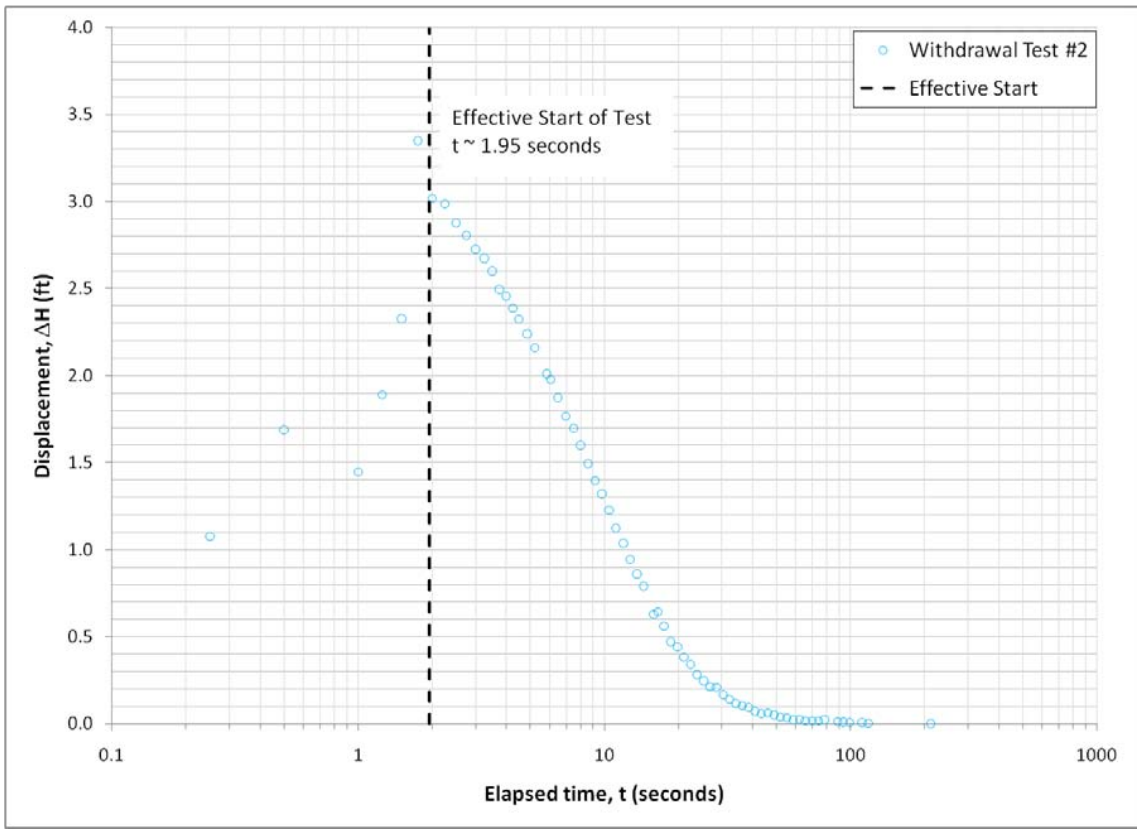

Figure 4-26.Estimation of Effective Starting Time at 199-F5-44

4.4.7 Estimation of Effective Initial Displacement Using Adjusted Elapsed Time

Adjusted elapsed time is calculated by subtracting the effective start time from the elapsed time. The displacements are plotted against the adjusted elapsed times in Figure 4-27. A revised effective initial displacement of 3.15 ft is estimated by back-fitting the observations to 0.0 elapsed time.

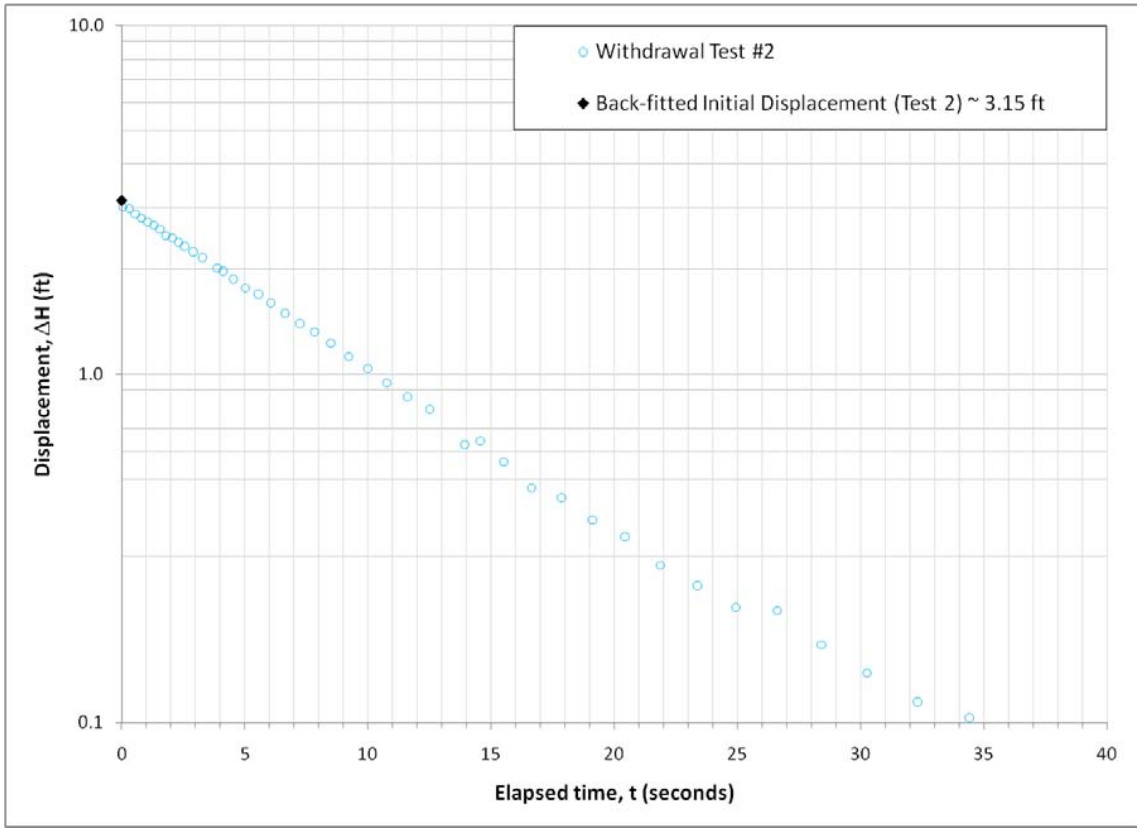

Figure 4-27. Estimation of Revised Effective Initial Displacement at 199-F5-44

4.4.8 Revised Normalized Displacement

The revised normalized displacements are calculated by dividing the displacements with the revised effective initial displacement. These revised normalized displacements are plotted against the adjusted elapsed time in Figure 4-28.

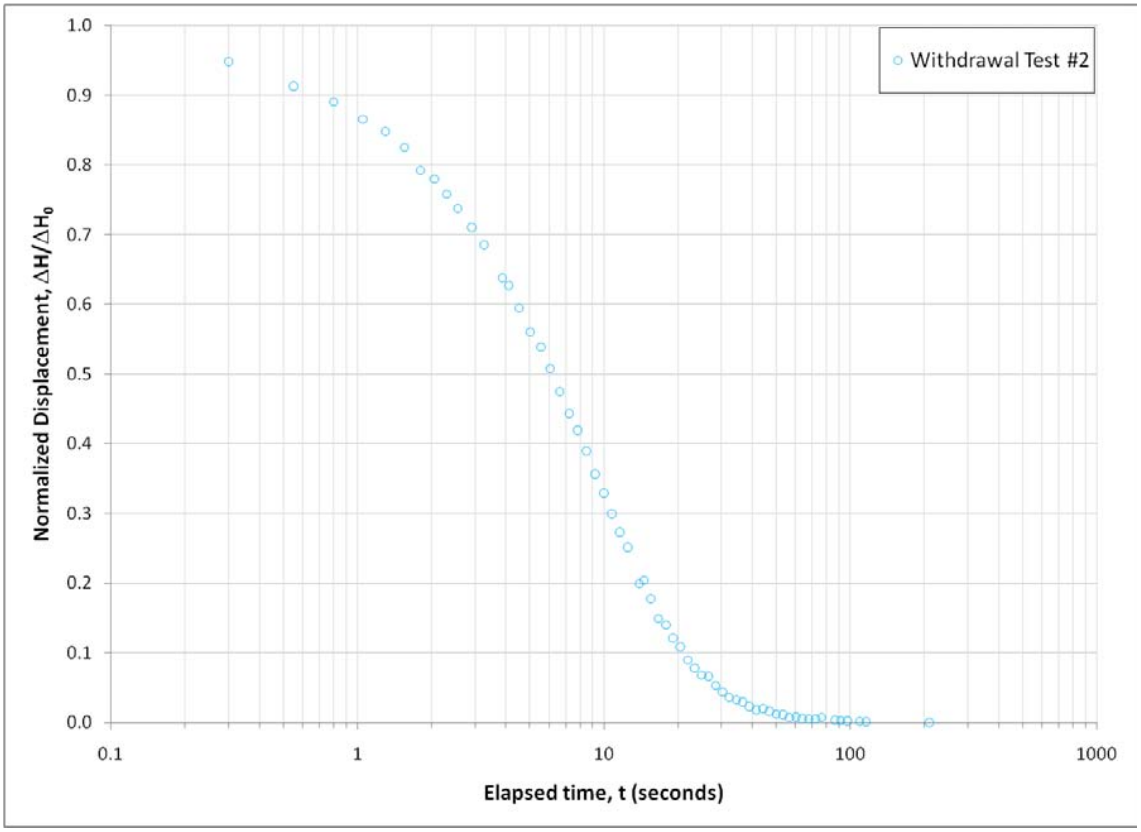

Figure 4-28. Revised Normalized Displacement at 199-F5-44

4.4.9 Revised Analysis

The revised normalized displacements are fit with the KGS model again. A good match to the observations is achieved with a specific storage, S_s, of 2.3×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **14 m/d** or $1.62\times\mathbf{10^{-4}}$ **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (13.96 ft ~ 4.3 m). The estimated horizontal hydraulic conductivity value of 14 m/d is not significantly different from the estimate of 13 m/d obtained from the first-cut analysis but the fit to the data is improved. The KGS model fit is shown in Figure 4-29.

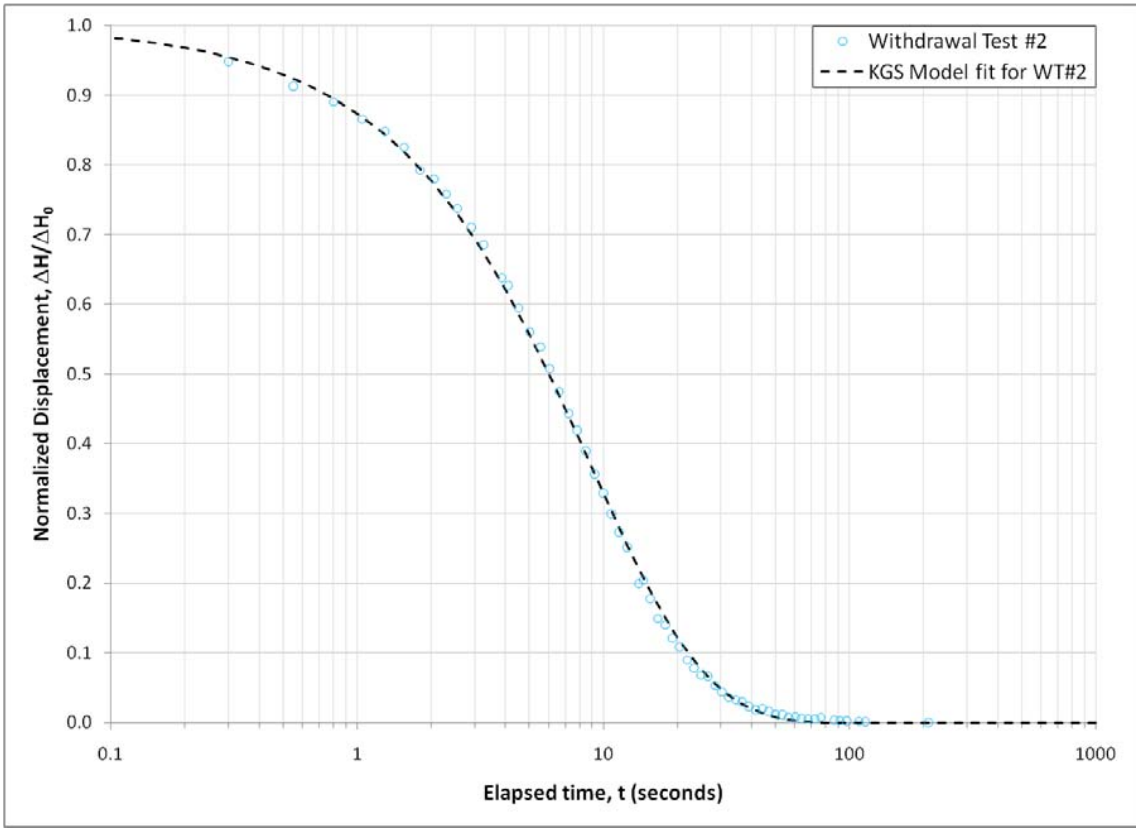

Figure 4-29. Revised KGS Model Fit at 199-F5-44

4.5 Analysis of Slug Test Data at Well 199-F5-43B

Three withdrawal tests at 199-F5-43B are analyzed in this section.

4.5.1 Raw Displacement Data for Withdrawal Tests #1, #2 and #3

The three tests were conducted with a slug of volume 0.3276 ft^3. The displacements for each test are shown in Figure 4-30. The responses for the second and third tests are essentially identical. After 100 seconds, even the first test is almost identical to the others. This suggests that the tests are reproducible.

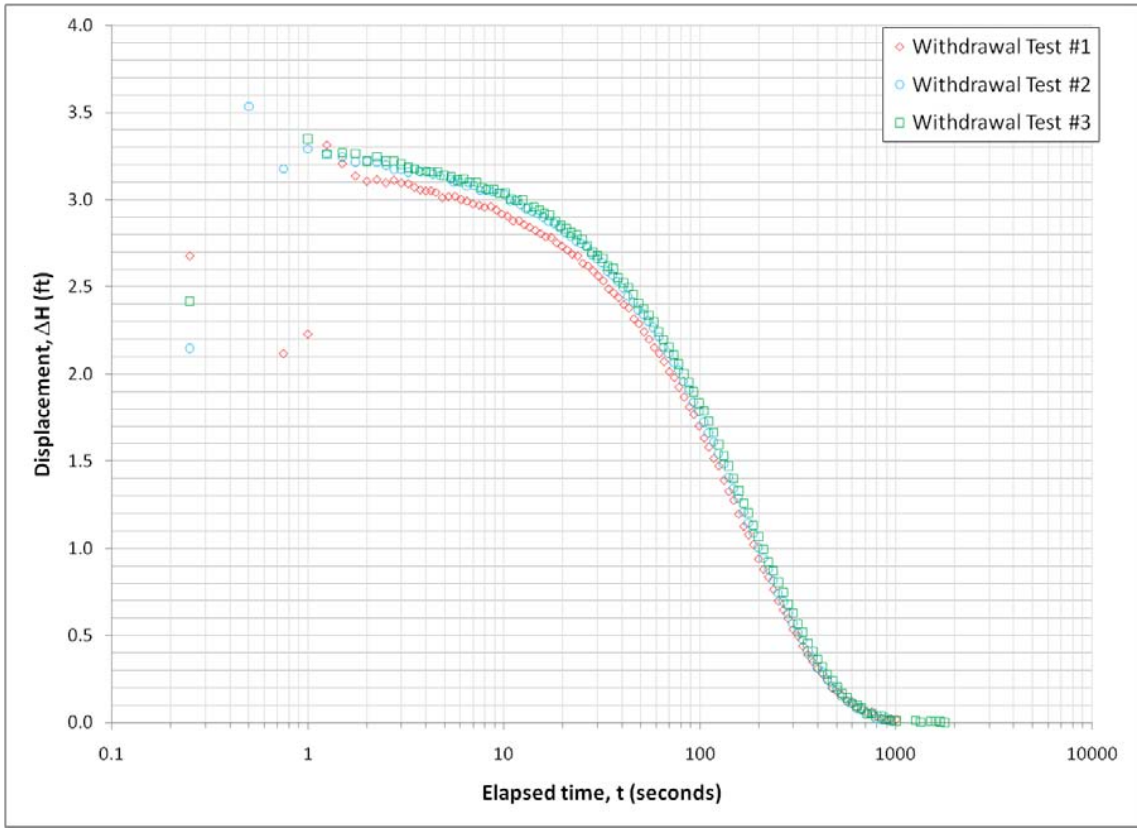

Figure 4-30. Displacements from Three Withdrawal Tests at 199-F5-43B

4.5.2 Estimation of Effective Initial Displacement

For a slug volume (V) of 0.3276 ft^3 and a casing radius (r_c) of 2 inches, a theoretical initial displacement (H_0) of 3.75 ft is calculated ($H_0 = V/\pi r_c^2$). An effective initial displacement of 3.2 ft is estimated for the first withdrawal test, by back-fitting the observations to 0.0 elapsed time. Similarly, an effective initial displacement of 3.32 ft is estimated for the second and third withdrawal tests. The theoretical and effective initial displacements are relatively close, suggesting that the test data are reliable. Figure 4-31 illustrates the estimation of effective initial displacement.

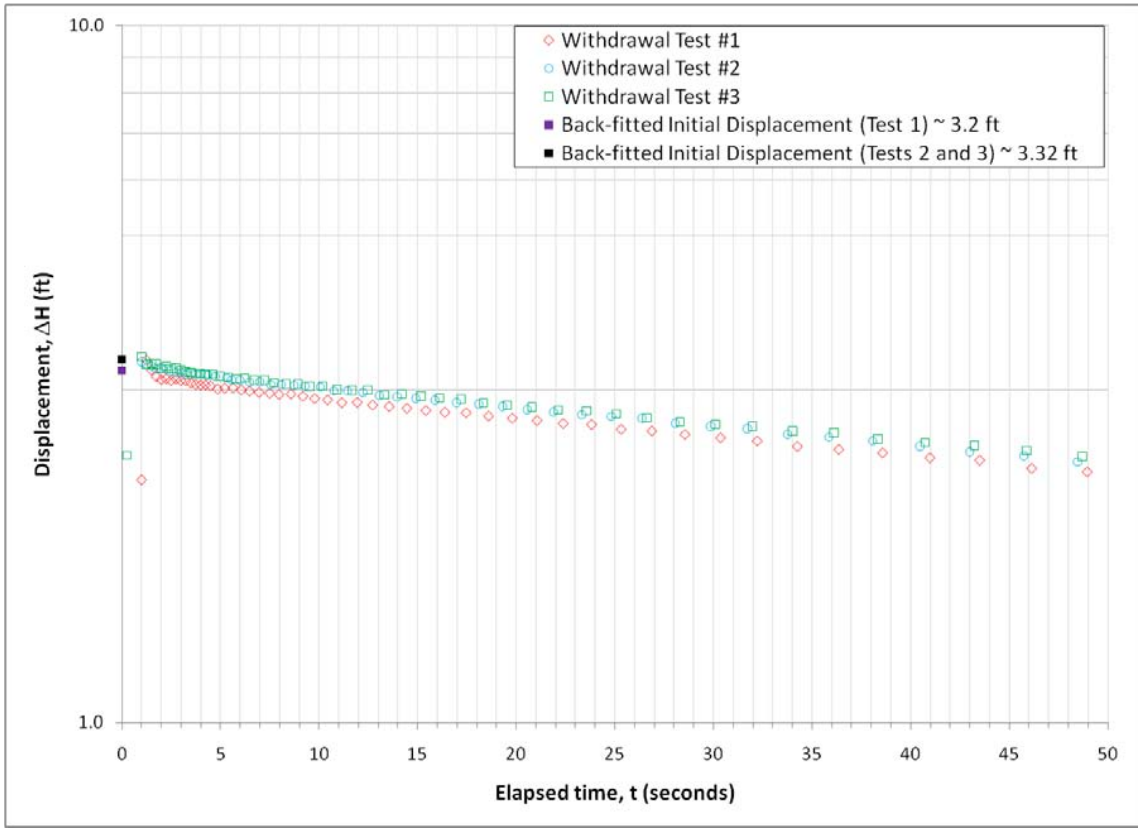

Figure 4-31. Estimation of Effective Initial Displacements at 199-F5-43B

4.5.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for the withdrawal tests by their respective effective initial displacement. As shown in Figure 4-32, the normalized displacements from the three tests agree with each other. This suggests that the tests are reproducible and that it is necessary to analyze only one of the tests. The third withdrawal test is chosen because it has the longest data record. Additionally, the data approach an asymptotic normalized displacement of 1.0 at the start of the test. This serves as a check on the estimation of the effective initial displacement.

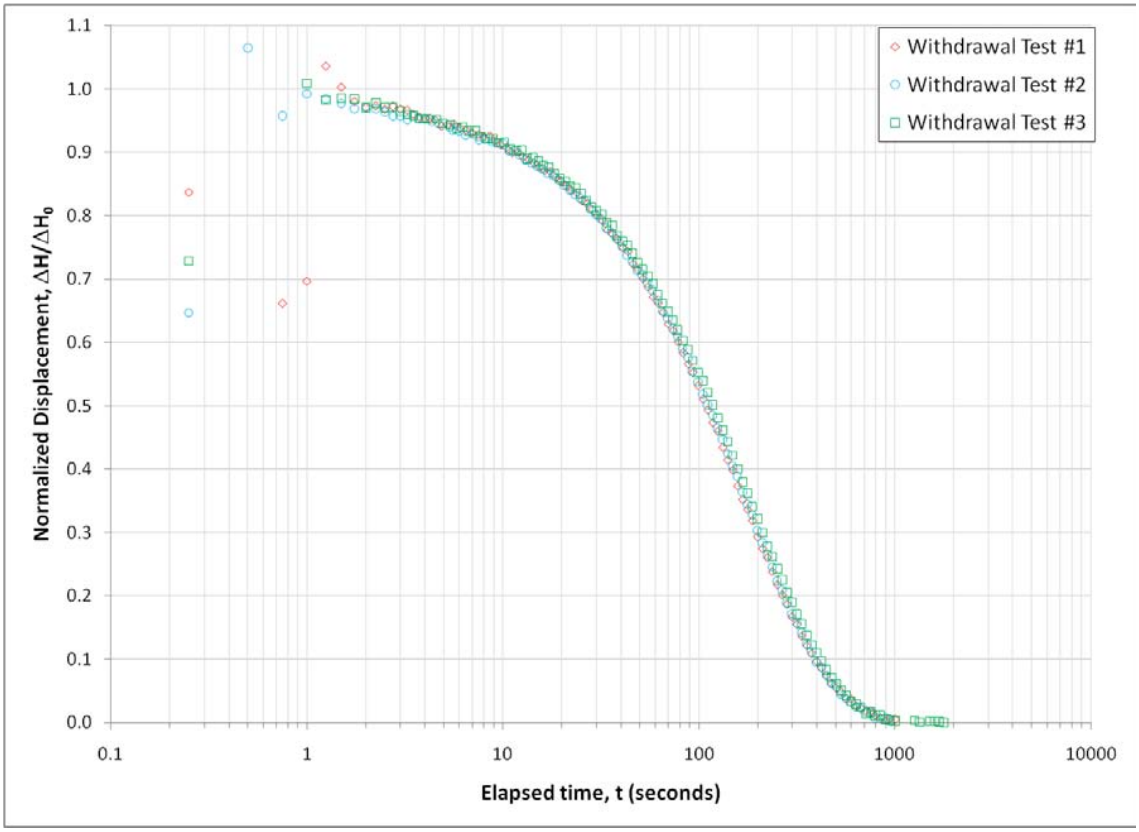

Figure 4-32. Normalized Displacements at 199-F5-43B.

4.5.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the third withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-4}, and a fitted transmissivity, *T*, of 2.7 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 10 ft (~3 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **0.9 m/d or 1.04×10^{-5} m/s.** The CBP model fit is shown in Figure 4-33.

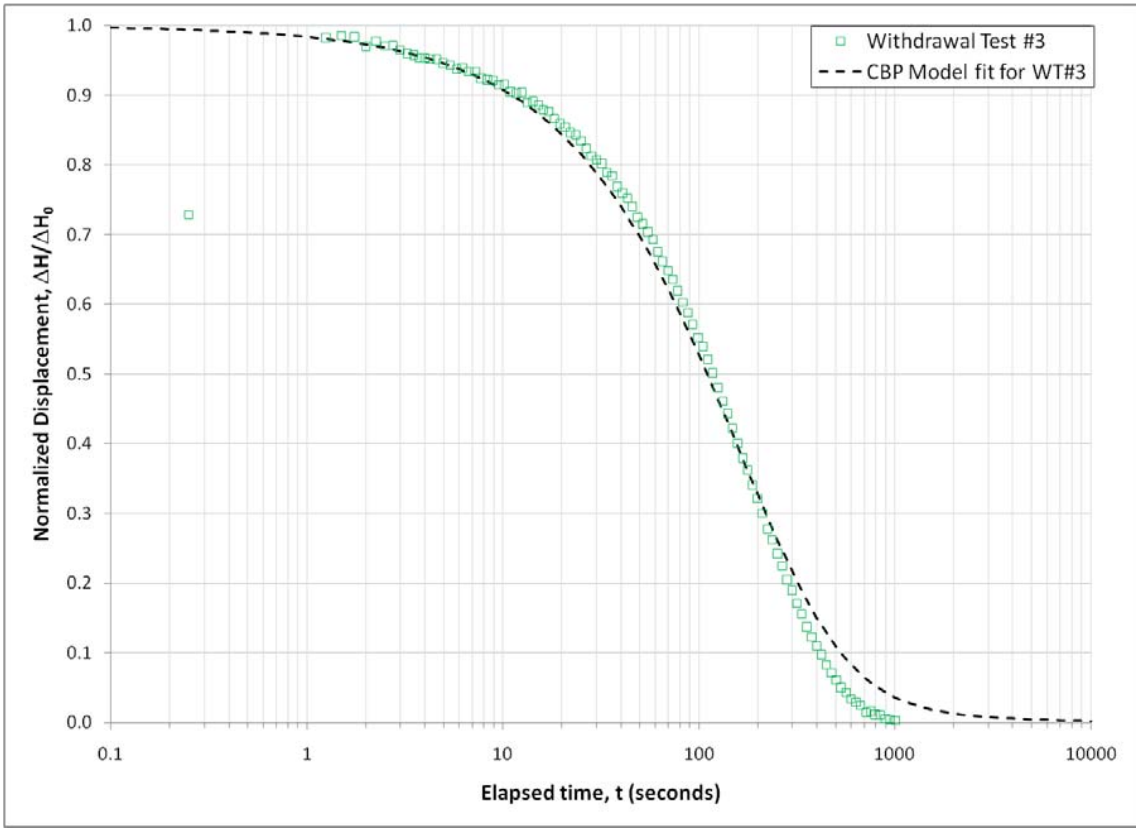

Figure 4-33. CBP Model Fit at 199-F5-43B

4.5.5 Refined Analysis

For a more refined analysis, the normalized displacements for the third withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 3.3×10^{-5} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **0.8 m/d** or $9.26\times\mathbf{10^{-6}}$ **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-4}) with the well screen length (10 ft ~ 3 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-34.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and medium sand. This is not representative of the well screen location in the RUM which is mostly composed of clay and silt. When AQTESOLV was used to test a specific storage value which was an order of magnitude higher, the resulting fit was much poorer in comparison.

The estimated hydraulic conductivity is in the middle of the range for silty sand and at the higher end of the range for silty loess reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the RUM being composed of clay, silt and silty fine grained sand.

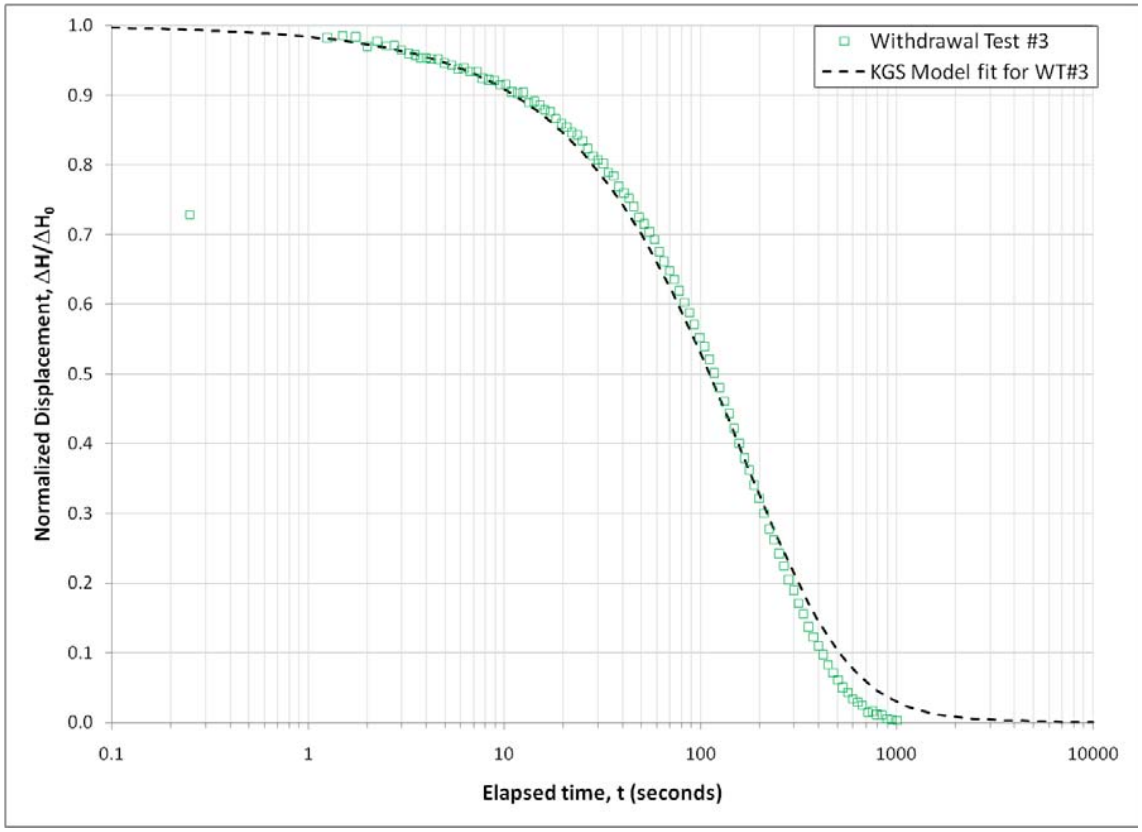

Figure 4-34. KGS Model Fit at 199-F5-43B

4.6 Analysis of Slug Test Data at Well 199-F5-43A

Three withdrawal tests at 199-F5-43A are analyzed in this section.

4.6.1 Raw Displacement Data for Withdrawal Tests #1, #2 and #3

The three withdrawal tests were conducted with a slug of volume 0.3276 ft^3.The displacements for each test are shown in Figure 4-35. The responses for the three tests are slightly different from each other. To analyze the reproducibility of the tests, we will have to look at normalized displacements.

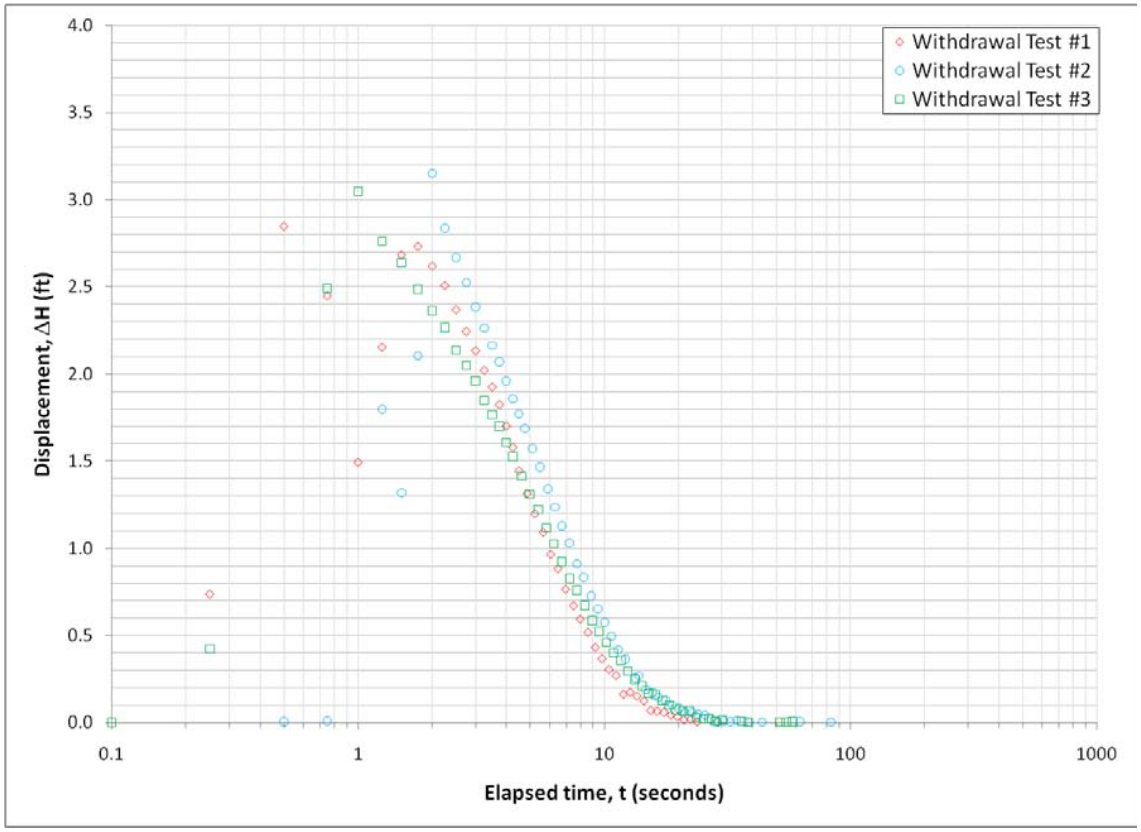

Figure 4-35. Displacements from Three Withdrawal Tests at 199-F5-43A

4.6.2 Estimation of Effective Initial Displacement

For the three tests, a theoretical initial displacement of 3.75 ft is calculated for a slug volume of 0.3276 ft^3 and a casing radius of 2 inches. An effective initial displacement of 3.8 ft is estimated for the first test, by back-fitting the observations to 0.0 elapsed time. Using the same approach, effective initial displacements of 4.3 ft and 3.6 ft are estimated for the second and third tests. The theoretical and effective initial displacements for the first and third tests are close, suggesting that the test data are reliable. For the second test, the effective initial displacement is higher than expected. The normalized displacements need to be inspected to verify the reliability of this test.

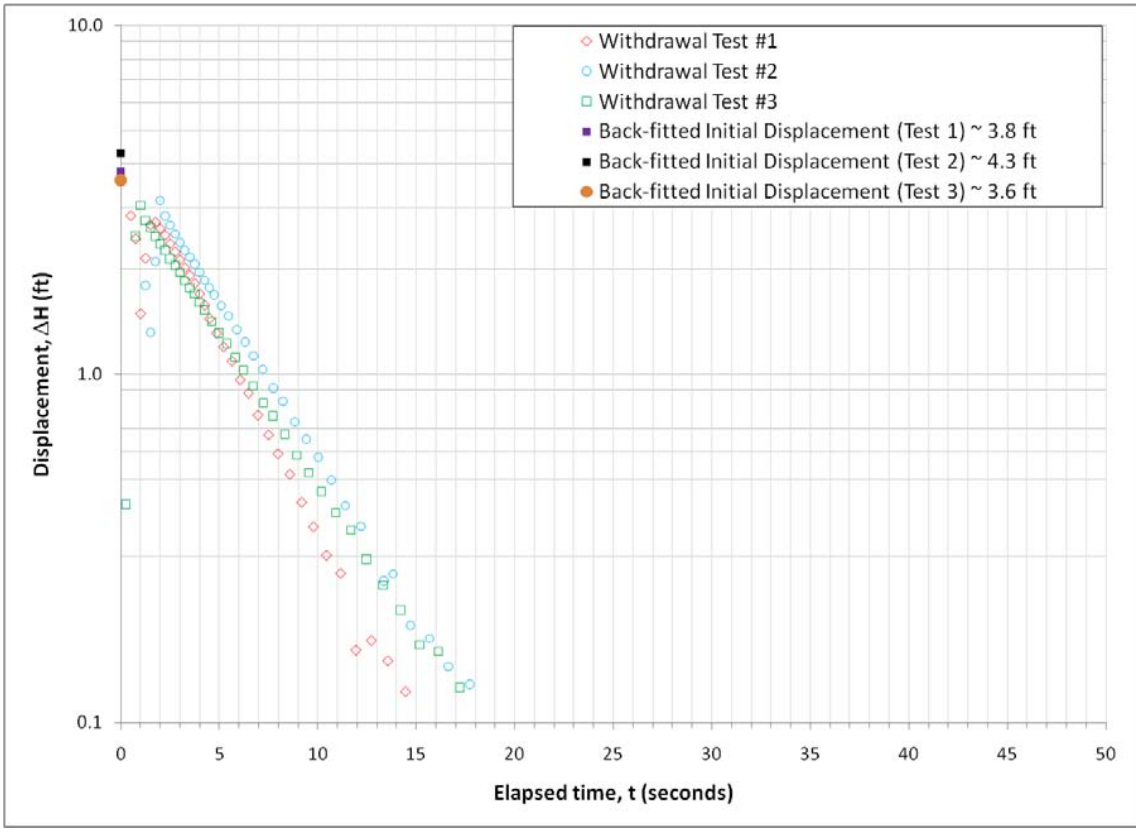

Figure 4-36. Estimation of Effective Initial Displacements at 199-F5-43A

4.6.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by the respective effective initial displacement and shown in Figure 4-37. If the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. In this case however, that assessment cannot be made because of the noisy data in the first seconds of the test. The close correspondence of the three normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The third withdrawal test is chosen for analysis.

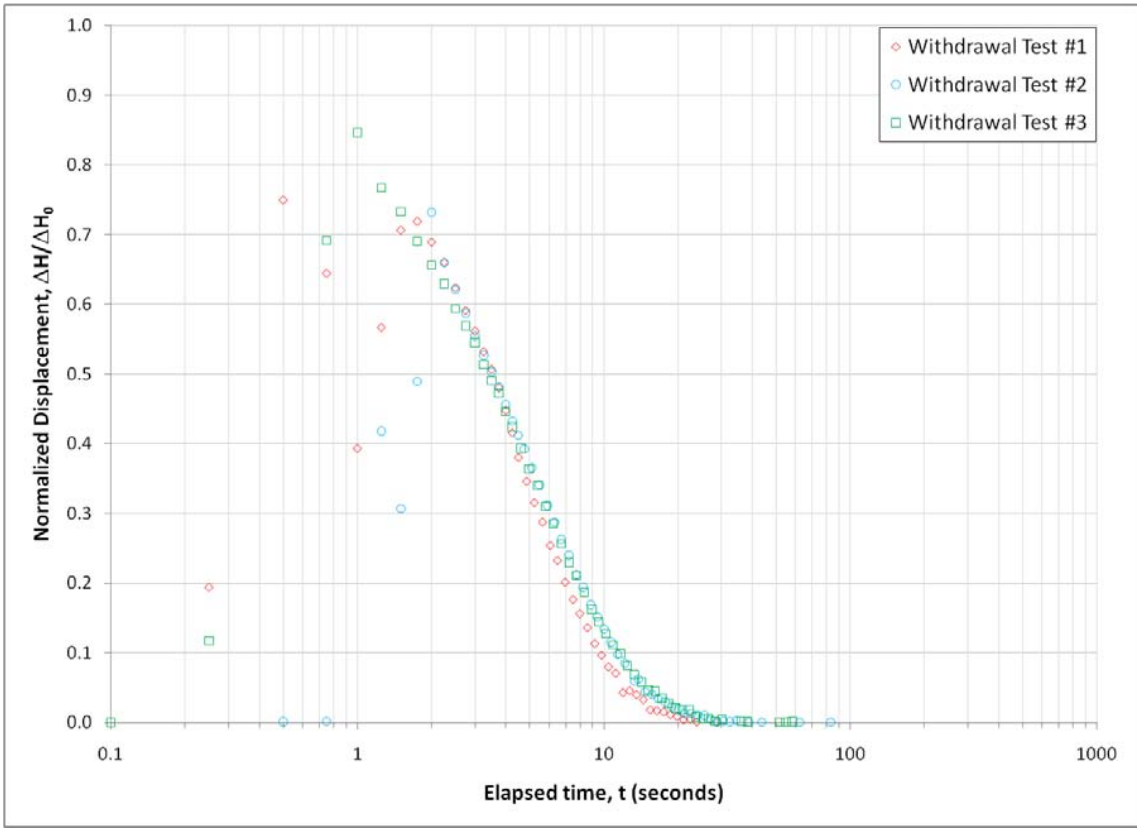

Figure 4-37. Normalized Displacements at 199-F5-43A

4.6.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the third withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 129.6 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 13.54 ft (~4.1 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **31 m/d or 3.59×10^{-4} m/s.** The CBP model fit is shown in Figure 4-38.

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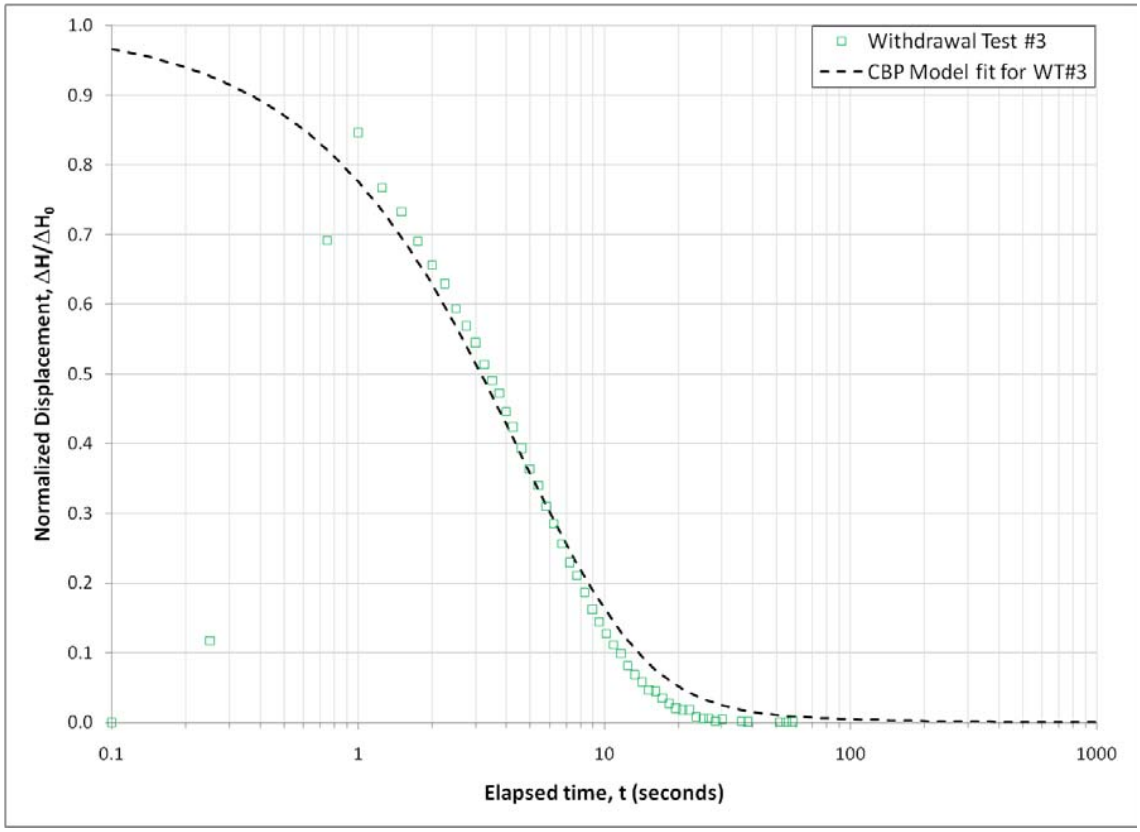

Figure 4-38. CBP Model Fit at 199-F5-43A

4.6.5 Refined Analysis

For a more refined analysis, the normalized displacements for the third withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.4×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **26 m/d** or **3.01×10^{-4} m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the submerged well screen length (13.54 ft ~ 4.1 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-39.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

From past experience with similar tests in conductive (~ 10^{-3} m/s) formations, it is hypothesized that these tests may be 'gradual'. In a 'gradual' test, the time required for the generation of effective initial displacement (about 1 second in this case) is not significantly lower than the time for effective completion

of the test (about 60 seconds in this case). An alternate method of estimating the effective initial displacement and thereby the hydraulic conductivity is presented in the subsequent sections.

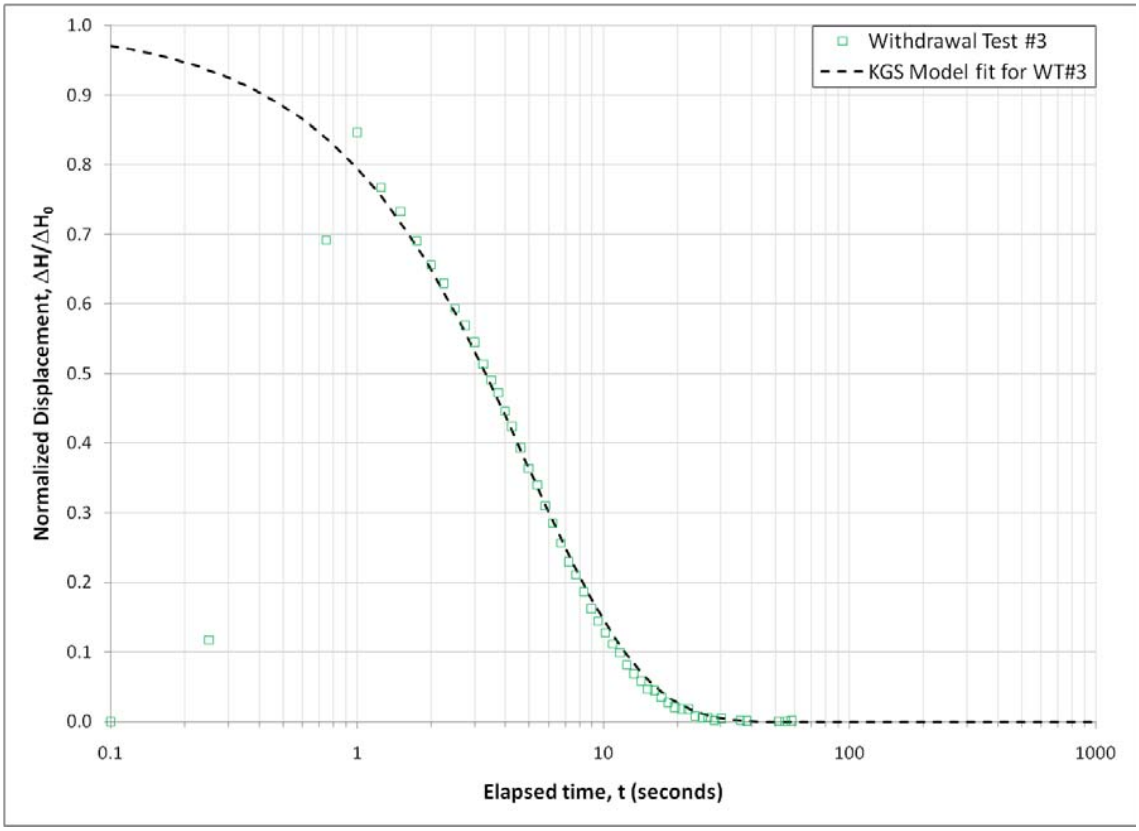

Figure 4-39. KGS Model Fit at 199-F5-43A

4.6.6 Correction for 'Non-Instantaneous' Generation of Effective Initial Displacement

A revised starting time of 1 second is estimated by visually identifying the start of the 'dissipation' portion of the test. This is illustrated in Figure 4-40.

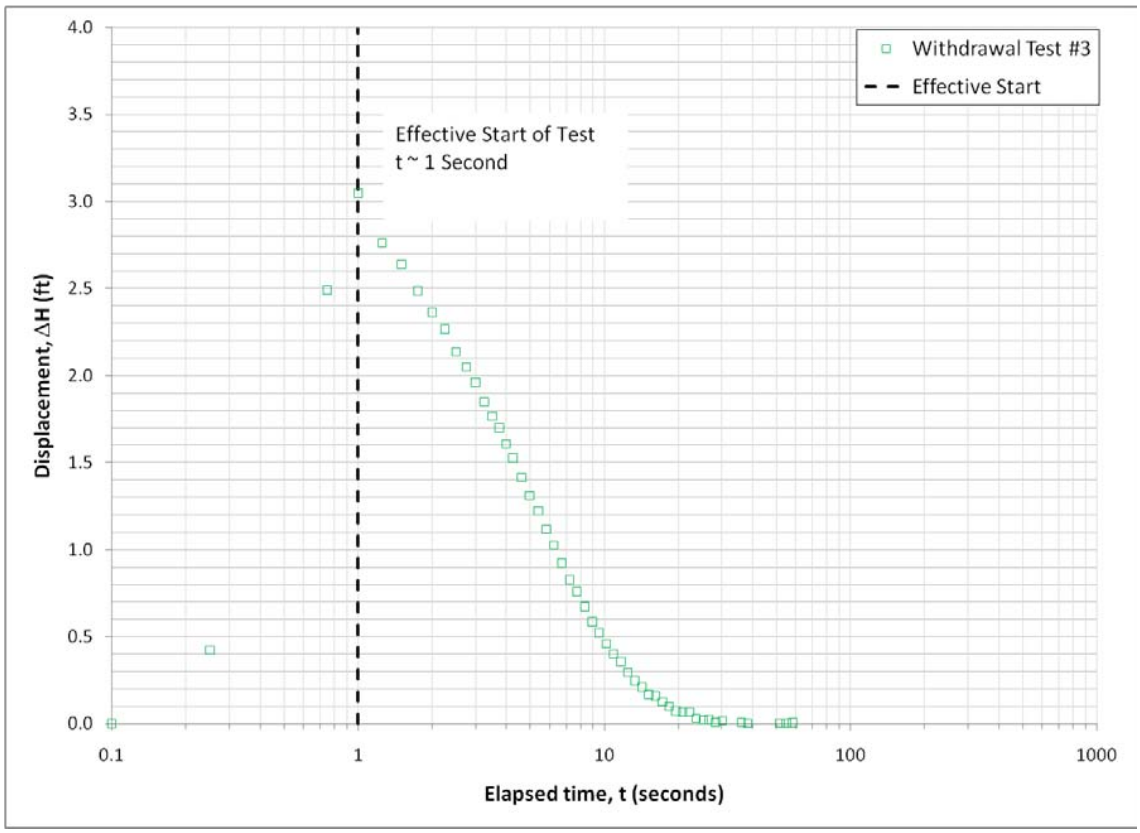

Figure 4-40.Estimation of Effective Starting Time at 199-F5-43A

4.6.7 Estimation of Effective Initial Displacement Using Adjusted Elapsed Time

Adjusted elapsed time is calculated by subtracting the effective start time from the elapsed time. The displacements are plotted against the adjusted elapsed times in Figure 4-41. A revised effective initial displacement of 2.95 ft is estimated by back-fitting the observations to 0.0 elapsed time.

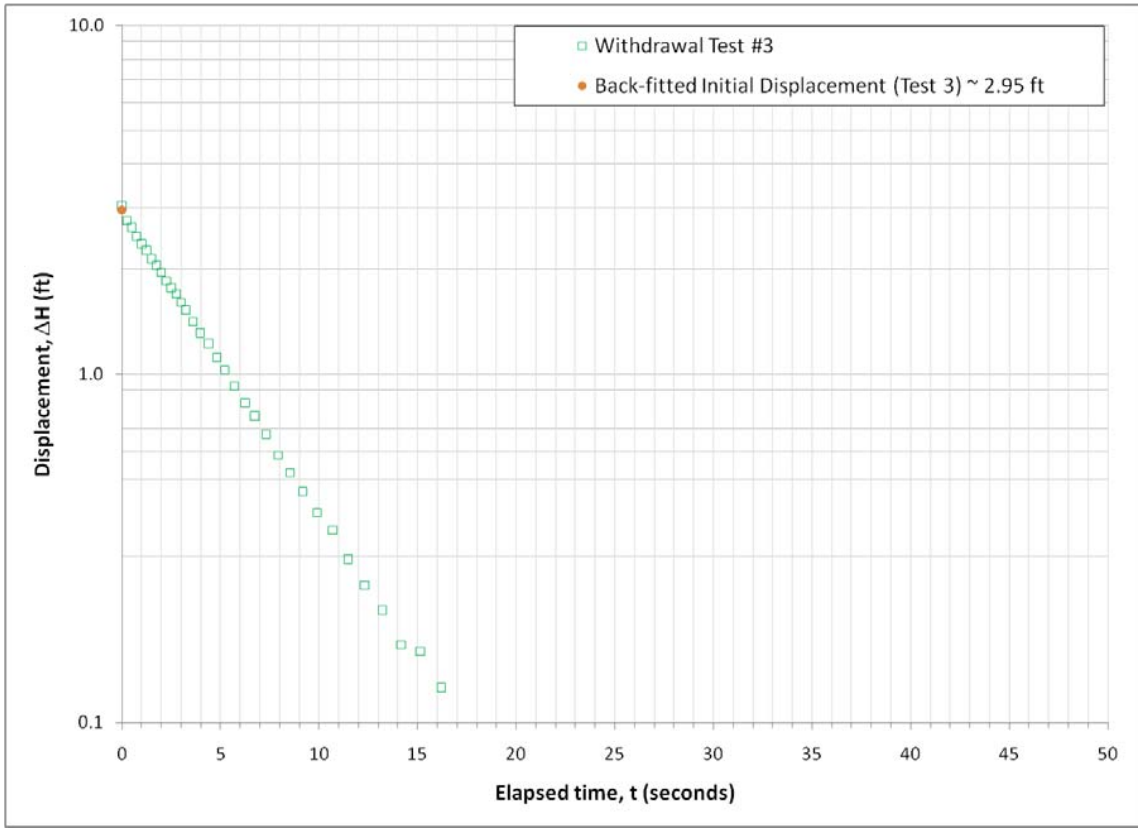

Figure 4-41. Estimation of Revised Effective Initial Displacement at 199-F5-43A

4.6.8 Revised Normalized Displacement

The revised normalized displacements are calculated by dividing the displacements with the revised effective initial displacement. These revised normalized displacements are plotted against the adjusted elapsed time in Figure 4-42.

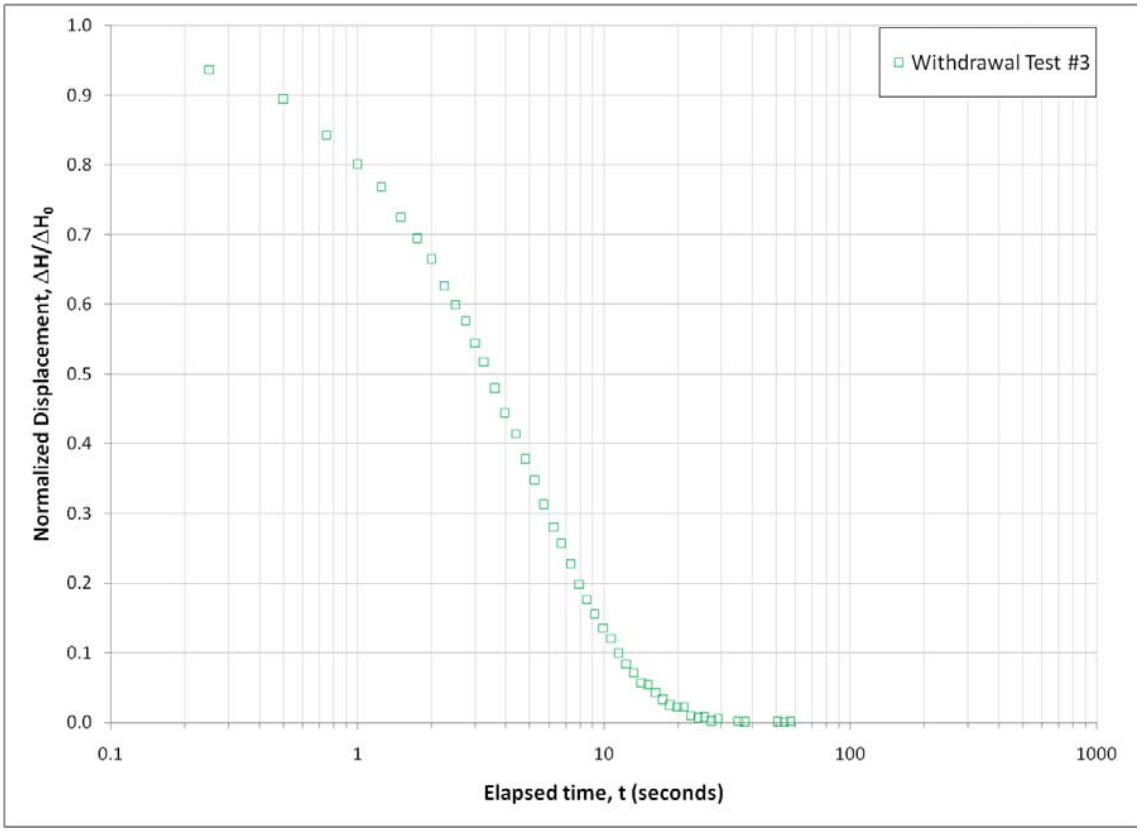

Figure 4-42. Revised Normalized Displacement at 199-F5-43A

4.6.9 Revised Analysis

The revised normalized displacements are fit with the KGS model again. A good match to the observations is achieved with a specific storage, S_s, of 2.4×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **26 m/d** or $3.0\times\mathbf{10^{-4}}$ **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (13.54 ft ~ 4.1 m). The estimated horizontal hydraulic conductivity value of 26 m/d is identical to the estimate of 26 m/d obtained from the first-cut analysis but the fit to the data is improved. The KGS model fit is shown in Figure 4-43.

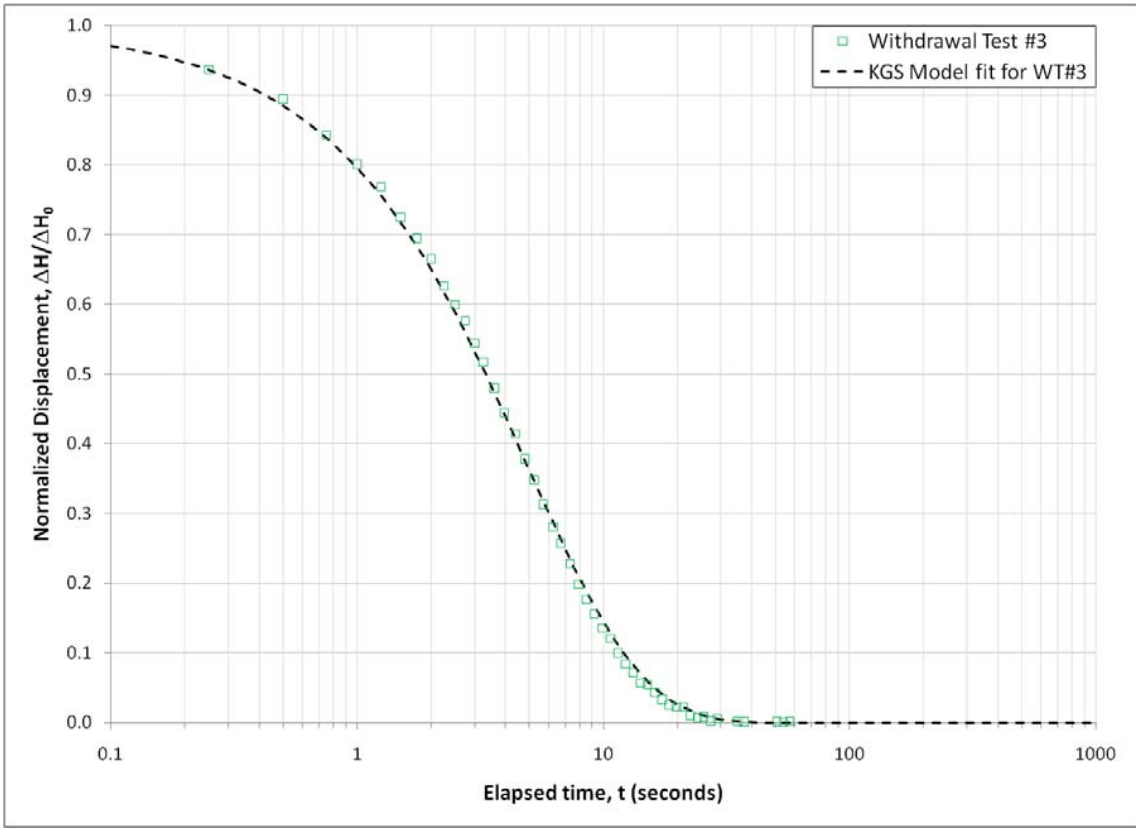

Figure 4-43. Revised KGS Model Fit at 199-F5-43A

4.7 Analysis of Slug Test Data at Well 199-F5-42

Two withdrawal tests at 199-F5-42 are analyzed in this section.

4.7.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The two withdrawal tests were conducted with a slug of volume 0.3276 ft^3.The displacements for each test are shown in Figure 4-44. The responses for the two tests are very close to each other suggesting that the tests are reproducible.

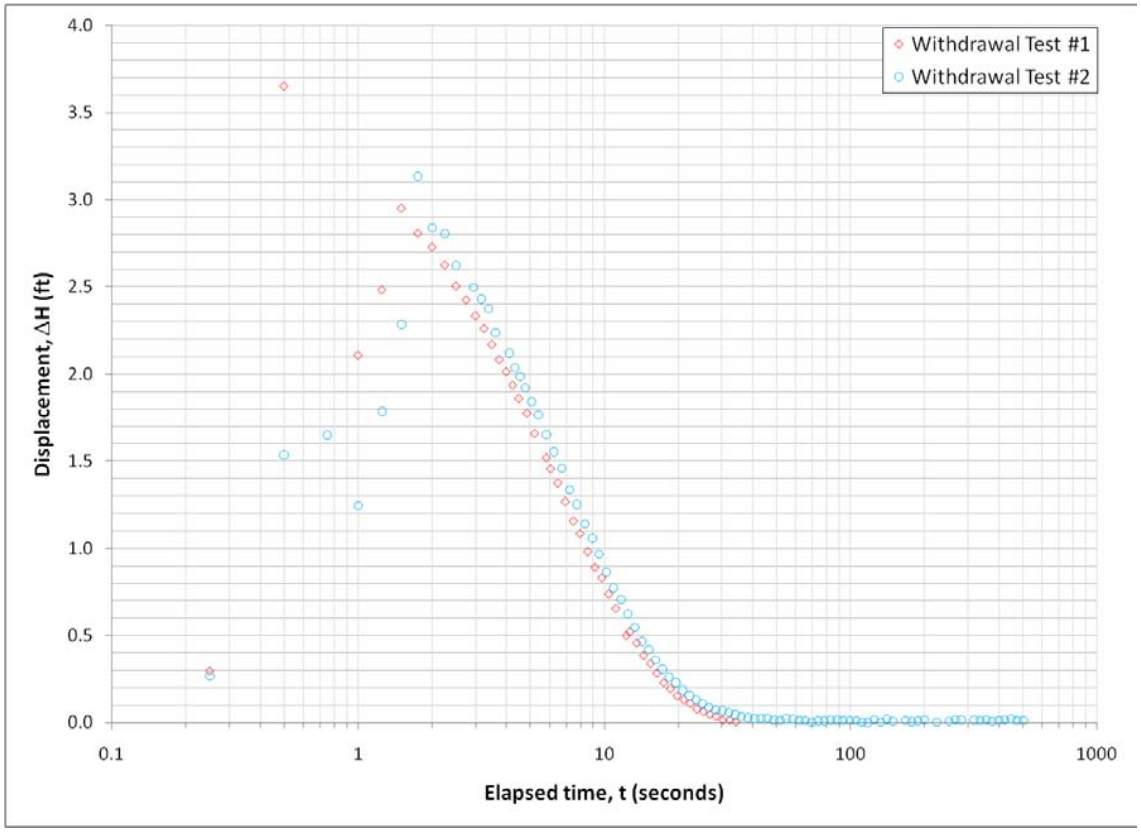

Figure 4-44. Displacements from Two Withdrawal Tests at 199-F5-42

4.7.2 Estimation of Effective Initial Displacement

For the two tests, a theoretical initial displacement of 3.75 ft is calculated for a slug volume of 0.3276 ft^3 and a casing radius of 2 inches. An effective initial displacement of 3.7 ft is estimated for the first test, by back-fitting the observations to 0.0 elapsed time. Using the same approach, effective initial displacement of 3.8 ft is estimated for the second test. The theoretical and effective initial displacements are close, suggesting that the test data are reliable.

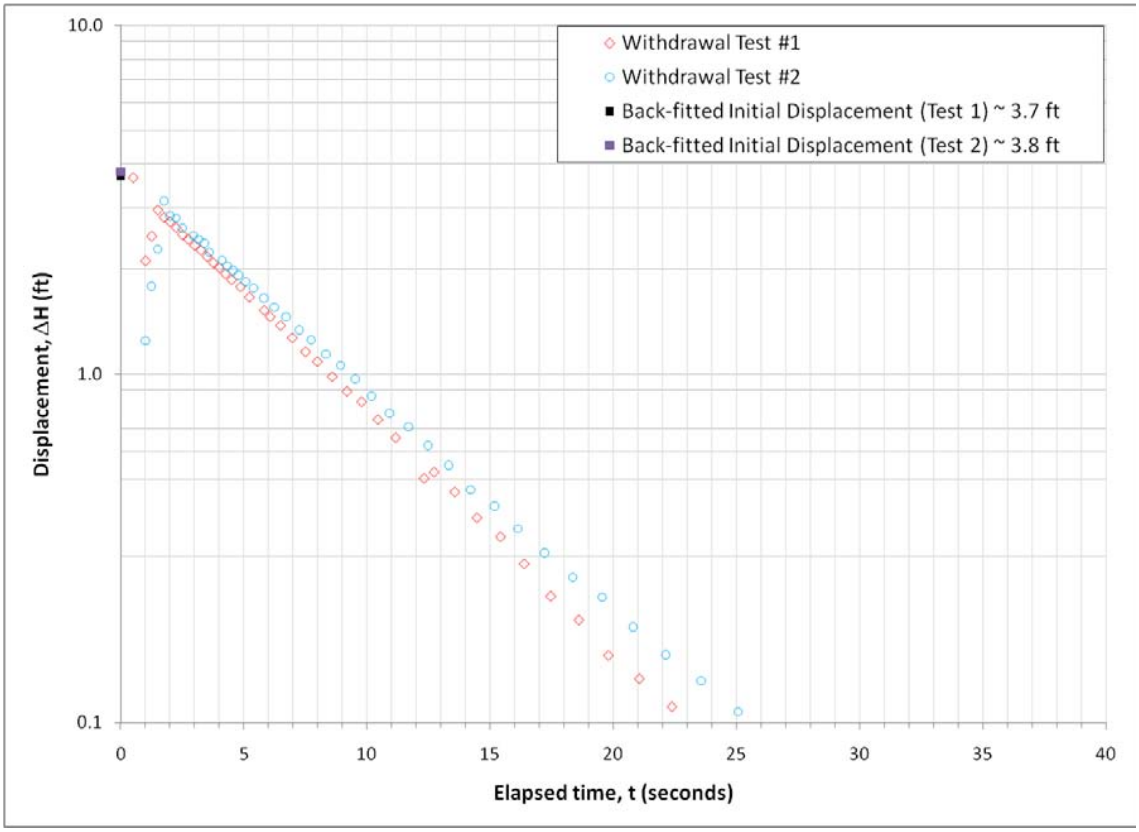

Figure 4-45. Estimation of Effective Initial Displacements at 199-F5-42

4.7.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for both withdrawal tests by the respective effective initial displacement and shown in Figure 4-46. If the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. In this case however, that assessment cannot be made because of the noisy data in the first second. The close correspondence of the three normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The second withdrawal test is chosen for analysis.

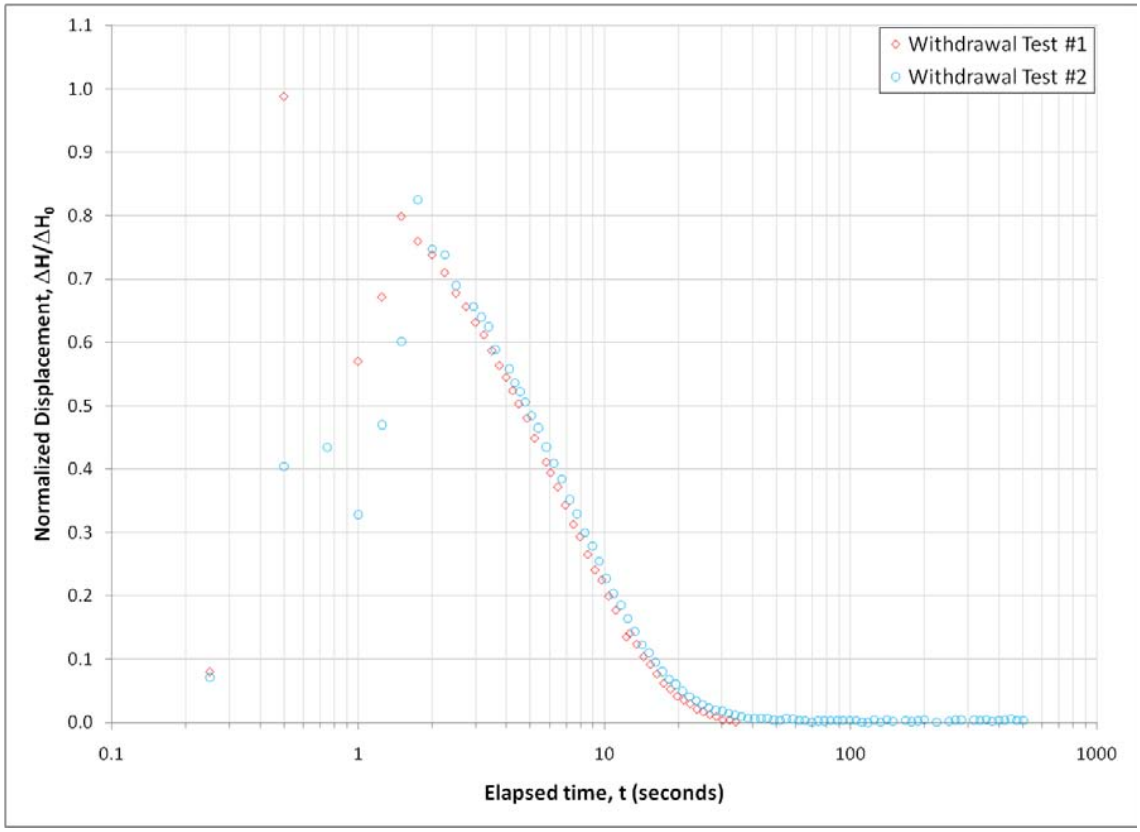

Figure 4-46. Normalized Displacements at 199-F5-42

4.7.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the second withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 91 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 14.37 ft (~4.4 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **21 m/d or 2.43×10^{-4} m/s.** The CBP model fit is shown in Figure 4-47.

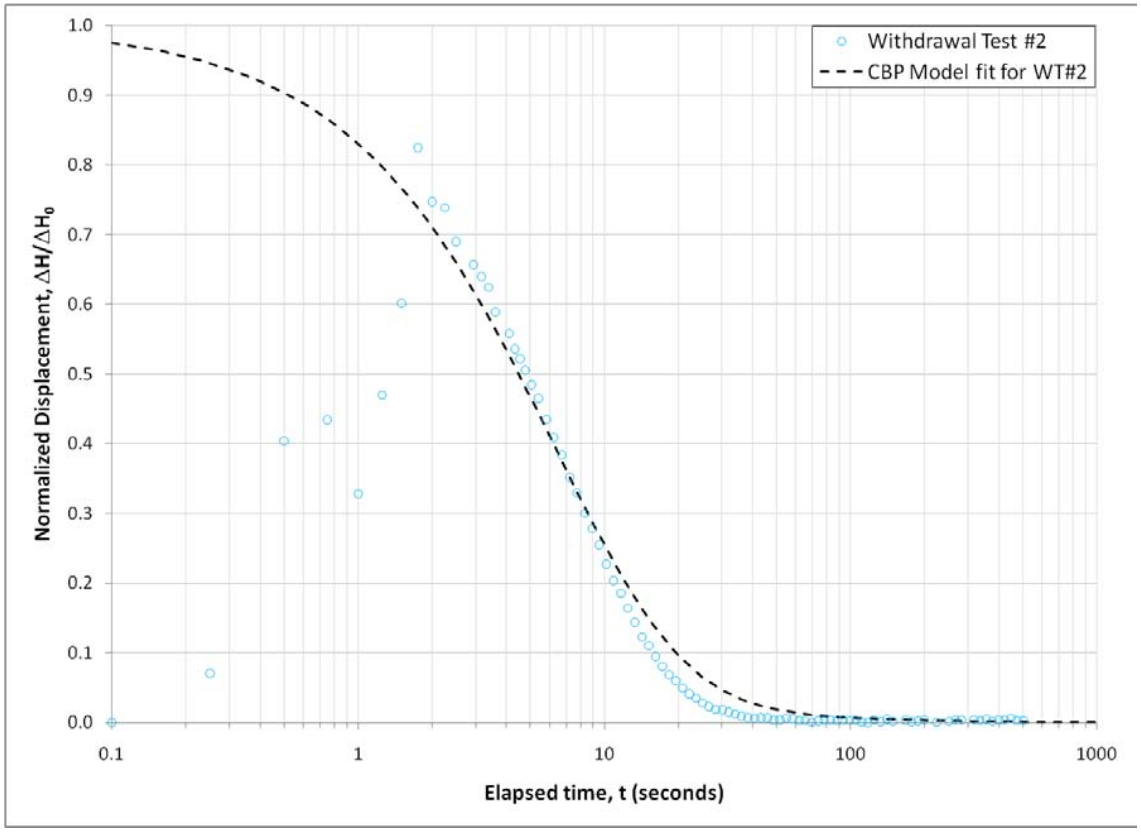

Figure 4-47. CBP Model Fit at 199-F5-42

4.7.5 Refined Analysis

For a more refined analysis, the normalized displacements for the first withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.3×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **17 m/d** or 2.0×10^{-4} **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (14.37 ft ~ 4.4 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-48.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel.

From past experience with similar tests in conductive (~ 10^{-3} m/s) formations, it is hypothesized that these tests may be 'gradual'. In a 'gradual' test, the time required for the generation of effective initial displacement (about 2 seconds in this case) is not significantly lower than the time for effective completion of the test (about 50 seconds in this case). An alternate method of estimating the effective initial displacement and thereby the hydraulic conductivity is presented in the subsequent sections.

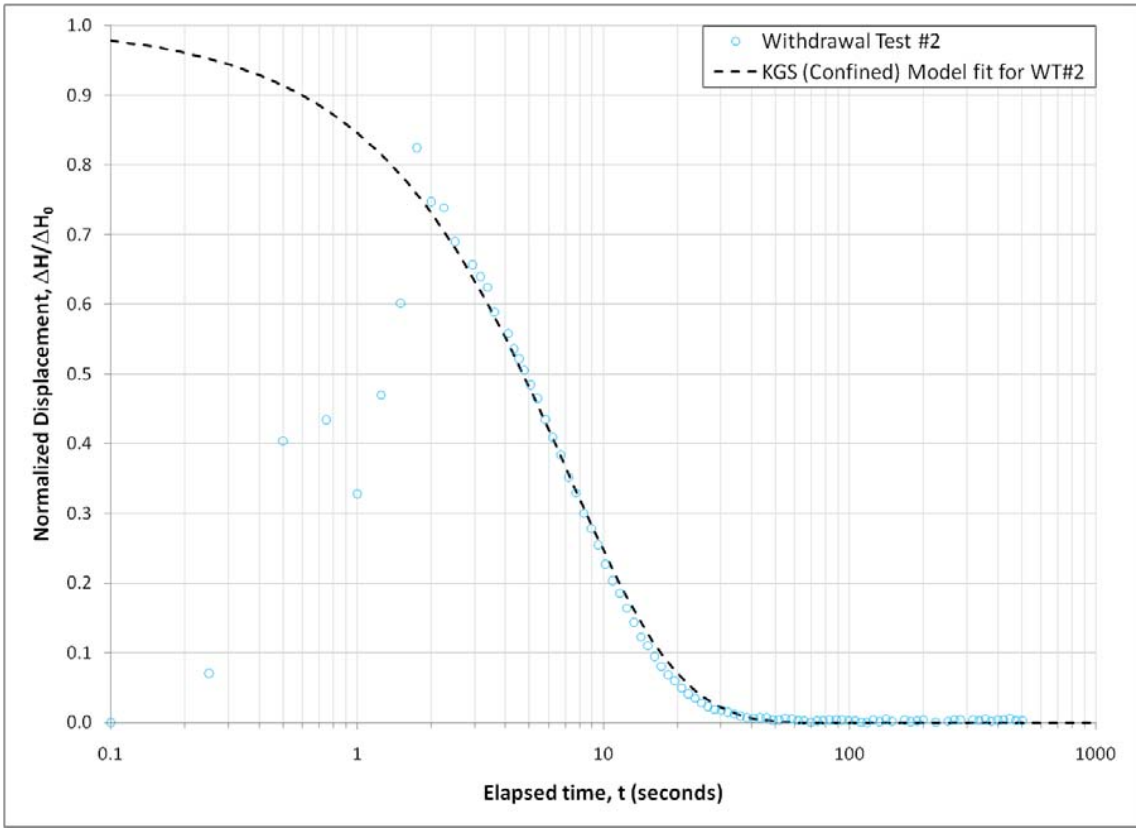

Figure 4-48. KGS Model Fit at 199-F5-42

4.7.6 Correction for 'Non-Instantaneous' Generation of Effective Initial Displacement

A revised starting time of 1.9 seconds is estimated by visually identifying the start of the 'dissipation' portion of the test. This is illustrated in Figure 4-49.

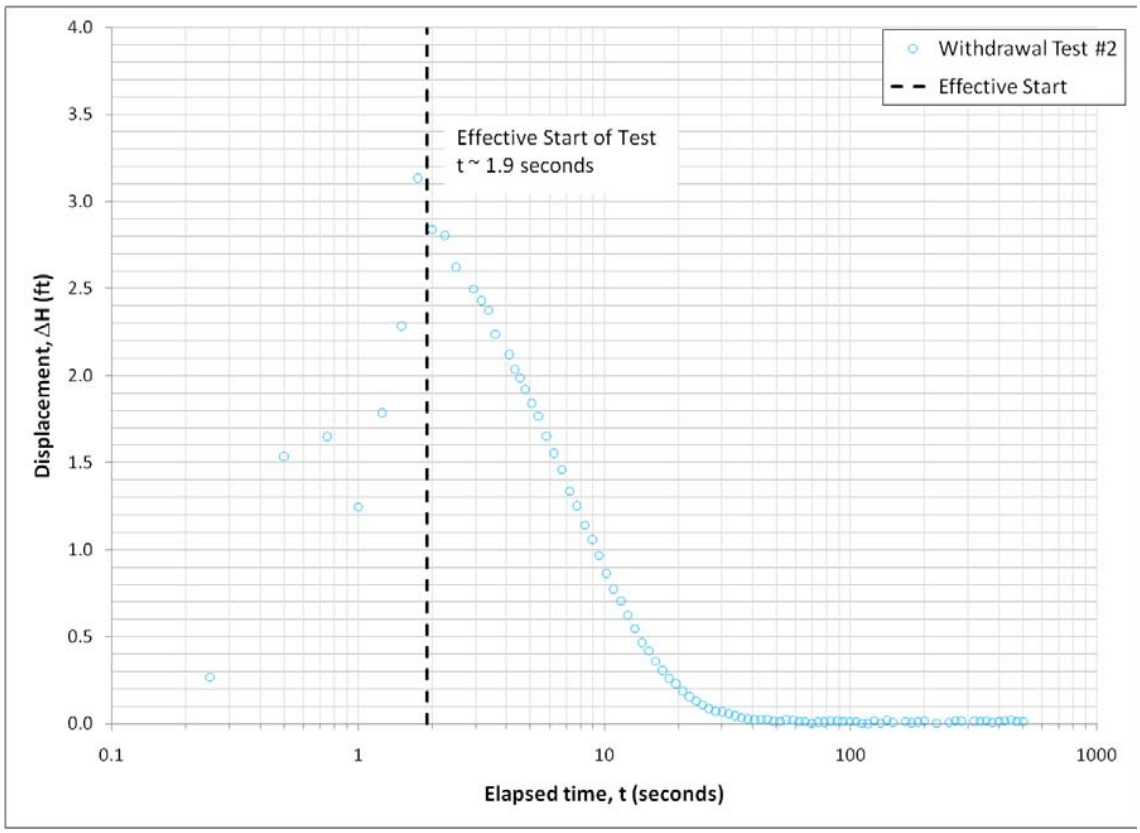

Figure 4-49.Estimation of Effective Starting Time at 199-F5-42

4.7.7 Estimation of Effective Initial Displacement Using Adjusted Elapsed Time

Adjusted elapsed time is calculated by subtracting the effective start time from the elapsed time. The displacements are plotted against the adjusted elapsed times in Figure 4-50. A revised effective initial displacement of 2.95 ft is estimated by back-fitting the observations to 0.0 elapsed time.

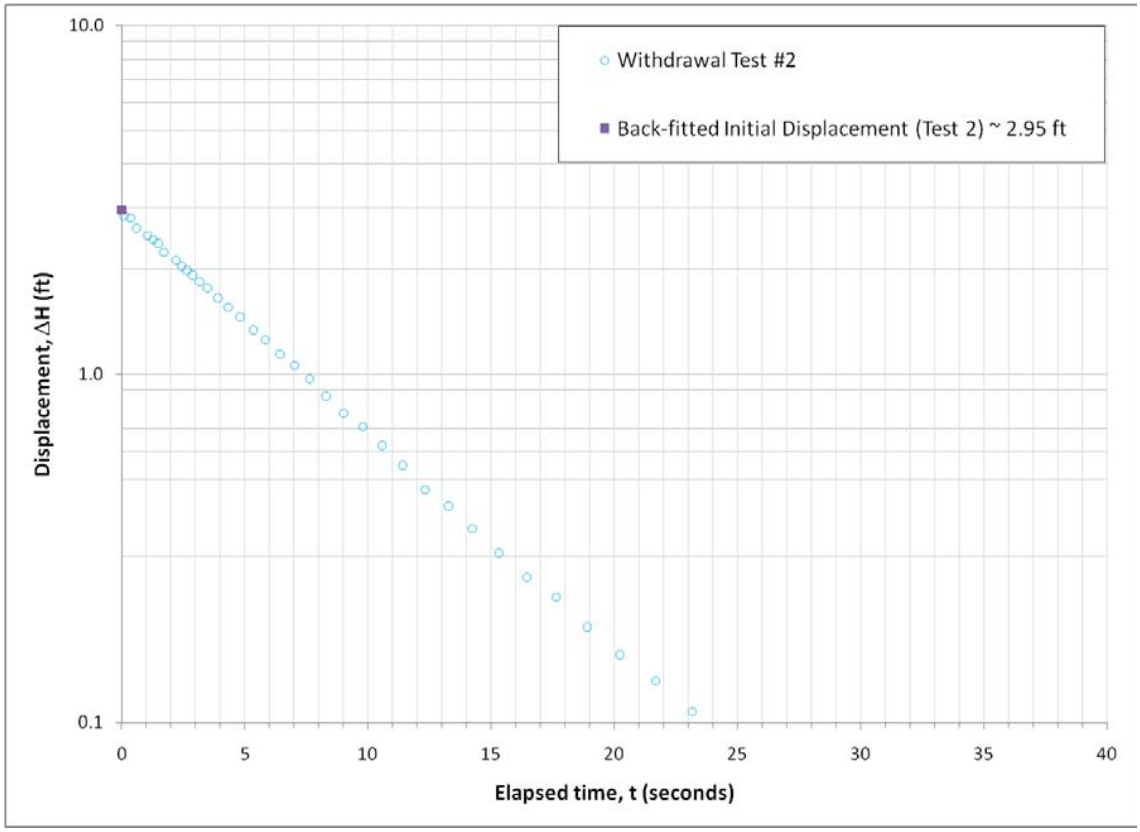

Figure 4-50. Estimation of Revised Effective Initial Displacement at 199-F5-42

4.7.8 Revised Normalized Displacement

The revised normalized displacements are calculated by dividing the displacements with the revised effective initial displacement. These revised normalized displacements are plotted against the adjusted elapsed time in Figure 4-51.

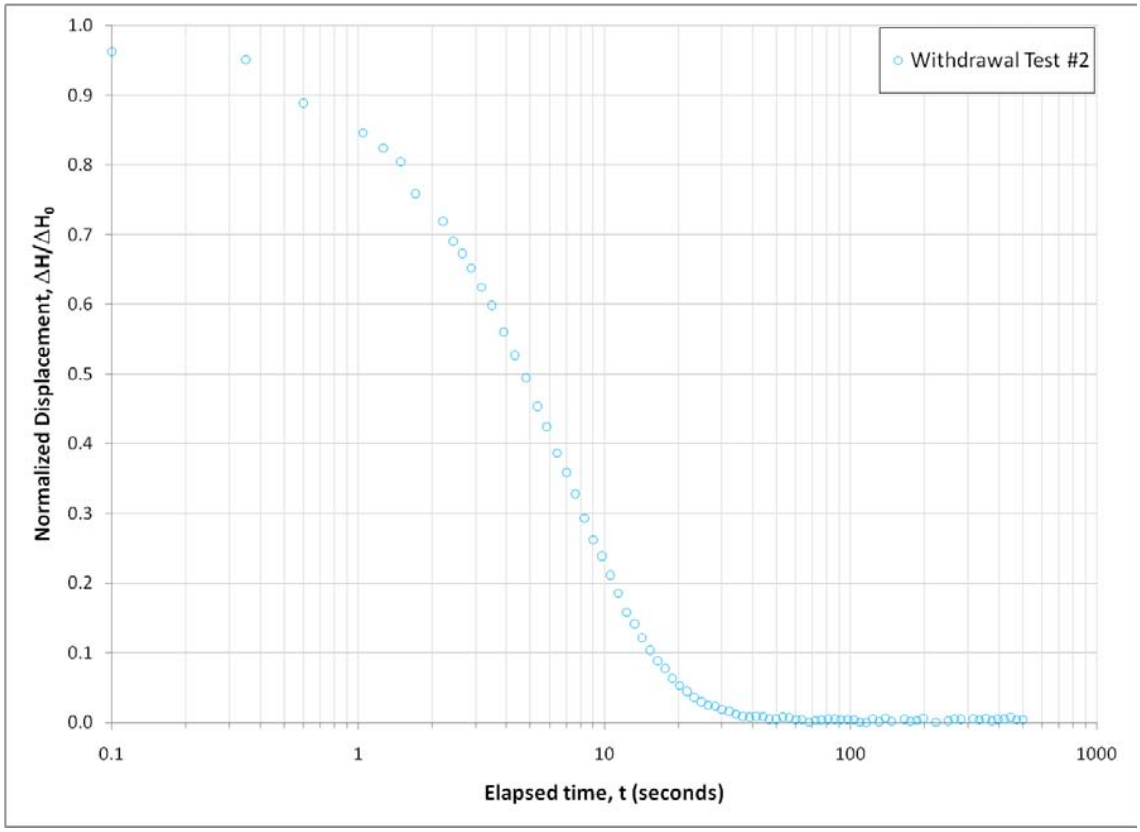

Figure 4-51. Revised Normalized Displacement at 199-F5-42

4.7.9 Revised Analysis

The revised normalized displacements are fit with the KGS model again. A good match to the observations is achieved with a specific storage, S_s, of 2.3×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **18 m/d** or $2.08\times\mathbf{10^{-4}}$ **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (14.37 ft ~ 4.4 m). The estimated horizontal hydraulic conductivity value of 18 m/d is very close to the estimate of 17 m/d obtained from the first-cut analysis but the fit to the data is improved. The KGS model fit is shown in Figure 4-52.

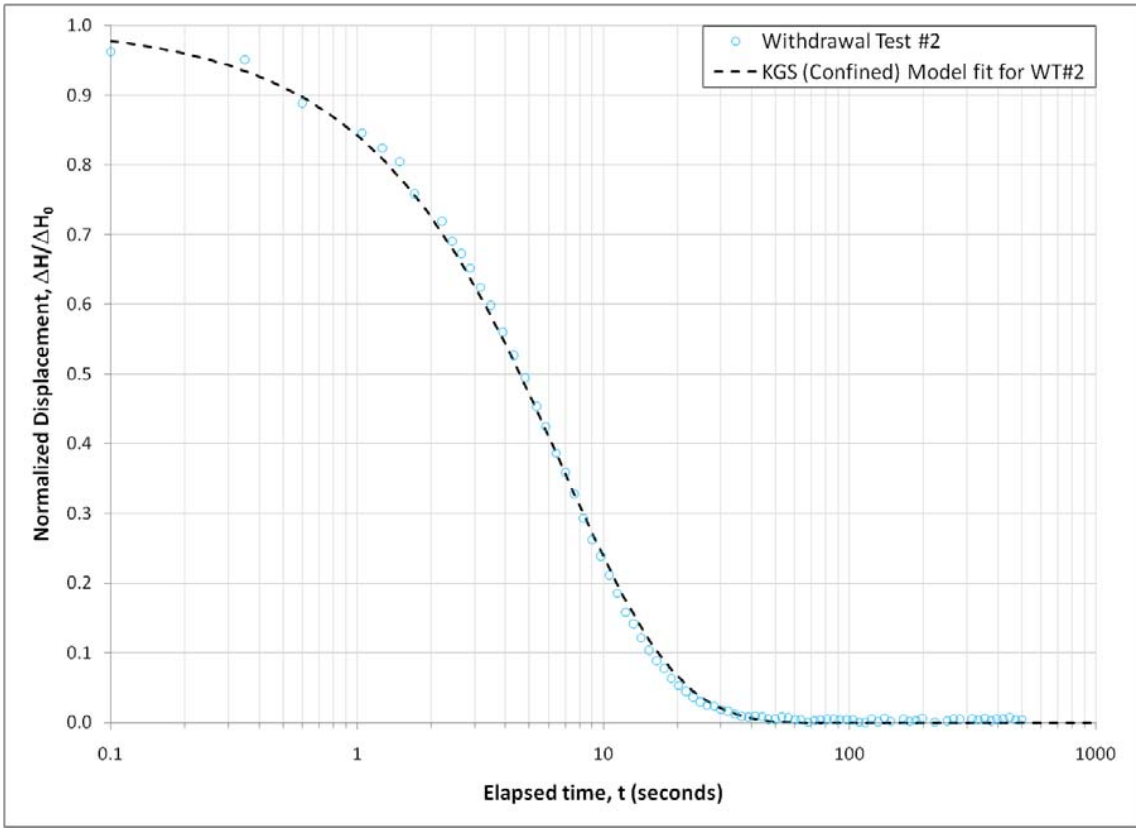

Figure 4-52. Revised KGS Model Fit at 199-F5-42

4.8 Analysis of Slug Test Data at Well 199-F5-52

Six withdrawal tests at 199-F5-52 are analyzed in this section.

4.8.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The first three withdrawal tests were conducted with a slug of volume 0.6877 ft^3. The next three withdrawal tests were conducted with a larger slug of volume 1.0112 ft^3. The displacements for each test are shown in Figure 4-53. The responses for the first three tests are very close to each other suggesting that the tests conducted with the smaller slug are reproducible. There are differences in the displacements for the tests conducted with the larger slug. The normalized displacements in section 4.8.3 will tell us if these tests are reproducible.

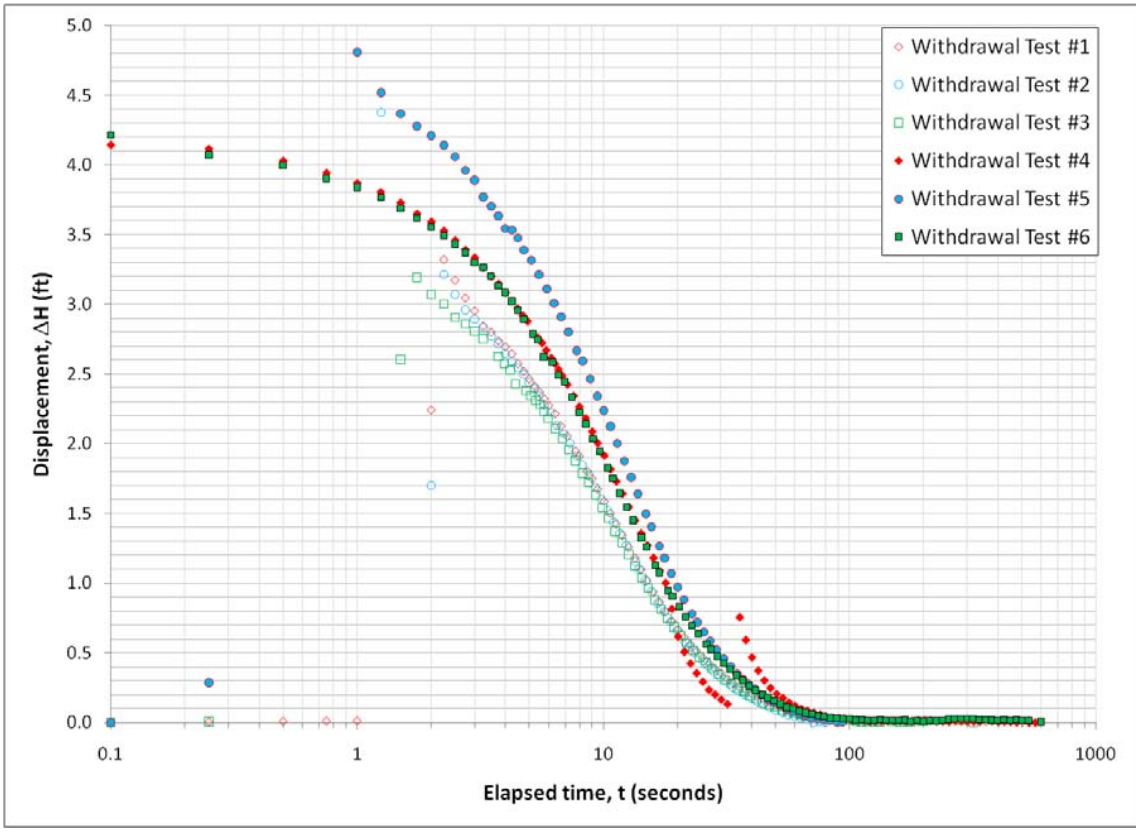

Figure 4-53. Displacements from Six Withdrawal Tests at 199-F5-52

4.8.2 Estimation of Effective Initial Displacement

For the first three tests, a theoretical initial displacement of 3.5 ft is calculated for a slug volume of 0.6877 ft^3 and a casing radius of 3 inches. An effective initial displacement of 3.8 ft is estimated for the first two tests, by back-fitting the observations to 0.0 elapsed time. Using the same approach, effective initial displacement of 3.6 ft is estimated for the third test. The theoretical and effective initial displacements are close, suggesting that the tests conducted with the smaller slug are reliable. The estimation of initial displacements for the first three tests is illustrated in Figure 4-54.

For the next three tests, a theoretical initial displacement of 5.15 ft is calculated for a slug volume of 1.0112 ft^3 and a casing radius of 3 inches. Using the approach described above, effective initial displacements of 4.2 ft, 4.9 ft and 4.2 ft are estimated for the fourth, fifth and sixth tests respectively. This is shown in Figure 4-55. For these tests, there is a difference between the theoretical and estimated displacements. This could be due to several reasons including an incorrect insertion/withdrawal of the slug. The normalized displacements in section 4.8.3 will give us more information on the admissibility of these tests for analysis.

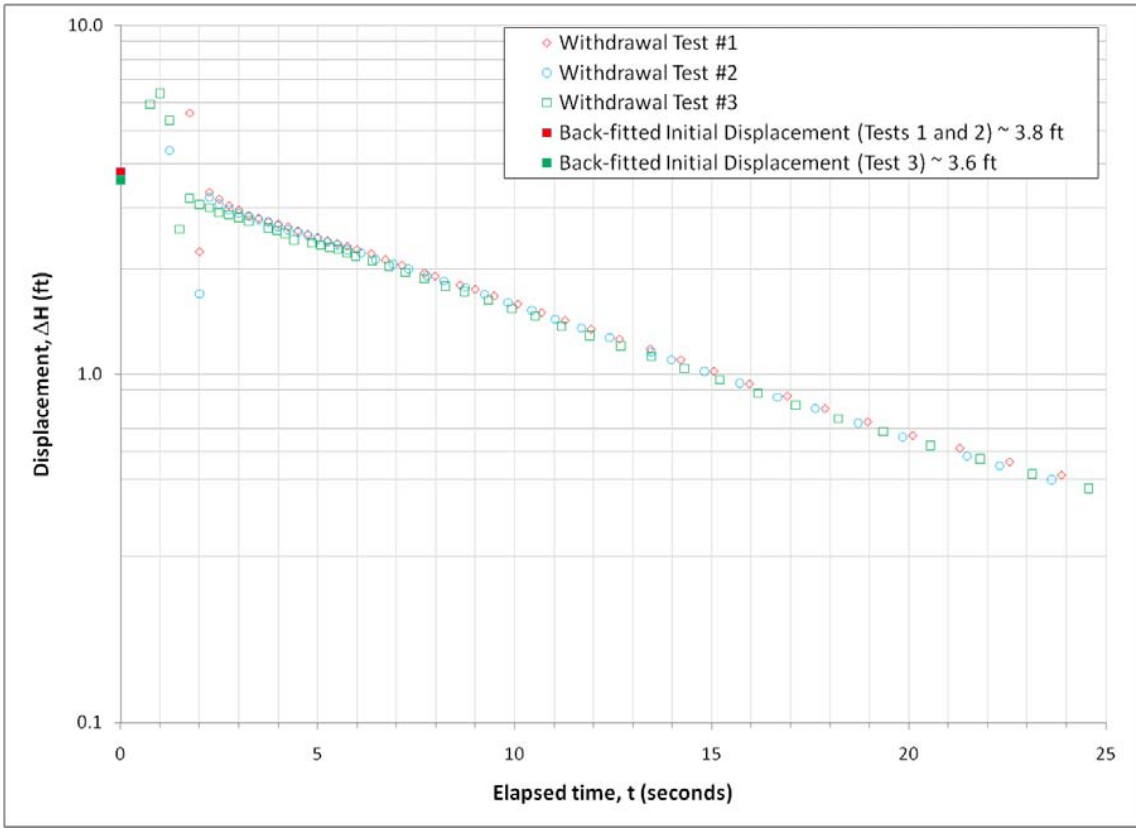

Figure 4-54. Estimation of Effective Initial Displacements for the First Three Tests at 199-F5-52

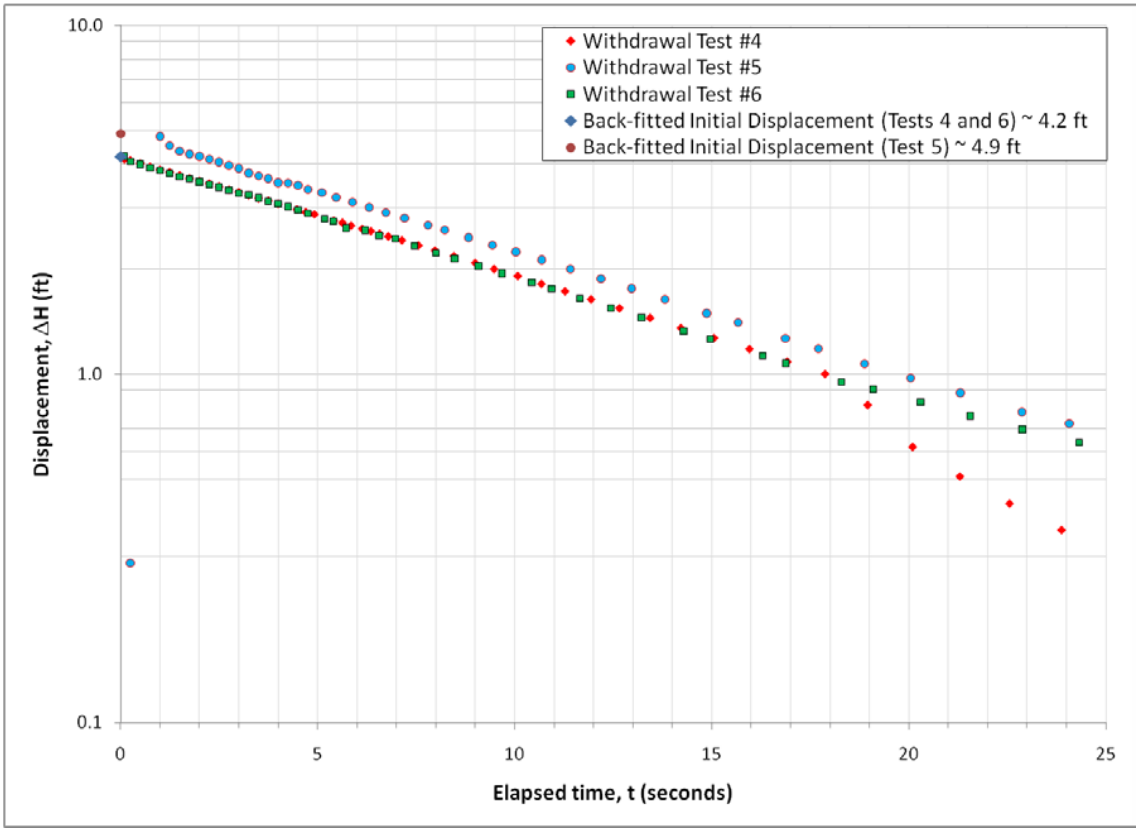

Figure 4-55. Estimation of Effective Initial Displacements (4, 5 and 6) at 199-F5-52

4.8.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for each withdrawal tests by its respective effective initial displacement and shown in Figure 4-56. Since the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. The close correspondence of all the normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The sixth withdrawal test is chosen for analysis.

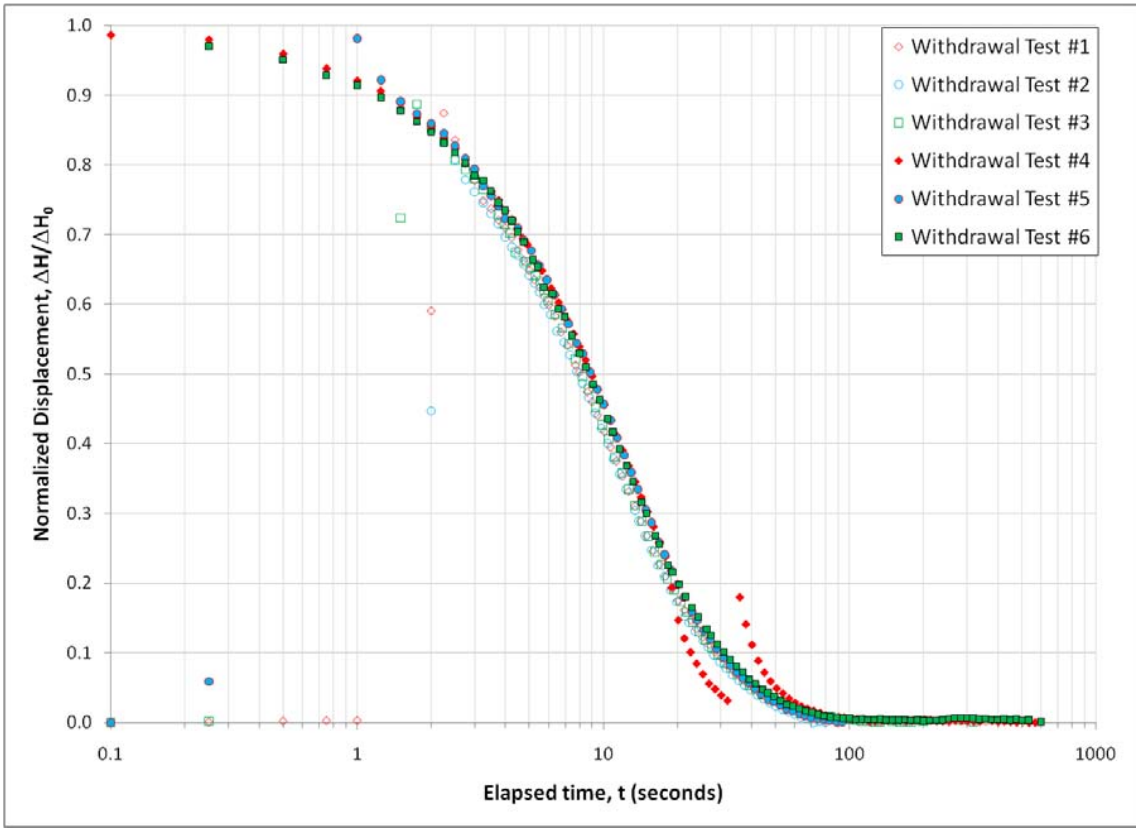

Figure 4-56. Normalized Displacements at 199-F5-52

4.8.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the sixth withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 118.8 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 13.08 ft (~4 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **30 m/d or 3.47×10^{-4} m/s.** The CBP model fit is shown in Figure 4-57.

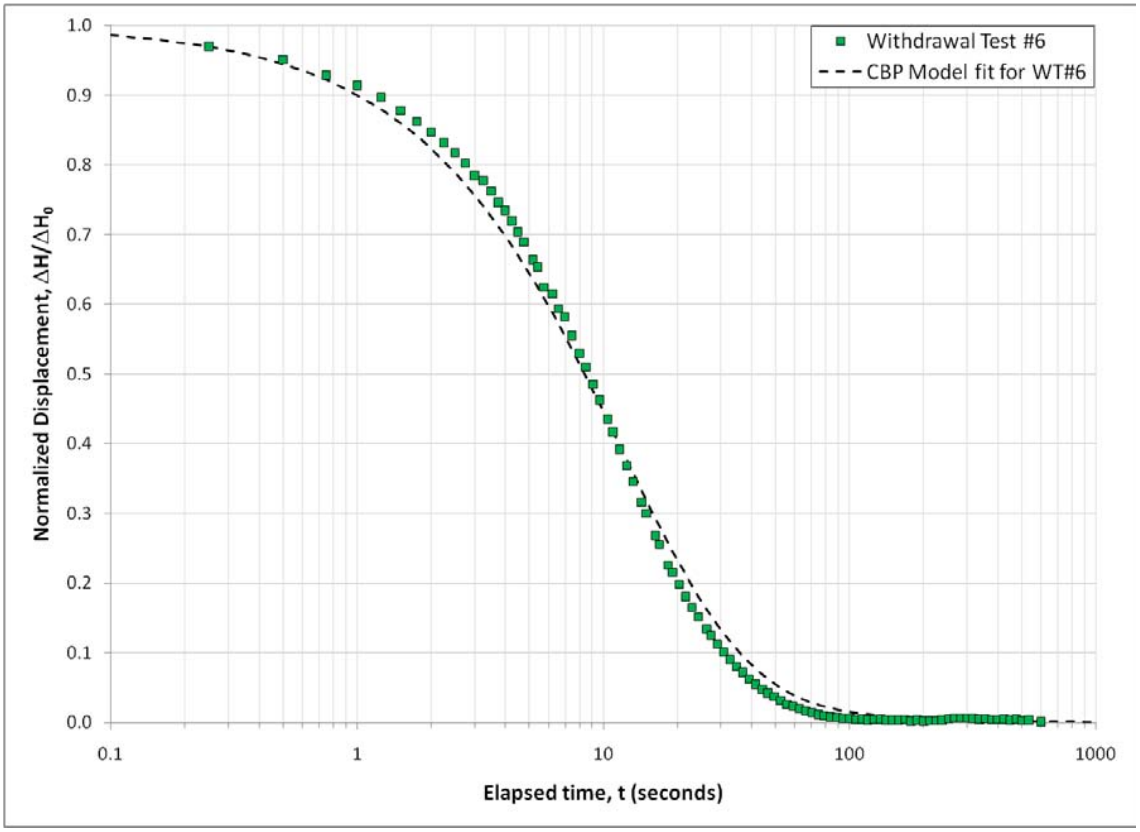

Figure 4-57. CBP Model Fit at 199-F5-52

4.8.5 Refined Analysis

For a more refined analysis, the normalized displacements for the sixth withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.5×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **23 m/d** or 2.66×10^{-4} **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (13.08 ft ~ 4 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-58.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

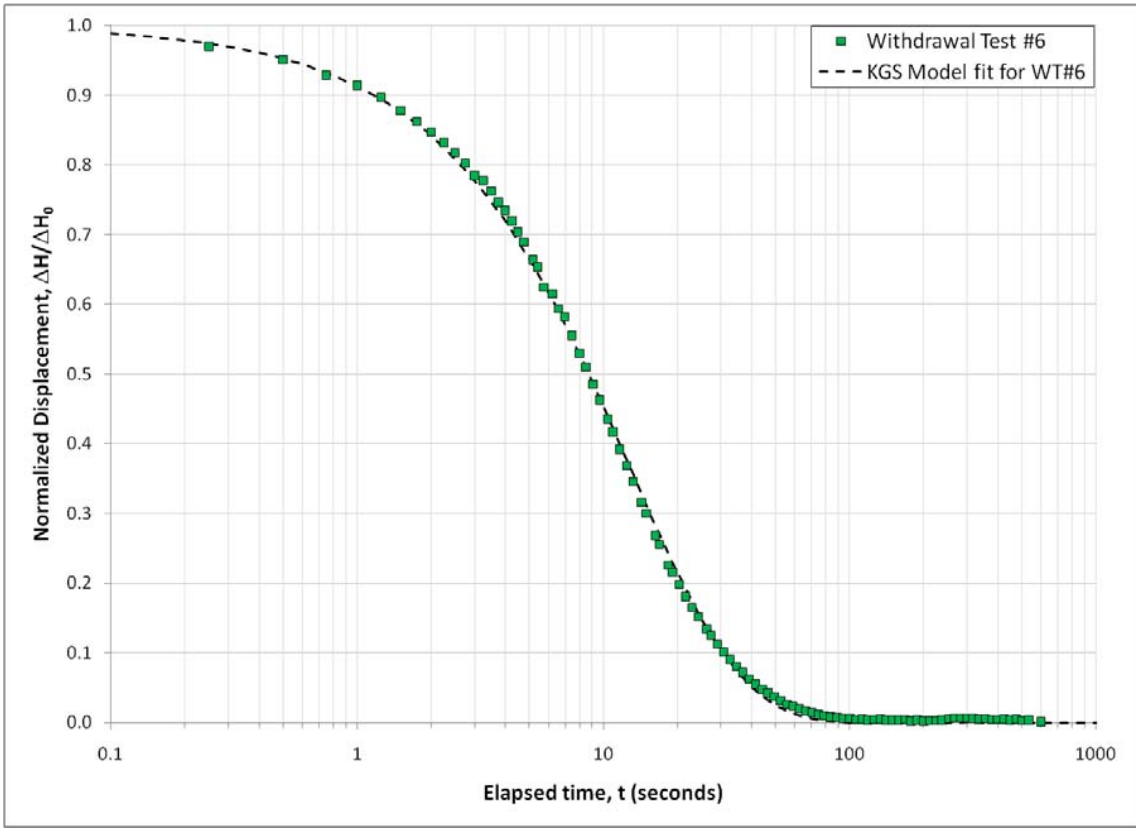

Figure 4-58. KGS Model Fit at 199-F5-52

4.9 Analysis of Slug Test Data at Well 199-F5-54

Six withdrawal tests at 199-F5-54 are analyzed in this section.

4.9.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The first three withdrawal tests were conducted with a slug of volume 0.6877 ft^3. The next three withdrawal tests were conducted with a larger slug of volume 1.0112 ft^3. The displacements for each test are shown in Figure 4-59. The responses for the last three tests are very close to each other suggesting that the tests conducted with the larger slug are reproducible. There are differences in the displacements for the tests conducted with the smaller slug. The normalized displacements in section 4.8.3 will tell us if these tests are reproducible.

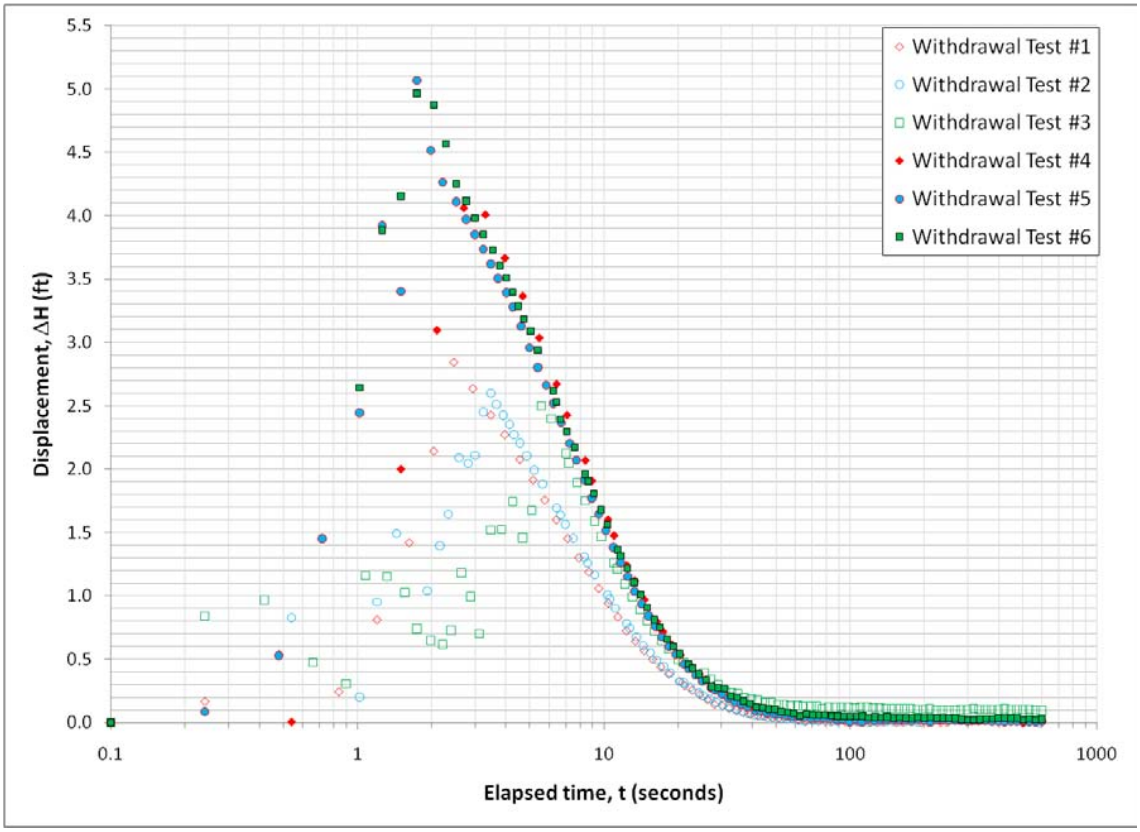

Figure 4-59. Displacements from Six Withdrawal Tests at 199-F5-54

4.9.2 Estimation of Effective Initial Displacement

For the first three tests, a theoretical initial displacement of 3.5 ft is calculated for a slug volume of 0.6877 ft^3 and a casing radius of 3 inches. An effective initial displacement of 4.1 ft is estimated for the first two tests, by back-fitting the observations to 0.0 elapsed time. Using the same approach, effective initial displacement of 5 ft is estimated for the third test. The theoretical and effective initial displacements for the first two tests are relatively close, suggesting that the tests are reliable. The initial displacement for the third test is higher than expected. The normalized displacements in section 4.9.3 will give us more information on the admissibility of this test for analysis. The estimation of initial displacements for the first three tests is illustrated in Figure 4-60.

For the next three tests, a theoretical initial displacement of 5.15 ft is calculated for a slug volume of 1.0112 ft^3 and a casing radius of 3 inches. Using the approach described above, effective initial displacements of 5.9 ft is estimated for all the tests. The theoretical and effective initial displacements are relatively close, suggesting that these tests are reliable. This is shown in Figure 4-61.

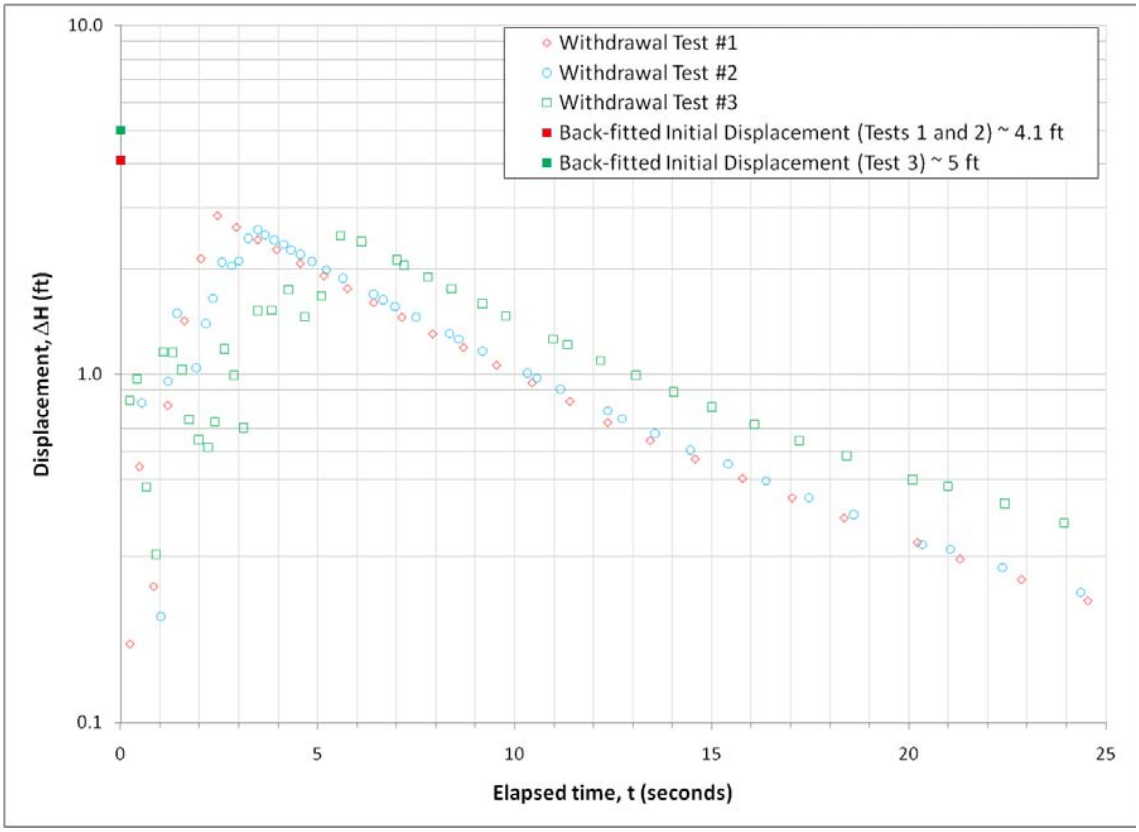

Figure 4-60. Estimation of Effective Initial Displacements (1, 2 and 3) at 199-F5-54

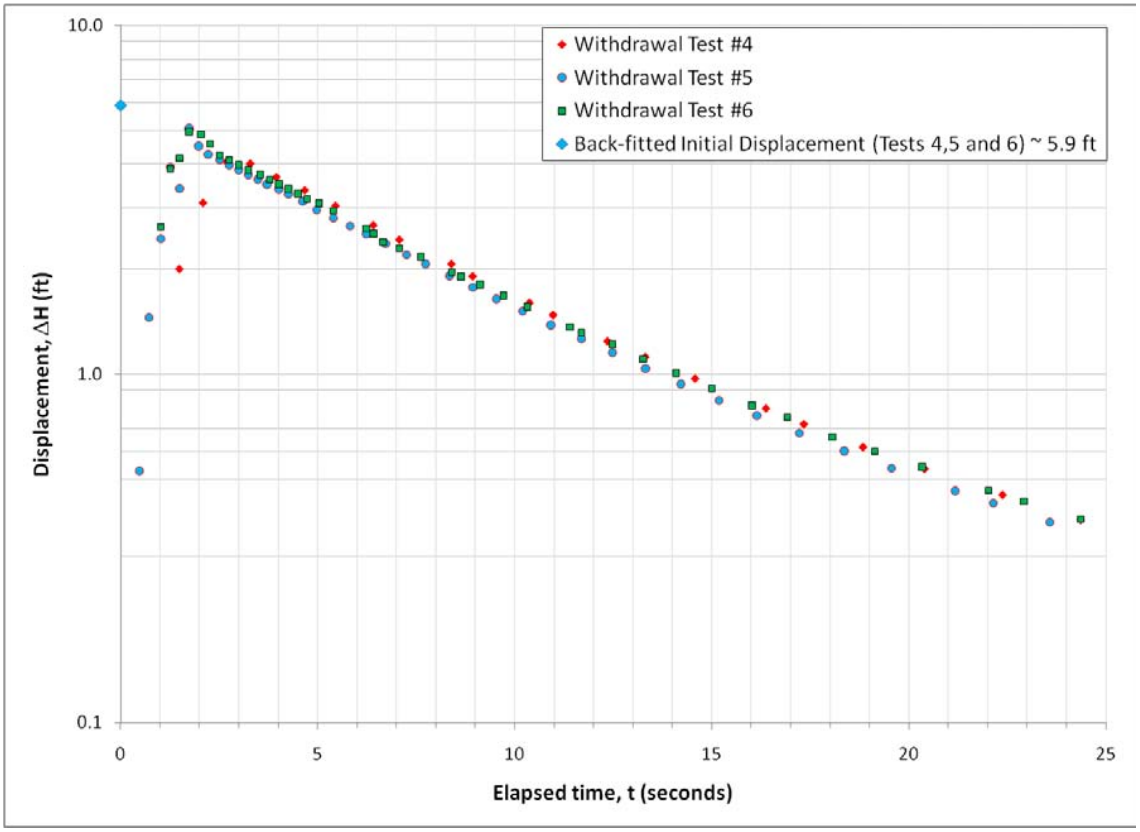

Figure 4-61. Estimation of Effective Initial Displacements (4, 5 and 6) at 199-F5-54

4.9.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for each withdrawal tests by its respective effective initial displacement and shown in Figure 4-62. If the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. In this case however, that assessment cannot be made because of the noisy data in the first two seconds. The close correspondence of the six normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The sixth withdrawal test is chosen for analysis.

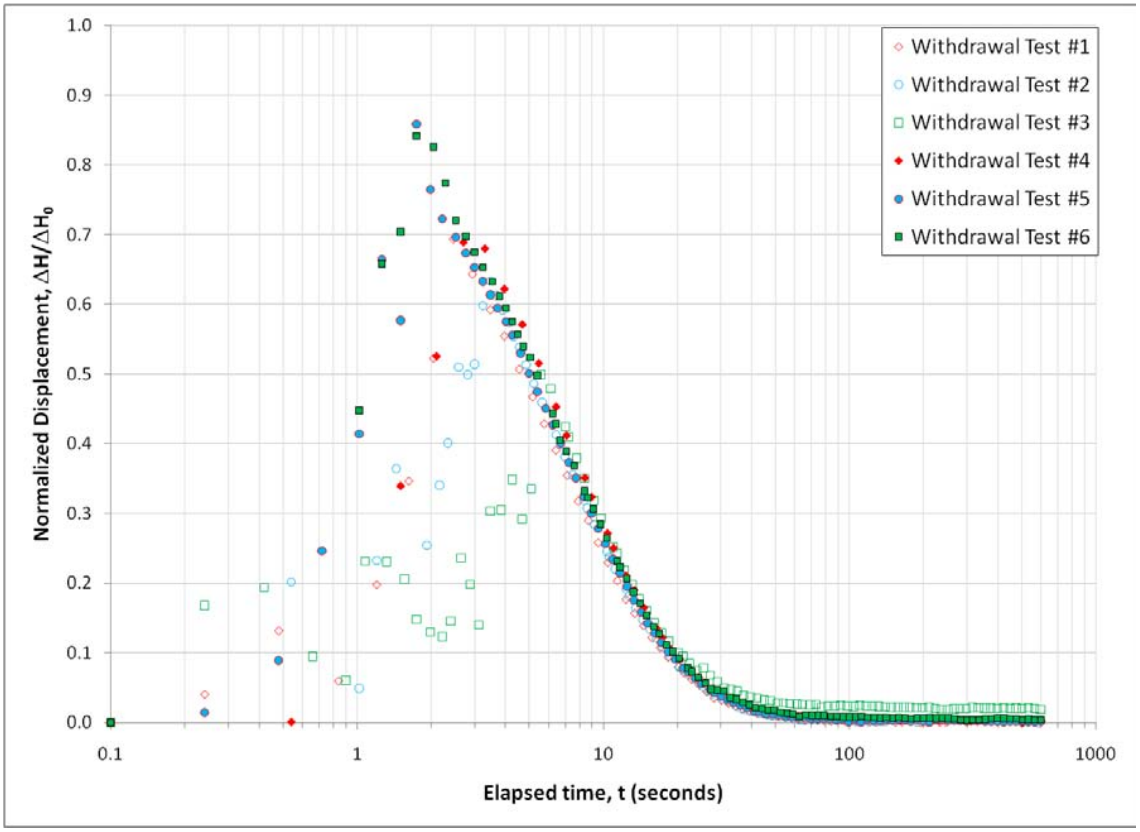

Figure 4-62. Normalized Displacements at 199-F5-54

4.9.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the sixth withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 10^{-5}, and a fitted transmissivity, *T*, of 194.4 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 14.92 ft (~4.5 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **43 m/d or 4.98×10^{-4} m/s.** The CBP model fit is shown in Figure 4-63.

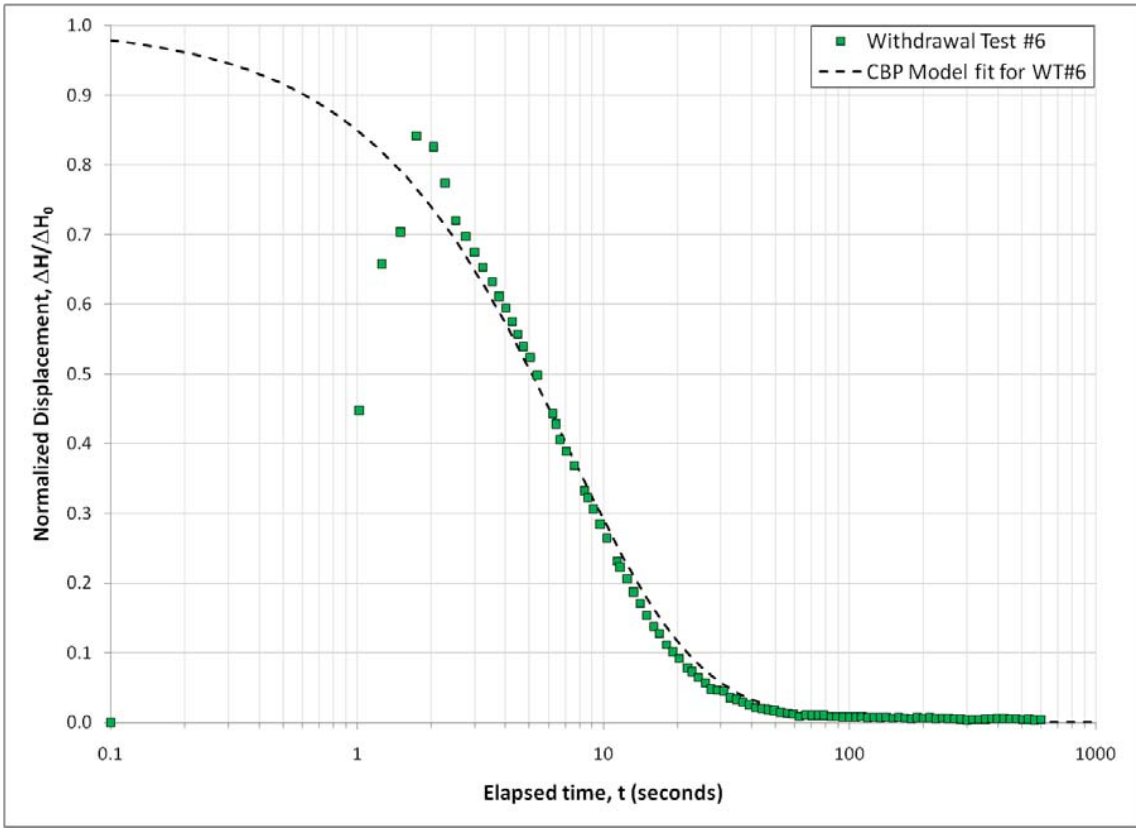

Figure 4-63. CBP Model Fit at 199-F5-54

4.9.5 Refined Analysis

For a more refined analysis, the normalized displacements for the sixth withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 2.2×10^{-6} m^{-1}, an anisotropy ratio K_V/K_H of 0.01, and a fitted horizontal hydraulic conductivity, K_H, of **34 m/d** or $3.94\times\mathbf{10^{-4}}$ **m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (10^{-5}) with the well screen length (14.92 ft ~ 4.5 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-64.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of coarse sand and gravel. This is a representative description of the well screen location in the Hanford formation which is a heterogeneous mix of sand, silt, and gravel.

The estimated hydraulic conductivity is in the middle of the range for clean sand and at the higher end of the range for silty sand reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the general interpretation of the Hanford formation being a heterogeneous mix of sand, silt, and gravel.

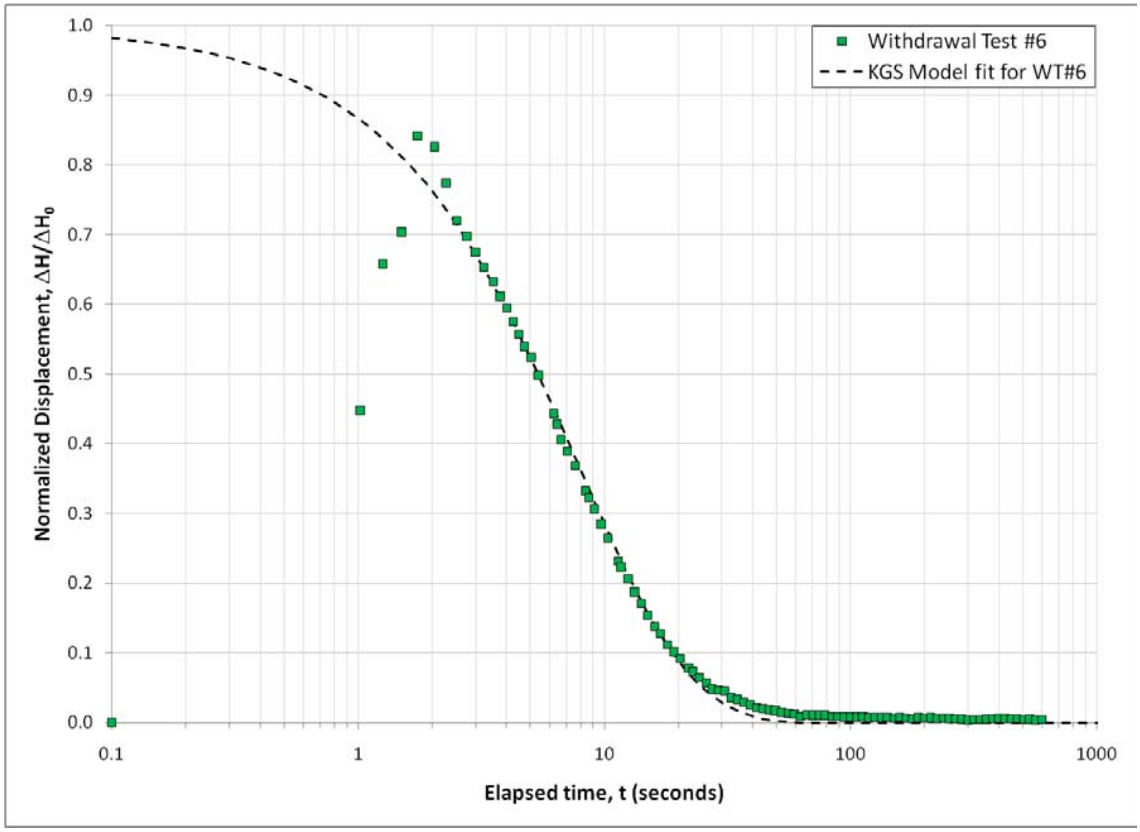

Figure 4-64. KGS Model Fit at 199-F5-54

4.10 Analysis of Slug Test Data at Well 199-F5-53

Two withdrawal tests at 199-F5-53 are analyzed in this section.

4.10.1 Raw Displacement Data for Withdrawal Tests #1 and #2

The first withdrawal test was conducted with a slug of volume 0.6877 ft^3 and the second withdrawal test was conducted with a larger slug of volume 1.0112 ft^3. The displacements for each test are shown in Figure 4-65. The normalized displacements in section 4.10.3 will tell us if these tests are equivalent.

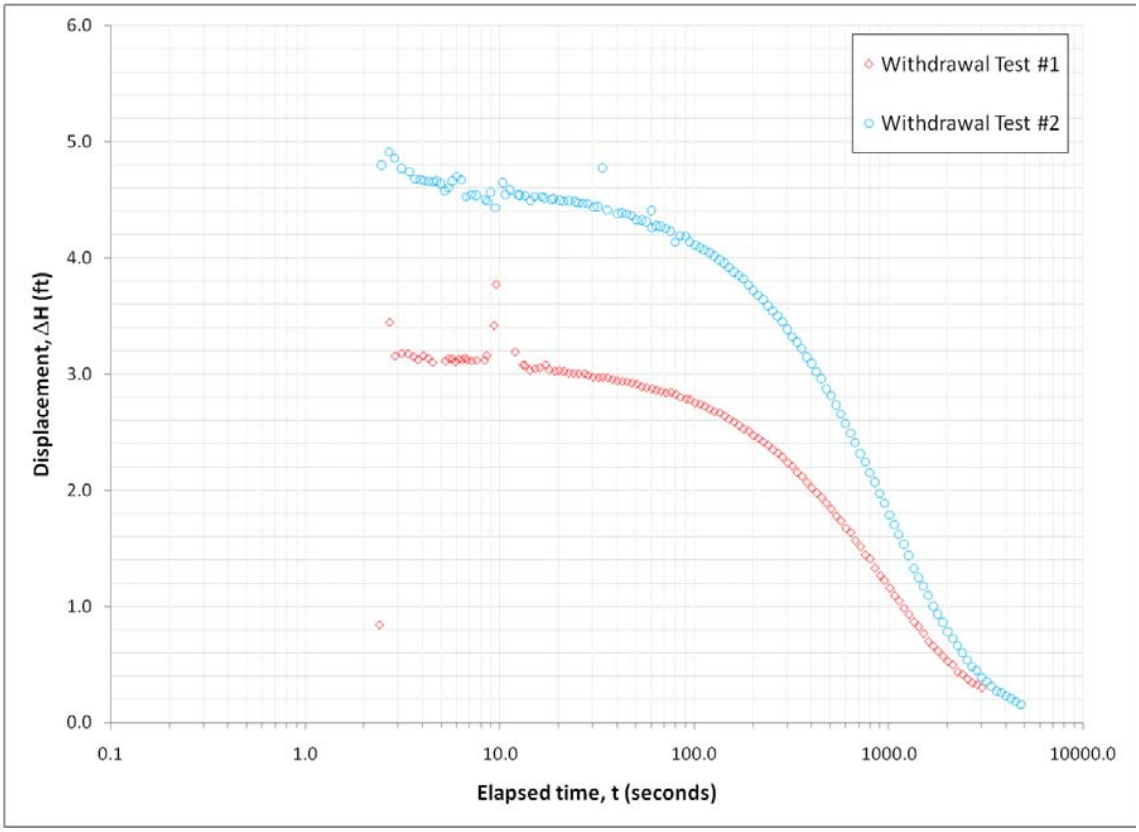

Figure 4-65. Displacements from Two Withdrawal Tests at 199-F5-53

4.10.2 Estimation of Effective Initial Displacement

For the first test, a theoretical initial displacement of 3.5 ft is calculated for a slug volume of 0.6877 ft^3 and a casing radius of 3 inches. An effective initial displacement of 3.15 ft is estimated for the first test by back-fitting the observations to 0.0 elapsed time. For the second test, a theoretical initial displacement of 5.15 ft is calculated for a slug volume of 1.0112 ft^3 and a casing radius of 3 inches. An effective initial displacement of 4.65 ft is estimated for the second test by back-fitting the observations to 0.0 elapsed time. The theoretical and effective initial displacements for both tests are close, suggesting that the tests are reliable. The normalized displacements in section 4.10.3 will give us more information on the admissibility of this test for analysis. The estimation of initial displacements for the two tests is illustrated in Figure 4-66.

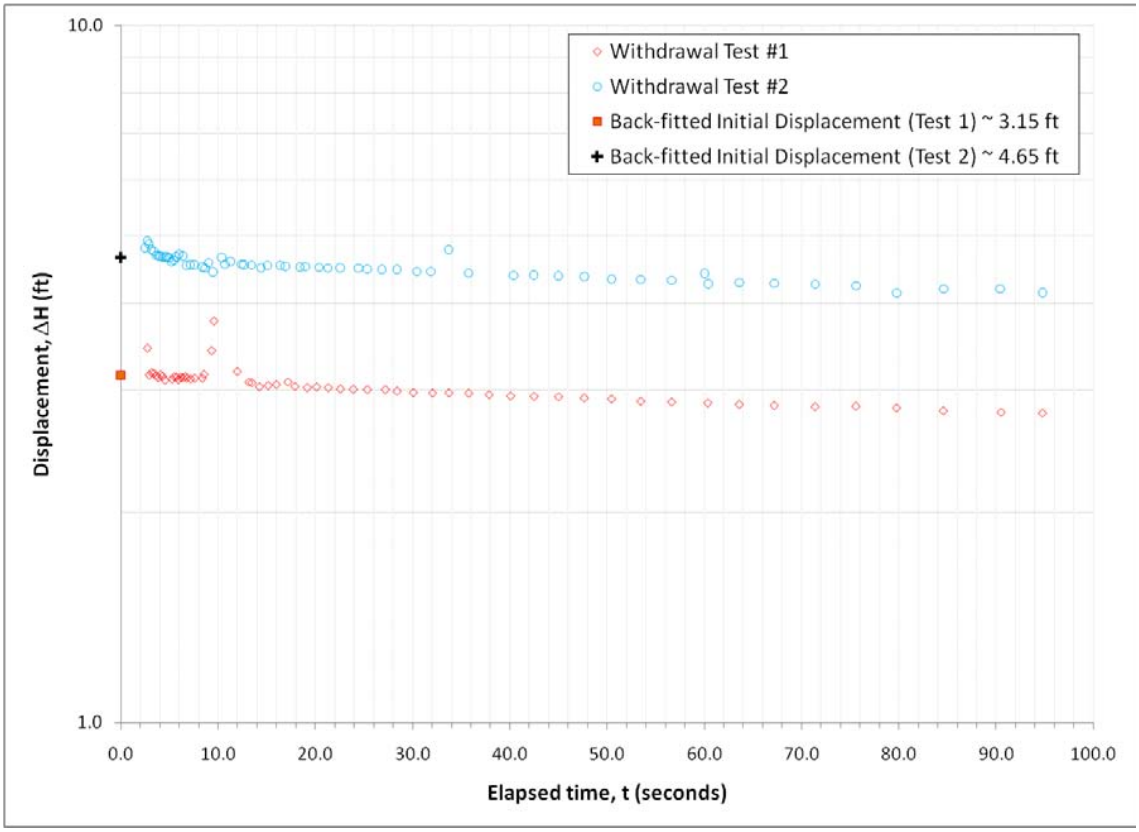

Figure 4-66. Estimation of Effective Initial Displacements at 199-F5-53

4.10.3 Normalized Displacements

The normalized displacements are calculated by dividing the observed displacements for each withdrawal tests by its respective effective initial displacement and shown in Figure 4-67. Since the normalized data appear to approach an asymptotic normalized displacement of 1.0 at the start of the test, the estimation of the effective initial displacement is considered to be accurate. The close correspondence of the two normalized displacement curves suggests that the tests are reproducible and that it is sufficient to analyze the data from only one of the withdrawal tests. The second withdrawal test is chosen for analysis.

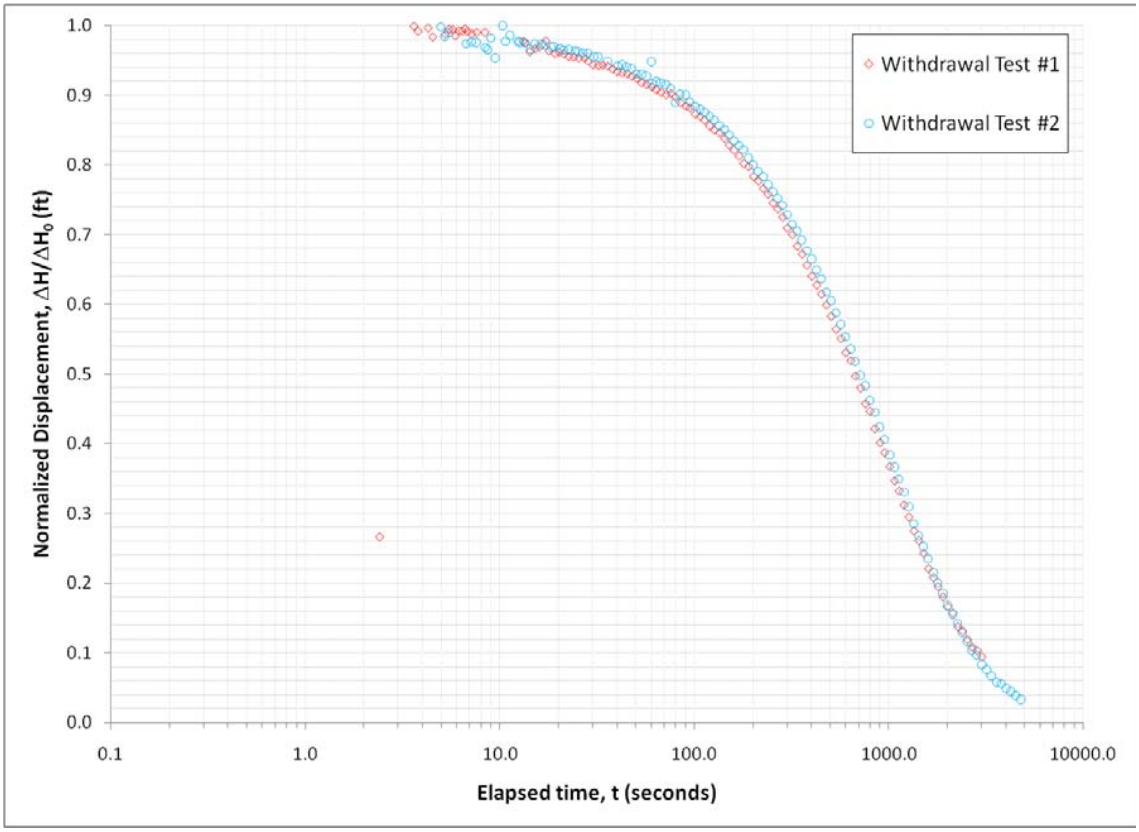

Figure 4-67. Normalized Displacements at 199-F5-53

4.10.4 Preliminary Analysis

For a first-cut analysis, the normalized displacements for the second withdrawal test are fit with the CBP model. A good match to the observations is achieved with a storage coefficient, *S*, of 5×10^{-4}, and a fitted transmissivity, *T*, of 0.8353 m^2/d. This model assumes that the well penetrates the full thickness of the aquifer. Cooper et al. (1967) suggested that in the case of a well that penetrates only a portion of the thickness of the aquifer, the effective thickness of the aquifer can be specified as the length of the well screen below the water table. Since the length of the submerged well screen is 10 ft (~3.05 m), the estimated transmissivity corresponds to a horizontal hydraulic conductivity, K_H, of **0.3 m/d or 3.47×10^{-6} m/s.** The CBP model fit is shown in Figure 4-68.

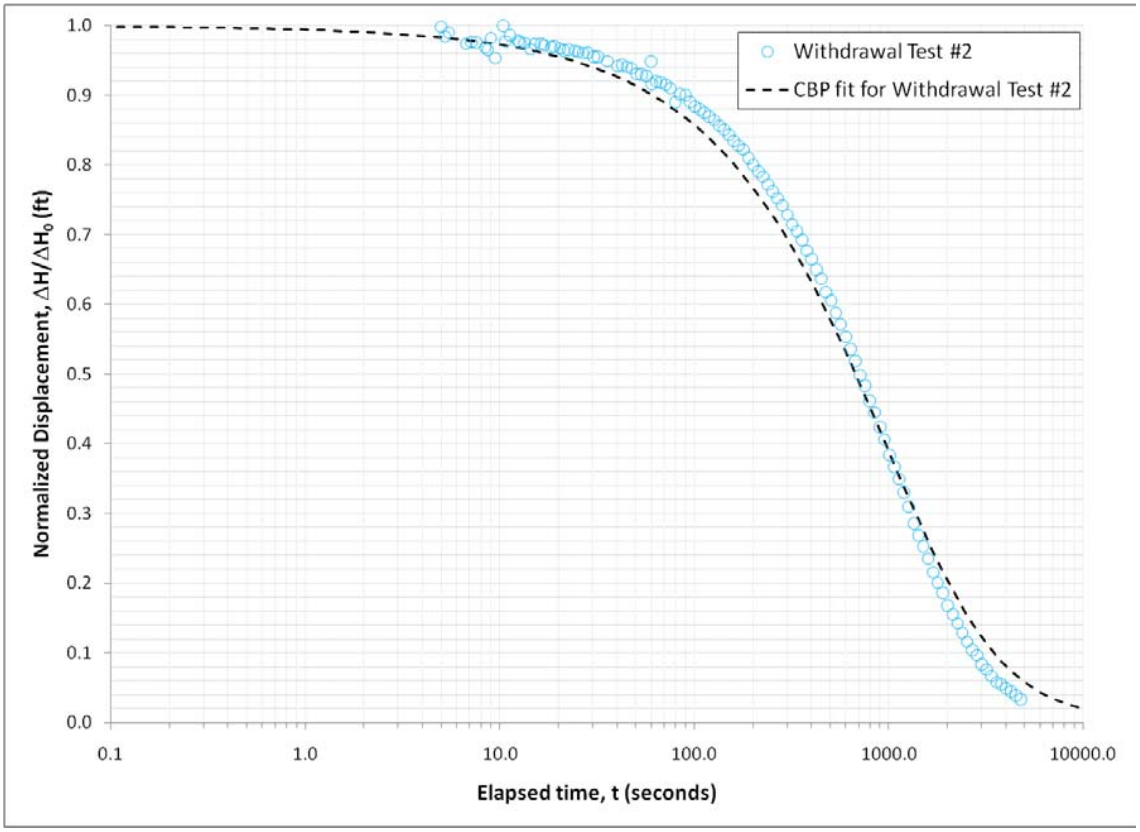

Figure 4-68. CBP Model Fit at 199-F5-53

4.10.5 Refined Analysis

For a more refined analysis, the normalized displacements for the second withdrawal test are fit with the KGS model. A good match to the observations is achieved with a specific storage, S_s, of 1.6×10^{-4} m^{-1}, an anisotropy ratio K_V/K_H of 0.1, and a fitted horizontal hydraulic conductivity, K_H, of **0.2 m/d** or **2.31×10^{-6} m/s**. The specific storage value was not iteratively estimated but instead calculated by dividing the previously estimated storage coefficient (5×10^{-4}) with the well screen length (10 ft ~ 3.05 m). The estimated horizontal hydraulic conductivity value is consistent with the estimate obtained from the first-cut analysis. The KGS model fit is shown in Figure 4-69.

The fitted value of the specific storage value falls in the range suggested by Younger (1993) as representative of aquifer materials that consist of silt fine sand and medium sand. This is a representative description of the well screen location in the RUM.

The estimated hydraulic conductivity is in the middle of the range for silty sand and at the higher end of the range for silt loess reported in the literature (see for example, Freeze and Cherry, 1979; Table 2.2). This is consistent with the well screen location in the Ringold Upper Mud.

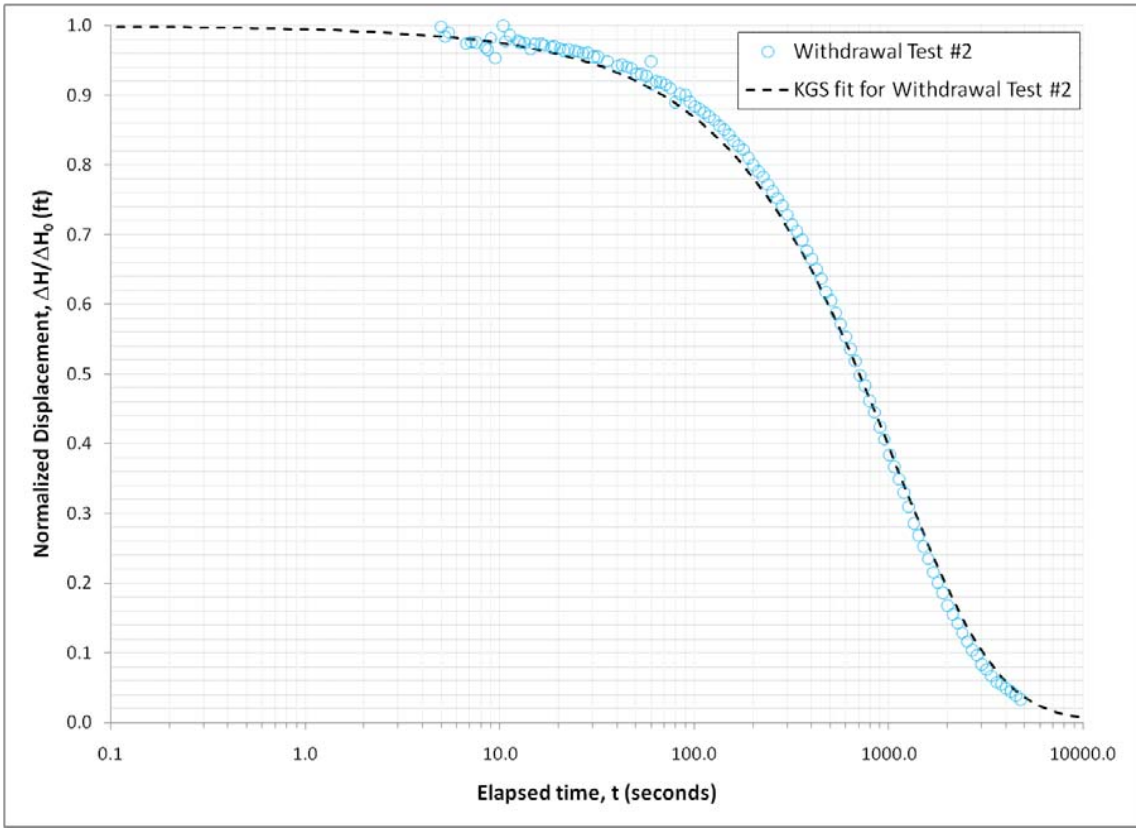

Figure 4-69. KGS Model Fit at 199-F5-53

4.11 Summary of Interpretations

Slug test data at ten wells is analyzed with the CBP and KGS methods. The estimated specific storage and hydraulic conductivities are tabulated on Table 4-2 and shown in Figure 4-70. It is to be noted that the reported storages are the specific storage and not the specific yield. In an unconfined aquifer, the drainage of the pores of the formation at the water table is quantified with the specific yield, also referred to as the drainable porosity. The effects of the slug tests are not sufficient to cause drainage of pores; therefore, the specific yield does not enter into the analysis. Rather, the changes in storage reflect an elastic response, and are more appropriately quantified with the specific storage or confined storage coefficient, also referred to as the storativity.

The reported hydraulic conductivity values on Table 4-2 are from the refined KGS analysis. The estimates from the preliminary CBP method are not reported to avoid confusion. While the KGS model is more accurate, the CBP model gives us a first-cut estimate of the storage coefficient and hydraulic conductivity. Since the CBP model neglects vertical flow, it gives us an upper bound estimate of the hydraulic conductivity. The hydraulic conductivity of the Hanford formation ranged from 14 m/d (1.62×10^{-4} m/s) to 48 m/d (5.56×10^{-4} m/s). The hydraulic conductivity of the RUM ranged from 0.2 m/d (2.31×10^{-6} m/s) to 0.8 m/d (9.26×10^{-6} m/s).

Table 2. Estimated Aquifer Properties

Well name	Geologic Unit	KGS method		
		Specific Storage (m^{-1}) Error! ookmark not defined.	**Hydraulic Conductivity (m/d)**	**Hydraulic Conductivity (m/s)**
199-F7-3	Hanford	3.5×10^{-6}	20	2.31×10^{-4}
199-F5-47	Hanford	2.3×10^{-6}	23	2.66×10^{-4}
199-F5-46	Hanford	3.1×10^{-6}	48	5.56×10^{-4}
199-F5-44	Hanford	2.4×10^{-6}	14	1.62×10^{-4}
199-F5-43A	Hanford	2.4×10^{-6}	26	3.01×10^{-4}
199-F5-42	Hanford	2.3×10^{-6}	18	2.08×10^{-4}
199-F5-52	Hanford	2.5×10^{-6}	23	2.66×10^{-4}
199-F5-54	Hanford	2.2×10^{-6}	34	3.94×10^{-4}
199-F5-43B	RUM	3.3×10^{-5}	0.8	9.26×10^{-6}
199-F5-53	RUM	1.6×10^{-4}	0.2	2.31×10^{-6}

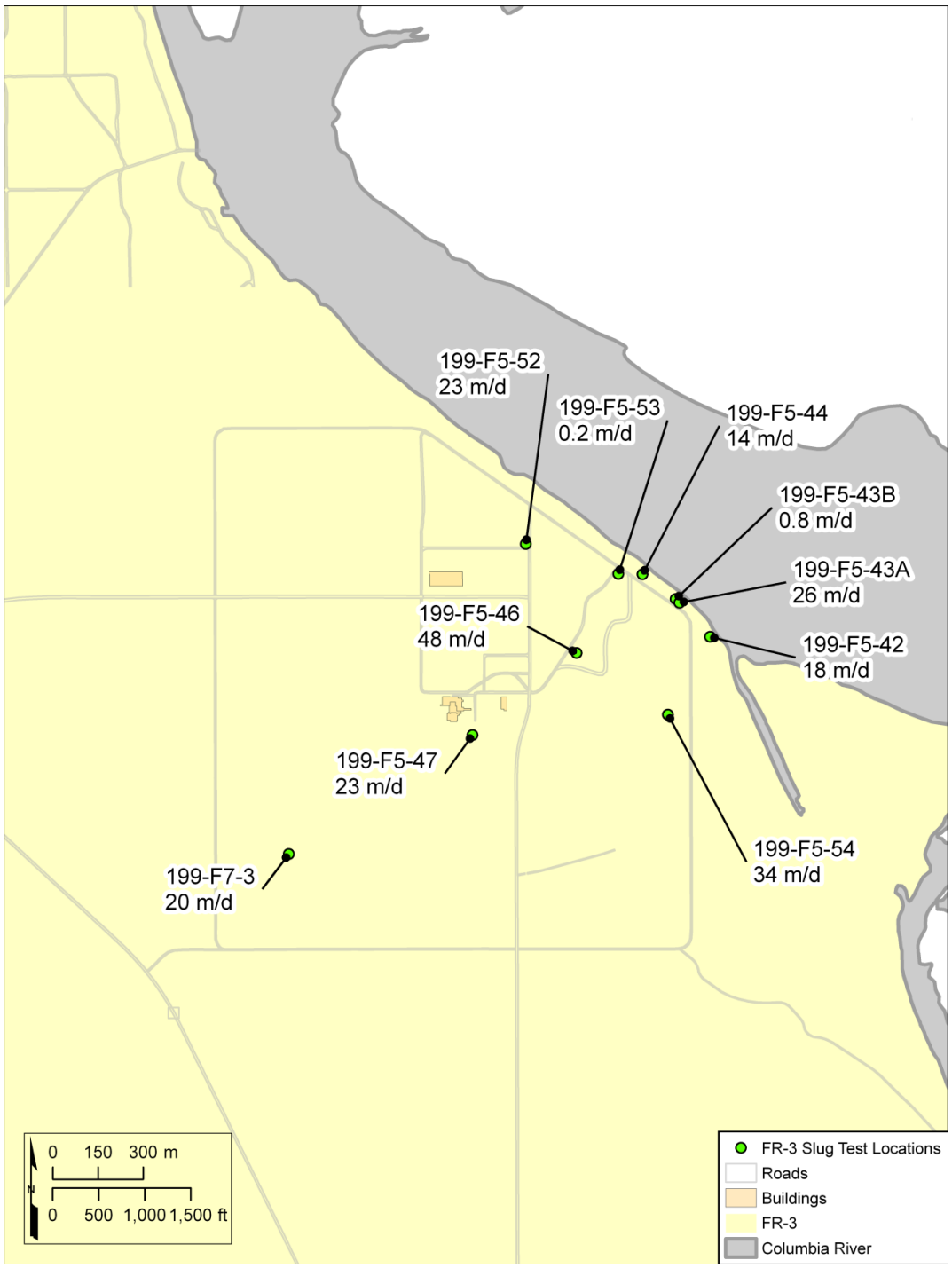

Figure 4-70. Slug Test Results

5. References

1. Bouwer, H., and R.C. Rice, 1976: A slug test for determining hydraulic conductivity of unconfined aquifers with completely or partially penetrating wells, Water Resources Research, v. 12, n. 3, pp. 423-428.

2. Cooper, H.H., Jr., J.D. Bredehoeft, and I.S. Papadopulos, 1967: Response of a finite diameter well to an instantaneous charge of water, Water Resources Research, v. 3, n. 1, pp. 263-269.

3. Freeze, R.A., and J.A. Cherry, 1979: Groundwater, Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

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5. Hvorslev, M.J., 1951: Time lag and soil permeability in ground-water observations, Bulletin 36, US Army Corps of Engineers, Waterways Experiment Station, Vicksburg, Mississippi, 55 pp.

6. Spane, F.A., and D.R.Newcomer, 2008: Results of Detailed Hydrologic Characterization Tests — Fiscal and Calendar Year 2005, PNNL-17348, Pacific Northwest Laboratory, Richland, Washington, pp. 4-3.

7. Younger, P.L., 1993: Simple generalized methods for estimating aquifer storage parameters, Quarterly Journal of Engineering Geology, 26, pp. 127-135.

Appendix A: Slug Test Data

Data collected during 100-FR-3 slug tests are included in electronic files on the enclosed compact disk.

Slug Testing at 199-F5-42 (A4591)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	24.60
D-T-B (ft TOC)	38.70
Stick up (ft)	3.14
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754
Max WL Change (ft)	4.86	3.65	4.85	3.13

Slug Testing was performed on 9/21/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-42

Slug Volume 0.3276 ft^3

Raw File:	199-F5-42 slug test 21Sept10_Append_2010-09-21_16-14-11-843.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/21/2010		4.86	3.65
Test start:	8:33	injection 1		
Test restart:	8:43	withdrawal 1		
Test restart:	8:56	injection 2	**Max Change Test 2**	
Test restart:	9:05	withdrawal 2	Injection 2	Withdrawal 2
Test Stop	9:15	end	4.85	3.13
Slug Volume:	0.3276 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:33	0.001	13.0112	0.1203	57.34359
9/21/2010 8:33	0.004	13.5238	0.6329	57.354797
9/21/2010 8:33	0.009	13.9	1.0091	57.347054
9/21/2010 8:33	0.013	15.9325	3.0416	57.356499
9/21/2010 8:33	0.017	17.6551	4.7642	57.35392
9/21/2010 8:33	0.021	17.7459	4.855	57.354797
9/21/2010 8:33	0.025	16.6192	3.7283	57.346172
9/21/2010 8:33	0.033	16.7582	3.8673	57.351334
9/21/2010 8:33	0.038	13.2502	0.3593	57.355675
9/21/2010 8:33	0.042	14.0434	1.1525	57.352215
9/21/2010 8:33	0.046	14.6488	1.7579	57.354797
9/21/2010 8:33	0.050	14.2491	1.3582	57.349632
9/21/2010 8:33	0.054	14.1892	1.2983	57.349632
9/21/2010 8:33	0.058	14.0623	1.1714	57.347054
9/21/2010 8:33	0.063	13.653	0.7621	57.351334
9/21/2010 8:33	0.067	13.6222	0.7313	57.342766
9/21/2010 8:33	0.073	13.7112	0.8203	57.329033
9/21/2010 8:33	0.079	13.589	0.6981	57.312721
9/21/2010 8:33	0.086	13.566	0.6751	57.292065
9/21/2010 8:33	0.093	13.4874	0.5965	57.292889
9/21/2010 8:33	0.100	13.4847	0.5938	57.280914
9/21/2010 8:33	0.108	13.4504	0.5595	57.270584
9/21/2010 8:33	0.117	13.3909	0.5	57.256798
9/21/2010 8:33	0.125	13.3623	0.4714	57.247406
9/21/2010 8:33	0.135	13.3149	0.424	57.236252
9/21/2010 8:33	0.145	13.2919	0.401	57.227631
9/21/2010 8:33	0.155	13.2619	0.371	57.219887

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:33	0.166	13.2163	0.3254	57.207031
9/21/2010 8:33	0.178	13.1876	0.2967	57.192364
9/21/2010 8:33	0.191	13.1619	0.271	57.184673
9/21/2010 8:33	0.204	13.135	0.2441	57.176983
9/21/2010 8:33	0.218	13.1172	0.2263	57.159843
9/21/2010 8:33	0.233	13.1002	0.2093	57.152924
9/21/2010 8:33	0.249	13.0768	0.1859	57.158089
9/21/2010 8:33	0.265	13.0673	0.1764	57.137432
9/21/2010 8:33	0.283	13.0586	0.1677	57.115128
9/21/2010 8:33	0.302	13.0465	0.1556	57.100517
9/21/2010 8:33	0.322	13.0108	0.1199	57.085907
9/21/2010 8:33	0.343	13.0178	0.1269	57.075577
9/21/2010 8:33	0.365	13.0043	0.1134	57.065308
9/21/2010 8:33	0.389	12.9873	0.0964	57.048168
9/21/2010 8:33	0.414	12.9826	0.0917	57.030922
9/21/2010 8:33	0.440	12.9826	0.0917	57.012077
9/21/2010 8:33	0.468	12.9795	0.0886	56.994061
9/21/2010 8:33	0.498	12.9639	0.073	57.006912
9/21/2010 8:33	0.529	12.9552	0.0643	56.961376
9/21/2010 8:33	0.563	12.9682	0.0773	56.941658
9/21/2010 8:33	0.598	12.9587	0.0678	56.920177
9/21/2010 8:33	0.635	12.9691	0.0782	56.900459
9/21/2010 8:33	0.675	12.9422	0.0513	56.879803
9/21/2010 8:33	0.717	12.9526	0.0617	56.852337
9/21/2010 8:33	0.761	12.9521	0.0612	56.831738
9/21/2010 8:33	0.808	12.96	0.0691	56.802567
9/21/2010 8:33	0.858	12.9521	0.0612	56.780266
9/21/2010 8:33	0.911	12.9274	0.0365	56.755325
9/21/2010 8:34	0.967	12.9457	0.0548	56.726158
9/21/2010 8:34	1.027	12.9361	0.0452	56.696991
9/21/2010 8:34	1.087	12.9417	0.0508	56.669472
9/21/2010 8:34	1.157	12.9404	0.0495	56.638653
9/21/2010 8:34	1.227	12.9391	0.0482	56.626625
9/21/2010 8:34	1.297	12.933	0.0421	56.581139
9/21/2010 8:34	1.377	12.9352	0.0443	56.541641
9/21/2010 8:34	1.467	12.9356	0.0447	56.500443
9/21/2010 8:34	1.547	12.9291	0.0382	56.466991
9/21/2010 8:34	1.647	12.93	0.0391	56.430077
9/21/2010 8:34	1.747	12.9187	0.0278	56.394043
9/21/2010 8:34	1.847	12.9179	0.027	56.374268
9/21/2010 8:35	1.957	12.9183	0.0274	56.323677
9/21/2010 8:35	2.079	12.9118	0.0209	56.314224
9/21/2010 8:35	2.207	12.9113	0.0204	56.247265

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:35	2.337	12.9013	0.0104	56.222488
9/21/2010 8:35	2.477	12.9074	0.0165	56.168381
9/21/2010 8:35	2.627	12.9187	0.0278	56.124657
9/21/2010 8:35	2.787	12.9122	0.0213	56.086922
9/21/2010 8:36	2.947	12.9074	0.0165	56.050884
9/21/2010 8:36	3.127	12.9065	0.0156	56.002052
9/21/2010 8:36	3.317	12.907	0.0161	55.956566
9/21/2010 8:36	3.517	12.9057	0.0148	55.922287
9/21/2010 8:36	3.727	12.9122	0.0213	55.870872
9/21/2010 8:37	3.947	12.8974	0.0065	55.828026
9/21/2010 8:37	4.187	12.9	0.0091	55.78595
9/21/2010 8:37	4.437	12.9057	0.0148	55.749092
9/21/2010 8:37	4.697	12.9448	0.0539	55.706245
9/21/2010 8:38	4.977	12.9096	0.0187	55.665977
9/21/2010 8:38	5.277	12.9031	0.0122	55.629997
9/21/2010 8:38	5.587	12.8944	0.0035	55.605114
9/21/2010 8:38	5.927	12.9092	0.0183	55.56221
9/21/2010 8:39	6.277	12.89	-0.0009	55.531395
9/21/2010 8:39	6.647	12.8996	0.0087	55.49366
9/21/2010 8:40	7.047	12.9078	0.0169	55.464546
9/21/2010 8:40	7.467	12.9105	0.0196	55.438835
9/21/2010 8:40	7.907	12.9087	0.0178	55.413128
9/21/2010 8:41	8.377	12.89	-0.0009	55.396042
9/21/2010 8:41	8.877	12.8966	0.0057	55.366875
9/21/2010 8:42	9.407	12.8918	0.0009	55.344574

Log Notes:

Date and Time	Note
9/21/2010 8:32	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/21/2010 8:33	Manual Start Command
9/21/2010 8:33	Log Download - Used Battery: 8% Used Memory: 17% User Name: H0066555
9/21/2010 8:42	Restart Command
9/21/2010 8:43	Log Download - Used Battery: 8% Used Memory: 17% User Name: H0066555
9/21/2010 8:56	Restart Command
9/21/2010 8:56	Log Download - Used Battery: 8% Used Memory: 17% User Name: H0066555
9/21/2010 9:05	Restart Command
9/21/2010 9:10	Log Download - Used Battery: 8% Used Memory: 17% User Name: H0066555
9/21/2010 9:13	Log Download - Used Battery: 8% Used Memory: 17% User Name: H0066555
9/21/2010 9:15	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:43	0.001	12.8892	0	55.440536
9/21/2010 8:43	0.004	12.5911	-0.2981	55.448284
9/21/2010 8:43	0.008	9.2344	-3.6548	55.448284
9/21/2010 8:43	0.017	10.7792	-2.11	55.458611
9/21/2010 8:43	0.021	10.4042	-2.485	55.464546
9/21/2010 8:43	0.025	9.9353	-2.9539	55.471466
9/21/2010 8:43	0.029	10.0787	-2.8105	55.47229
9/21/2010 8:43	0.033	10.1586	-2.7306	55.473167
9/21/2010 8:43	0.037	10.2612	-2.628	55.478222
9/21/2010 8:43	0.042	10.3824	-2.5068	55.481682
9/21/2010 8:43	0.046	10.4602	-2.429	55.481682
9/21/2010 8:43	0.050	10.5532	-2.336	55.48344
9/21/2010 8:43	0.054	10.6254	-2.2638	55.491131
9/21/2010 8:43	0.058	10.7179	-2.1713	55.4869
9/21/2010 8:43	0.062	10.8044	-2.0848	55.495415
9/21/2010 8:43	0.067	10.8735	-2.0157	55.491955
9/21/2010 8:43	0.071	10.9513	-1.9379	55.494537
9/21/2010 8:43	0.075	11.0273	-1.8619	55.497116
9/21/2010 8:43	0.081	11.1116	-1.7776	55.481682
9/21/2010 8:43	0.087	11.228	-1.6612	55.473991
9/21/2010 8:43	0.097	11.3675	-1.5217	55.474869
9/21/2010 8:43	0.101	11.4302	-1.459	55.487724
9/21/2010 8:43	0.108	11.5122	-1.377	55.468002
9/21/2010 8:43	0.116	11.6182	-1.271	55.455151
9/21/2010 8:43	0.125	11.7314	-1.1578	55.450813
9/21/2010 8:43	0.133	11.8029	-1.0863	55.444
9/21/2010 8:43	0.143	11.9063	-0.9829	55.435432

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:43	0.153	11.9971	-0.8921	55.432022
9/21/2010 8:43	0.163	12.056	-0.8332	55.423401
9/21/2010 8:43	0.174	12.1489	-0.7403	55.41571
9/21/2010 8:43	0.186	12.2323	-0.6569	55.41571
9/21/2010 8:43	0.205	12.3873	-0.5019	55.434551
9/21/2010 8:43	0.212	12.366	-0.5232	55.437958
9/21/2010 8:43	0.226	12.43	-0.4592	55.416588
9/21/2010 8:43	0.241	12.502	-0.3872	55.426861
9/21/2010 8:43	0.257	12.5477	-0.3415	55.412247
9/21/2010 8:43	0.273	12.6033	-0.2859	55.406319
9/21/2010 8:43	0.291	12.6585	-0.2307	55.418346
9/21/2010 8:43	0.310	12.6919	-0.1973	55.401154
9/21/2010 8:43	0.330	12.7332	-0.156	55.391762
9/21/2010 8:43	0.351	12.7554	-0.1338	55.391762
9/21/2010 8:43	0.373	12.778	-0.1112	55.411423
9/21/2010 8:43	0.397	12.8088	-0.0804	55.388298
9/21/2010 8:43	0.422	12.8245	-0.0647	55.382309
9/21/2010 8:43	0.448	12.8401	-0.0491	55.425102
9/21/2010 8:43	0.476	12.8514	-0.0378	55.381485
9/21/2010 8:43	0.506	12.8731	-0.0161	55.374565
9/21/2010 8:43	0.539	12.8731	-0.0161	55.388298
9/21/2010 8:43	0.571	12.8835	-0.0057	55.371986
9/21/2010 8:43	0.606	12.8931	0.0039	55.371162
9/21/2010 8:43	0.643	12.8957	0.0065	55.371162
9/21/2010 8:43	0.683	12.9139	0.0247	55.364349
9/21/2010 8:43	0.725	12.9105	0.0213	55.3549
9/21/2010 8:43	0.769	12.9105	0.0213	55.348034
9/21/2010 8:43	0.816	12.9113	0.0221	55.337761
9/21/2010 8:43	0.866	12.9113	0.0221	55.343697
9/21/2010 8:43	0.919	12.9135	0.0243	55.334301
9/21/2010 8:43	0.975	12.9283	0.0391	55.324081
9/21/2010 8:44	1.035	12.9178	0.0286	55.327492
9/21/2010 8:44	1.095	12.923	0.0338	55.316338
9/21/2010 8:44	1.165	12.9274	0.0382	55.33606
9/21/2010 8:44	1.235	12.9165	0.0273	55.308647
9/21/2010 8:44	1.305	12.91	0.0208	55.299202
9/21/2010 8:44	1.385	12.9109	0.0217	55.297497
9/21/2010 8:44	1.475	12.9226	0.0334	55.287224
9/21/2010 8:44	1.555	12.9152	0.026	55.281181
9/21/2010 8:44	1.655	12.9222	0.033	55.273544
9/21/2010 8:44	1.755	12.9248	0.0356	55.27179
9/21/2010 8:44	1.855	12.8992	0.01	55.2658
9/21/2010 8:44	1.965	12.9117	0.0225	55.25811

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:45	2.085	12.9165	0.0273	55.249542
9/21/2010 8:45	2.215	12.9122	0.023	55.24696
9/21/2010 8:45	2.345	12.8996	0.0104	55.240093
9/21/2010 8:45	2.485	12.9143	0.0251	55.234985
9/21/2010 8:45	2.635	12.9065	0.0173	55.228065
9/21/2010 8:45	2.795	12.9491	0.0599	55.227242
9/21/2010 8:45	2.955	12.9161	0.0269	55.223007
9/21/2010 8:46	3.135	12.9474	0.0582	55.213562
9/21/2010 8:46	3.325	12.9091	0.0199	55.209274
9/21/2010 8:46	3.525	12.9178	0.0286	55.20417
9/21/2010 8:46	3.735	12.9222	0.033	55.203232
9/21/2010 8:46	3.955	12.9157	0.0265	55.198181
9/21/2010 8:47	4.195	12.9087	0.0195	55.189499
9/21/2010 8:47	4.445	12.9204	0.0312	55.187851
9/21/2010 8:47	4.705	12.9139	0.0247	55.179283
9/21/2010 8:47	4.985	12.9135	0.0243	55.177528
9/21/2010 8:48	5.285	12.9017	0.0125	55.169014
9/21/2010 8:48	5.595	12.9061	0.0169	55.163849
9/21/2010 8:48	5.935	12.9074	0.0182	55.1544
9/21/2010 8:49	6.285	12.9126	0.0234	55.146767
9/21/2010 8:49	6.655	12.9131	0.0239	55.143303
9/21/2010 8:50	7.055	12.9122	0.023	55.145004
9/21/2010 8:50	7.475	12.91	0.0208	55.147644
9/21/2010 8:50	7.915	12.9131	0.0239	55.145004
9/21/2010 8:51	8.385	12.9044	0.0152	55.143303
40442.36936	8.885	12.9074	0.0182	55.14418
9/21/2010 8:52	9.415	12.9014	0.0122	55.14418
9/21/2010 8:52	9.975	12.9061	0.0169	55.142426
40442.37054	10.575	12.9009	0.0117	55.14418
40442.37096	11.175	12.9118	0.0226	55.148415
40442.37145	11.875	12.9196	0.0304	55.156158
40442.37193	12.575	12.9096	0.0204	55.155281
40442.37242	13.275	12.9057	0.0165	55.162148

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:56	0.001	12.9105	0	55.276073
9/21/2010 8:56	0.004	15.5663	2.6558	55.291454
9/21/2010 8:56	0.012	17.6613	4.7508	55.299202
9/21/2010 8:56	0.017	17.6855	4.775	55.306011
9/21/2010 8:56	0.021	15.7246	2.8141	55.305187
9/21/2010 8:56	0.025	15.5061	2.5956	55.313812
9/21/2010 8:56	0.029	15.2887	2.3782	55.313812
9/21/2010 8:56	0.033	17.7564	4.8459	55.316338
9/21/2010 8:56	0.037	14.1127	1.2022	55.325787
9/21/2010 8:56	0.046	13.139	0.2285	55.329247
9/21/2010 8:56	0.050	13.9098	0.9993	55.331772
9/21/2010 8:56	0.054	14.1431	1.2326	55.331772
9/21/2010 8:56	0.058	14.3776	1.4671	55.334301
9/21/2010 8:56	0.062	13.9059	0.9954	55.335182
9/21/2010 8:56	0.067	13.734	0.8235	55.342049
9/21/2010 8:56	0.071	13.7829	0.8724	55.33952
9/21/2010 8:56	0.075	13.6352	0.7247	55.342926
9/21/2010 8:56	0.081	13.7104	0.7999	55.324081
9/21/2010 8:56	0.087	13.6536	0.7431	55.316338
9/21/2010 8:56	0.094	13.6167	0.7062	55.312054
9/21/2010 8:56	0.101	13.5692	0.6587	55.303482
9/21/2010 8:56	0.108	13.5144	0.6039	55.300903
9/21/2010 8:56	0.116	13.4871	0.5766	55.294037
9/21/2010 8:56	0.125	13.4479	0.5374	55.288101
9/21/2010 8:56	0.133	13.3993	0.4888	55.285522
9/21/2010 8:56	0.143	13.371	0.4605	55.281181
9/21/2010 8:56	0.153	13.3441	0.4336	55.273544

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:56	0.163	13.3159	0.4054	55.275249
9/21/2010 8:56	0.174	13.2746	0.3641	55.27179
9/21/2010 8:56	0.186	13.2511	0.3406	55.267502
9/21/2010 8:56	0.199	13.2164	0.3059	55.264923
9/21/2010 8:56	0.212	13.1942	0.2837	55.250366
9/21/2010 8:56	0.226	13.1803	0.2698	55.258934
9/21/2010 8:57	0.241	13.139	0.2285	55.251244
9/21/2010 8:57	0.257	13.1456	0.2351	55.275249
9/21/2010 8:57	0.273	13.1312	0.2207	55.253769
9/21/2010 8:57	0.291	13.0881	0.1776	55.246078
9/21/2010 8:57	0.310	13.0925	0.182	55.244377
9/21/2010 8:57	0.330	13.0747	0.1642	55.24696
9/21/2010 8:57	0.353	13.0791	0.1686	55.244377
9/21/2010 8:57	0.373	13.0508	0.1403	55.24696
9/21/2010 8:57	0.397	13.0351	0.1246	55.242676
9/21/2010 8:57	0.422	13.0451	0.1346	55.241798
9/21/2010 8:57	0.448	13.026	0.1155	55.240974
9/21/2010 8:57	0.476	13.016	0.1055	55.240974
9/21/2010 8:57	0.506	13.0195	0.109	55.236687
9/21/2010 8:57	0.537	13.0121	0.1016	55.237564
9/21/2010 8:57	0.571	12.9982	0.0877	55.236687
9/21/2010 8:57	0.606	13.0017	0.0912	55.236687
9/21/2010 8:57	0.643	12.9935	0.083	55.236687
9/21/2010 8:57	0.683	12.9878	0.0773	55.228943
9/21/2010 8:57	0.725	13.0043	0.0938	55.233227
9/21/2010 8:57	0.769	12.9865	0.076	55.232403
9/21/2010 8:57	0.816	12.9886	0.0781	55.231522
9/21/2010 8:57	0.866	12.983	0.0725	55.228943
9/21/2010 8:57	0.919	12.9726	0.0621	55.228943
9/21/2010 8:57	0.975	12.9656	0.0551	55.228943
9/21/2010 8:57	1.035	12.973	0.0625	55.22982
9/21/2010 8:57	1.095	12.9691	0.0586	55.228065
9/21/2010 8:57	1.165	12.9526	0.0421	55.224712
9/21/2010 8:58	1.235	12.9643	0.0538	55.226418
9/21/2010 8:58	1.305	12.9639	0.0534	55.219551
9/21/2010 8:58	1.385	12.9517	0.0412	55.219551
9/21/2010 8:58	1.475	12.9682	0.0577	55.22213
9/21/2010 8:58	1.555	12.9465	0.036	55.219551
9/21/2010 8:58	1.655	12.953	0.0425	55.221252
9/21/2010 8:58	1.755	12.9356	0.0251	55.219551
9/21/2010 8:58	1.855	12.9356	0.0251	55.219551
9/21/2010 8:58	1.965	12.9535	0.043	55.219551
9/21/2010 8:58	2.085	12.9469	0.0364	55.224712

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 8:58	2.215	12.9426	0.0321	55.21867
9/21/2010 8:59	2.345	12.93	0.0195	55.21867
9/21/2010 8:59	2.485	12.933	0.0225	55.219551
9/21/2010 8:59	2.635	12.92	0.0095	55.216965
9/21/2010 8:59	2.795	12.9352	0.0247	55.220428
9/21/2010 8:59	2.955	12.9313	0.0208	55.219551
9/21/2010 8:59	3.135	12.917	0.0065	55.226418
9/21/2010 9:00	3.325	12.9157	0.0052	55.219551
9/21/2010 9:00	3.525	12.9196	0.0091	55.225536
9/21/2010 9:00	3.735	12.9274	0.0169	55.224712
9/21/2010 9:00	3.955	12.9187	0.0082	55.223778
9/21/2010 9:00	4.195	12.9252	0.0147	55.226418
9/21/2010 9:01	4.445	12.92	0.0095	55.228065
9/21/2010 9:01	4.705	12.923	0.0125	55.233227
9/21/2010 9:01	4.985	12.9161	0.0056	55.232403
9/21/2010 9:02	5.285	12.9252	0.0147	55.231522
9/21/2010 9:02	5.595	12.9144	0.0039	55.234985
9/21/2010 9:02	5.935	12.9204	0.0099	55.239269
9/21/2010 9:03	6.285	12.9179	0.0074	55.2435
9/21/2010 9:03	6.655	12.9174	0.0069	55.252068
9/21/2010 9:03	7.055	12.9252	0.0147	55.25811
9/21/2010 9:04	7.475	12.9213	0.0108	55.253769
9/21/2010 9:04	7.915	12.9209	0.0104	55.25811

Withdrawal #2

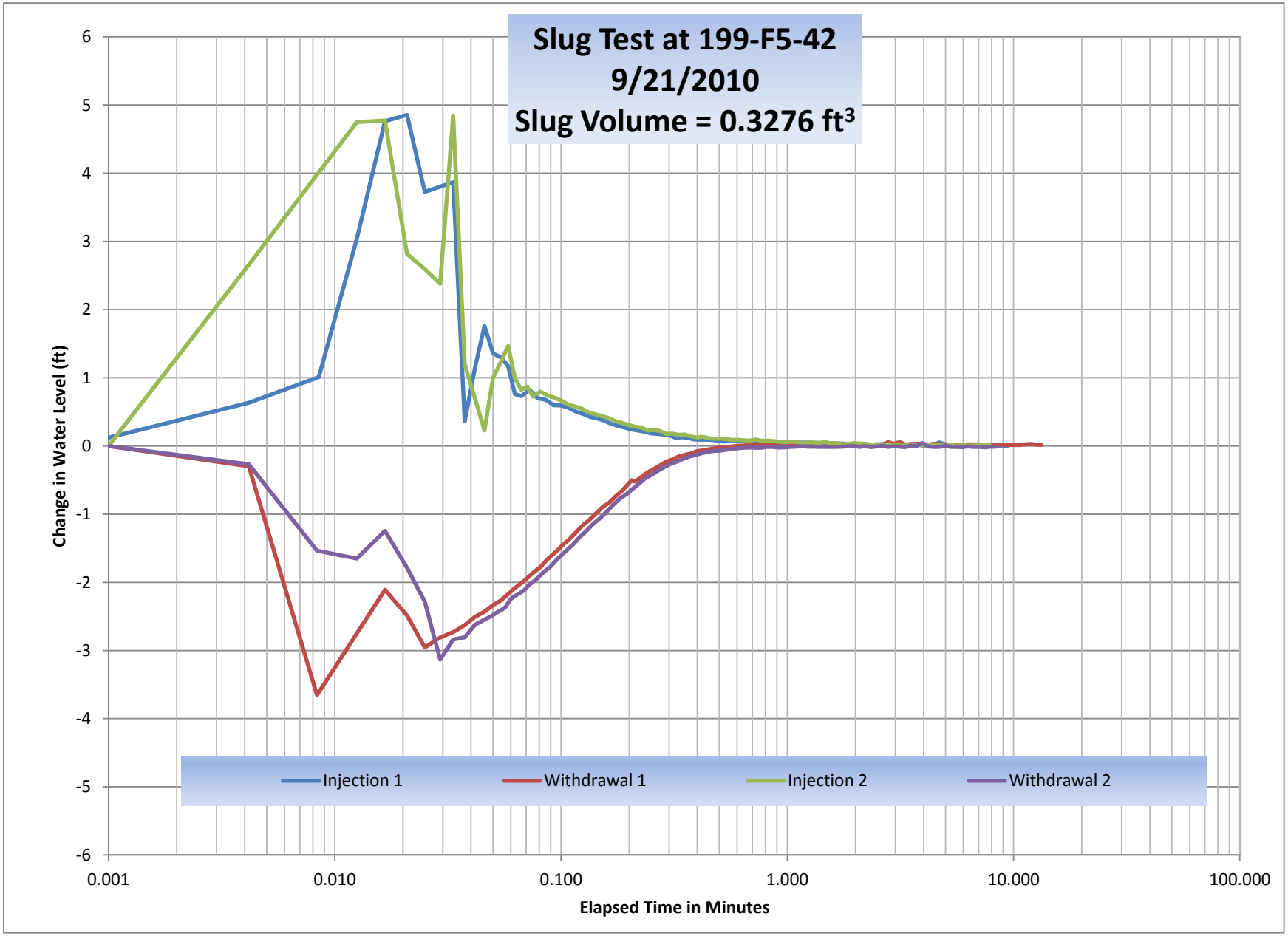
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:05	0.001	12.9318	0	55.369457
9/21/2010 9:05	0.004	12.6628	-0.269	55.378029
9/21/2010 9:05	0.008	11.3962	-1.5356	55.386597
9/21/2010 9:05	0.012	11.2819	-1.6499	55.387421
9/21/2010 9:05	0.017	11.6853	-1.2465	55.394287
9/21/2010 9:05	0.021	11.1451	-1.7867	55.396866
9/21/2010 9:05	0.025	10.647	-2.2848	55.404613
9/21/2010 9:05	0.029	9.7969	-3.1349	55.401154
9/21/2010 9:05	0.033	10.092	-2.8398	55.404613
9/21/2010 9:05	0.037	10.1259	-2.8059	55.408897
9/21/2010 9:05	0.042	10.3093	-2.6225	55.410545
9/21/2010 9:05	0.049	10.4353	-2.4965	55.47229
9/21/2010 9:05	0.053	10.5005	-2.4313	55.467125
9/21/2010 9:05	0.056	10.5584	-2.3734	55.458611
9/21/2010 9:05	0.060	10.6944	-2.2374	55.457733
9/21/2010 9:05	0.069	10.811	-2.1208	55.414009
9/21/2010 9:05	0.072	10.8949	-2.0369	55.426861
9/21/2010 9:05	0.076	10.947	-1.9848	55.434551
9/21/2010 9:05	0.080	11.0096	-1.9222	55.441418
9/21/2010 9:05	0.084	11.0908	-1.841	55.431145
9/21/2010 9:05	0.090	11.1655	-1.7663	55.422577
9/21/2010 9:05	0.097	11.2795	-1.6523	55.408897
9/21/2010 9:05	0.104	11.3776	-1.5542	55.396866
9/21/2010 9:05	0.112	11.4728	-1.459	55.382309
9/21/2010 9:05	0.121	11.5941	-1.3377	55.376324
9/21/2010 9:05	0.129	11.6801	-1.2517	55.377205
9/21/2010 9:05	0.139	11.7914	-1.1404	55.369457

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:05	0.149	11.8737	-1.0581	55.366051
9/21/2010 9:05	0.159	11.9641	-0.9677	55.359131
9/21/2010 9:05	0.170	12.0679	-0.8639	55.35743
9/21/2010 9:05	0.182	12.1588	-0.773	55.358307
9/21/2010 9:05	0.195	12.2266	-0.7052	55.346329
9/21/2010 9:05	0.208	12.3083	-0.6235	55.347153
9/21/2010 9:05	0.222	12.3847	-0.5471	55.342926
9/21/2010 9:05	0.237	12.4651	-0.4667	55.342926
9/21/2010 9:05	0.253	12.5134	-0.4184	55.33606
9/21/2010 9:05	0.269	12.5719	-0.3599	55.335182
9/21/2010 9:05	0.287	12.625	-0.3068	55.33606
9/21/2010 9:05	0.306	12.6707	-0.2611	55.335182
9/21/2010 9:05	0.326	12.7028	-0.229	55.331772
9/21/2010 9:05	0.347	12.7437	-0.1881	55.328316
9/21/2010 9:05	0.369	12.7754	-0.1564	55.326668
9/21/2010 9:05	0.393	12.8001	-0.1317	55.327492
9/21/2010 9:05	0.418	12.8245	-0.1073	55.324081
9/21/2010 9:05	0.444	12.8444	-0.0874	55.323204
9/21/2010 9:05	0.472	12.8596	-0.0722	55.318039
9/21/2010 9:05	0.502	12.8622	-0.0696	55.316338
9/21/2010 9:05	0.533	12.8753	-0.0565	55.317215
9/21/2010 9:05	0.567	12.8848	-0.047	55.315514
9/21/2010 9:05	0.602	12.8966	-0.0352	55.315514
9/21/2010 9:05	0.639	12.9048	-0.027	55.312935
9/21/2010 9:05	0.679	12.9083	-0.0235	55.30777
9/21/2010 9:05	0.721	12.9052	-0.0266	55.30777
9/21/2010 9:05	0.765	12.9057	-0.0261	55.305187
9/21/2010 9:05	0.812	12.9179	-0.0139	55.303482
9/21/2010 9:06	0.862	12.9187	-0.0131	55.305187
9/21/2010 9:06	0.915	12.9083	-0.0235	55.297497
9/21/2010 9:06	0.971	12.9109	-0.0209	55.297497
9/21/2010 9:06	1.031	12.9196	-0.0122	55.300079
9/21/2010 9:06	1.091	12.9204	-0.0114	55.295792
9/21/2010 9:06	1.161	12.9291	-0.0027	55.294914
9/21/2010 9:06	1.231	12.9226	-0.0092	55.29063
9/21/2010 9:06	1.301	12.9217	-0.0101	55.289749
9/21/2010 9:06	1.381	12.9183	-0.0135	55.31123
9/21/2010 9:06	1.471	12.9183	-0.0135	55.284645
9/21/2010 9:06	1.551	12.9192	-0.0126	55.285522
9/21/2010 9:06	1.651	12.9196	-0.0122	55.277779
9/21/2010 9:06	1.751	12.9204	-0.0114	55.279533
9/21/2010 9:07	1.851	12.9292	-0.0026	55.276073
9/21/2010 9:07	1.961	12.9309	-0.0009	55.273544

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:07	2.081	12.9165	-0.0153	55.276073
9/21/2010 9:07	2.211	12.9278	-0.004	55.274368
9/21/2010 9:07	2.341	12.9135	-0.0183	55.268326
9/21/2010 9:07	2.481	12.9256	-0.0062	55.270912
9/21/2010 9:07	2.631	12.933	0.0012	55.270912
9/21/2010 9:07	2.791	12.9187	-0.0131	55.269207
9/21/2010 9:08	2.951	12.9274	-0.0044	55.266624
9/21/2010 9:08	3.131	12.9222	-0.0096	55.264923
9/21/2010 9:08	3.321	12.9152	-0.0166	55.263275
9/21/2010 9:08	3.521	12.9339	0.0021	55.268326
9/21/2010 9:08	3.731	12.9296	-0.0022	55.268326
9/21/2010 9:09	3.951	12.9747	0.0429	55.264923
9/21/2010 9:09	4.191	12.9252	-0.0066	55.263275
9/21/2010 9:09	4.441	12.9165	-0.0153	55.258934
9/21/2010 9:09	4.701	12.9174	-0.0144	55.25811
9/21/2010 9:10	4.982	12.9365	0.0047	55.258934
9/21/2010 9:10	5.281	12.917	-0.0148	55.257233
9/21/2010 9:10	5.591	12.9196	-0.0122	55.2658
9/21/2010 9:11	5.931	12.9144	-0.0174	55.262341
9/21/2010 9:11	6.281	12.9252	-0.0066	55.261517
9/21/2010 9:11	6.651	12.9187	-0.0131	55.258934
9/21/2010 9:12	7.051	12.9165	-0.0153	55.25811
9/21/2010 9:12	7.471	12.9105	-0.0213	55.259811
9/21/2010 9:13	7.911	12.9204	-0.0114	55.252892
9/21/2010 9:13	8.381	12.9204	-0.0114	55.257233


Slug Test at 199-F5-42
9/21/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2

Slug Test Field Activity Report
Summary of FAR - 199-F5-42

Time	Note
8:33	3 inch stainless slug (0.2985 ft 3) volume in
8:43	3 inch slug stainless slug out.
8:56	3 inch stainless slug in. (Slug may hit a joint in well on insertion)
9:05	3 inch slug stainless slug out.
9:15	Stopped data logging and pulled slug from well.

Note* the slug volumes were recalculated by Robert Edrington, therefore there is a slight variation in the slug volumes in the field notes and raw data file name.

Slug Testing at 199-F5-43A (A4592)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	29.58
D-T-B (ft TOC)	43.50
Stick up (ft)	3.02
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754	3.754	3.754
Max WL Change (ft)	3.26	2.85	5.03	3.15	3.61	3.05

Slug Testing was performed on 9/21/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-43A

Slug Volume 0.3276 ft^3

Raw File:	199-F5-43A slug test 21Sept10_Append_2010-09-21_17-41-42-734.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/21/2010		3.26	2.85
Test start:	9:42	injection 1		
Test restart:	9:46	withdrawal 1	**Max Change Test 2**	
Test restart:	9:56	injection 2	Injection 2	Withdrawal 2
Test restart:	10:04	withdrawal 2	5.03	3.15
Test restart:	10:14	injection 3		
Test restart:	10:24	withdrawal 3	**Max Change Test 3**	
Test Stop	10:38	end	Injection 3	Withdrawal 3
Slug Volume:	0.3276 cu ft		3.61	3.05

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:42	0.001	12.4881	0	56.92
9/21/2010 9:42	0.008	13.5031	1.015	56.88
9/21/2010 9:42	0.012	13.7559	1.2678	56.9
9/21/2010 9:42	0.016	14.6158	2.1277	56.91
9/21/2010 9:42	0.020	14.7201	2.232	56.92
9/21/2010 9:42	0.025	15.7514	3.2633	56.9
9/21/2010 9:42	0.029	15.4626	2.9745	56.92
9/21/2010 9:42	0.033	15.5	3.0119	56.92
9/21/2010 9:42	0.038	12.5098	0.0217	56.92
9/21/2010 9:42	0.042	14.9654	2.4773	56.93
9/21/2010 9:42	0.045	12.7587	0.2706	56.93
9/21/2010 9:42	0.049	14.3608	1.8727	56.94
9/21/2010 9:42	0.053	13.6065	1.1184	56.94
9/21/2010 9:42	0.060	13.1132	0.6251	56.95
9/21/2010 9:42	0.064	13.4442	0.9561	56.95
9/21/2010 9:42	0.067	13.1175	0.6294	56.95
9/21/2010 9:42	0.071	13.155	0.6669	56.95
9/21/2010 9:42	0.075	13.349	0.8609	56.95
9/21/2010 9:42	0.078	13.4055	0.9174	56.95
9/21/2010 9:42	0.083	13.2842	0.7961	56.94
9/21/2010 9:42	0.089	13.1815	0.6934	56.93
9/21/2010 9:42	0.096	13.1301	0.642	56.91

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:42	0.103	13.0566	0.5685	56.89
9/21/2010 9:42	0.110	13.0249	0.5368	56.89
9/21/2010 9:42	0.118	12.9605	0.4724	56.89
9/21/2010 9:42	0.127	12.9174	0.4293	56.87
9/21/2010 9:42	0.135	12.91	0.4219	56.87
9/21/2010 9:42	0.145	12.8635	0.3754	56.85
9/21/2010 9:42	0.155	12.8256	0.3375	56.85
9/21/2010 9:42	0.165	12.79	0.3019	56.85
9/21/2010 9:42	0.176	12.7674	0.2793	56.84
9/21/2010 9:42	0.188	12.73	0.2419	56.84
9/21/2010 9:42	0.201	12.7078	0.2197	56.82
9/21/2010 9:42	0.214	12.6774	0.1893	56.83
9/21/2010 9:42	0.228	12.6665	0.1784	56.81
9/21/2010 9:42	0.243	12.6369	0.1488	56.81
9/21/2010 9:42	0.259	12.6312	0.1431	56.81
9/21/2010 9:42	0.275	12.616	0.1279	56.8
9/21/2010 9:42	0.293	12.6112	0.1231	56.8
9/21/2010 9:42	0.312	12.5908	0.1027	56.79
9/21/2010 9:42	0.332	12.5925	0.1044	56.79
9/21/2010 9:42	0.353	12.5617	0.0736	56.78
9/21/2010 9:42	0.375	12.57	0.0819	56.77
9/21/2010 9:42	0.399	12.5535	0.0654	56.76
9/21/2010 9:42	0.424	12.5413	0.0532	56.76
9/21/2010 9:42	0.450	12.5391	0.051	56.75
9/21/2010 9:42	0.478	12.549	0.0609	56.75
9/21/2010 9:42	0.508	12.5512	0.0631	56.73
9/21/2010 9:42	0.540	12.5429	0.0548	56.73
9/21/2010 9:42	0.573	12.5352	0.0471	56.72
9/21/2010 9:42	0.608	12.5369	0.0488	56.71
9/21/2010 9:42	0.645	12.5352	0.0471	56.7
9/21/2010 9:42	0.685	12.5278	0.0397	56.69
9/21/2010 9:42	0.727	12.5217	0.0336	56.69
9/21/2010 9:42	0.771	12.5187	0.0306	56.68
9/21/2010 9:42	0.818	12.5173	0.0292	56.67
9/21/2010 9:42	0.868	12.5078	0.0197	56.65
9/21/2010 9:42	0.921	12.5178	0.0297	56.64
9/21/2010 9:43	0.977	12.5178	0.0297	56.63
9/21/2010 9:43	1.037	12.5235	0.0354	56.62
9/21/2010 9:43	1.097	12.5104	0.0223	56.6
9/21/2010 9:43	1.168	12.5055	0.0174	56.59
9/21/2010 9:43	1.237	12.4961	0.008	56.58
9/21/2010 9:43	1.307	12.5291	0.041	56.57

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:43	1.387	12.4935	0.0054	56.55
9/21/2010 9:43	1.477	12.473	-0.0151	56.59
9/21/2010 9:43	1.557	12.5026	0.0145	56.53
9/21/2010 9:43	1.657	12.4813	-0.0068	56.53
9/21/2010 9:43	1.757	12.4917	0.0036	56.51
9/21/2010 9:43	1.857	12.4917	0.0036	56.49
9/21/2010 9:44	1.967	12.4835	-0.0046	56.48
9/21/2010 9:44	2.087	12.4774	-0.0107	56.47
9/21/2010 9:44	2.217	12.4787	-0.0094	56.44
9/21/2010 9:44	2.347	12.4778	-0.0103	56.43
9/21/2010 9:44	2.487	12.4765	-0.0116	56.44
9/21/2010 9:44	2.637	12.4701	-0.018	56.39
9/21/2010 9:44	2.797	12.4795	-0.0086	56.38
9/21/2010 9:44	2.957	12.5248	0.0367	56.36
9/21/2010 9:45	3.137	12.4762	-0.0119	56.34
9/21/2010 9:45	3.327	12.483	-0.0051	56.34
9/21/2010 9:45	3.527	12.4722	-0.0159	56.32
9/21/2010 9:45	3.737	12.4739	-0.0142	56.32
9/21/2010 9:45	3.957	12.4791	-0.009	56.28
9/21/2010 9:46	4.197	12.4735	-0.0146	56.26
9/21/2010 9:46	4.445	12.4762	-0.0119	56.24

Log Notes:

Date and Time	Note
9/21/2010 9:29	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/21/2010 9:42	Manual Start Command
9/21/2010 9:42	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 9:46	Restart Command
9/21/2010 9:46	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 9:52	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 9:55	Restart Command
9/21/2010 9:56	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 10:04	Restart Command
9/21/2010 10:14	Restart Command
9/21/2010 10:14	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 10:23	Restart Command
9/21/2010 10:24	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 10:31	Log Download - Used Battery: 8% Used Memory: 18% User Name: H0066555
9/21/2010 10:38	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:46	0.001	12.4669	0	56.36
9/21/2010 9:46	0.004	11.7305	-0.7364	56.37
9/21/2010 9:46	0.008	9.617	-2.8499	56.37
9/21/2010 9:46	0.013	10.018	-2.4489	56.37
9/21/2010 9:46	0.017	10.9732	-1.4937	56.38
9/21/2010 9:46	0.021	10.3124	-2.1545	56.38
9/21/2010 9:46	0.025	9.7816	-2.6853	56.38
9/21/2010 9:46	0.029	9.7338	-2.7331	56.38
9/21/2010 9:46	0.033	9.8465	-2.6204	56.39
9/21/2010 9:46	0.038	9.9579	-2.509	56.39
9/21/2010 9:46	0.042	10.0966	-2.3703	56.39
9/21/2010 9:46	0.046	10.2211	-2.2458	56.39
9/21/2010 9:46	0.050	10.3329	-2.134	56.39
9/21/2010 9:46	0.054	10.4447	-2.0222	56.39
9/21/2010 9:46	0.058	10.5413	-1.9256	56.39
9/21/2010 9:46	0.063	10.6422	-1.8247	56.4
9/21/2010 9:46	0.067	10.7653	-1.7016	56.38
9/21/2010 9:46	0.071	10.8872	-1.5797	56.37
9/21/2010 9:46	0.075	11.0229	-1.444	56.36
9/21/2010 9:46	0.081	11.1529	-1.314	56.36
9/21/2010 9:46	0.087	11.2691	-1.1978	56.35
9/21/2010 9:46	0.094	11.3752	-1.0917	56.34

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:46	0.101	11.5027	-0.9642	56.34
9/21/2010 9:46	0.108	11.5843	-0.8826	56.34
9/21/2010 9:46	0.116	11.7033	-0.7636	56.33
9/21/2010 9:46	0.125	11.797	-0.6699	56.32
9/21/2010 9:46	0.133	11.8753	-0.5916	56.32
9/21/2010 9:46	0.143	11.9506	-0.5163	56.31
9/21/2010 9:46	0.153	12.038	-0.4289	56.31
9/21/2010 9:46	0.163	12.1015	-0.3654	56.3
9/21/2010 9:46	0.174	12.1646	-0.3023	56.3
9/21/2010 9:46	0.186	12.1989	-0.268	56.3
9/21/2010 9:46	0.199	12.3054	-0.1615	56.32
9/21/2010 9:46	0.212	12.2949	-0.172	56.33
9/21/2010 9:46	0.226	12.3164	-0.1505	56.31
9/21/2010 9:46	0.241	12.3442	-0.1227	56.29
9/21/2010 9:46	0.257	12.3994	-0.0675	56.29
9/21/2010 9:46	0.273	12.4032	-0.0637	56.28
9/21/2010 9:46	0.291	12.4104	-0.0565	56.28
9/21/2010 9:46	0.310	12.4256	-0.0413	56.27
9/21/2010 9:46	0.330	12.4347	-0.0322	56.27
9/21/2010 9:46	0.351	12.4534	-0.0135	56.27
9/21/2010 9:46	0.373	12.4491	-0.0178	56.26
9/21/2010 9:46	0.397	12.4655	-0.0014	56.26
9/21/2010 9:47	0.422	12.4795	0.0126	56.26
9/21/2010 9:47	0.448	12.4764	0.0095	56.25
9/21/2010 9:47	0.476	12.4648	-0.0021	56.25
9/21/2010 9:47	0.506	12.483	0.0161	56.24
9/21/2010 9:47	0.537	12.48	0.0131	56.24
9/21/2010 9:47	0.571	12.4795	0.0126	56.23
9/21/2010 9:47	0.609	12.4813	0.0144	56.23
9/21/2010 9:47	0.643	12.4835	0.0166	56.23
9/21/2010 9:47	0.683	12.4714	0.0045	56.22
9/21/2010 9:47	0.725	12.4895	0.0226	56.22
9/21/2010 9:47	0.769	12.4817	0.0148	56.21
9/21/2010 9:47	0.816	12.4813	0.0144	56.21
9/21/2010 9:47	0.866	12.48	0.0131	56.2
9/21/2010 9:47	0.919	12.4675	0.0006	56.19
9/21/2010 9:47	0.976	12.484	0.0171	56.19
9/21/2010 9:47	1.035	12.4774	0.0105	56.18
9/21/2010 9:47	1.095	12.4788	0.0119	56.17
9/21/2010 9:47	1.165	12.4835	0.0166	56.19
9/21/2010 9:47	1.235	12.4692	0.0023	56.16
9/21/2010 9:48	1.305	12.467	1E-04	56.16

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:48	1.385	12.4762	0.0093	56.15
9/21/2010 9:48	1.475	12.4844	0.0175	56.15
9/21/2010 9:48	1.555	12.4892	0.0223	56.13
9/21/2010 9:48	1.655	12.4866	0.0197	56.13
9/21/2010 9:48	1.755	12.4862	0.0193	56.12
9/21/2010 9:48	1.855	12.4844	0.0175	56.12
9/21/2010 9:48	1.965	12.4762	0.0093	56.11
9/21/2010 9:48	2.085	12.4701	0.0032	56.1
9/21/2010 9:49	2.215	12.4905	0.0236	56.09
9/21/2010 9:49	2.345	12.4827	0.0158	56.09
9/21/2010 9:49	2.485	12.4757	0.0088	56.08
9/21/2010 9:49	2.635	12.4788	0.0119	56.08
9/21/2010 9:49	2.795	12.4862	0.0193	56.07
9/21/2010 9:50	2.955	12.4869	0.02	56.06
9/21/2010 9:50	3.135	12.4892	0.0223	56.05
9/21/2010 9:50	3.325	12.4831	0.0162	56.07
9/21/2010 9:50	3.525	12.4978	0.0309	56.04
9/21/2010 9:50	3.735	12.497	0.0301	56.04
9/21/2010 9:51	3.955	12.4805	0.0136	56.03
9/21/2010 9:51	4.195	12.4857	0.0188	56.03
9/21/2010 9:51	4.445	12.4744	0.0075	56.02
9/21/2010 9:52	4.705	12.4835	0.0166	56.02
9/21/2010 9:52	4.985	12.4883	0.0214	56.01
9/21/2010 9:52	5.285	12.4827	0.0158	56.01
9/21/2010 9:53	5.595	12.48	0.0131	56.01
9/21/2010 9:53	5.935	12.4788	0.0119	56
9/21/2010 9:53	6.285	12.4879	0.021	56
9/21/2010 9:54	6.655	12.4922	0.0253	56
9/21/2010 9:54	7.055	12.4931	0.0262	55.98
9/21/2010 9:55	7.475	12.4892	0.0223	55.98

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:55	0.001	12.4956	0	56.08
9/21/2010 9:55	0.004	13.4878	0.9922	56.09
9/21/2010 9:55	0.008	13.9323	1.4367	56.1
9/21/2010 9:55	0.013	13.8508	1.3552	56.1
9/21/2010 9:55	0.017	17.1533	4.6577	56.11
9/21/2010 9:55	0.021	16.7567	4.2611	56.11
9/21/2010 9:55	0.025	15.2064	2.7108	56.12
9/21/2010 9:55	0.029	13.5261	1.0305	56.12
9/21/2010 9:55	0.033	16.4158	3.9202	56.12
9/21/2010 9:55	0.038	12.5269	0.0313	56.12
9/21/2010 9:55	0.042	12.5978	0.1022	56.13
9/21/2010 9:55	0.046	17.5238	5.0282	56.13
9/21/2010 9:55	0.050	12.3341	-0.1615	56.13
9/21/2010 9:55	0.054	11.5171	-0.9785	56.14
9/21/2010 9:55	0.058	13.794	1.2984	56.14
9/21/2010 9:55	0.063	14.0946	1.599	56.14
9/21/2010 9:55	0.067	13.8732	1.3776	56.15
9/21/2010 9:55	0.071	13.3868	0.8912	56.15
9/21/2010 9:55	0.075	13.2493	0.7537	56.14
9/21/2010 9:55	0.081	13.4255	0.9299	56.13
9/21/2010 9:55	0.087	13.2955	0.7999	56.13
9/21/2010 9:55	0.094	13.221	0.7254	56.12

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:55	0.101	13.1693	0.6737	56.11
9/21/2010 9:55	0.108	13.1279	0.6323	56.11
9/21/2010 9:55	0.116	13.0853	0.5897	56.1
9/21/2010 9:55	0.125	13.014	0.5184	56.09
9/21/2010 9:55	0.133	12.9844	0.4888	56.09
9/21/2010 9:55	0.143	12.934	0.4384	56.09
9/21/2010 9:55	0.153	12.9087	0.4131	56.08
9/21/2010 9:55	0.163	12.857	0.3614	56.08
9/21/2010 9:56	0.174	12.8643	0.3687	56.07
9/21/2010 9:56	0.186	12.79	0.2944	56.07
9/21/2010 9:56	0.199	12.7739	0.2783	56.06
9/21/2010 9:56	0.212	12.753	0.2574	56.06
9/21/2010 9:56	0.226	12.7148	0.2192	56.06
9/21/2010 9:56	0.241	12.7069	0.2113	56.06
9/21/2010 9:56	0.257	12.6835	0.1879	56.06
9/21/2010 9:56	0.273	12.6557	0.1601	56.05
9/21/2010 9:56	0.291	12.6374	0.1418	56.05
9/21/2010 9:56	0.310	12.6496	0.154	56.05
9/21/2010 9:56	0.330	12.6183	0.1227	56.05
9/21/2010 9:56	0.351	12.6113	0.1157	56.05
9/21/2010 9:56	0.373	12.6109	0.1153	56.04
9/21/2010 9:56	0.397	12.6	0.1044	56.04
9/21/2010 9:56	0.422	12.5887	0.0931	56.04
9/21/2010 9:56	0.448	12.5818	0.0862	56.03
9/21/2010 9:56	0.476	12.5735	0.0779	56.03
9/21/2010 9:56	0.506	12.5692	0.0736	56.03
9/21/2010 9:56	0.537	12.5717	0.0761	56.02
9/21/2010 9:56	0.571	12.5631	0.0675	56.03
9/21/2010 9:56	0.609	12.6052	0.1096	56.06
9/21/2010 9:56	0.643	12.5565	0.0609	56.04
9/21/2010 9:56	0.683	12.5513	0.0557	56.03
9/21/2010 9:56	0.725	12.5669	0.0713	56.02
9/21/2010 9:56	0.769	12.5344	0.0388	56.02
9/21/2010 9:56	0.816	12.5417	0.0461	56.02
9/21/2010 9:56	0.866	12.5466	0.051	56.01
9/21/2010 9:56	0.919	12.5512	0.0556	56.01
9/21/2010 9:56	0.976	12.5556	0.06	56.01
9/21/2010 9:56	1.035	12.5262	0.0306	56.01
9/21/2010 9:56	1.095	12.524	0.0284	56
9/21/2010 9:57	1.165	12.5357	0.0401	56
9/21/2010 9:57	1.235	12.5253	0.0297	56
9/21/2010 9:57	1.305	12.5275	0.0319	56

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 9:57	1.385	12.5166	0.021	56
9/21/2010 9:57	1.475	12.5174	0.0218	55.99
9/21/2010 9:57	1.555	12.504	0.0084	55.99
9/21/2010 9:57	1.655	12.5105	0.0149	55.98
9/21/2010 9:57	1.755	12.5053	0.0097	55.98
9/21/2010 9:57	1.855	12.5018	0.0062	55.98
9/21/2010 9:57	1.965	12.5035	0.0079	55.97
9/21/2010 9:57	2.085	12.497	0.0014	55.97
9/21/2010 9:58	2.215	12.4961	0.0005	55.97
9/21/2010 9:58	2.345	12.5126	0.017	55.96
9/21/2010 9:58	2.485	12.5061	0.0105	55.96
9/21/2010 9:58	2.635	12.5018	0.0062	55.96
9/21/2010 9:58	2.795	12.5031	0.0075	55.96
9/21/2010 9:58	2.955	12.4953	-0.0003	55.96
9/21/2010 9:58	3.135	12.4996	0.004	55.95
9/21/2010 9:59	3.325	12.4979	0.0023	55.95
9/21/2010 9:59	3.525	12.4927	-0.0029	55.95
9/21/2010 9:59	3.735	12.5009	0.0053	55.95
9/21/2010 9:59	3.955	12.4992	0.0036	55.94
9/21/2010 10:00	4.195	12.504	0.0084	55.94
9/21/2010 10:00	4.445	12.4979	0.0023	55.93
9/21/2010 10:00	4.705	12.5101	0.0145	55.94
9/21/2010 10:00	4.985	12.4927	-0.0029	55.94
9/21/2010 10:01	5.285	12.507	0.0114	55.93
9/21/2010 10:01	5.595	12.5105	0.0149	55.93
9/21/2010 10:01	5.935	12.5096	0.014	55.93
9/21/2010 10:02	6.285	12.4892	-0.0064	55.92
9/21/2010 10:02	6.655	12.5005	0.0049	55.92
9/21/2010 10:02	7.055	12.4901	-0.0055	55.92
9/21/2010 10:03	7.475	12.4935	-0.0021	55.92
9/21/2010 10:03	7.915	12.5044	0.0088	55.92
40442.41959	8.385	12.5079	0.0123	55.92

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:04	0.001	12.4948	0	56.02
9/21/2010 10:04	0.004	12.5035	0.0087	56.03
9/21/2010 10:04	0.008	12.4904	-0.0044	56.04
9/21/2010 10:04	0.013	12.4856	-0.0092	56.04
9/21/2010 10:04	0.021	10.6975	-1.7973	56.05
9/21/2010 10:04	0.025	11.1768	-1.318	56.06
9/21/2010 10:04	0.029	10.3895	-2.1053	56.06
9/21/2010 10:04	0.033	9.3451	-3.1497	56.06
9/21/2010 10:04	0.038	9.6566	-2.8382	56.07
9/21/2010 10:04	0.042	9.8253	-2.6695	56.07
9/21/2010 10:04	0.046	9.9702	-2.5246	56.07
9/21/2010 10:04	0.050	10.1084	-2.3864	56.07
9/21/2010 10:04	0.054	10.229	-2.2658	56.08
9/21/2010 10:04	0.058	10.3307	-2.1641	56.08
9/21/2010 10:04	0.063	10.4247	-2.0701	56.08
9/21/2010 10:04	0.067	10.5334	-1.9614	56.08
9/21/2010 10:04	0.071	10.6361	-1.8587	56.08
9/21/2010 10:04	0.075	10.7248	-1.77	56.09
9/21/2010 10:04	0.079	10.8066	-1.6882	56.09
9/21/2010 10:04	0.085	10.9223	-1.5725	56.07
9/21/2010 10:04	0.091	11.0276	-1.4672	56.07
9/21/2010 10:04	0.098	11.1533	-1.3415	56.05

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:04	0.105	11.2585	-1.2363	56.05
9/21/2010 10:04	0.112	11.3655	-1.1293	56.05
9/21/2010 10:04	0.120	11.4638	-1.031	56.04
9/21/2010 10:04	0.129	11.583	-0.9118	56.03
9/21/2010 10:04	0.137	11.6592	-0.8356	56.03
9/21/2010 10:04	0.147	11.767	-0.7278	56.02
9/21/2010 10:04	0.157	11.844	-0.6508	56.02
9/21/2010 10:04	0.167	11.9184	-0.5764	56.02
9/21/2010 10:04	0.178	11.998	-0.4968	56.02
9/21/2010 10:04	0.190	12.0758	-0.419	56.01
9/21/2010 10:04	0.203	12.1291	-0.3657	56
9/21/2010 10:04	0.222	12.2394	-0.2554	56.03
9/21/2010 10:04	0.230	12.2276	-0.2672	56.03
9/21/2010 10:04	0.245	12.3049	-0.1899	56.04
9/21/2010 10:04	0.261	12.3207	-0.1741	56.02
9/21/2010 10:04	0.277	12.3499	-0.1449	56.01
9/21/2010 10:04	0.295	12.366	-0.1288	56
9/21/2010 10:05	0.314	12.3952	-0.0996	56
9/21/2010 10:05	0.335	12.4116	-0.0832	56.03
9/21/2010 10:05	0.355	12.4382	-0.0566	56
9/21/2010 10:05	0.377	12.4373	-0.0575	56.02
9/21/2010 10:05	0.401	12.4486	-0.0462	56.01
9/21/2010 10:05	0.426	12.4507	-0.0441	56.02
9/21/2010 10:05	0.452	12.4764	-0.0184	56
9/21/2010 10:05	0.480	12.4916	-0.0032	56
9/21/2010 10:05	0.511	12.4847	-0.0101	55.99
9/21/2010 10:05	0.541	12.49	-0.0048	55.99
9/21/2010 10:05	0.575	12.4835	-0.0113	55.99
9/21/2010 10:05	0.610	12.4956	0.0008	55.99
9/21/2010 10:05	0.647	12.4922	-0.0026	55.99
9/21/2010 10:05	0.687	12.5026	0.0078	55.98
9/21/2010 10:05	0.729	12.4931	-0.0017	55.98
9/21/2010 10:05	0.773	12.5126	0.0178	55.98
9/21/2010 10:05	0.820	12.4987	0.0039	55.98
9/21/2010 10:05	0.870	12.4979	0.0031	55.98
9/21/2010 10:05	0.923	12.504	0.0092	55.98
9/21/2010 10:05	0.979	12.514	0.0192	55.98
9/21/2010 10:05	1.039	12.4905	-0.0043	55.97
9/21/2010 10:05	1.099	12.5079	0.0131	55.97
9/21/2010 10:05	1.169	12.5026	0.0078	55.97
9/21/2010 10:05	1.239	12.4983	0.0035	55.97
9/21/2010 10:06	1.309	12.4953	0.0005	55.97

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:06	1.389	12.4931	-0.0017	55.97
9/21/2010 10:06	1.479	12.5061	0.0113	55.96
9/21/2010 10:06	1.559	12.4992	0.0044	55.96
9/21/2010 10:06	1.659	12.5092	0.0144	55.96
9/21/2010 10:06	1.759	12.5101	0.0153	55.96
9/21/2010 10:06	1.859	12.5096	0.0148	55.96
9/21/2010 10:06	1.969	12.5009	0.0061	55.96
9/21/2010 10:06	2.089	12.4974	0.0026	55.95
9/21/2010 10:06	2.219	12.5079	0.0131	55.95
9/21/2010 10:07	2.349	12.5	0.0052	55.95
9/21/2010 10:07	2.489	12.504	0.0092	55.95
9/21/2010 10:07	2.639	12.5101	0.0153	55.95
9/21/2010 10:07	2.799	12.5061	0.0113	55.95
9/21/2010 10:07	2.959	12.5135	0.0187	55.95
9/21/2010 10:07	3.139	12.5022	0.0074	55.95
9/21/2010 10:08	3.329	12.5048	0.01	55.95
9/21/2010 10:08	3.529	12.5044	0.0096	55.95
9/21/2010 10:08	3.739	12.5144	0.0196	55.95
9/21/2010 10:08	3.959	12.5153	0.0205	55.95
9/21/2010 10:08	4.199	12.5022	0.0074	55.95
9/21/2010 10:09	4.449	12.5157	0.0209	55.95
9/21/2010 10:09	4.709	12.5122	0.0174	55.94
9/21/2010 10:09	4.989	12.5005	0.0057	55.95
9/21/2010 10:09	5.289	12.5014	0.0066	55.95
9/21/2010 10:10	5.599	12.5083	0.0135	55.94
9/21/2010 10:10	5.939	12.5179	0.0231	55.95
9/21/2010 10:10	6.289	12.5	0.0052	55.94
9/21/2010 10:11	6.659	12.514	0.0192	55.94
9/21/2010 10:11	7.059	12.517	0.0222	55.95
9/21/2010 10:12	7.479	12.5153	0.0205	55.94
9/21/2010 10:12	7.919	12.5018	0.007	55.94
40442.42575	8.389	12.514	0.0192	55.94
9/21/2010 10:13	8.889	12.5153	0.0205	55.94
9/21/2010 10:14	9.419	12.5162	0.0214	55.94
9/21/2010 10:14	9.614	12.5179	0.0231	55.94

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:14	0.001	12.5195	0	56.05
9/21/2010 10:14	0.004	12.9375	0.418	56.07
9/21/2010 10:14	0.008	13.6746	1.1551	56.07
9/21/2010 10:14	0.013	14.0765	1.557	56.07
9/21/2010 10:14	0.017	15.1572	2.6377	56.08
9/21/2010 10:14	0.021	15.3169	2.7974	56.09
9/21/2010 10:14	0.025	15.8018	3.2823	56.09
9/21/2010 10:14	0.029	16.1314	3.6119	56.09
9/21/2010 10:14	0.033	15.7101	3.1906	56.09
9/21/2010 10:14	0.038	13.2188	0.6993	56.1
9/21/2010 10:14	0.042	13.3851	0.8656	56.1
9/21/2010 10:14	0.046	14.4695	1.95	56.1
9/21/2010 10:14	0.050	14.5283	2.0088	56.1
9/21/2010 10:14	0.054	14.0071	1.4876	56.1
9/21/2010 10:14	0.058	13.3185	0.799	56.1
9/21/2010 10:14	0.063	13.138	0.6185	56.11
9/21/2010 10:14	0.067	13.3873	0.8678	56.11
9/21/2010 10:14	0.071	13.5534	1.0339	56.11
9/21/2010 10:14	0.077	13.3172	0.7977	56.09
9/21/2010 10:14	0.083	13.4003	0.8808	56.09
9/21/2010 10:14	0.090	13.2354	0.7159	56.08
9/21/2010 10:14	0.097	13.2202	0.7007	56.07

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:14	0.104	13.168	0.6485	56.07
9/21/2010 10:14	0.112	13.1384	0.6189	56.06
9/21/2010 10:14	0.121	13.094	0.5745	56.05
9/21/2010 10:14	0.129	13.0601	0.5406	56.05
9/21/2010 10:14	0.139	13.0031	0.4836	56.05
9/21/2010 10:14	0.149	12.9692	0.4497	56.04
9/21/2010 10:14	0.159	12.9161	0.3966	56.04
9/21/2010 10:14	0.170	12.8957	0.3762	56.04
9/21/2010 10:14	0.183	12.8522	0.3327	56.05
9/21/2010 10:14	0.195	12.8387	0.3192	56.04
9/21/2010 10:14	0.208	12.8004	0.2809	56.04
9/21/2010 10:14	0.222	12.7691	0.2496	56.03
9/21/2010 10:14	0.237	12.7526	0.2331	56.03
9/21/2010 10:14	0.253	12.7248	0.2053	56.08
9/21/2010 10:14	0.269	12.703	0.1835	56.03
9/21/2010 10:14	0.287	12.7	0.1805	56.03
9/21/2010 10:14	0.306	12.673	0.1535	56.02
9/21/2010 10:14	0.326	12.6696	0.1501	56.01
9/21/2010 10:14	0.347	12.65	0.1305	56.04
9/21/2010 10:14	0.369	12.6457	0.1262	56.02
9/21/2010 10:14	0.393	12.6308	0.1113	56.01
9/21/2010 10:14	0.418	12.6365	0.117	56.01
9/21/2010 10:14	0.444	12.6104	0.0909	56.03
9/21/2010 10:14	0.472	12.6204	0.1009	56.01
9/21/2010 10:14	0.502	12.6035	0.084	56.01
9/21/2010 10:14	0.533	12.5961	0.0766	56.01
9/21/2010 10:14	0.567	12.593	0.0735	56
9/21/2010 10:14	0.602	12.5943	0.0748	56
9/21/2010 10:14	0.639	12.5947	0.0752	56
9/21/2010 10:15	0.679	12.5925	0.073	56.08
9/21/2010 10:15	0.721	12.5943	0.0748	56
9/21/2010 10:15	0.765	12.5764	0.0569	56
9/21/2010 10:15	0.812	12.5696	0.0501	56
9/21/2010 10:15	0.862	12.6018	0.0823	55.99
9/21/2010 10:15	0.915	12.5687	0.0492	55.99
9/21/2010 10:15	0.971	12.5635	0.044	55.99
9/21/2010 10:15	1.031	12.5479	0.0284	55.98
9/21/2010 10:15	1.091	12.5553	0.0358	55.98
9/21/2010 10:15	1.161	12.5522	0.0327	55.99
9/21/2010 10:15	1.231	12.5427	0.0232	55.98
9/21/2010 10:15	1.301	12.5588	0.0393	55.98
9/21/2010 10:15	1.381	12.5457	0.0262	55.98

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:15	1.471	12.55	0.0305	55.97
9/21/2010 10:15	1.551	12.5427	0.0232	55.97
9/21/2010 10:15	1.651	12.5427	0.0232	55.97
9/21/2010 10:16	1.751	12.5379	0.0184	55.97
9/21/2010 10:16	1.851	12.5362	0.0167	55.97
9/21/2010 10:16	1.961	12.5322	0.0127	55.97
9/21/2010 10:16	2.081	12.5218	0.0023	55.97
9/21/2010 10:16	2.211	12.5379	0.0184	55.96
9/21/2010 10:16	2.341	12.5222	0.0027	55.96
9/21/2010 10:16	2.481	12.5213	0.0018	55.95
9/21/2010 10:16	2.631	12.5122	-0.0073	55.96
9/21/2010 10:17	2.791	12.5209	0.0014	55.96
9/21/2010 10:17	2.951	12.5275	0.008	55.96
9/21/2010 10:17	3.131	12.5174	-0.0021	55.95
9/21/2010 10:17	3.321	12.5166	-0.0029	55.95
9/21/2010 10:17	3.521	12.5231	0.0036	55.95
9/21/2010 10:18	3.731	12.5227	0.0032	55.95
9/21/2010 10:18	3.951	12.5266	0.0071	55.95
9/21/2010 10:18	4.191	12.5275	0.008	55.95
9/21/2010 10:18	4.441	12.5283	0.0088	55.94
9/21/2010 10:19	4.701	12.5183	-0.0012	55.95
9/21/2010 10:19	4.981	12.5343	0.0148	55.95
9/21/2010 10:19	5.281	12.5253	0.0058	55.95
9/21/2010 10:19	5.591	12.5296	0.0101	55.94
9/21/2010 10:20	5.931	12.5222	0.0027	55.94
9/21/2010 10:20	6.281	12.5235	0.004	55.94
9/21/2010 10:20	6.651	12.5331	0.0136	55.94
9/21/2010 10:21	7.051	12.5275	0.008	55.94
9/21/2010 10:21	7.471	12.5262	0.0067	55.94
9/21/2010 10:22	7.911	12.5266	0.0071	55.94
9/21/2010 10:22	8.381	12.5196	1E-04	55.94
40442.43279	8.881	12.5266	0.0071	55.94
9/21/2010 10:23	9.343	12.5279	0.0084	55.94

Withdrawal #3

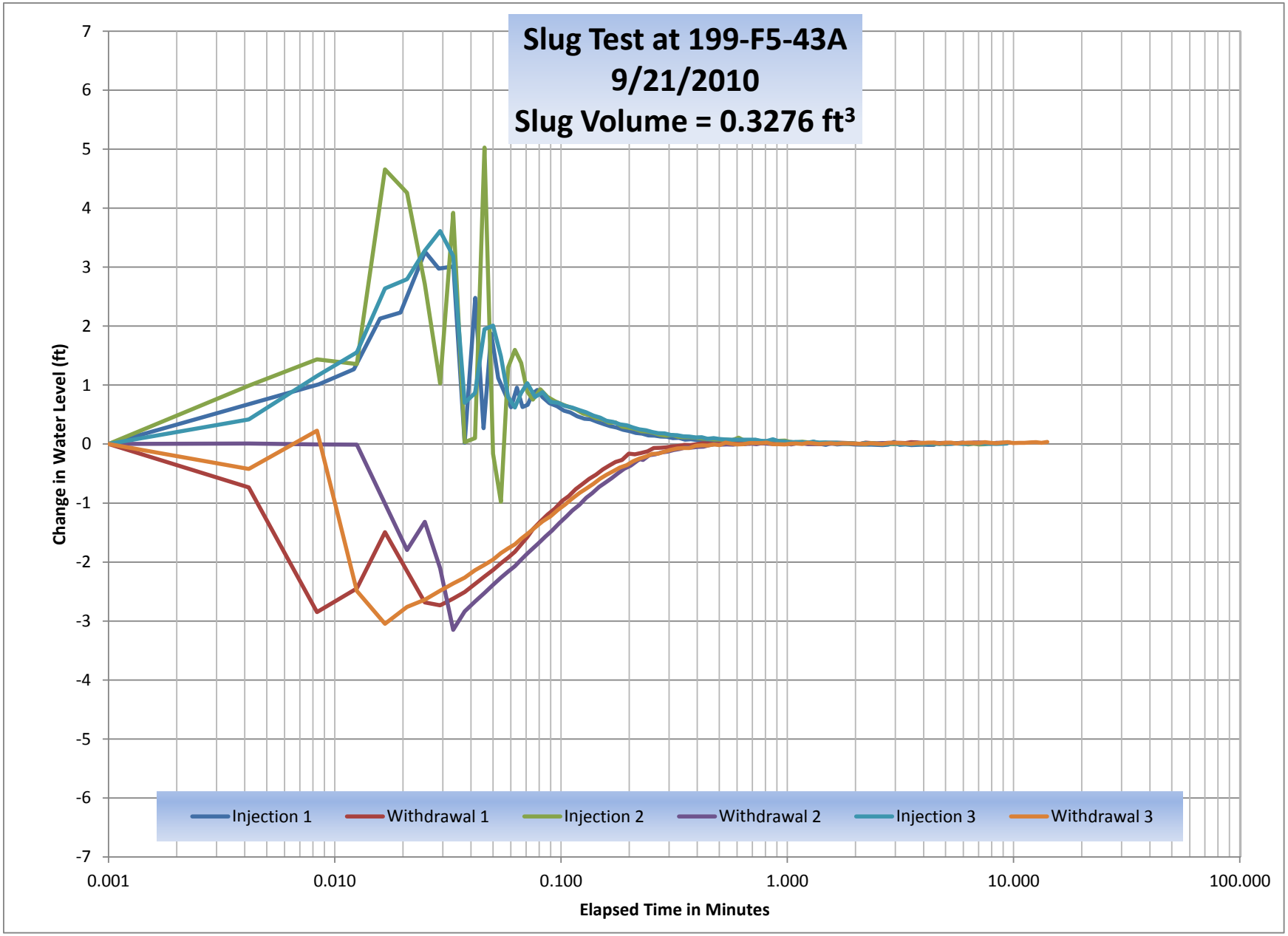
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:23	0.001	12.5221	0	56.06
9/21/2010 10:23	0.004	12.0995	-0.4226	56.06
9/21/2010 10:23	0.008	12.7478	0.2257	56.07
9/21/2010 10:23	0.013	10.0306	-2.4915	56.07
9/21/2010 10:23	0.017	9.4739	-3.0482	56.08
9/21/2010 10:23	0.021	9.7601	-2.762	56.09
9/21/2010 10:23	0.025	9.8836	-2.6385	56.09
9/21/2010 10:23	0.029	10.0363	-2.4858	56.09
9/21/2010 10:23	0.033	10.159	-2.3631	56.09
9/21/2010 10:23	0.038	10.2559	-2.2662	56.1
9/21/2010 10:23	0.042	10.3843	-2.1378	56.1
9/21/2010 10:23	0.046	10.473	-2.0491	56.1
9/21/2010 10:23	0.050	10.5609	-1.9612	56.1
9/21/2010 10:23	0.054	10.674	-1.8481	56.11
9/21/2010 10:23	0.058	10.7544	-1.7677	56.11
9/21/2010 10:23	0.063	10.8219	-1.7002	56.11
9/21/2010 10:23	0.067	10.9154	-1.6067	56.11
9/21/2010 10:23	0.071	10.9963	-1.5258	56.11
9/21/2010 10:23	0.077	11.1064	-1.4157	56.1
9/21/2010 10:23	0.083	11.2113	-1.3108	56.09
9/21/2010 10:23	0.090	11.2994	-1.2227	56.08
9/21/2010 10:23	0.097	11.4057	-1.1164	56.08

Withdrawal #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:23	0.104	11.4952	-1.0269	56.07
9/21/2010 10:23	0.112	11.5982	-0.9239	56.06
9/21/2010 10:23	0.121	11.6953	-0.8268	56.06
9/21/2010 10:23	0.129	11.7631	-0.759	56.06
9/21/2010 10:23	0.139	11.8497	-0.6724	56.05
9/21/2010 10:23	0.149	11.9375	-0.5846	56.04
9/21/2010 10:23	0.159	12.001	-0.5211	56.04
9/21/2010 10:23	0.170	12.0624	-0.4597	56.04
9/21/2010 10:23	0.182	12.1219	-0.4002	56.04
9/21/2010 10:23	0.195	12.166	-0.3561	56.03
9/21/2010 10:23	0.208	12.2282	-0.2939	56.03
9/21/2010 10:23	0.222	12.2743	-0.2478	56.03
9/21/2010 10:23	0.237	12.3121	-0.21	56.02
9/21/2010 10:23	0.253	12.355	-0.1671	56.02
9/21/2010 10:23	0.269	12.3617	-0.1604	56.02
9/21/2010 10:23	0.287	12.396	-0.1261	56.02
9/21/2010 10:24	0.306	12.4234	-0.0987	56.02
9/21/2010 10:24	0.326	12.4482	-0.0739	56.01
9/21/2010 10:24	0.347	12.4552	-0.0669	56.02
9/21/2010 10:24	0.369	12.4552	-0.0669	56.01
9/21/2010 10:24	0.393	12.493	-0.0291	56.03
9/21/2010 10:24	0.420	12.5011	-0.021	56.04
9/21/2010 10:24	0.444	12.4987	-0.0234	56.02
9/21/2010 10:24	0.472	12.5155	-0.0066	56.01
9/21/2010 10:24	0.502	12.5048	-0.0173	56.01
9/21/2010 10:24	0.533	12.5456	0.0235	56.01
9/21/2010 10:24	0.567	12.5261	0.004	56.01
9/21/2010 10:24	0.602	12.5161	-0.006	56
9/21/2010 10:24	0.639	12.5183	-0.0038	56
9/21/2010 10:24	0.679	12.5377	0.0156	56
9/21/2010 10:24	0.721	12.5403	0.0182	56
9/21/2010 10:24	0.767	12.5377	0.0156	56
9/21/2010 10:24	0.812	12.5473	0.0252	55.99
9/21/2010 10:24	0.862	12.5187	-0.0034	55.99
9/21/2010 10:24	0.915	12.5201	-0.002	55.99
9/21/2010 10:24	0.971	12.517	-0.0051	55.99
9/21/2010 10:24	1.031	12.5283	0.0062	55.99
9/21/2010 10:24	1.091	12.5305	0.0084	55.99
9/21/2010 10:24	1.161	12.5253	0.0032	55.99
9/21/2010 10:24	1.231	12.5444	0.0223	55.99
9/21/2010 10:25	1.301	12.5344	0.0123	55.98
9/21/2010 10:25	1.381	12.5222	1E-04	55.99

Withdrawal #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 10:25	1.471	12.5309	0.0088	55.98
9/21/2010 10:25	1.551	12.5366	0.0145	55.98
9/21/2010 10:25	1.651	12.5278	0.0057	55.98
9/21/2010 10:25	1.751	12.537	0.0149	55.98
9/21/2010 10:25	1.851	12.5353	0.0132	55.98
9/21/2010 10:25	1.961	12.5331	0.011	55.97
9/21/2010 10:25	2.081	12.5283	0.0062	55.97
9/21/2010 10:25	2.211	12.5279	0.0058	55.98
9/21/2010 10:26	2.341	12.534	0.0119	55.97
9/21/2010 10:26	2.481	12.5296	0.0075	55.97
9/21/2010 10:26	2.631	12.5235	0.0014	55.96
9/21/2010 10:26	2.791	12.5401	0.018	55.97
9/21/2010 10:26	2.951	12.5435	0.0214	55.97
9/21/2010 10:26	3.131	12.5405	0.0184	55.97
9/21/2010 10:27	3.321	12.5353	0.0132	55.96
9/21/2010 10:27	3.521	12.5296	0.0075	55.96
9/21/2010 10:27	3.731	12.5392	0.0171	55.96
9/21/2010 10:27	3.951	12.5409	0.0188	55.96
9/21/2010 10:27	4.191	12.5453	0.0232	55.96
9/21/2010 10:28	4.441	12.547	0.0249	55.96
9/21/2010 10:28	4.701	12.5314	0.0093	55.96
9/21/2010 10:28	4.981	12.5414	0.0193	55.95
9/21/2010 10:28	5.281	12.5479	0.0258	55.95
9/21/2010 10:29	5.591	12.5318	0.0097	55.95
9/21/2010 10:29	5.931	12.5431	0.021	55.95
9/21/2010 10:29	6.281	12.5414	0.0193	55.95
9/21/2010 10:30	6.651	12.5409	0.0188	55.95
9/21/2010 10:30	7.051	12.5401	0.018	55.95
9/21/2010 10:31	7.471	12.5547	0.0326	55.95
9/21/2010 10:31	7.911	12.5448	0.0227	55.95
9/21/2010 10:32	8.381	12.5348	0.0127	55.95
40442.43929	8.881	12.5479	0.0258	55.95
9/21/2010 10:33	9.411	12.5527	0.0306	55.95
9/21/2010 10:33	9.971	12.5401	0.018	55.95
9/21/2010 10:34	10.571	12.5431	0.021	55.95
9/21/2010 10:34	11.171	12.5414	0.0193	55.95
40442.44137	11.871	12.5501	0.028	55.94
40442.44185	12.571	12.5557	0.0336	55.95
40442.44234	13.271	12.5414	0.0193	55.94
40442.44289	14.071	12.5579	0.0358	55.94


Slug Test at 199-F5-43A
9/21/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2
Injection 3
Withdrawal 3

Slug Test Field Activity Report

Summary of FAR - F5-43A

Time	Note
9:42	3 inch stainless slug (0.2985 ft^3) volume in, early time data looked bouncy
9:46	3 inch slug stainless slug out.
9:56	3 inch stainless slug in, slug may hit joint in well on insertion.
10:04	3 inch slug stainless slug out.
10:14	3 inch stainless slug in.
10:24	3 inch slug stainless slug out.
10:38	Stopped data logging and pulled slug from well.

Note* The slug volumes were recalculated by Robert Edrington, therefore there is some slightly variations in the field notes and raw data file names when referring to volumes.

Slug Testing at 199-F5-43B (A4593)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	27.84
D-T-B (ft TOC)	>100
Stick up (ft)	3.20
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754	3.754	3.754
Max WL Change (ft)	4.87	3.32	6.03	3.53	5.44	3.35

Slug Testing was performed on 9/21/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-43B

Slug Volume 0.3276 ft^3

Raw File:	199-F5-43B slug test 21Sept10_2010-10-14_12-31-34-048.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/21/2010		4.87	3.32
Test start:	12:15	injection 1		
Test restart:	12:25	withdrawal 1	**Max Change Test 2**	
Test restart:	12:45	injection 2	Injection 2	Withdrawal 2
Test restart:	13:05	withdrawal 2	6.03	3.53
Test restart:	13:25	injection 3		
Test restart:	13:50	withdrawal 3	**Max Change Test 3**	
Test Stop	14:20	end	Injection 3	Withdrawal 3
Slug Volume:	0.3276 cu ft		5.44	3.35

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:15	0.001	12.7419	0	63.43
9/21/2010 12:15	0.008	14.0529	1.311	63.39
9/21/2010 12:15	0.012	14.437	1.6951	63.37
9/21/2010 12:15	0.019	17.6098	4.8679	63.34
9/21/2010 12:15	0.023	16.4148	3.6729	63.34
9/21/2010 12:15	0.026	17.0273	4.2854	63.33
9/21/2010 12:15	0.034	17.2638	4.5219	63.32
9/21/2010 12:15	0.041	15.0376	2.2957	63.31
9/21/2010 12:15	0.045	16.1317	3.3898	63.3
9/21/2010 12:15	0.048	15.21	2.4681	63.3
9/21/2010 12:15	0.052	15.3885	2.6466	63.29
9/21/2010 12:15	0.056	16.4291	3.6872	63.28
9/21/2010 12:15	0.060	16.2205	3.4786	63.34
9/21/2010 12:15	0.067	15.9091	3.1672	63.31
9/21/2010 12:16	0.071	15.9162	3.1743	63.29
9/21/2010 12:16	0.075	15.9582	3.2163	63.27
9/21/2010 12:16	0.079	15.9789	3.237	63.27
9/21/2010 12:16	0.083	15.9268	3.1849	63.25
9/21/2010 12:16	0.089	15.9482	3.2063	63.22
9/21/2010 12:16	0.096	15.931	3.1891	63.19

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:16	0.103	15.938	3.1961	63.17
9/21/2010 12:16	0.110	15.9201	3.1782	63.14
9/21/2010 12:16	0.118	15.9075	3.1656	63.12
9/21/2010 12:16	0.127	15.8949	3.153	63.09
9/21/2010 12:16	0.135	15.8853	3.1434	63.07
9/21/2010 12:16	0.145	15.8944	3.1525	63.05
9/21/2010 12:16	0.155	15.8547	3.1128	63.02
9/21/2010 12:16	0.165	15.8547	3.1128	63
9/21/2010 12:16	0.176	15.8403	3.0984	62.98
9/21/2010 12:16	0.188	15.8251	3.0832	62.95
9/21/2010 12:16	0.201	15.8238	3.0819	62.92
9/21/2010 12:16	0.214	15.8011	3.0592	62.89
9/21/2010 12:16	0.228	15.7938	3.0519	62.87
9/21/2010 12:16	0.243	15.765	3.0231	62.83
9/21/2010 12:16	0.259	15.7682	3.0263	62.81
9/21/2010 12:16	0.275	15.7393	2.9974	62.78
9/21/2010 12:16	0.293	15.7187	2.9768	62.74
9/21/2010 12:16	0.312	15.7022	2.9603	62.7
9/21/2010 12:16	0.332	15.6735	2.9316	62.67
9/21/2010 12:16	0.353	15.6534	2.9115	62.63
9/21/2010 12:16	0.375	15.6273	2.8854	62.59
9/21/2010 12:16	0.399	15.6169	2.875	62.54
9/21/2010 12:16	0.424	15.5938	2.8519	62.5
9/21/2010 12:16	0.450	15.5595	2.8176	62.46
9/21/2010 12:16	0.478	15.5355	2.7936	62.41
9/21/2010 12:16	0.508	15.4963	2.7544	62.35
9/21/2010 12:16	0.539	15.4567	2.7148	62.31
9/21/2010 12:16	0.573	15.4398	2.6979	62.25
9/21/2010 12:16	0.608	15.3975	2.6556	62.2
9/21/2010 12:16	0.645	15.3679	2.626	62.14
9/21/2010 12:16	0.685	15.3366	2.5947	62.07
9/21/2010 12:16	0.727	15.2926	2.5507	62
9/21/2010 12:16	0.771	15.2661	2.5242	61.93
9/21/2010 12:16	0.818	15.2243	2.4824	61.86
9/21/2010 12:16	0.868	15.1882	2.4463	61.78
9/21/2010 12:16	0.921	15.146	2.4041	61.71
9/21/2010 12:16	0.977	15.102	2.3601	61.62
9/21/2010 12:16	1.037	15.0498	2.3079	61.54
9/21/2010 12:16	1.097	15.0015	2.2596	61.46
9/21/2010 12:16	1.167	14.9418	2.1999	61.36
9/21/2010 12:16	1.237	14.9118	2.1699	61.26
9/21/2010 12:16	1.307	14.8274	2.0855	61.17
9/21/2010 12:16	1.387	14.7877	2.0458	61.06

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:17	1.477	14.7386	1.9967	60.95
9/21/2010 12:17	1.557	14.6759	1.934	60.85
9/21/2010 12:17	1.657	14.6054	1.8635	60.72
9/21/2010 12:17	1.757	14.5402	1.7983	60.62
9/21/2010 12:17	1.857	14.4858	1.7439	60.49
9/21/2010 12:17	1.967	14.4513	1.7094	60.38
9/21/2010 12:17	2.087	14.3653	1.6234	60.25
9/21/2010 12:17	2.217	14.3161	1.5742	60.11
9/21/2010 12:17	2.347	14.2386	1.4967	59.98
9/21/2010 12:17	2.487	14.186	1.4441	59.85
9/21/2010 12:17	2.637	14.1042	1.3623	59.71
9/21/2010 12:18	2.797	14.0424	1.3005	59.57
9/21/2010 12:18	2.957	13.9649	1.223	59.44
9/21/2010 12:18	3.137	13.911	1.1691	59.3
9/21/2010 12:18	3.327	13.8387	1.0968	59.15
9/21/2010 12:18	3.527	13.7491	1.0072	59.01
9/21/2010 12:18	3.737	13.6916	0.9497	58.87
9/21/2010 12:18	3.957	13.6107	0.8688	58.73
9/21/2010 12:19	4.197	13.5502	0.8083	58.58
9/21/2010 12:19	4.447	13.4814	0.7395	58.45
9/21/2010 12:19	4.707	13.4175	0.6756	58.32
9/21/2010 12:19	4.987	13.3583	0.6164	58.18
9/21/2010 12:19	5.287	13.2782	0.5363	58.05
9/21/2010 12:20	5.597	13.215	0.4731	57.93
9/21/2010 12:20	5.937	13.1786	0.4367	57.81
9/21/2010 12:20	6.287	13.1324	0.3905	57.7
9/21/2010 12:20	6.657	13.0663	0.3244	57.6
9/21/2010 12:21	7.057	13.0266	0.2847	57.49
9/21/2010 12:21	7.477	12.9919	0.25	57.4
9/21/2010 12:21	7.917	12.9509	0.209	57.3
9/21/2010 12:22	8.387	12.9048	0.1629	57.21
9/21/2010 12:22	8.887	12.8783	0.1364	57.13
9/21/2010 12:23	9.101	12.8787	0.1368	57.09
9/21/2010 12:23				
9/21/2010 12:23				
9/21/2010 12:24				
9/21/2010 12:24				
9/21/2010 12:25				

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Log Notes:

Date and Time	Note
9/21/2010 12:14	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/21/2010 12:15	Manual Start Command
9/21/2010 12:25	Restart Command
9/21/2010 12:32	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 12:44	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 12:45	Restart Command
9/21/2010 12:46	Restart Command
9/21/2010 12:46	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:01	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:05	Restart Command
9/21/2010 13:06	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:18	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:25	Restart Command
9/21/2010 13:25	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:48	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 13:50	Restart Command
9/21/2010 14:05	Log Download - Used Battery: 8% Used Memory: 21% User Name: H0066555
9/21/2010 14:20	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:25	0.001	12.8761	0.1576	57.2
9/21/2010 12:25	0.004	10.0405	-2.678	57.2
9/21/2010 12:25	0.013	10.6007	-2.1178	57.21
9/21/2010 12:25	0.017	10.4889	-2.2296	57.22
9/21/2010 12:25	0.021	9.4032	-3.3153	57.22
9/21/2010 12:25	0.025	9.5094	-3.2091	57.23
9/21/2010 12:25	0.029	9.5813	-3.1372	57.23
9/21/2010 12:25	0.033	9.6113	-3.1072	57.23
9/21/2010 12:25	0.038	9.603	-3.1155	57.23
9/21/2010 12:25	0.042	9.6207	-3.0978	57.24
9/21/2010 12:25	0.046	9.6056	-3.1129	57.24
9/21/2010 12:25	0.050	9.6209	-3.0976	57.24
9/21/2010 12:25	0.054	9.6244	-3.0941	57.24
9/21/2010 12:25	0.058	9.6463	-3.0722	57.25
9/21/2010 12:25	0.063	9.6607	-3.0578	57.24
9/21/2010 12:25	0.067	9.6672	-3.0513	57.25
9/21/2010 12:25	0.071	9.6659	-3.0526	57.25
9/21/2010 12:25	0.075	9.6751	-3.0434	57.25
9/21/2010 12:25	0.081	9.7062	-3.0123	57.23
9/21/2010 12:25	0.087	9.699	-3.0195	57.22

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:25	0.094	9.6966	-3.0219	57.21
9/21/2010 12:25	0.101	9.7166	-3.0019	57.2
9/21/2010 12:25	0.108	9.7262	-2.9923	57.2
9/21/2010 12:25	0.116	9.7414	-2.9771	57.19
9/21/2010 12:25	0.125	9.7484	-2.9701	57.18
9/21/2010 12:25	0.133	9.7602	-2.9583	57.19
9/21/2010 12:25	0.143	9.7563	-2.9622	57.17
9/21/2010 12:25	0.153	9.778	-2.9405	57.17
9/21/2010 12:25	0.163	9.8002	-2.9183	57.16
9/21/2010 12:25	0.174	9.8129	-2.9056	57.16
9/21/2010 12:25	0.186	9.8403	-2.8782	57.16
9/21/2010 12:25	0.199	9.8374	-2.8811	57.15
9/21/2010 12:25	0.212	9.8621	-2.8564	57.15
9/21/2010 12:25	0.226	9.8755	-2.843	57.14
9/21/2010 12:25	0.241	9.893	-2.8255	57.13
9/21/2010 12:25	0.257	9.9127	-2.8058	57.13
9/21/2010 12:25	0.273	9.9297	-2.7888	57.13
9/21/2010 12:25	0.291	9.934	-2.7845	57.12
9/21/2010 12:25	0.310	9.965	-2.7535	57.12
9/21/2010 12:25	0.330	9.9849	-2.7336	57.11
9/21/2010 12:25	0.351	10.0059	-2.7126	57.1
9/21/2010 12:25	0.373	10.0311	-2.6874	57.1
9/21/2010 12:25	0.397	10.0403	-2.6782	57.09
9/21/2010 12:25	0.422	10.0824	-2.6361	57.09
9/21/2010 12:25	0.448	10.0972	-2.6213	57.09
9/21/2010 12:25	0.476	10.1264	-2.5921	57.08
9/21/2010 12:25	0.506	10.1557	-2.5628	57.07
9/21/2010 12:25	0.537	10.1831	-2.5354	57.07
9/21/2010 12:25	0.571	10.2291	-2.4894	57.06
9/21/2010 12:25	0.606	10.2527	-2.4658	57.06
9/21/2010 12:25	0.643	10.2801	-2.4384	57.04
9/21/2010 12:25	0.683	10.3197	-2.3988	57.04
9/21/2010 12:25	0.725	10.3389	-2.3796	57.03
9/21/2010 12:25	0.769	10.4015	-2.317	57.02
9/21/2010 12:25	0.816	10.4298	-2.2887	57.02
9/21/2010 12:25	0.866	10.4755	-2.243	57.01
9/21/2010 12:25	0.919	10.5186	-2.1999	57.01
9/21/2010 12:26	0.975	10.5673	-2.1512	56.99
9/21/2010 12:26	1.035	10.6	-2.1185	56.98
9/21/2010 12:26	1.095	10.6465	-2.072	56.97
9/21/2010 12:26	1.165	10.704	-2.0145	56.96
9/21/2010 12:26	1.235	10.7384	-1.9801	56.95
9/21/2010 12:26	1.305	10.7941	-1.9244	56.95

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:26	1.385	10.8502	-1.8683	56.93
9/21/2010 12:26	1.475	10.9068	-1.8117	56.92
9/21/2010 12:26	1.555	10.9498	-1.7687	56.91
9/21/2010 12:26	1.655	11.0155	-1.703	56.9
9/21/2010 12:26	1.755	11.0843	-1.6342	56.89
9/21/2010 12:26	1.855	11.1374	-1.5811	56.88
9/21/2010 12:27	1.965	11.2026	-1.5159	56.86
9/21/2010 12:27	2.085	11.2457	-1.4728	56.86
9/21/2010 12:27	2.215	11.3275	-1.391	56.84
9/21/2010 12:27	2.345	11.3915	-1.327	56.83
9/21/2010 12:27	2.485	11.4424	-1.2761	56.82
9/21/2010 12:27	2.635	11.522	-1.1965	56.81
9/21/2010 12:27	2.795	11.5916	-1.1269	56.79
9/21/2010 12:28	2.955	11.6408	-1.0777	56.78
9/21/2010 12:28	3.135	11.6969	-1.0216	56.76
9/21/2010 12:28	3.325	11.7792	-0.9393	56.75
9/21/2010 12:28	3.525	11.8384	-0.8801	56.74
9/21/2010 12:28	3.735	11.8845	-0.834	56.73
9/21/2010 12:29	3.955	11.9549	-0.7636	56.72
9/21/2010 12:29	4.195	12.0202	-0.6983	56.7
9/21/2010 12:29	4.445	12.0724	-0.6461	56.69
9/21/2010 12:29	4.705	12.1203	-0.5982	56.67
9/21/2010 12:30	4.985	12.1838	-0.5347	56.67
9/21/2010 12:30	5.285	12.2214	-0.4971	56.65
9/21/2010 12:30	5.595	12.28	-0.4385	56.65
9/21/2010 12:31	5.935	12.3287	-0.3898	56.64
9/21/2010 12:31	6.285	12.3688	-0.3497	56.63
9/21/2010 12:31	6.655	12.4084	-0.3101	56.62
9/21/2010 12:32	7.055	12.4406	-0.2779	56.61
9/21/2010 12:32	7.475	12.4767	-0.2418	56.6
9/21/2010 12:32	7.915	12.5204	-0.1981	56.6
9/21/2010 12:33	8.385	12.5424	-0.1761	56.6
9/21/2010 12:33	8.885	12.5615	-0.157	56.59
9/21/2010 12:34	9.415	12.5941	-0.1244	56.58
9/21/2010 12:35	9.975	12.5994	-0.1191	56.57
9/21/2010 12:35	10.575	12.6329	-0.0856	56.57
9/21/2010 12:36	11.175	12.6464	-0.0721	56.56
9/21/2010 12:36	11.875	12.6559	-0.0626	56.55
40442.52615	12.575	12.659	-0.0595	56.55
40442.52663	13.275	12.6821	-0.0364	56.55
40442.52719	14.075	12.6929	-0.0256	56.54
40442.52781	14.975	12.706	-0.0125	56.53
40442.52837	15.775	12.696	-0.0225	56.53

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
40442.52906	16.775	12.7003	-0.0182	56.53
40442.52976	17.775	12.7151	-0.0034	56.53
40442.53045	18.775	12.7016	-0.0169	56.52
40442.53122	19.875	12.7086	-0.0099	56.53
40442.53157	20.38831667	12.7195	0.001	56.53

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:46	0.001	12.7577	0	56.68
9/21/2010 12:46	0.004	13.5207	0.763	56.69
9/21/2010 12:46	0.008	14.0957	1.338	56.7
9/21/2010 12:46	0.013	13.9085	1.1508	56.7
9/21/2010 12:46	0.017	14.7356	1.9779	56.71
9/21/2010 12:46	0.021	15.0102	2.2525	56.71
9/21/2010 12:46	0.029	18.7835	6.0258	56.72
9/21/2010 12:46	0.033	18.7877	6.03	56.72
9/21/2010 12:46	0.038	18.055	5.2973	56.73
9/21/2010 12:46	0.042	17.5501	4.7924	56.73
9/21/2010 12:46	0.046	13.7598	1.0021	56.73
9/21/2010 12:46	0.050	16.0802	3.3225	56.73
9/21/2010 12:46	0.054	16.4329	3.6752	56.74
9/21/2010 12:46	0.058	16.1864	3.4287	56.73
9/21/2010 12:46	0.063	16.2661	3.5084	56.73
9/21/2010 12:46	0.067	15.9613	3.2036	56.74
9/21/2010 12:46	0.071	15.8599	3.1022	56.74
9/21/2010 12:46	0.075	15.516	2.7583	56.75
9/21/2010 12:46	0.079	16.0937	3.336	56.75
9/21/2010 12:46	0.085	16.0475	3.2898	56.73

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:46	0.091	15.9951	3.2374	56.72
9/21/2010 12:46	0.101	15.857	3.0993	56.69
9/21/2010 12:46	0.105	15.9504	3.1927	56.72
9/21/2010 12:46	0.112	15.8406	3.0829	56.7
9/21/2010 12:46	0.120	15.8318	3.0741	56.69
9/21/2010 12:46	0.129	15.8506	3.0929	56.68
9/21/2010 12:46	0.138	15.8321	3.0744	56.68
9/21/2010 12:46	0.147	15.8162	3.0585	56.68
9/21/2010 12:46	0.157	15.808	3.0503	56.68
9/21/2010 12:46	0.167	15.794	3.0363	56.68
9/21/2010 12:46	0.178	15.7827	3.025	56.67
9/21/2010 12:46	0.190	15.7739	3.0162	56.67
9/21/2010 12:46	0.203	15.7631	3.0054	56.66
9/21/2010 12:46	0.216	15.7627	3.005	56.66
9/21/2010 12:46	0.234	15.7614	3.0037	56.68
9/21/2010 12:46	0.245	15.7118	2.9541	56.72
9/21/2010 12:46	0.261	15.7018	2.9441	56.67
9/21/2010 12:46	0.277	15.67	2.9123	56.66
9/21/2010 12:46	0.295	15.6655	2.9078	56.65
9/21/2010 12:46	0.314	15.6551	2.8974	56.64
9/21/2010 12:46	0.334	15.6433	2.8856	56.64
9/21/2010 12:46	0.355	15.6211	2.8634	56.64
9/21/2010 12:46	0.377	15.5937	2.836	56.64
9/21/2010 12:46	0.401	15.5646	2.8069	56.63
9/21/2010 12:46	0.426	15.5528	2.7951	56.63
9/21/2010 12:46	0.452	15.5306	2.7729	56.62
9/21/2010 12:46	0.480	15.5071	2.7494	56.63
9/21/2010 12:46	0.510	15.4793	2.7216	56.62
9/21/2010 12:46	0.541	15.4519	2.6942	56.62
9/21/2010 12:46	0.576	15.4337	2.676	56.61
9/21/2010 12:46	0.610	15.3848	2.6271	56.61
9/21/2010 12:46	0.647	15.3592	2.6015	56.61
9/21/2010 12:46	0.687	15.3361	2.5784	56.61
9/21/2010 12:46	0.730	15.3118	2.5541	56.61
9/21/2010 12:46	0.773	15.3188	2.5611	56.6
9/21/2010 12:46	0.820	15.2391	2.4814	56.61
9/21/2010 12:47	0.870	15.1795	2.4218	56.6
9/21/2010 12:47	0.923	15.1433	2.3856	56.6
9/21/2010 12:47	0.979	15.1098	2.3521	56.6
9/21/2010 12:47	1.039	15.0707	2.313	56.59
9/21/2010 12:47	1.099	15.0041	2.2464	56.59
9/21/2010 12:47	1.169	14.9606	2.2029	56.59
9/21/2010 12:47	1.239	14.9158	2.1581	56.59

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 12:47	1.309	14.8766	2.1189	56.59
9/21/2010 12:47	1.389	14.8001	2.0424	56.59
9/21/2010 12:47	1.479	14.7722	2.0145	56.58
9/21/2010 12:47	1.559	14.7261	1.9684	56.58
9/21/2010 12:47	1.659	14.6652	1.9075	56.58
9/21/2010 12:47	1.759	14.6112	1.8535	56.58
9/21/2010 12:48	1.859	14.5464	1.7887	56.57
9/21/2010 12:48	1.969	14.4964	1.7387	56.57
9/21/2010 12:48	2.089	14.4285	1.6708	56.57
9/21/2010 12:48	2.219	14.3632	1.6055	56.57
9/21/2010 12:48	2.349	14.3093	1.5516	56.56
9/21/2010 12:48	2.489	14.227	1.4693	56.56
9/21/2010 12:48	2.639	14.1762	1.4185	56.56
9/21/2010 12:48	2.799	14.1118	1.3541	56.56
9/21/2010 12:49	2.959	14.0404	1.2827	56.55
9/21/2010 12:49	3.139	13.9786	1.2209	56.55
9/21/2010 12:49	3.329	13.8986	1.1409	56.56
9/21/2010 12:49	3.529	13.8385	1.0808	56.55
9/21/2010 12:49	3.739	13.7641	1.0064	56.55
9/21/2010 12:50	3.959	13.7063	0.9486	56.55
9/21/2010 12:50	4.199	13.6214	0.8637	56.55
9/21/2010 12:50	4.449	13.5592	0.8015	56.54
9/21/2010 12:50	4.709	13.4948	0.7371	56.54
9/21/2010 12:51	4.989	13.4239	0.6662	56.54
9/21/2010 12:51	5.289	13.356	0.5983	56.54
9/21/2010 12:51	5.599	13.3068	0.5491	56.54
9/21/2010 12:52	5.939	13.2577	0.5	56.54
9/21/2010 12:52	6.289	13.1994	0.4417	56.54
9/21/2010 12:52	6.659	13.1394	0.3817	56.54
9/21/2010 12:53	7.059	13.0828	0.3251	56.54
9/21/2010 12:53	7.479	13.0375	0.2798	56.53
9/21/2010 12:54	7.919	12.9992	0.2415	56.54
9/21/2010 12:54	8.389	12.9596	0.2019	56.54
9/21/2010 12:55	8.889	12.9205	0.1628	56.53
9/21/2010 12:55	9.419	12.8904	0.1327	56.53
9/21/2010 12:56	9.979	12.87	0.1123	56.54
9/21/2010 12:56	10.579	12.8426	0.0849	56.54
9/21/2010 12:57	11.179	12.8161	0.0584	56.54
40442.54031	11.879	12.7934	0.0357	56.55
40442.5408	12.579	12.7891	0.0314	56.55
40442.54128	13.279	12.7665	0.0088	56.55
40442.54184	14.079	12.7643	0.0066	56.54
40442.54247	14.979	12.7443	-0.0134	56.55

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
40442.54302	15.779	12.7308	-0.0269	56.55
40442.54372	16.779	12.7325	-0.0252	56.55
40442.54441	17.779	12.7343	-0.0234	56.55
40442.5451	18.77915	12.7334	-0.0243	56.57
40442.54551	19.36513333	12.7255	-0.0322	56.58

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:05	0.001	12.3334	-0.353	56.69
9/21/2010 13:05	0.004	10.5385	-2.1479	56.7
9/21/2010 13:05	0.008	9.1529	-3.5335	56.7
9/21/2010 13:05	0.013	9.5077	-3.1787	56.7
9/21/2010 13:05	0.017	9.3932	-3.2932	56.71
9/21/2010 13:05	0.021	9.4202	-3.2662	56.71
9/21/2010 13:05	0.025	9.4419	-3.2445	56.71
9/21/2010 13:05	0.029	9.4694	-3.217	56.72
9/21/2010 13:05	0.033	9.4624	-3.224	56.72
9/21/2010 13:05	0.038	9.4713	-3.2151	56.72
9/21/2010 13:05	0.042	9.487	-3.1994	56.73
9/21/2010 13:05	0.046	9.5101	-3.1763	56.73
9/21/2010 13:05	0.050	9.5101	-3.1763	56.73
9/21/2010 13:05	0.054	9.5284	-3.158	56.73
9/21/2010 13:05	0.058	9.5083	-3.1781	56.73
9/21/2010 13:05	0.063	9.5271	-3.1593	56.74
9/21/2010 13:05	0.067	9.5271	-3.1593	56.74
9/21/2010 13:05	0.073	9.5379	-3.1485	56.72
9/21/2010 13:05	0.079	9.549	-3.1374	56.72
9/21/2010 13:05	0.089	9.5673	-3.1191	56.68

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:05	0.093	9.5834	-3.103	56.71
9/21/2010 13:05	0.100	9.5867	-3.0997	56.7
9/21/2010 13:05	0.108	9.6065	-3.0799	56.69
9/21/2010 13:05	0.117	9.6043	-3.0821	56.68
9/21/2010 13:05	0.126	9.6322	-3.0542	56.67
9/21/2010 13:05	0.135	9.63	-3.0564	56.67
9/21/2010 13:05	0.146	9.6403	-3.0461	56.69
9/21/2010 13:05	0.155	9.6479	-3.0385	56.68
9/21/2010 13:05	0.168	9.6574	-3.029	56.71
9/21/2010 13:05	0.179	9.6929	-2.9935	56.68
9/21/2010 13:05	0.191	9.6936	-2.9928	56.67
9/21/2010 13:05	0.204	9.7127	-2.9737	56.66
9/21/2010 13:05	0.218	9.7389	-2.9475	56.65
9/21/2010 13:05	0.233	9.7545	-2.9319	56.65
9/21/2010 13:05	0.249	9.7693	-2.9171	56.65
9/21/2010 13:05	0.265	9.785	-2.9014	56.64
9/21/2010 13:05	0.283	9.8085	-2.8779	56.64
9/21/2010 13:05	0.302	9.8213	-2.8651	56.64
9/21/2010 13:05	0.322	9.8448	-2.8416	56.64
9/21/2010 13:05	0.343	9.8731	-2.8133	56.64
9/21/2010 13:05	0.365	9.8949	-2.7915	56.63
9/21/2010 13:05	0.389	9.9223	-2.7641	56.63
9/21/2010 13:05	0.414	9.9384	-2.748	56.63
9/21/2010 13:06	0.440	9.9554	-2.731	56.64
9/21/2010 13:06	0.468	9.9984	-2.688	56.64
9/21/2010 13:06	0.498	10.0254	-2.661	56.63
9/21/2010 13:06	0.529	10.0475	-2.6389	56.63
9/21/2010 13:06	0.563	10.0955	-2.5909	56.62
9/21/2010 13:06	0.598	10.1186	-2.5678	56.62
9/21/2010 13:06	0.635	10.1522	-2.5342	56.62
9/21/2010 13:06	0.675	10.1946	-2.4918	56.62
9/21/2010 13:06	0.717	10.2404	-2.446	56.62
9/21/2010 13:06	0.762	10.2734	-2.413	56.61
9/21/2010 13:06	0.808	10.3196	-2.3668	56.61
9/21/2010 13:06	0.858	10.3423	-2.3441	56.61
9/21/2010 13:06	0.911	10.3824	-2.304	56.6
9/21/2010 13:06	0.967	10.4203	-2.2661	56.6
9/21/2010 13:06	1.027	10.4725	-2.2139	56.6
9/21/2010 13:06	1.087	10.5325	-2.1539	56.6
9/21/2010 13:06	1.157	10.5682	-2.1182	56.59
9/21/2010 13:06	1.227	10.6204	-2.066	56.59
9/21/2010 13:06	1.297	10.6639	-2.0225	56.59
9/21/2010 13:06	1.377	10.7275	-1.9589	56.59

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:07	1.467	10.7753	-1.9111	56.59
9/21/2010 13:07	1.547	10.8471	-1.8393	56.59
9/21/2010 13:07	1.647	10.9024	-1.784	56.59
9/21/2010 13:07	1.747	10.9642	-1.7222	56.58
9/21/2010 13:07	1.847	11.0221	-1.6643	56.58
9/21/2010 13:07	1.957	11.0756	-1.6108	56.58
9/21/2010 13:07	2.077	11.1422	-1.5442	56.57
9/21/2010 13:07	2.207	11.2026	-1.4838	56.57
9/21/2010 13:07	2.337	11.2792	-1.4072	56.57
9/21/2010 13:08	2.477	11.3427	-1.3437	56.56
9/21/2010 13:08	2.627	11.3976	-1.2888	56.56
9/21/2010 13:08	2.787	11.4785	-1.2079	56.57
9/21/2010 13:08	2.947	11.5416	-1.1448	56.56
9/21/2010 13:08	3.127	11.5999	-1.0865	56.56
9/21/2010 13:08	3.317	11.6804	-1.006	56.56
9/21/2010 13:09	3.517	11.7426	-0.9438	56.56
9/21/2010 13:09	3.727	11.8062	-0.8802	56.55
9/21/2010 13:09	3.947	11.8714	-0.815	56.55
9/21/2010 13:09	4.187	11.9428	-0.7436	56.55
9/21/2010 13:10	4.437	11.992	-0.6944	56.56
9/21/2010 13:10	4.697	12.0599	-0.6265	56.56
9/21/2010 13:10	4.977	12.1164	-0.57	56.55
9/21/2010 13:10	5.277	12.1664	-0.52	56.55
9/21/2010 13:11	5.587	12.2143	-0.4721	56.55
9/21/2010 13:11	5.927	12.2756	-0.4108	56.55
9/21/2010 13:11	6.277	12.3153	-0.3711	56.55
9/21/2010 13:12	6.647	12.3705	-0.3159	56.56
9/21/2010 13:12	7.047	12.3971	-0.2893	56.56
9/21/2010 13:13	7.467	12.4393	-0.2471	56.56
9/21/2010 13:13	7.907	12.4802	-0.2062	56.56
9/21/2010 13:13	8.377	12.4967	-0.1897	56.56
9/21/2010 13:14	8.877	12.5372	-0.1492	56.56
9/21/2010 13:14	9.407	12.5624	-0.124	56.56
9/21/2010 13:15	9.967	12.5776	-0.1088	56.57
9/21/2010 13:16	10.567	12.6037	-0.0827	56.57
9/21/2010 13:16	11.167	12.609	-0.0774	56.57
9/21/2010 13:17	11.867	12.6311	-0.0553	56.57
9/21/2010 13:18	12.567	12.6377	-0.0487	56.57
40442.55475	13.267	12.6638	-0.0226	56.57
40442.5553	14.067	12.6677	-0.0187	56.57
40442.55593	14.967	12.659	-0.0274	56.57
40442.55648	15.767	12.6799	-0.0065	56.56
40442.55718	16.767	12.6794	-0.007	56.56

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
40442.55787	17.767	12.6781	-0.0083	56.56
40442.55856	18.767	12.6729	-0.0135	56.55
40442.5592	19.696	12.6864	0	56.56

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:25	0.001	12.6811	0	56.66
9/21/2010 13:25	0.004	18.0606	5.3795	56.68
9/21/2010 13:25	0.017	18.1185	5.4374	56.69
9/21/2010 13:25	0.021	13.7053	1.0242	56.69
9/21/2010 13:25	0.025	14.0134	1.3323	56.7
9/21/2010 13:25	0.033	16.5191	3.838	56.7
9/21/2010 13:25	0.038	15.199	2.5179	56.7
9/21/2010 13:25	0.042	16.7749	4.0938	56.71
9/21/2010 13:25	0.046	17.0183	4.3372	56.71
9/21/2010 13:25	0.050	16.5074	3.8263	56.71
9/21/2010 13:25	0.054	15.8146	3.1335	56.72
9/21/2010 13:25	0.058	15.7054	3.0243	56.72
9/21/2010 13:25	0.063	15.9313	3.2502	56.72
9/21/2010 13:25	0.067	16.2965	3.6154	56.72
9/21/2010 13:25	0.071	16.3544	3.6733	56.72
9/21/2010 13:25	0.075	14.8151	2.134	56.73
9/21/2010 13:25	0.081	16.1137	3.4326	56.71
9/21/2010 13:25	0.087	16.5134	3.8323	56.7
9/21/2010 13:25	0.094	14.1533	1.4722	56.7
9/21/2010 13:25	0.101	14.0413	1.3602	56.69

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:25	0.108	16.4852	3.8041	56.69
9/21/2010 13:25	0.116	15.5007	2.8196	56.68
9/21/2010 13:25	0.125	15.6117	2.9306	56.67
9/21/2010 13:25	0.133	15.8206	3.1395	56.67
9/21/2010 13:25	0.143	15.6818	3.0007	56.66
9/21/2010 13:25	0.153	15.8219	3.1408	56.66
9/21/2010 13:25	0.163	15.7866	3.1055	56.66
9/21/2010 13:25	0.174	15.8119	3.1308	56.65
9/21/2010 13:25	0.186	15.7988	3.1177	56.65
9/21/2010 13:25	0.206	15.8364	3.1553	56.67
9/21/2010 13:25	0.212	15.7814	3.1003	56.67
9/21/2010 13:25	0.226	15.7546	3.0735	56.68
9/21/2010 13:25	0.241	15.7257	3.0446	56.66
9/21/2010 13:25	0.257	15.7257	3.0446	56.65
9/21/2010 13:25	0.273	15.703	3.0219	56.65
9/21/2010 13:25	0.291	15.6877	3.0066	56.64
9/21/2010 13:25	0.310	15.686	3.0049	56.64
9/21/2010 13:25	0.330	15.649	2.9679	56.63
9/21/2010 13:25	0.351	15.6346	2.9535	56.64
9/21/2010 13:25	0.373	15.6116	2.9305	56.63
9/21/2010 13:25	0.397	15.599	2.9179	56.63
9/21/2010 13:25	0.422	15.5841	2.903	56.63
9/21/2010 13:25	0.448	15.5725	2.8914	56.62
9/21/2010 13:25	0.476	15.5329	2.8518	56.65
9/21/2010 13:25	0.506	15.5272	2.8461	56.63
9/21/2010 13:25	0.537	15.5511	2.87	56.63
9/21/2010 13:25	0.571	15.4723	2.7912	56.62
9/21/2010 13:25	0.606	15.3588	2.6777	56.62
9/21/2010 13:25	0.643	15.458	2.7769	56.7
9/21/2010 13:25	0.683	15.3806	2.6995	56.62
9/21/2010 13:26	0.725	15.3336	2.6525	56.62
9/21/2010 13:26	0.769	15.3017	2.6206	56.62
9/21/2010 13:26	0.816	15.2779	2.5968	56.61
9/21/2010 13:26	0.866	15.2369	2.5558	56.62
9/21/2010 13:26	0.919	15.1991	2.518	56.61
9/21/2010 13:26	0.975	15.159	2.4779	56.61
9/21/2010 13:26	1.035	15.1133	2.4322	56.61
9/21/2010 13:26	1.095	15.0807	2.3996	56.61
9/21/2010 13:26	1.165	15.0376	2.3565	56.61
9/21/2010 13:26	1.235	14.9737	2.2926	56.61
9/21/2010 13:26	1.305	14.9397	2.2586	56.61
9/21/2010 13:26	1.385	14.8884	2.2073	56.61
9/21/2010 13:26	1.475	14.8461	2.165	56.61

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:26	1.555	14.7957	2.1146	56.6
9/21/2010 13:26	1.655	14.7348	2.0537	56.6
9/21/2010 13:27	1.755	14.6873	2.0062	56.6
9/21/2010 13:27	1.855	14.6712	1.9901	56.6
9/21/2010 13:27	1.965	14.5778	1.8967	56.6
9/21/2010 13:27	2.085	14.4964	1.8153	56.59
9/21/2010 13:27	2.215	14.4477	1.7666	56.59
9/21/2010 13:27	2.345	14.3902	1.7091	56.59
9/21/2010 13:27	2.485	14.3354	1.6543	56.59
9/21/2010 13:27	2.635	14.2588	1.5777	56.59
9/21/2010 13:28	2.795	14.1875	1.5064	56.59
9/21/2010 13:28	2.955	14.134	1.4529	56.59
9/21/2010 13:28	3.135	14.0596	1.3785	56.59
9/21/2010 13:28	3.325	13.9869	1.3058	56.58
9/21/2010 13:28	3.525	13.9299	1.2488	56.58
9/21/2010 13:29	3.735	13.8646	1.1835	56.58
9/21/2010 13:29	3.955	13.8037	1.1226	56.58
9/21/2010 13:29	4.195	13.7267	1.0456	56.58
9/21/2010 13:29	4.445	13.6523	0.9712	56.57
9/21/2010 13:29	4.705	13.6007	0.9196	56.57
9/21/2010 13:30	4.985	13.5209	0.8398	56.57
9/21/2010 13:30	5.285	13.4635	0.7824	56.58
9/21/2010 13:30	5.595	13.3878	0.7067	56.58
9/21/2010 13:31	5.935	13.3251	0.644	56.57
9/21/2010 13:31	6.285	13.2594	0.5783	56.57
9/21/2010 13:31	6.655	13.2016	0.5205	56.57
9/21/2010 13:32	7.055	13.1498	0.4687	56.57
9/21/2010 13:32	7.475	13.0907	0.4096	56.57
9/21/2010 13:33	7.915	13.0441	0.363	56.57
9/21/2010 13:33	8.385	12.9944	0.3133	56.57
9/21/2010 13:34	8.885	12.9588	0.2777	56.57
9/21/2010 13:34	9.415	12.9131	0.232	56.57
9/21/2010 13:35	9.975	12.8813	0.2002	56.57
9/21/2010 13:35	10.575	12.8548	0.1737	56.57
9/21/2010 13:36	11.175	12.813	0.1319	56.57
9/21/2010 13:37	11.875	12.803	0.1219	56.57
9/21/2010 13:37	12.575	12.773	0.0919	56.56
9/21/2010 13:38	13.275	12.7599	0.0788	56.57
40442.56899	14.075	12.7308	0.0497	56.57
40442.56962	14.975	12.7103	0.0292	56.57
40442.57017	15.775	12.7042	0.0231	56.57
40442.57087	16.775	12.709	0.0279	56.56
40442.57156	17.775	12.692	0.0109	56.56

Injection #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
40442.57226	18.775	12.6855	0.0044	56.57
40442.57302	19.875	12.669	-0.0121	56.57
40442.57385	21.075	12.6764	-0.0047	56.57
40442.57476	22.37498333	12.6746	-0.0065	56.57
40442.57566	23.67498333	12.6703	-0.0108	56.57

Withdrawal #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:50	0.001	12.6472	0.02	56.69
9/21/2010 13:50	0.004	10.2102	-2.417	56.69
9/21/2010 13:50	0.017	9.2778	-3.3494	56.71
9/21/2010 13:50	0.021	9.3658	-3.2614	56.71
9/21/2010 13:50	0.025	9.3562	-3.271	56.71
9/21/2010 13:50	0.029	9.361	-3.2662	56.72
9/21/2010 13:50	0.033	9.4063	-3.2209	56.72
9/21/2010 13:50	0.038	9.3815	-3.2457	56.72
9/21/2010 13:50	0.042	9.4056	-3.2216	56.73
9/21/2010 13:50	0.046	9.4034	-3.2238	56.72
9/21/2010 13:50	0.050	9.4234	-3.2038	56.73
9/21/2010 13:50	0.054	9.4415	-3.1857	56.73
9/21/2010 13:50	0.058	9.4482	-3.179	56.73
9/21/2010 13:50	0.063	9.4622	-3.165	56.74
9/21/2010 13:50	0.067	9.4617	-3.1655	56.74
9/21/2010 13:50	0.071	9.4665	-3.1607	56.75
9/21/2010 13:50	0.077	9.4678	-3.1594	56.72
9/21/2010 13:50	0.083	9.4874	-3.1398	56.74
9/21/2010 13:50	0.090	9.497	-3.1302	56.72
9/21/2010 13:50	0.097	9.5144	-3.1128	56.71

Withdrawal #3

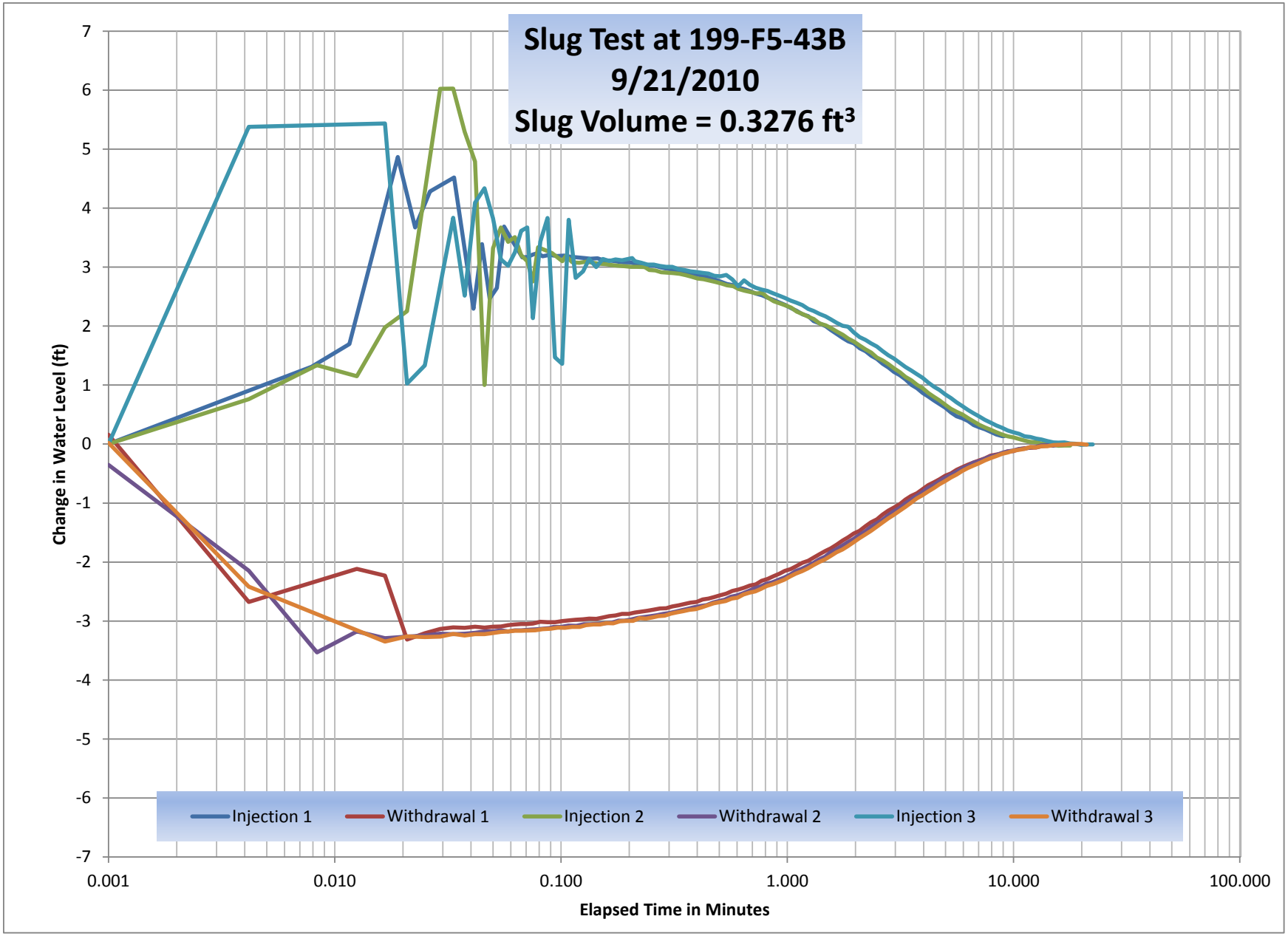
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:50	0.104	9.5092	-3.118	56.71
9/21/2010 13:50	0.112	9.5273	-3.0999	56.69
9/21/2010 13:50	0.121	9.526	-3.1012	56.69
9/21/2010 13:50	0.129	9.558	-3.0692	56.68
9/21/2010 13:50	0.139	9.5669	-3.0603	56.68
9/21/2010 13:50	0.149	9.5682	-3.059	56.68
9/21/2010 13:50	0.159	9.5908	-3.0364	56.67
9/21/2010 13:50	0.170	9.5887	-3.0385	56.67
9/21/2010 13:50	0.182	9.6231	-3.0041	56.66
9/21/2010 13:50	0.195	9.6309	-2.9963	56.66
9/21/2010 13:50	0.208	9.6276	-2.9996	56.67
9/21/2010 13:50	0.222	9.674	-2.9532	56.65
9/21/2010 13:50	0.237	9.6692	-2.958	56.65
9/21/2010 13:50	0.253	9.6864	-2.9408	56.65
9/21/2010 13:50	0.269	9.7077	-2.9195	56.65
9/21/2010 13:50	0.287	9.7169	-2.9103	56.65
9/21/2010 13:50	0.306	9.7499	-2.8773	56.64
9/21/2010 13:50	0.326	9.7756	-2.8516	56.64
9/21/2010 13:50	0.347	9.793	-2.8342	56.64
9/21/2010 13:50	0.369	9.817	-2.8102	56.64
9/21/2010 13:50	0.393	9.8283	-2.7989	56.63
9/21/2010 13:50	0.418	9.8566	-2.7706	56.64
9/21/2010 13:50	0.444	9.8918	-2.7354	56.64
9/21/2010 13:50	0.472	9.9275	-2.6997	56.64
9/21/2010 13:50	0.502	9.9471	-2.6801	56.63
9/21/2010 13:50	0.533	9.965	-2.6622	56.63
9/21/2010 13:50	0.567	10.0085	-2.6187	56.63
9/21/2010 13:50	0.602	10.0228	-2.6044	56.63
9/21/2010 13:50	0.639	10.075	-2.5522	56.62
9/21/2010 13:50	0.679	10.1055	-2.5217	56.62
9/21/2010 13:50	0.721	10.1287	-2.4985	56.62
9/21/2010 13:50	0.765	10.1696	-2.4576	56.62
9/21/2010 13:50	0.812	10.2204	-2.4068	56.62
9/21/2010 13:50	0.862	10.2526	-2.3746	56.62
9/21/2010 13:50	0.915	10.2901	-2.3371	56.62
9/21/2010 13:51	0.971	10.3276	-2.2996	56.61
9/21/2010 13:51	1.031	10.3859	-2.2413	56.61
9/21/2010 13:51	1.091	10.4306	-2.1966	56.61
9/21/2010 13:51	1.161	10.4738	-2.1534	56.61
9/21/2010 13:51	1.231	10.5173	-2.1099	56.6
9/21/2010 13:51	1.301	10.5708	-2.0564	56.6
9/21/2010 13:51	1.381	10.6261	-2.0011	56.6
9/21/2010 13:51	1.471	10.6748	-1.9524	56.6

Withdrawal #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 13:51	1.551	10.7301	-1.8971	56.59
9/21/2010 13:51	1.651	10.7936	-1.8336	56.59
9/21/2010 13:51	1.751	10.8375	-1.7897	56.59
9/21/2010 13:51	1.851	10.8967	-1.7305	56.59
9/21/2010 13:52	1.961	10.9624	-1.6648	56.59
9/21/2010 13:52	2.081	11.0312	-1.596	56.59
9/21/2010 13:52	2.211	11.0965	-1.5307	56.58
9/21/2010 13:52	2.341	11.1552	-1.472	56.58
9/21/2010 13:52	2.481	11.2261	-1.4011	56.58
9/21/2010 13:52	2.631	11.2975	-1.3297	56.58
9/21/2010 13:52	2.791	11.3675	-1.2597	56.58
9/21/2010 13:52	2.951	11.425	-1.2022	56.58
9/21/2010 13:53	3.131	11.4968	-1.1304	56.58
9/21/2010 13:53	3.321	11.559	-1.0682	56.58
9/21/2010 13:53	3.521	11.6321	-0.9951	56.58
9/21/2010 13:53	3.731	11.7048	-0.9224	56.58
9/21/2010 13:53	3.951	11.757	-0.8702	56.58
9/21/2010 13:54	4.191	11.8223	-0.8049	56.58
9/21/2010 13:54	4.441	11.8806	-0.7466	56.58
9/21/2010 13:54	4.701	11.9476	-0.6796	56.58
9/21/2010 13:55	4.981	11.9976	-0.6296	56.57
9/21/2010 13:55	5.281	12.0599	-0.5673	56.57
9/21/2010 13:55	5.591	12.1099	-0.5173	56.57
9/21/2010 13:55	5.931	12.1712	-0.456	56.57
9/21/2010 13:56	6.281	12.2195	-0.4077	56.57
9/21/2010 13:56	6.651	12.2626	-0.3646	56.57
9/21/2010 13:57	7.051	12.3048	-0.3224	56.58
9/21/2010 13:57	7.471	12.3514	-0.2758	56.58
9/21/2010 13:57	7.911	12.3901	-0.2371	56.58
9/21/2010 13:58	8.381	12.4245	-0.2027	56.58
9/21/2010 13:58	8.881	12.4597	-0.1675	56.58
9/21/2010 13:59	9.411	12.4844	-0.1428	56.59
9/21/2010 14:00	9.971	12.5159	-0.1113	56.59
9/21/2010 14:00	10.571	12.5306	-0.0966	56.61
9/21/2010 14:01	11.171	12.5445	-0.0827	56.61
9/21/2010 14:01	11.871	12.5801	-0.0471	56.61
9/21/2010 14:02	12.571	12.5732	-0.054	56.61
9/21/2010 14:03	13.271	12.5894	-0.0378	56.61
40442.58618	14.071	12.5898	-0.0374	56.62
40442.58681	14.971	12.6098	-0.0174	56.61
40442.58736	15.771	12.6141	-0.0131	56.62
40442.58806	16.771	12.6177	-0.0095	56.62
40442.58875	17.771	12.6293	0.0021	56.61

Withdrawal #3

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
40442.58944	18.771	12.6307	0.0035	56.62
40442.59021	19.871	12.6307	0.0035	56.61
40442.59104	21.071	12.6164	-0.0108	56.6
40442.59194	22.37081667	12.625	-0.0022	56.6
40442.59285	23.67081667	12.6324	0.0052	56.6
40442.59382	25.07081667	12.6198	-0.0074	56.6
40442.59486	26.57081667	12.6203	-0.0069	56.6
40442.59597	28.17081667	12.622	-0.0052	56.6
40442.59708	29.77081667	12.6272	0	56.61


Slug Test at 199-F5-43B
9/21/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2
Injection 3
Withdrawal 3

Slug Test Field Activity Report

Summary of FAR - F5-43B

Time	Note
12:15	3 inch stainless slug (0.2985 ft^3) volume in
12:25	3 inch slug stainless slug out.
12:46	3 inch stainless slug in.
13:05	3 inch slug stainless slug out.
13:25	3 inch stainless slug in.
13:50	3 inch slug stainless slug out.
14:20	Stopped data logging and pulled slug from well.

Note* the slug volumes were recalculated by Robert Edrington, therefore there is a slight variation in the slug volumes in the field notes and raw data file name.

Slug Testing at 199-F5-44 (A4594)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	36.73
D-T-B (ft TOC)	51.10
Stick up (ft)	2.99
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754
Max WL Change (ft)	5.20	3.09	5.87	3.35

Slug Testing was performed on 9/21/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-44

Slug Volume 0.3276 ft^3

Raw File:	199-F5-44 slug test 21Sept10_Append_2010-09-21_18-45-55-843.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/21/2010		5.20	3.09
Test start:	11:03	injection 1		
Test restart:	11:13	withdrawal 1		
Test restart:	11:23	injection 2	**Max Change Test 2**	
Test restart:	11:33	withdrawal 2	Injection 2	Withdrawal 2
Test Stop	11:44	end	5.87	3.35
Slug Volume:	0.3276 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:03	0.001	13.7469	0	69.3653
9/21/2010 11:03	0.004	14.2082	0.4613	69.3514
9/21/2010 11:03	0.007	18.5837	4.8368	69.4353
9/21/2010 11:03	0.015	18.9462	5.1993	69.396
9/21/2010 11:03	0.023	18.429	4.6821	69.3619
9/21/2010 11:03	0.026	16.3213	2.5744	69.3549
9/21/2010 11:03	0.030	15.5003	1.7534	69.3479
9/21/2010 11:03	0.034	18.1275	4.3806	69.333
9/21/2010 11:03	0.041	16.2311	2.4842	69.3269
9/21/2010 11:03	0.045	15.716	1.9691	69.3191
9/21/2010 11:03	0.048	14.1856	0.4387	69.3173
9/21/2010 11:03	0.052	14.8219	1.075	69.3033
9/21/2010 11:03	0.056	15.5425	1.7956	69.2981
9/21/2010 11:03	0.059	14.9831	1.2362	69.2989
9/21/2010 11:03	0.063	14.6541	0.9072	69.2814
9/21/2010 11:03	0.067	14.8684	1.1215	69.3365
9/21/2010 11:03	0.074	14.8315	1.0846	69.2963
9/21/2010 11:03	0.078	14.6765	0.9296	69.2788
9/21/2010 11:03	0.084	14.6591	0.9122	69.2429
9/21/2010 11:03	0.091	14.5674	0.8205	69.2071
9/21/2010 11:03	0.098	14.5808	0.8339	69.1853
9/21/2010 11:03	0.105	14.4923	0.7454	69.166
9/21/2010 11:03	0.113	14.4593	0.7124	69.1319
9/21/2010 11:03	0.122	14.4333	0.6864	69.1049
9/21/2010 11:03	0.130	14.3895	0.6426	69.0952
9/21/2010 11:03	0.140	14.3553	0.6084	69.0646

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:03	0.150	14.3179	0.571	69.0463
9/21/2010 11:03	0.160	14.2714	0.5245	69.0253
9/21/2010 11:03	0.171	14.2429	0.496	68.9921
9/21/2010 11:03	0.183	14.2012	0.4543	68.9737
9/21/2010 11:03	0.196	14.1643	0.4174	68.9405
9/21/2010 11:03	0.209	14.1316	0.3847	68.9125
9/21/2010 11:03	0.223	14.0987	0.3518	68.889
9/21/2010 11:03	0.238	14.0859	0.339	68.8636
9/21/2010 11:03	0.254	14.0416	0.2947	68.8286
9/21/2010 11:03	0.270	14.0232	0.2763	68.8015
9/21/2010 11:03	0.288	14.0025	0.2556	68.7675
9/21/2010 11:03	0.307	13.974	0.2271	68.7335
9/21/2010 11:03	0.327	13.9691	0.2222	68.6993
9/21/2010 11:03	0.348	13.9468	0.1999	68.6644
9/21/2010 11:03	0.370	13.9345	0.1876	68.6243
9/21/2010 11:03	0.394	13.92	0.1731	68.5806
9/21/2010 11:03	0.419	13.9121	0.1652	68.5421
9/21/2010 11:03	0.445	13.8994	0.1525	68.4897
9/21/2010 11:03	0.473	13.8843	0.1374	68.4504
9/21/2010 11:03	0.503	13.8698	0.1229	68.3936
9/21/2010 11:03	0.534	13.8746	0.1277	68.3491
9/21/2010 11:03	0.568	13.8628	0.1159	68.2933
9/21/2010 11:04	0.603	13.8478	0.1009	68.233
9/21/2010 11:04	0.640	13.8408	0.0939	68.1841
9/21/2010 11:04	0.680	13.8671	0.1202	68.1178
9/21/2010 11:04	0.722	13.8224	0.0755	68.0549
9/21/2010 11:04	0.766	13.8294	0.0825	67.9886
9/21/2010 11:04	0.813	13.8228	0.0759	67.9188
9/21/2010 11:04	0.863	13.8162	0.0693	67.8428
9/21/2010 11:04	0.916	13.8237	0.0768	67.7661
9/21/2010 11:04	0.972	13.811	0.0641	67.6982
9/21/2010 11:04	1.032	13.8061	0.0592	67.6109
9/21/2010 11:04	1.092	13.7987	0.0518	67.5315
9/21/2010 11:04	1.162	13.818	0.0711	67.4338
9/21/2010 11:04	1.232	13.8004	0.0535	67.3449
9/21/2010 11:04	1.302	13.7903	0.0434	67.2595
9/21/2010 11:04	1.382	13.7899	0.043	67.1644
9/21/2010 11:04	1.472	13.782	0.0351	67.0599
9/21/2010 11:04	1.552	13.7886	0.0417	66.9675
9/21/2010 11:05	1.652	13.775	0.0281	66.8534
9/21/2010 11:05	1.752	13.7846	0.0377	66.7401
9/21/2010 11:05	1.852	13.7811	0.0342	66.6304

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:05	1.962	13.7829	0.036	66.5198
9/21/2010 11:05	2.082	13.7767	0.0298	66.3988
9/21/2010 11:05	2.212	13.7715	0.0246	66.2804
9/21/2010 11:05	2.342	13.7781	0.0312	66.1594
9/21/2010 11:05	2.482	13.7684	0.0215	66.042
9/21/2010 11:06	2.632	13.7767	0.0298	65.921
9/21/2010 11:06	2.792	13.7678	0.0209	65.7975
9/21/2010 11:06	2.952	13.7639	0.017	65.6774
9/21/2010 11:06	3.132	13.7728	0.0259	65.5505
9/21/2010 11:06	3.322	13.7678	0.0209	65.421
9/21/2010 11:06	3.522	13.7683	0.0214	65.2958
9/21/2010 11:07	3.732	13.7785	0.0316	65.1654
9/21/2010 11:07	3.952	13.7744	0.0275	65.0473
9/21/2010 11:07	4.192	13.7573	0.0104	64.9274
9/21/2010 11:07	4.442	13.7766	0.0297	64.8092
9/21/2010 11:08	4.702	13.7661	0.0192	64.6946
9/21/2010 11:08	4.982	13.7744	0.0275	64.5748
9/21/2010 11:08	5.282	13.7713	0.0244	64.4611
9/21/2010 11:08	5.592	13.7871	0.0402	64.356
9/21/2010 11:09	5.932	13.7801	0.0332	64.258
9/21/2010 11:09	6.282	13.7683	0.0214	64.1512
9/21/2010 11:10	6.652	13.7863	0.0394	64.0618
9/21/2010 11:10	7.052	13.7885	0.0416	63.9682
9/21/2010 11:10	7.472	13.7946	0.0477	63.8849
9/21/2010 11:11	7.912	13.7998	0.0529	63.806
9/21/2010 11:11	8.382	13.7858	0.0389	63.7227
9/21/2010 11:12	8.882	13.8025	0.0556	63.6578
9/21/2010 11:12	9.412	13.8135	0.0666	63.5944
9/21/2010 11:13	9.972	13.824	0.0771	63.5286
9/21/2010 11:13	10.572	13.806	0.0591	63.466

Log Notes:

Date and Time	Note
9/21/2010 11:03	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/21/2010 11:03	Manual Start Command
9/21/2010 11:09	Log Download - Used Battery: 8% Used Memory: 20% Name: H0066555
9/21/2010 11:13	Restart Command
9/21/2010 11:23	Restart Command
9/21/2010 11:23	Log Download - Used Battery: 8% Used Memory: 20% Name: H0066555
9/21/2010 11:33	Restart Command
9/21/2010 11:44	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:14	0.001	13.8114	0	63.5623
9/21/2010 11:14	0.004	13.1803	-0.6311	63.5667
9/21/2010 11:14	0.008	11.3886	-2.4228	63.5762
9/21/2010 11:14	0.013	11.4011	-2.4103	63.5797
9/21/2010 11:14	0.017	12.017	-1.7944	63.59
9/21/2010 11:14	0.021	12.2272	-1.5842	63.5918
9/21/2010 11:14	0.025	11.739	-2.0724	63.597
9/21/2010 11:14	0.029	11.268	-2.5434	63.597
9/21/2010 11:14	0.033	10.7165	-3.0949	63.6074
9/21/2010 11:14	0.038	10.8008	-3.0106	63.6048
9/21/2010 11:14	0.042	10.861	-2.9504	63.6135
9/21/2010 11:14	0.046	10.9264	-2.885	63.6083
9/21/2010 11:14	0.050	11.0243	-2.7871	63.6152
9/21/2010 11:14	0.054	11.0994	-2.712	63.6126
9/21/2010 11:14	0.058	11.1617	-2.6497	63.617
9/21/2010 11:14	0.063	11.2355	-2.5759	63.6204
9/21/2010 11:14	0.067	11.3146	-2.4968	63.623
9/21/2010 11:14	0.071	11.3857	-2.4257	63.6239
9/21/2010 11:14	0.075	11.4494	-2.362	63.6265
9/21/2010 11:14	0.079	11.5157	-2.2957	63.6239
9/21/2010 11:14	0.083	11.5587	-2.2527	63.629
9/21/2010 11:14	0.089	11.6387	-2.1727	63.6126
9/21/2010 11:14	0.095	11.7414	-2.07	63.6057
9/21/2010 11:14	0.102	11.8358	-1.9756	63.59
9/21/2010 11:14	0.109	11.9094	-1.902	63.5883
9/21/2010 11:14	0.116	11.9981	-1.8133	63.5883

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:14	0.124	12.1008	-1.7106	63.5771
9/21/2010 11:14	0.133	12.1917	-1.6197	63.5632
9/21/2010 11:14	0.141	12.2817	-1.5297	63.5658
9/21/2010 11:14	0.151	12.3756	-1.4358	63.5572
9/21/2010 11:14	0.161	12.4832	-1.3282	63.5545
9/21/2010 11:14	0.171	12.5526	-1.2588	63.5536
9/21/2010 11:14	0.182	12.6913	-1.1201	63.5484
9/21/2010 11:14	0.194	12.7527	-1.0587	63.5407
9/21/2010 11:14	0.207	12.844	-0.9674	63.5355
9/21/2010 11:14	0.220	12.9068	-0.9046	63.5303
9/21/2010 11:14	0.234	12.9915	-0.8199	63.5259
9/21/2010 11:14	0.249	13.0784	-0.733	63.5276
9/21/2010 11:14	0.265	13.1491	-0.6623	63.5225
9/21/2010 11:14	0.281	13.2321	-0.5793	63.5225
9/21/2010 11:14	0.299	13.293	-0.5184	63.5138
9/21/2010 11:14	0.318	13.3607	-0.4507	63.5138
9/21/2010 11:14	0.338	13.4182	-0.3932	63.5086
9/21/2010 11:14	0.359	13.4651	-0.3463	63.5112
9/21/2010 11:14	0.381	13.5125	-0.2989	63.4965
9/21/2010 11:14	0.405	13.5555	-0.2559	63.4965
9/21/2010 11:14	0.430	13.5835	-0.2279	63.4938
9/21/2010 11:14	0.456	13.6227	-0.1887	63.4895
9/21/2010 11:14	0.484	13.6572	-0.1542	63.4843
9/21/2010 11:14	0.514	13.6858	-0.1256	63.4826
9/21/2010 11:14	0.545	13.6792	-0.1322	63.4774
9/21/2010 11:14	0.579	13.7165	-0.0949	63.4722
9/21/2010 11:14	0.614	13.7152	-0.0962	63.4704
9/21/2010 11:14	0.651	13.7573	-0.0541	63.4601
9/21/2010 11:14	0.691	13.7666	-0.0448	63.4592
9/21/2010 11:14	0.733	13.7603	-0.0511	63.4496
9/21/2010 11:14	0.777	13.7542	-0.0572	63.4453
9/21/2010 11:14	0.824	13.7876	-0.0238	63.4401
9/21/2010 11:14	0.874	13.7814	-0.03	63.4323
9/21/2010 11:14	0.927	13.7963	-0.0151	63.4263
9/21/2010 11:14	0.983	13.7911	-0.0203	63.4193
9/21/2010 11:15	1.043	13.8064	-0.005	63.4089
9/21/2010 11:15	1.103	13.8104	-0.001	63.4002
9/21/2010 11:15	1.173	13.8082	-0.0032	63.389
9/21/2010 11:15	1.243	13.8047	-0.0067	63.3855
9/21/2010 11:15	1.313	13.8161	0.0047	63.3803
9/21/2010 11:15	1.393	13.8183	0.0069	63.3656
9/21/2010 11:15	1.483	13.8227	0.0113	63.3534

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:15	1.563	13.8191	0.0077	63.3431
9/21/2010 11:15	1.663	13.8249	0.0135	63.3361
9/21/2010 11:15	1.763	13.8279	0.0165	63.3223
9/21/2010 11:15	1.863	13.8323	0.0209	63.3119
9/21/2010 11:15	1.973	13.8244	0.013	63.3015
9/21/2010 11:16	2.093	13.8231	0.0117	63.291
9/21/2010 11:16	2.223	13.8262	0.0148	63.2824
9/21/2010 11:16	2.353	13.8319	0.0205	63.2702
9/21/2010 11:16	2.493	13.8257	0.0143	63.2529
9/21/2010 11:16	2.643	13.8266	0.0152	63.2512
9/21/2010 11:16	2.803	13.8477	0.0363	63.2356
9/21/2010 11:16	2.963	13.8402	0.0288	63.2208
9/21/2010 11:17	3.143	13.8547	0.0433	63.2105
9/21/2010 11:17	3.333	13.8433	0.0319	63.2027
9/21/2010 11:17	3.533	13.8459	0.0345	63.181
9/21/2010 11:17	3.743	13.8244	0.013	63.1767
9/21/2010 11:17	3.963	13.8494	0.038	63.1602
9/21/2010 11:18	4.203	13.8573	0.0459	63.1516
9/21/2010 11:18	4.453	13.856	0.0446	63.142
9/21/2010 11:18	4.713	13.8547	0.0433	63.1317
9/21/2010 11:18	4.993	13.8534	0.042	63.1178
9/21/2010 11:19	5.293	13.8464	0.035	63.1099
9/21/2010 11:19	5.603	13.8502	0.0388	63.0995
9/21/2010 11:19	5.943	13.8595	0.0481	63.0892
9/21/2010 11:20	6.293	13.8613	0.0499	63.0805
9/21/2010 11:20	6.663	13.867	0.0556	63.0719
9/21/2010 11:21	7.063	13.863	0.0516	63.0606
9/21/2010 11:21	7.483	13.8573	0.0459	63.0519
9/21/2010 11:21	7.923	13.867	0.0556	63.0424
9/21/2010 11:22	8.393	13.8753	0.0639	63.0389
40442.47422	8.893316667	13.8876	0.0762	63.0329

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:23	0.001	13.8873	0	63.1446
9/21/2010 11:23	0.004	15.2659	1.3786	63.1498
9/21/2010 11:23	0.008	15.8584	1.9711	63.1559
9/21/2010 11:23	0.013	18.512	4.6247	63.1611
9/21/2010 11:23	0.017	16.2895	2.4022	63.1628
9/21/2010 11:23	0.021	16.3898	2.5025	63.1715
9/21/2010 11:23	0.025	17.935	4.0477	63.1697
9/21/2010 11:23	0.033	19.7534	5.8661	63.1732
9/21/2010 11:23	0.038	13.9859	0.0986	63.1853
9/21/2010 11:23	0.042	14.5446	0.6573	63.1827
9/21/2010 11:23	0.046	15.2167	1.3294	63.181
9/21/2010 11:23	0.050	15.5288	1.6415	63.1862
9/21/2010 11:23	0.054	15.4594	1.5721	63.1862
9/21/2010 11:23	0.058	15.1535	1.2662	63.1897
9/21/2010 11:23	0.063	14.9472	1.0599	63.1862
9/21/2010 11:23	0.067	14.8809	0.9936	63.1932
9/21/2010 11:23	0.071	14.9323	1.045	63.1957
9/21/2010 11:23	0.077	14.877	0.9897	63.1784
9/21/2010 11:23	0.083	14.88	0.9927	63.1759
9/21/2010 11:23	0.090	14.7922	0.9049	63.1619
9/21/2010 11:23	0.097	14.7646	0.8773	63.1576
9/21/2010 11:23	0.104	14.7022	0.8149	63.155
9/21/2010 11:23	0.112	14.6873	0.8	63.1446
9/21/2010 11:23	0.121	14.6189	0.7316	63.1446
9/21/2010 11:23	0.129	14.6	0.7127	63.1394
9/21/2010 11:23	0.139	14.5509	0.6636	63.1325

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:23	0.149	14.4838	0.5965	63.1299
9/21/2010 11:23	0.159	14.4661	0.5788	63.1272
9/21/2010 11:23	0.170	14.457	0.5697	63.1221
9/21/2010 11:23	0.182	14.3802	0.4929	63.1212
9/21/2010 11:23	0.195	14.3561	0.4688	63.1134
9/21/2010 11:23	0.208	14.3421	0.4548	63.1117
9/21/2010 11:23	0.222	14.2841	0.3968	63.1125
9/21/2010 11:23	0.237	14.2466	0.3593	63.1056
9/21/2010 11:23	0.253	14.2319	0.3446	63.0995
9/21/2010 11:23	0.269	14.2003	0.313	63.1013
9/21/2010 11:23	0.287	14.1849	0.2976	63.0961
9/21/2010 11:23	0.306	14.1478	0.2605	63.097
9/21/2010 11:23	0.326	14.1336	0.2463	63.1108
9/21/2010 11:23	0.347	14.1178	0.2305	63.1004
9/21/2010 11:23	0.369	14.0809	0.1936	63.1099
9/21/2010 11:23	0.393	14.0875	0.2002	63.1004
9/21/2010 11:23	0.418	14.0612	0.1739	63.0918
9/21/2010 11:23	0.444	14.0541	0.1668	63.0875
9/21/2010 11:23	0.472	14.0399	0.1526	63.0865
9/21/2010 11:23	0.502	14.0245	0.1372	63.0918
9/21/2010 11:23	0.533	14.021	0.1337	63.0848
9/21/2010 11:23	0.567	13.9969	0.1096	63.0814
9/21/2010 11:23	0.602	14.0385	0.1512	63.0285
9/21/2010 11:23	0.639	14.0056	0.1183	63.0771
9/21/2010 11:23	0.679	14.0095	0.1222	63.0754
9/21/2010 11:23	0.721	13.9907	0.1034	63.0762
9/21/2010 11:23	0.765	13.9727	0.0854	63.0754
9/21/2010 11:24	0.812	13.9789	0.0916	63.0709
9/21/2010 11:24	0.862	13.9657	0.0784	63.0632
9/21/2010 11:24	0.915	13.967	0.0797	63.0675
9/21/2010 11:24	0.971	13.9688	0.0815	63.0666
9/21/2010 11:24	1.031	13.9596	0.0723	63.0641
9/21/2010 11:24	1.091	13.96	0.0727	63.0597
9/21/2010 11:24	1.161	13.942	0.0547	63.0597
9/21/2010 11:24	1.231	13.9447	0.0574	63.0519
9/21/2010 11:24	1.301	13.9394	0.0521	63.0536
9/21/2010 11:24	1.381	13.9372	0.0499	63.0528
9/21/2010 11:24	1.471	13.9376	0.0503	63.0459
9/21/2010 11:24	1.551	13.9245	0.0372	63.0476
9/21/2010 11:24	1.651	13.9477	0.0604	63.0424
9/21/2010 11:24	1.751	13.9289	0.0416	63.0424
9/21/2010 11:25	1.851	13.9433	0.056	63.0346

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:25	1.961	13.946	0.0587	63.0346
9/21/2010 11:25	2.081	13.9249	0.0376	63.032
9/21/2010 11:25	2.211	13.9297	0.0424	63.0303
9/21/2010 11:25	2.341	13.9341	0.0468	63.0329
9/21/2010 11:25	2.481	13.9205	0.0332	63.0268
9/21/2010 11:25	2.631	13.924	0.0367	63.0259
9/21/2010 11:25	2.791	13.921	0.0337	63.0208
9/21/2010 11:26	2.951	13.9297	0.0424	63.0208
9/21/2010 11:26	3.131	13.9111	0.0238	63.0156
9/21/2010 11:26	3.321	13.9319	0.0446	63.0146
9/21/2010 11:26	3.521	13.9196	0.0323	63.0103
9/21/2010 11:26	3.731	13.9205	0.0332	63.0078
9/21/2010 11:27	3.951	13.9153	0.028	63.0069
9/21/2010 11:27	4.191	13.9306	0.0433	63.0086
9/21/2010 11:27	4.441	13.9249	0.0376	63.0043
9/21/2010 11:27	4.701	13.9376	0.0503	63.0086
9/21/2010 11:28	4.981	13.928	0.0407	62.9965
9/21/2010 11:28	5.281	13.9271	0.0398	62.9999
9/21/2010 11:28	5.591	13.919	0.0317	62.9939
9/21/2010 11:29	5.931	13.9223	0.035	62.9939
9/21/2010 11:29	6.281	13.9425	0.0552	62.9913
9/21/2010 11:29	6.651	13.9324	0.0451	62.9895
9/21/2010 11:30	7.051	13.9416	0.0543	62.9835
9/21/2010 11:30	7.471	13.9455	0.0582	62.9869
9/21/2010 11:31	7.911	13.9451	0.0578	62.9826
9/21/2010 11:31	8.381	13.9449	0.0576	62.974
9/21/2010 11:32	8.881	13.9438	0.0565	62.9792
9/21/2010 11:32	9.411	13.9401	0.0528	62.9705
9/21/2010 11:33	9.971	13.9482	0.0609	62.9688

Withdrawal #2

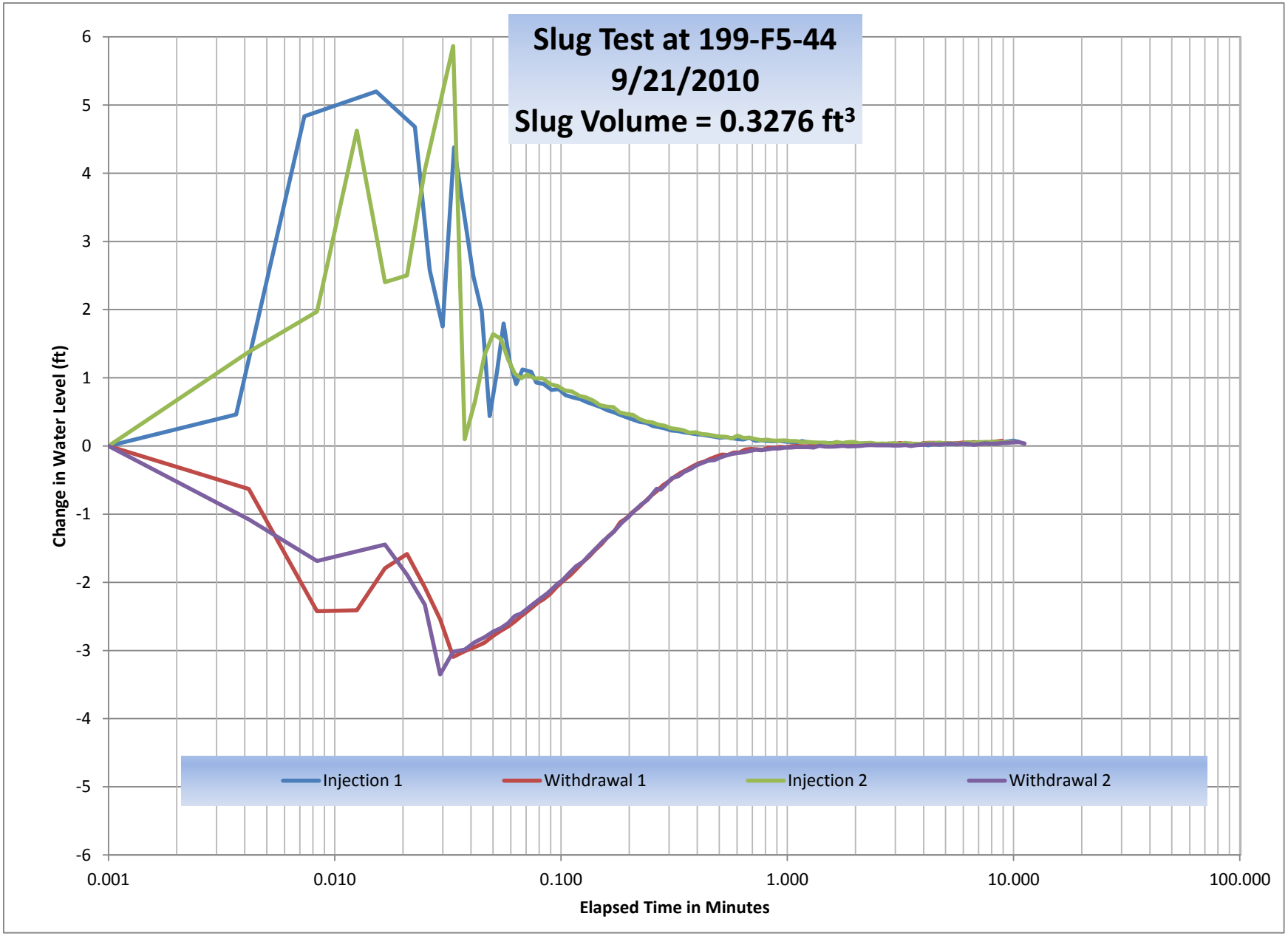
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:33	0.001	13.9536	0	63.0719
9/21/2010 11:33	0.004	12.8761	-1.0775	63.0788
9/21/2010 11:33	0.008	12.2651	-1.6885	63.0865
9/21/2010 11:33	0.017	12.5069	-1.4467	63.0995
9/21/2010 11:33	0.021	12.0641	-1.8895	63.0995
9/21/2010 11:33	0.025	11.6267	-2.3269	63.0995
9/21/2010 11:33	0.029	10.6033	-3.3503	63.1022
9/21/2010 11:33	0.033	10.9343	-3.0193	63.1099
9/21/2010 11:33	0.038	10.9668	-2.9868	63.1056
9/21/2010 11:33	0.042	11.0779	-2.8757	63.1091
9/21/2010 11:33	0.046	11.1477	-2.8059	63.1099
9/21/2010 11:33	0.050	11.228	-2.7256	63.116
9/21/2010 11:33	0.054	11.2807	-2.6729	63.1204
9/21/2010 11:33	0.058	11.354	-2.5996	63.1221
9/21/2010 11:33	0.063	11.4589	-2.4947	63.1238
9/21/2010 11:33	0.067	11.498	-2.4556	63.1255
9/21/2010 11:33	0.071	11.5661	-2.3875	63.1264
9/21/2010 11:33	0.075	11.6306	-2.323	63.1281
9/21/2010 11:33	0.081	11.7144	-2.2392	63.1143
9/21/2010 11:33	0.087	11.7939	-2.1597	63.1074
9/21/2010 11:33	0.097	11.9434	-2.0102	63.0771
9/21/2010 11:33	0.101	11.9781	-1.9755	63.0961
9/21/2010 11:33	0.108	12.0806	-1.873	63.0944
9/21/2010 11:33	0.116	12.188	-1.7656	63.0797
9/21/2010 11:33	0.125	12.2562	-1.6974	63.0771
9/21/2010 11:33	0.133	12.354	-1.5996	63.0736

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:33	0.143	12.4587	-1.4949	63.0692
9/21/2010 11:33	0.153	12.5569	-1.3967	63.0632
9/21/2010 11:33	0.163	12.6325	-1.3211	63.0614
9/21/2010 11:33	0.174	12.726	-1.2276	63.0545
9/21/2010 11:33	0.186	12.83	-1.1236	63.0528
9/21/2010 11:33	0.199	12.9165	-1.0371	63.045
9/21/2010 11:33	0.212	13.0104	-0.9432	63.0476
9/21/2010 11:33	0.226	13.0938	-0.8598	63.0441
9/21/2010 11:33	0.241	13.1618	-0.7918	63.0372
9/21/2010 11:33	0.265	13.3256	-0.628	63.0624
9/21/2010 11:33	0.275	13.3119	-0.6417	63.103
9/21/2010 11:33	0.291	13.3928	-0.5608	63.0614
9/21/2010 11:33	0.310	13.4828	-0.4708	63.045
9/21/2010 11:33	0.330	13.5117	-0.4419	63.0329
9/21/2010 11:33	0.351	13.5722	-0.3814	63.0346
9/21/2010 11:33	0.373	13.6117	-0.3419	63.0355
9/21/2010 11:33	0.397	13.6705	-0.2831	63.0251
9/21/2010 11:33	0.422	13.7061	-0.2475	63.0242
9/21/2010 11:33	0.448	13.7397	-0.2139	63.0277
9/21/2010 11:33	0.476	13.7441	-0.2095	63.0234
9/21/2010 11:33	0.506	13.7863	-0.1673	63.0198
9/21/2010 11:33	0.537	13.8148	-0.1388	63.019
9/21/2010 11:33	0.571	13.8389	-0.1147	63.0164
9/21/2010 11:33	0.606	13.8503	-0.1033	63.0129
9/21/2010 11:33	0.643	13.8595	-0.0941	63.0173
9/21/2010 11:33	0.683	13.8815	-0.0721	63.0095
9/21/2010 11:33	0.725	13.896	-0.0576	63.0069
9/21/2010 11:33	0.769	13.8911	-0.0625	63.0052
9/21/2010 11:34	0.816	13.9034	-0.0502	63.0026
9/21/2010 11:34	0.866	13.9157	-0.0379	63.0008
9/21/2010 11:34	0.919	13.9179	-0.0357	63.0016
9/21/2010 11:34	0.975	13.9297	-0.0239	62.9956
9/21/2010 11:34	1.035	13.9284	-0.0252	62.9956
9/21/2010 11:34	1.095	13.9359	-0.0177	62.9965
9/21/2010 11:34	1.165	13.9376	-0.016	62.9956
9/21/2010 11:34	1.235	13.9381	-0.0155	62.9905
9/21/2010 11:34	1.305	13.9302	-0.0234	62.9852
9/21/2010 11:34	1.385	13.9565	0.0029	62.9878
9/21/2010 11:34	1.475	13.942	-0.0116	62.9835
9/21/2010 11:34	1.555	13.9442	-0.0094	62.98
9/21/2010 11:34	1.655	13.9455	-0.0081	62.9817
9/21/2010 11:34	1.755	13.9574	0.0038	62.9817

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/21/2010 11:35	1.855	13.9475	-0.0061	62.9774
9/21/2010 11:35	1.965	13.9504	-0.0032	62.9731
9/21/2010 11:35	2.085	13.9543	0.0007	62.9774
9/21/2010 11:35	2.215	13.9627	0.0091	62.9774
9/21/2010 11:35	2.345	13.9675	0.0139	62.9696
9/21/2010 11:35	2.485	13.9627	0.0091	62.9731
9/21/2010 11:35	2.635	13.9635	0.0099	62.9644
9/21/2010 11:36	2.795	13.9627	0.0091	62.9679
9/21/2010 11:36	2.955	13.96	0.0064	62.9696
9/21/2010 11:36	3.135	13.9582	0.0046	62.9749
9/21/2010 11:36	3.325	13.9653	0.0117	62.967
9/21/2010 11:36	3.525	13.9533	-0.0003	62.9636
9/21/2010 11:36	3.735	13.9661	0.0125	62.9662
9/21/2010 11:37	3.955	13.971	0.0174	62.9644
9/21/2010 11:37	4.195	13.978	0.0244	62.967
9/21/2010 11:37	4.445	13.9745	0.0209	62.9627
9/21/2010 11:37	4.705	13.9745	0.0209	62.9619
9/21/2010 11:38	4.985	13.9789	0.0253	62.9627
9/21/2010 11:38	5.285	13.9903	0.0367	62.9574
9/21/2010 11:38	5.595	13.9754	0.0218	62.9532
9/21/2010 11:39	5.935	13.9846	0.031	62.9593
9/21/2010 11:39	6.285	13.9859	0.0323	62.9593
9/21/2010 11:39	6.655	13.9705	0.0169	62.9567
9/21/2010 11:40	7.055	13.9784	0.0248	62.9567
9/21/2010 11:40	7.475	13.9916	0.038	62.9523
9/21/2010 11:41	7.915	13.9877	0.0341	62.9506
9/21/2010 11:41	8.385	13.9894	0.0358	62.9532
9/21/2010 11:42	8.885	13.9969	0.0433	62.9567
9/21/2010 11:42	9.415	14.0004	0.0468	62.9497
9/21/2010 11:43	9.975	14.0074	0.0538	62.9515
40442.48874	10.575	14.0105	0.0569	62.9462
40442.48916	11.175	13.9903	0.0367	62.9593


Slug Test at 199-F5-44
9/21/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2

Slug Test Field Activity Report
Summary of FAR - F5-44

Time	Note
11:03	3 inch stainless slug (0.2985 ft 3) volume in
11:13	3 inch slug stainless slug out.
11:23	3 inch stainless slug in. (Slug may hit a joint in well on insertion)
11:33	3 inch slug stainless slug out.
11:44	Stopped data logging and pulled slug from well.

Note* the slug volumes were recalculated by Robert Edrington, therefore there is a slight variation in the slug volumes in the field notes and raw data file name.

Slug Testing at 199-F5-46 (A4596)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	48.25
D-T-B (ft TOC)	56.33
Stick up (ft)	3.09
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754
Max WL Change (ft)	2.85	2.92	3.04	3.25

Slug Testing was performed on 9/14/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-46

Slug Volume 0.3276 ft^3

Raw File:	199-F5-46 slug test 14Sept10_Append_2010-09-14_19-51-11-390.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/14/2010		2.85	2.92
Test start:	12:10	injection 1		
Test restart:	12:20	withdrawal 1		
Test restart:	12:30	injection 2	**Max Change Test 2**	
Test restart:	12:40	withdrawal 2	Injection 2	Withdrawal 2
Test Stop	12:50	end	3.04	3.25
Slug Volume:	0.3276 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:10	0.001	7.9134	0	67.43
9/14/2010 12:10	0.004	8.9322	1.0188	67.43
9/14/2010 12:10	0.008	9.3291	1.4157	67.44
9/14/2010 12:10	0.013	9.5359	1.6225	67.45
9/14/2010 12:10	0.017	10.5146	2.6012	67.44
9/14/2010 12:10	0.021	10.7614	2.848	67.45
9/14/2010 12:10	0.025	10.568	2.6546	67.45
9/14/2010 12:10	0.029	8.9663	1.0529	67.45
9/14/2010 12:10	0.033	8.6749	0.7615	67.46
9/14/2010 12:10	0.042	8.0023	0.0889	67.45
9/14/2010 12:10	0.046	8.2082	0.2948	67.46
9/14/2010 12:10	0.050	8.5089	0.5955	67.46
9/14/2010 12:10	0.054	8.584	0.6706	67.46
9/14/2010 12:10	0.058	8.1359	0.2225	67.46
9/14/2010 12:10	0.067	8.167	0.2536	67.46
9/14/2010 12:10	0.073	8.2556	0.3422	67.45
9/14/2010 12:10	0.079	8.1327	0.2193	67.44
9/14/2010 12:10	0.086	8.2419	0.3285	67.43
9/14/2010 12:10	0.093	8.192	0.2786	67.42
9/14/2010 12:10	0.100	8.1253	0.2119	67.42
9/14/2010 12:10	0.108	8.1068	0.1934	67.41
9/14/2010 12:10	0.117	7.9978	0.0844	67.4
9/14/2010 12:10	0.125	7.9876	0.0742	67.4
9/14/2010 12:10	0.135	8.034	0.1206	67.39
9/14/2010 12:10	0.145	8.0264	0.113	67.39
9/14/2010 12:10	0.155	8.0111	0.0977	67.38

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:10	0.166	8.0419	0.1285	67.38
9/14/2010 12:10	0.178	7.9824	0.069	67.38
9/14/2010 12:10	0.191	7.986	0.0726	67.37
9/14/2010 12:10	0.204	7.9679	0.0545	67.37
9/14/2010 12:10	0.218	7.9842	0.0708	67.36
9/14/2010 12:10	0.233	7.9754	0.062	67.36
9/14/2010 12:10	0.249	7.9612	0.0478	67.35
9/14/2010 12:10	0.265	7.974	0.0606	67.35
9/14/2010 12:10	0.283	7.9701	0.0567	67.34
9/14/2010 12:10	0.302	7.9626	0.0492	67.34
9/14/2010 12:10	0.322	7.9595	0.0461	67.34
9/14/2010 12:10	0.343	7.9507	0.0373	67.33
9/14/2010 12:11	0.365	7.9414	0.028	67.33
9/14/2010 12:11	0.390	7.9383	0.0249	67.34
9/14/2010 12:11	0.416	7.9607	0.0473	67.32
9/14/2010 12:11	0.440	7.9624	0.049	67.32
9/14/2010 12:11	0.468	7.9477	0.0343	67.32
9/14/2010 12:11	0.498	7.9375	0.0241	67.31
9/14/2010 12:11	0.529	7.9599	0.0465	67.31
9/14/2010 12:11	0.563	7.9589	0.0455	67.3
9/14/2010 12:11	0.598	7.9461	0.0327	67.3
9/14/2010 12:11	0.635	7.9362	0.0228	67.29
9/14/2010 12:11	0.675	7.9344	0.021	67.29
9/14/2010 12:11	0.717	7.9415	0.0281	67.28
9/14/2010 12:11	0.761	7.9261	0.0127	67.27
9/14/2010 12:11	0.808	7.9336	0.0202	67.28
9/14/2010 12:11	0.858	7.934	0.0206	67.27
9/14/2010 12:11	0.911	7.9184	0.005	67.26
9/14/2010 12:11	0.967	7.9247	0.0113	67.26
9/14/2010 12:11	1.027	7.9186	0.0052	67.25
9/14/2010 12:11	1.087	7.9186	0.0052	67.24
9/14/2010 12:11	1.157	7.9339	0.0205	67.24
9/14/2010 12:11	1.227	7.9251	0.0117	67.23
9/14/2010 12:11	1.297	7.9093	-0.0041	67.23
9/14/2010 12:12	1.377	7.9265	0.0131	67.23
9/14/2010 12:12	1.467	7.9102	-0.0032	67.21
9/14/2010 12:12	1.547	7.9186	0.0052	67.22
9/14/2010 12:12	1.647	7.9159	0.0025	67.2
9/14/2010 12:12	1.747	7.9247	0.0113	67.2
9/14/2010 12:12	1.847	7.9137	0.0003	67.19
9/14/2010 12:12	1.957	7.9186	0.0052	67.19
9/14/2010 12:12	2.077	7.9062	-0.0072	67.18
9/14/2010 12:12	2.207	7.9261	0.0127	67.17

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:12	2.337	7.9195	0.0061	67.16
9/14/2010 12:13	2.477	7.9199	0.0065	67.16
9/14/2010 12:13	2.627	7.9173	0.0039	67.15
9/14/2010 12:13	2.787	7.9252	0.0118	67.15
9/14/2010 12:13	2.947	7.9256	0.0122	67.14
9/14/2010 12:13	3.127	7.9234	0.01	67.13
9/14/2010 12:13	3.317	7.9173	0.0039	67.12
9/14/2010 12:14	3.517	7.915	0.0016	67.12
9/14/2010 12:14	3.727	7.9155	0.0021	67.11
9/14/2010 12:14	3.947	7.9234	0.01	67.11
9/14/2010 12:14	4.187	7.9265	0.0131	67.1
9/14/2010 12:15	4.437	7.9042	-0.0092	67.1
9/14/2010 12:15	4.697	7.9133	-0.0001	67.09
9/14/2010 12:15	4.977	7.9305	0.0171	67.08
9/14/2010 12:15	5.277	7.9243	0.0109	67.08
9/14/2010 12:16	5.587	7.917	0.0036	67.07
9/14/2010 12:16	5.927	7.9247	0.0113	67.07
9/14/2010 12:16	6.277	7.9287	0.0153	67.06
9/14/2010 12:17	6.647	7.93	0.0166	67.06
9/14/2010 12:17	7.047	7.9556	0.0422	67.06
9/14/2010 12:18	7.467	7.9331	0.0197	67.05
9/14/2010 12:18	7.907	7.9428	0.0294	67.05
9/14/2010 12:19	8.377	7.9314	0.018	67.04

Log Notes:

Date and Time	Note
9/14/2010 12:02	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/14/2010 12:10	Manual Start Command
9/14/2010 12:10	Restart Command
9/14/2010 12:11	Log Download - Used Battery: 8% Used Memory: 15% Name: H0066555
9/14/2010 12:11	Log Download - Used Battery: 8% Used Memory: 15% Name: H0066555
9/14/2010 12:19	Restart Command
9/14/2010 12:20	Log Download - Used Battery: 8% Used Memory: 15% Name: H0066555
9/14/2010 12:25	Log Download - Used Battery: 8% Used Memory: 15% Name: H0066555
9/14/2010 12:30	Restart Command
9/14/2010 12:31	Log Download - Used Battery: 8% Used Memory: 15% Name: H0066555
9/14/2010 12:40	Restart Command
9/14/2010 12:50	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:19	0.001	7.918	0	67.15
9/14/2010 12:19	0.004	7.3014	-0.6166	67.15
9/14/2010 12:19	0.008	6.3953	-1.5227	67.16
9/14/2010 12:19	0.012	6.721	-1.197	67.17
9/14/2010 12:19	0.017	6.3958	-1.5222	67.17
9/14/2010 12:19	0.021	5.9941	-1.9239	67.17
9/14/2010 12:19	0.025	5.6572	-2.2608	67.17
9/14/2010 12:19	0.029	4.9972	-2.9208	67.18
9/14/2010 12:19	0.033	5.289	-2.629	67.19
9/14/2010 12:19	0.037	5.4541	-2.4639	67.19
9/14/2010 12:19	0.042	5.6051	-2.3129	67.19
9/14/2010 12:19	0.046	5.7375	-2.1805	67.19
9/14/2010 12:19	0.050	5.8669	-2.0511	67.2
9/14/2010 12:19	0.054	6.0174	-1.9006	67.2
9/14/2010 12:19	0.058	6.1326	-1.7854	67.2
9/14/2010 12:19	0.062	6.2594	-1.6586	67.2
9/14/2010 12:19	0.067	6.3883	-1.5297	67.2
9/14/2010 12:19	0.071	6.4955	-1.4225	67.2
9/14/2010 12:19	0.075	6.6073	-1.3107	67.21
9/14/2010 12:19	0.081	6.76	-1.158	67.19
9/14/2010 12:19	0.087	6.8845	-1.0335	67.18
9/14/2010 12:19	0.094	7.05	-0.868	67.17
9/14/2010 12:19	0.101	7.1648	-0.7532	67.17
9/14/2010 12:19	0.108	7.2884	-0.6296	67.16
9/14/2010 12:19	0.116	7.3952	-0.5228	67.16
9/14/2010 12:19	0.125	7.4998	-0.4182	67.15

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:19	0.133	7.5864	-0.3316	67.15
9/14/2010 12:19	0.143	7.6435	-0.2745	67.14
9/14/2010 12:19	0.153	7.7148	-0.2032	67.14
9/14/2010 12:19	0.163	7.7432	-0.1748	67.14
9/14/2010 12:19	0.174	7.779	-0.139	67.14
9/14/2010 12:19	0.186	7.816	-0.102	67.12
9/14/2010 12:19	0.199	7.8152	-0.1028	67.12
9/14/2010 12:19	0.212	7.8589	-0.0591	67.12
9/14/2010 12:19	0.226	7.8575	-0.0605	67.12
9/14/2010 12:19	0.241	7.8681	-0.0499	67.12
9/14/2010 12:19	0.257	7.8765	-0.0415	67.12
9/14/2010 12:19	0.273	7.8898	-0.0282	67.11
9/14/2010 12:19	0.291	7.8871	-0.0309	67.11
9/14/2010 12:19	0.310	7.8872	-0.0308	67.1
9/14/2010 12:19	0.330	7.8968	-0.0212	67.11
9/14/2010 12:19	0.351	7.8986	-0.0194	67.1
9/14/2010 12:19	0.373	7.9039	-0.0141	67.1
9/14/2010 12:19	0.397	7.9027	-0.0153	67.1
9/14/2010 12:20	0.422	7.9074	-0.0106	67.12
9/14/2010 12:20	0.448	7.9109	-0.0071	67.13
9/14/2010 12:20	0.476	7.9131	-0.0049	67.11
9/14/2010 12:20	0.506	7.9177	-0.0003	67.1
9/14/2010 12:20	0.537	7.9009	-0.0171	67.09
9/14/2010 12:20	0.571	7.9031	-0.0149	67.1
9/14/2010 12:20	0.606	7.9273	0.0093	67.09
9/14/2010 12:20	0.643	7.9223	0.0043	67.09
9/14/2010 12:20	0.683	7.9137	-0.0043	67.09
9/14/2010 12:20	0.725	7.9164	-0.0016	67.09
9/14/2010 12:20	0.769	7.919	0.001	67.08
9/14/2010 12:20	0.816	7.8917	-0.0263	67.08
9/14/2010 12:20	0.866	7.9049	-0.0131	67.08
9/14/2010 12:20	0.919	7.9158	-0.0022	67.08
9/14/2010 12:20	0.975	7.9386	0.0206	67.07
9/14/2010 12:20	1.035	7.919	0.001	67.07
9/14/2010 12:20	1.095	7.9221	0.0041	67.07
9/14/2010 12:20	1.165	7.9265	0.0085	67.07
9/14/2010 12:20	1.235	7.9278	0.0098	67.07
9/14/2010 12:20	1.305	7.93	0.012	67.07
9/14/2010 12:20	1.385	7.9208	0.0028	67.06
9/14/2010 12:21	1.475	7.9239	0.0059	67.06
9/14/2010 12:21	1.555	7.9168	-0.0012	67.06
9/14/2010 12:21	1.655	7.9137	-0.0043	67.06
9/14/2010 12:21	1.755	7.9089	-0.0091	67.05

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:21	1.855	7.919	0.001	67.05
9/14/2010 12:21	1.965	7.9036	-0.0144	67.05
9/14/2010 12:21	2.085	7.919	0.001	67.05
9/14/2010 12:21	2.215	7.9146	-0.0034	67.04
9/14/2010 12:21	2.345	7.9084	-0.0096	67.04
9/14/2010 12:22	2.485	7.904	-0.014	67.05
9/14/2010 12:22	2.635	7.9155	-0.0025	67.04
9/14/2010 12:22	2.795	7.9261	0.0081	67.04
9/14/2010 12:22	2.955	7.9261	0.0081	67.04
9/14/2010 12:22	3.135	7.9195	0.0015	67.04
9/14/2010 12:22	3.325	7.9239	0.0059	67.03
9/14/2010 12:23	3.525	7.9261	0.0081	67.04
9/14/2010 12:23	3.735	7.9177	-0.0003	67.02
9/14/2010 12:23	3.955	7.9106	-0.0074	67.03
9/14/2010 12:23	4.195	7.9089	-0.0091	67.03
9/14/2010 12:24	4.445	7.9177	-0.0003	67.03
9/14/2010 12:24	4.705	7.9181	1E-04	67.02
9/14/2010 12:24	4.985	7.9143	-0.0037	67.02
9/14/2010 12:24	5.285	7.9125	-0.0055	67.02
9/14/2010 12:25	5.595	7.9133	-0.0047	67.02
9/14/2010 12:25	5.935	7.9203	0.0023	67.02
9/14/2010 12:25	6.285	7.9071	-0.0109	67.02
9/14/2010 12:26	6.655	7.9274	0.0094	67.02
40435.5185	7.054983333	7.9155	-0.0025	67.01
40435.51878	7.475	7.9137	-0.0043	67.02
9/14/2010 12:27	7.915	7.923	0.005	67.01
9/14/2010 12:27	8.385	7.9362	0.0182	67.01
9/14/2010 12:28	8.885	7.9225	0.0045	67.01
9/14/2010 12:29	9.415	7.9142	-0.0038	67.01
9/14/2010 12:29	9.975	7.9168	-0.0012	67.01
9/14/2010 12:30	10.575	7.912	-0.006	67.01

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:30	0.001	7.903	0	67.13
9/14/2010 12:30	0.004	8.377	0.474	67.13
9/14/2010 12:30	0.008	9.2764	1.3734	67.14
9/14/2010 12:30	0.013	8.7256	0.8226	67.15
9/14/2010 12:30	0.017	10.0663	2.1633	67.15
9/14/2010 12:30	0.021	10.8823	2.9793	67.15
9/14/2010 12:30	0.025	10.9423	3.0393	67.16
9/14/2010 12:30	0.029	9.3361	1.4331	67.16
9/14/2010 12:30	0.033	9.7943	1.8913	67.16
9/14/2010 12:30	0.038	9.7188	1.8158	67.17
9/14/2010 12:30	0.046	8.1099	0.2069	67.17
9/14/2010 12:30	0.050	8.2503	0.3473	67.17
9/14/2010 12:30	0.054	8.1324	0.2294	67.17
9/14/2010 12:31	0.058	8.565	0.662	67.18
9/14/2010 12:31	0.063	8.516	0.613	67.19
9/14/2010 12:31	0.067	8.4568	0.5538	67.18
9/14/2010 12:31	0.071	8.455	0.552	67.18
9/14/2010 12:31	0.077	8.2423	0.3393	67.17
9/14/2010 12:31	0.083	8.2529	0.3499	67.16
9/14/2010 12:31	0.090	8.2105	0.3075	67.15
9/14/2010 12:31	0.097	8.1827	0.2797	67.14
9/14/2010 12:31	0.104	8.1108	0.2078	67.14
9/14/2010 12:31	0.112	8.1196	0.2166	67.13
9/14/2010 12:31	0.121	8.0869	0.1839	67.12
9/14/2010 12:31	0.129	8.0693	0.1663	67.13
9/14/2010 12:31	0.139	8.031	0.128	67.13

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:31	0.149	8.027	0.124	67.11
9/14/2010 12:31	0.159	8.0244	0.1214	67.11
9/14/2010 12:31	0.170	8.0376	0.1346	67.12
9/14/2010 12:31	0.182	8.0054	0.1024	67.1
9/14/2010 12:31	0.195	7.9758	0.0728	67.1
9/14/2010 12:31	0.208	7.9957	0.0927	67.1
9/14/2010 12:31	0.222	7.9882	0.0852	67.09
9/14/2010 12:31	0.237	7.9851	0.0821	67.1
9/14/2010 12:31	0.253	7.9515	0.0485	67.09
9/14/2010 12:31	0.269	7.9736	0.0706	67.09
9/14/2010 12:31	0.287	7.9745	0.0715	67.09
9/14/2010 12:31	0.306	7.9595	0.0565	67.09
9/14/2010 12:31	0.326	7.9701	0.0671	67.09
9/14/2010 12:31	0.347	7.9674	0.0644	67.09
9/14/2010 12:31	0.369	7.9661	0.0631	67.09
9/14/2010 12:31	0.393	7.9652	0.0622	67.08
9/14/2010 12:31	0.418	7.9561	0.0531	67.08
9/14/2010 12:31	0.444	7.9537	0.0507	67.08
9/14/2010 12:31	0.472	7.9565	0.0535	67.08
9/14/2010 12:31	0.502	7.9797	0.0767	67.07
9/14/2010 12:31	0.533	7.949	0.046	67.08
9/14/2010 12:31	0.567	7.9709	0.0679	67.08
9/14/2010 12:31	0.602	7.9646	0.0616	67.07
9/14/2010 12:31	0.639	7.9521	0.0491	67.08
9/14/2010 12:31	0.679	7.9362	0.0332	67.07
9/14/2010 12:31	0.721	7.9503	0.0473	67.08
9/14/2010 12:31	0.765	7.9309	0.0279	67.08
9/14/2010 12:31	0.812	7.9362	0.0332	67.07
9/14/2010 12:31	0.862	7.9367	0.0337	67.08
9/14/2010 12:31	0.915	7.9455	0.0425	67.08
9/14/2010 12:31	0.971	7.9424	0.0394	67.08
9/14/2010 12:31	1.031	7.9468	0.0438	67.07
9/14/2010 12:32	1.091	7.9358	0.0328	67.07
9/14/2010 12:32	1.161	7.9415	0.0385	67.07
9/14/2010 12:32	1.231	7.9473	0.0443	67.07
9/14/2010 12:32	1.301	7.9349	0.0319	67.08
9/14/2010 12:32	1.381	7.9398	0.0368	67.08
9/14/2010 12:32	1.471	7.9203	0.0173	67.07
9/14/2010 12:32	1.551	7.9362	0.0332	67.07
9/14/2010 12:32	1.651	7.9371	0.0341	67.07
9/14/2010 12:32	1.751	7.9371	0.0341	67.07
9/14/2010 12:32	1.851	7.9314	0.0284	67.07
9/14/2010 12:32	1.961	7.9446	0.0416	67.07

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:33	2.081	7.9292	0.0262	67.07
9/14/2010 12:33	2.211	7.9309	0.0279	67.07
9/14/2010 12:33	2.341	7.9137	0.0107	67.08
9/14/2010 12:33	2.481	7.9296	0.0266	67.07
9/14/2010 12:33	2.631	7.927	0.024	67.07
9/14/2010 12:33	2.791	7.9323	0.0293	67.08
9/14/2010 12:33	2.951	7.9318	0.0288	67.08
9/14/2010 12:34	3.131	7.9265	0.0235	67.08
9/14/2010 12:34	3.321	7.927	0.024	67.08
9/14/2010 12:34	3.521	7.9243	0.0213	67.08
9/14/2010 12:34	3.731	7.9116	0.0086	67.08
9/14/2010 12:34	3.951	7.93	0.027	67.08
9/14/2010 12:35	4.191	7.9375	0.0345	67.08
9/14/2010 12:35	4.441	7.9287	0.0257	67.08
9/14/2010 12:35	4.701	7.9225	0.0195	67.08
9/14/2010 12:35	4.981	7.938	0.035	67.08
9/14/2010 12:36	5.281	7.9314	0.0284	67.08
9/14/2010 12:36	5.591	7.9309	0.0279	67.08
9/14/2010 12:36	5.931	7.9084	0.0054	67.08
9/14/2010 12:37	6.281	7.9164	0.0134	67.09
9/14/2010 12:37	6.651	7.9287	0.0257	67.09
9/14/2010 12:37	7.051	7.9168	0.0138	67.08
9/14/2010 12:38	7.471	7.9247	0.0217	67.09
40435.52698	7.910816667	7.919	0.016	67.09
40435.5273	8.380816667	7.9287	0.0257	67.09
9/14/2010 12:39	8.881	7.9252	0.0222	67.09

Withdrawal #2

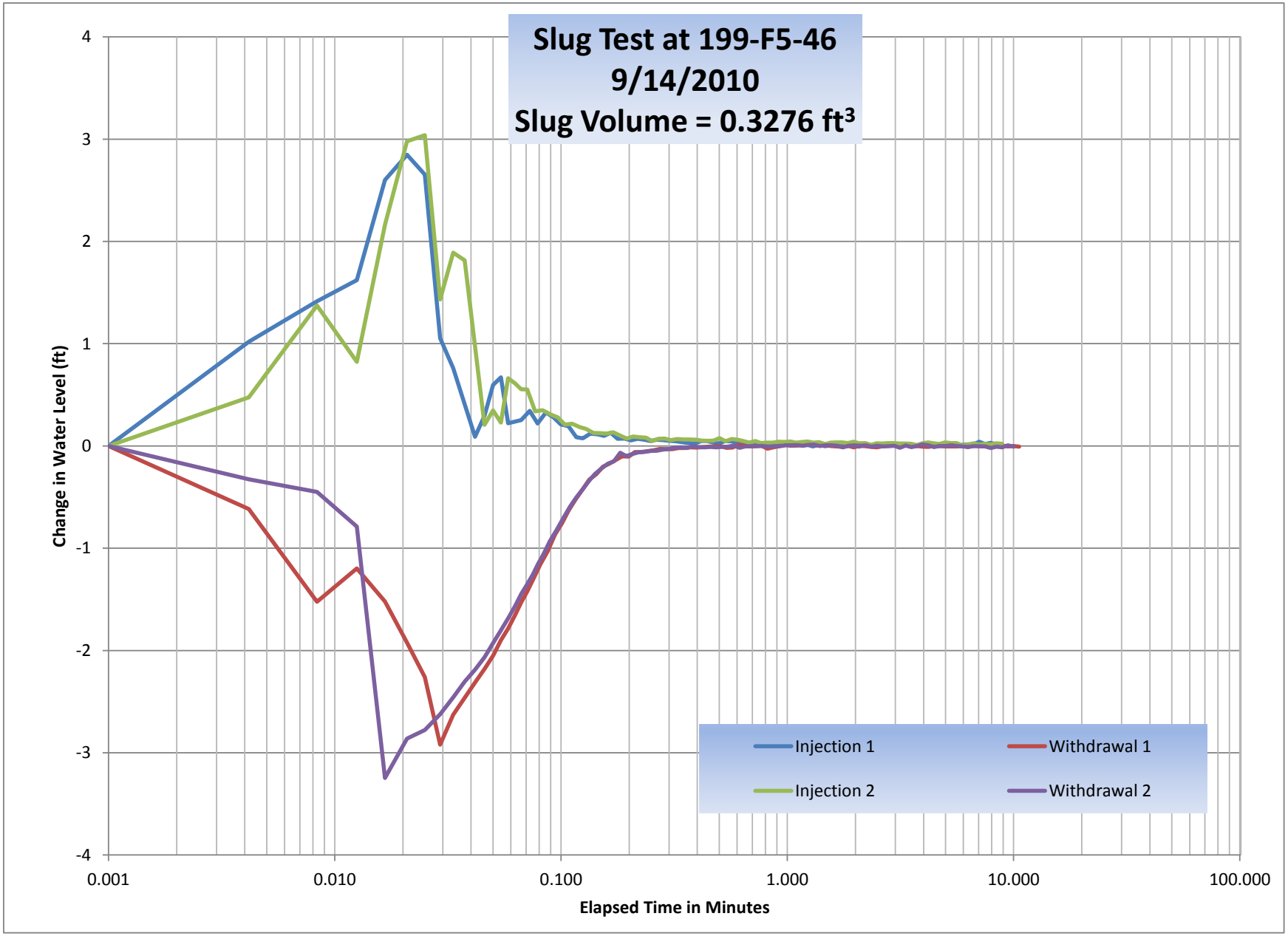
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:40	0.001	7.9237	0	67.17
9/14/2010 12:40	0.004	7.5971	-0.3266	67.19
9/14/2010 12:40	0.008	7.4749	-0.4488	67.2
9/14/2010 12:40	0.013	7.1355	-0.7882	67.21
9/14/2010 12:40	0.017	4.6775	-3.2462	67.21
9/14/2010 12:40	0.021	5.0612	-2.8625	67.22
9/14/2010 12:40	0.025	5.1458	-2.7779	67.22
9/14/2010 12:40	0.029	5.3003	-2.6234	67.22
9/14/2010 12:40	0.033	5.4656	-2.4581	67.23
9/14/2010 12:40	0.038	5.6197	-2.304	67.24
9/14/2010 12:40	0.042	5.7353	-2.1884	67.24
9/14/2010 12:40	0.046	5.8568	-2.0669	67.24
9/14/2010 12:40	0.050	5.9954	-1.9283	67.25
9/14/2010 12:40	0.054	6.1199	-1.8038	67.24
9/14/2010 12:40	0.058	6.2364	-1.6873	67.24
9/14/2010 12:40	0.063	6.3543	-1.5694	67.25
9/14/2010 12:40	0.067	6.4744	-1.4493	67.25
9/14/2010 12:40	0.071	6.571	-1.3527	67.26
9/14/2010 12:40	0.075	6.6668	-1.2569	67.26
9/14/2010 12:40	0.079	6.7692	-1.1545	67.26
9/14/2010 12:40	0.083	6.8602	-1.0635	67.26
9/14/2010 12:40	0.089	6.9941	-0.9296	67.24
9/14/2010 12:40	0.095	7.1003	-0.8234	67.24
9/14/2010 12:40	0.102	7.2164	-0.7073	67.23
9/14/2010 12:40	0.109	7.3263	-0.5974	67.22
9/14/2010 12:40	0.116	7.4146	-0.5091	67.22

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:40	0.124	7.4972	-0.4265	67.21
9/14/2010 12:40	0.133	7.5859	-0.3378	67.2
9/14/2010 12:40	0.141	7.6499	-0.2738	67.2
9/14/2010 12:40	0.151	7.7064	-0.2173	67.19
9/14/2010 12:40	0.161	7.7514	-0.1723	67.19
9/14/2010 12:40	0.171	7.7746	-0.1491	67.19
9/14/2010 12:40	0.182	7.8565	-0.0672	67.19
9/14/2010 12:40	0.194	7.8253	-0.0984	67.18
9/14/2010 12:40	0.207	7.8465	-0.0772	67.18
9/14/2010 12:40	0.220	7.8619	-0.0618	67.18
9/14/2010 12:40	0.234	7.8668	-0.0569	67.17
9/14/2010 12:40	0.249	7.8752	-0.0485	67.17
9/14/2010 12:40	0.265	7.8778	-0.0459	67.17
9/14/2010 12:40	0.281	7.8871	-0.0366	67.17
9/14/2010 12:40	0.299	7.8955	-0.0282	67.17
9/14/2010 12:40	0.318	7.9052	-0.0185	67.17
9/14/2010 12:40	0.338	7.9109	-0.0128	67.17
9/14/2010 12:40	0.359	7.903	-0.0207	67.16
9/14/2010 12:40	0.381	7.9211	-0.0026	67.15
9/14/2010 12:40	0.405	7.9114	-0.0123	67.15
9/14/2010 12:40	0.430	7.91	-0.0137	67.15
9/14/2010 12:40	0.456	7.9137	-0.01	67.15
9/14/2010 12:40	0.484	7.9106	-0.0131	67.16
9/14/2010 12:40	0.514	7.915	-0.0087	67.14
9/14/2010 12:40	0.545	7.9159	-0.0078	67.15
9/14/2010 12:40	0.579	7.927	0.0033	67.15
9/14/2010 12:41	0.614	7.9067	-0.017	67.14
9/14/2010 12:41	0.651	7.9186	-0.0051	67.15
9/14/2010 12:41	0.691	7.9208	-0.0029	67.14
9/14/2010 12:41	0.733	7.9234	-0.0003	67.14
9/14/2010 12:41	0.777	7.9234	-0.0003	67.14
9/14/2010 12:41	0.824	7.9164	-0.0073	67.14
9/14/2010 12:41	0.874	7.9212	-0.0025	67.14
9/14/2010 12:41	0.927	7.9221	-0.0016	67.14
9/14/2010 12:41	0.983	7.9305	0.0068	67.13
9/14/2010 12:41	1.043	7.9296	0.0059	67.13
9/14/2010 12:41	1.103	7.9323	0.0086	67.13
9/14/2010 12:41	1.173	7.9252	0.0015	67.13
9/14/2010 12:41	1.243	7.9336	0.0099	67.13
9/14/2010 12:41	1.313	7.9358	0.0121	67.13
9/14/2010 12:41	1.393	7.9225	-0.0012	67.13
9/14/2010 12:41	1.483	7.9296	0.0059	67.12
9/14/2010 12:41	1.563	7.93	0.0063	67.13

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 12:42	1.663	7.9265	0.0028	67.12
9/14/2010 12:42	1.763	7.9106	-0.0131	67.13
9/14/2010 12:42	1.863	7.9265	0.0028	67.12
9/14/2010 12:42	1.973	7.93	0.0063	67.12
9/14/2010 12:42	2.093	7.9252	0.0015	67.13
9/14/2010 12:42	2.223	7.9292	0.0055	67.12
9/14/2010 12:42	2.353	7.9177	-0.006	67.13
9/14/2010 12:42	2.493	7.9256	0.0019	67.13
9/14/2010 12:43	2.643	7.9181	-0.0056	67.13
9/14/2010 12:43	2.803	7.9221	-0.0016	67.13
9/14/2010 12:43	2.963	7.9247	0.001	67.13
9/14/2010 12:43	3.143	7.9062	-0.0175	67.13
9/14/2010 12:43	3.333	7.9278	0.0041	67.13
9/14/2010 12:43	3.533	7.9115	-0.0122	67.13
9/14/2010 12:44	3.743	7.923	-0.0007	67.14
9/14/2010 12:44	3.963	7.938	0.0143	67.13
9/14/2010 12:44	4.203	7.9292	0.0055	67.13
9/14/2010 12:44	4.453	7.915	-0.0087	67.14
9/14/2010 12:45	4.713	7.923	-0.0007	67.13
9/14/2010 12:45	4.993	7.9239	0.0002	67.13
9/14/2010 12:45	5.293	7.9296	0.0059	67.13
9/14/2010 12:46	5.603	7.923	-0.0007	67.13
9/14/2010 12:46	5.943	7.9186	-0.0051	67.14
40435.53242	6.293333333	7.915	-0.0087	67.14
40435.53267	6.663333333	7.9203	-0.0034	67.14
9/14/2010 12:47	7.063	7.9203	-0.0034	67.14
9/14/2010 12:47	7.483	7.919	-0.0047	67.14
9/14/2010 12:48	7.923	7.904	-0.0197	67.14
9/14/2010 12:48	8.393	7.9164	-0.0073	67.15
9/14/2010 12:49	8.893	7.9102	-0.0135	67.14
9/14/2010 12:49	9.423	7.93	0.0063	67.13
40435.53499	9.983333333	7.9164	-0.0073	67.14


Slug Test at 199-F5-46
9/14/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
4
3
2
1
0
-1
-2
-3
-4
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2

Slug Test Field Activity Report
Summary of FAR - F5-46

Time	Note
12:09	False start
12:10	restarted 3 inch stainless slug (0.2985 ft 3) volume in test
12:20	3 inch slug stainless slug out.
12:30	3 inch stainless slug in.
12:40	3 inch slug stainless slug out.
12:50	Stopped data logging and pulled slug from well.

Note* the slug volumes were recalculated by Robert Edrington, therefore there is a slight variation in the slug volumes in the field notes and raw data file name.

Slug Testing at 199-F5-47 (A4597)

Summary of test data

	Pre-Test
D-T-W (ft TOC)	48.30
D-T-B (ft TOC)	63.10
Stick up (ft)	3.00
Top of Screen (TOC)	N/A
Screen length	N/A
Casing dia. (in)	4
Borehole Dia. (in)	8

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2
Slug Volume (ft^3)	0.3276	0.3276	0.3276	0.3276
Predicted WL Change	3.754	3.754	3.754	3.754
Max WL Change (ft)	4.35	2.77	2.91	2.80

Slug Testing was performed on 9/14/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-47

Slug Volume 0.3276 ft^3

Raw File:	199-F5-47 slug test 14Sept2010_Append_2010-09-14_18-41-44-531.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/14/2010		4.35	2.77
Test start:	11:15	injection 1		
Test restart:	11:20	withdrawal 1		
Test restart:	11:25	injection 2	**Max Change Test 2**	
Test restart:	11:33	withdrawal 2	Injection 2	Withdrawal 2
Test Stop	11:41	end	2.91	2.80
Slug Volume:	0.3276 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:15	0.001	11.8931	0	62.95
9/14/2010 11:15	0.004	12.4759	0.5828	62.96
9/14/2010 11:15	0.008	15.3439	3.4508	62.96
9/14/2010 11:15	0.013	14.3745	2.4814	62.97
9/14/2010 11:15	0.017	16.2461	4.353	62.97
9/14/2010 11:15	0.021	15.5774	3.6843	62.97
9/14/2010 11:15	0.029	13.0977	1.2046	62.98
9/14/2010 11:15	0.033	13.3212	1.4281	62.98
9/14/2010 11:15	0.038	13.013	1.1199	62.99
9/14/2010 11:15	0.042	12.6158	0.7227	63
9/14/2010 11:15	0.046	12.5886	0.6955	62.99
9/14/2010 11:15	0.050	12.8515	0.9584	63
9/14/2010 11:15	0.054	12.7278	0.8347	63
9/14/2010 11:15	0.058	12.6413	0.7482	63
9/14/2010 11:15	0.063	12.6325	0.7394	63.01
9/14/2010 11:15	0.067	12.6004	0.7073	63.01
9/14/2010 11:15	0.071	12.5061	0.613	63.01
9/14/2010 11:15	0.075	12.4903	0.5972	63.01
9/14/2010 11:15	0.081	12.4609	0.5678	63
9/14/2010 11:15	0.087	12.41	0.5169	62.99
9/14/2010 11:15	0.094	12.3735	0.4804	62.97
9/14/2010 11:15	0.101	12.3139	0.4208	62.97
9/14/2010 11:15	0.108	12.3204	0.4273	62.97
9/14/2010 11:15	0.116	12.2802	0.3871	62.96
9/14/2010 11:15	0.125	12.2265	0.3334	62.95
9/14/2010 11:15	0.133	12.1907	0.2976	62.96
9/14/2010 11:15	0.143	12.1758	0.2827	62.95

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:15	0.153	12.1731	0.28	62.94
9/14/2010 11:15	0.163	12.1538	0.2607	62.94
9/14/2010 11:15	0.174	12.138	0.2449	62.94
9/14/2010 11:15	0.186	12.1112	0.2181	62.93
9/14/2010 11:15	0.199	12.1012	0.2081	62.93
9/14/2010 11:15	0.212	12.0814	0.1883	62.93
9/14/2010 11:15	0.226	12.0726	0.1795	62.93
9/14/2010 11:15	0.241	12.0731	0.18	62.92
9/14/2010 11:15	0.257	12.0481	0.155	62.92
9/14/2010 11:15	0.273	12.0375	0.1444	62.92
9/14/2010 11:15	0.291	12.0197	0.1266	62.92
9/14/2010 11:15	0.310	12.0279	0.1348	62.91
9/14/2010 11:15	0.330	12.0088	0.1157	62.91
9/14/2010 11:16	0.351	12.0167	0.1236	62.91
9/14/2010 11:16	0.373	11.9978	0.1047	62.9
9/14/2010 11:16	0.397	11.9985	0.1054	62.9
9/14/2010 11:16	0.422	11.9974	0.1043	62.9
9/14/2010 11:16	0.448	11.9864	0.0933	62.9
9/14/2010 11:16	0.476	11.9807	0.0876	62.9
9/14/2010 11:16	0.506	11.9754	0.0823	62.9
9/14/2010 11:16	0.537	11.9583	0.0652	62.89
9/14/2010 11:16	0.571	11.9772	0.0841	62.89
9/14/2010 11:16	0.606	11.9691	0.076	62.89
9/14/2010 11:16	0.643	11.9645	0.0714	62.89
9/14/2010 11:16	0.683	11.9553	0.0622	62.89
9/14/2010 11:16	0.725	11.9561	0.063	62.89
9/14/2010 11:16	0.769	11.9473	0.0542	62.89
9/14/2010 11:16	0.816	11.9526	0.0595	62.88
9/14/2010 11:16	0.866	11.9487	0.0556	62.88
9/14/2010 11:16	0.919	11.9473	0.0542	62.88
9/14/2010 11:16	0.975	11.9429	0.0498	62.87
9/14/2010 11:16	1.035	11.9394	0.0463	62.86
9/14/2010 11:16	1.095	11.9249	0.0318	62.87
9/14/2010 11:16	1.165	11.9195	0.0264	62.87
9/14/2010 11:16	1.235	11.9206	0.0275	62.86
9/14/2010 11:16	1.305	11.9166	0.0235	62.86
9/14/2010 11:17	1.385	11.9157	0.0226	62.85
9/14/2010 11:17	1.475	11.9223	0.0292	62.85
9/14/2010 11:17	1.555	11.928	0.0349	62.87
9/14/2010 11:17	1.655	11.9331	0.04	62.85
9/14/2010 11:17	1.755	11.9054	0.0123	62.85
9/14/2010 11:17	1.855	11.9164	0.0233	62.85
9/14/2010 11:17	1.965	11.9114	0.0183	62.84
9/14/2010 11:17	2.085	11.9175	0.0244	62.84

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:17	2.215	11.9164	0.0233	62.83
9/14/2010 11:18	2.345	11.9109	0.0178	62.83
9/14/2010 11:18	2.485	11.8971	0.004	62.83
9/14/2010 11:18	2.635	11.9171	0.024	62.82
9/14/2010 11:18	2.795	11.8976	0.0045	62.82
9/14/2010 11:18	2.955	11.894	0.0009	62.81
9/14/2010 11:18	3.135	11.8897	-0.0034	62.82
9/14/2010 11:18	3.325	11.8984	0.0053	62.81
9/14/2010 11:19	3.525	11.9103	0.0172	62.81
9/14/2010 11:19	3.735	11.8993	0.0062	62.8
9/14/2010 11:19	3.955	11.9028	0.0097	62.8
9/14/2010 11:19	4.195	11.8918	-0.0013	62.8
9/14/2010 11:20	4.445	11.9039	0.0108	62.8
9/14/2010 11:20	4.705	11.8914	-0.0017	62.8
9/14/2010 11:20	4.985	11.8988	0.0057	62.79
9/14/2010 11:20	5.285	11.9002	0.0071	62.79
9/14/2010 11:21	5.570	11.9061	0.013	62.79
9/14/2010 11:21	5.574	11.9043	0.0112	62.83

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Log Notes:

Date and Time	Note
9/14/2010 10:50	Sensor: 141741 Factory calibration has expired.: 2/20/2010 8:53:49 AM
9/14/2010 11:15	Manual Start Command
9/14/2010 11:17	Log Download - Used Battery: 8% Used Memory: 14% Name: H0066555
9/14/2010 11:21	Restart Command
9/14/2010 11:21	Log Download - Used Battery: 8% Used Memory: 14% Name: H0066555
9/14/2010 11:26	Restart Command
9/14/2010 11:26	Log Download - Used Battery: 8% Used Memory: 14% Name: H0066555
9/14/2010 11:33	Restart Command
9/14/2010 11:33	Log Download - Used Battery: 8% Used Memory: 14% Name: H0066555
9/14/2010 11:41	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:21	0.001	11.9006	0	62.88
9/14/2010 11:21	0.004	11.8962	-0.0044	62.89
9/14/2010 11:21	0.008	11.2758	-0.6248	62.9
9/14/2010 11:21	0.013	10.3729	-1.5277	62.91
9/14/2010 11:21	0.017	9.2367	-2.6639	62.92
9/14/2010 11:21	0.021	9.396	-2.5046	62.92
9/14/2010 11:21	0.025	9.1331	-2.7675	62.92
9/14/2010 11:21	0.029	9.238	-2.6626	62.93
9/14/2010 11:21	0.033	9.3992	-2.5014	62.94
9/14/2010 11:21	0.038	9.5151	-2.3855	62.94
9/14/2010 11:21	0.042	9.5744	-2.3262	62.94
9/14/2010 11:21	0.046	9.7236	-2.177	62.94
9/14/2010 11:21	0.050	9.8331	-2.0675	62.95
9/14/2010 11:21	0.054	9.9106	-1.99	62.95
9/14/2010 11:21	0.058	9.9894	-1.9112	62.95
9/14/2010 11:21	0.063	10.1003	-1.8003	62.95
9/14/2010 11:21	0.067	10.174	-1.7266	62.96
9/14/2010 11:21	0.071	10.2434	-1.6572	62.95
9/14/2010 11:21	0.075	10.3022	-1.5984	62.95
9/14/2010 11:21	0.079	10.3931	-1.5075	62.96
9/14/2010 11:21	0.085	10.4804	-1.4202	62.94
9/14/2010 11:21	0.091	10.5735	-1.3271	62.94
9/14/2010 11:21	0.098	10.688	-1.2126	62.92
9/14/2010 11:21	0.105	10.7543	-1.1463	62.92
9/14/2010 11:21	0.112	10.8548	-1.0458	62.92
9/14/2010 11:21	0.120	10.9264	-0.9742	62.91
9/14/2010 11:21	0.129	11.0172	-0.8834	62.91

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:21	0.137	11.1032	-0.7974	62.9
9/14/2010 11:21	0.147	11.1993	-0.7013	62.9
9/14/2010 11:21	0.157	11.2722	-0.6284	62.9
9/14/2010 11:21	0.167	11.3323	-0.5683	62.89
9/14/2010 11:21	0.178	11.4122	-0.4884	62.89
9/14/2010 11:21	0.190	11.4798	-0.4208	62.89
9/14/2010 11:21	0.203	11.5416	-0.359	62.88
9/14/2010 11:21	0.216	11.5868	-0.3138	62.87
9/14/2010 11:21	0.230	11.6373	-0.2633	62.87
9/14/2010 11:21	0.245	11.6812	-0.2194	62.87
9/14/2010 11:21	0.261	11.7119	-0.1887	62.87
9/14/2010 11:21	0.277	11.7267	-0.1739	62.87
9/14/2010 11:21	0.295	11.7604	-0.1402	62.86
9/14/2010 11:21	0.315	11.8227	-0.0779	62.9
9/14/2010 11:21	0.334	11.8021	-0.0985	62.89
9/14/2010 11:21	0.355	11.8194	-0.0812	62.87
9/14/2010 11:21	0.377	11.8131	-0.0875	62.86
9/14/2010 11:21	0.401	11.8438	-0.0568	62.86
9/14/2010 11:21	0.426	11.8552	-0.0454	62.86
9/14/2010 11:21	0.452	11.8622	-0.0384	62.86
9/14/2010 11:21	0.480	11.8552	-0.0454	62.85
9/14/2010 11:21	0.510	11.8622	-0.0384	62.85
9/14/2010 11:21	0.541	11.8754	-0.0252	62.85
9/14/2010 11:21	0.575	11.8916	-0.009	62.85
9/14/2010 11:21	0.610	11.8925	-0.0081	62.84
9/14/2010 11:21	0.647	11.8988	-0.0018	62.84
9/14/2010 11:21	0.690	11.8984	-0.0022	62.84
9/14/2010 11:21	0.729	11.8872	-0.0134	62.84
9/14/2010 11:22	0.773	11.896	-0.0046	62.84
9/14/2010 11:22	0.820	11.8894	-0.0112	62.84
9/14/2010 11:22	0.870	11.9065	0.0059	62.83
9/14/2010 11:22	0.923	11.8894	-0.0112	62.83
9/14/2010 11:22	0.979	11.8977	-0.0029	62.83
9/14/2010 11:22	1.039	11.8905	-0.0101	62.83
9/14/2010 11:22	1.099	11.9045	0.0039	62.83
9/14/2010 11:22	1.169	11.9065	0.0059	62.83
9/14/2010 11:22	1.239	11.9004	-0.0002	62.83
9/14/2010 11:22	1.309	11.9013	0.0007	62.83
9/14/2010 11:22	1.389	11.8999	-0.0007	62.83
9/14/2010 11:22	1.479	11.8999	-0.0007	62.82
9/14/2010 11:22	1.559	11.8995	-0.0011	62.82
9/14/2010 11:22	1.659	11.9083	0.0077	62.82
9/14/2010 11:23	1.759	11.9149	0.0143	62.81
9/14/2010 11:23	1.859	11.9162	0.0156	62.81

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:23	1.969	11.898	-0.0026	62.81
9/14/2010 11:23	2.089	11.896	-0.0046	62.81
9/14/2010 11:23	2.219	11.9087	0.0081	62.81
9/14/2010 11:23	2.349	11.9109	0.0103	62.81
9/14/2010 11:23	2.489	11.8993	-0.0013	62.81
9/14/2010 11:23	2.639	11.9184	0.0178	62.81
9/14/2010 11:24	2.799	11.9013	0.0007	62.81
9/14/2010 11:24	2.959	11.9087	0.0081	62.81
9/14/2010 11:24	3.139	11.9065	0.0059	62.81
9/14/2010 11:24	3.329	11.9074	0.0068	62.8
9/14/2010 11:24	3.529	11.9061	0.0055	62.8
9/14/2010 11:24	3.739	11.8967	-0.0039	62.8
9/14/2010 11:25	3.959	11.9131	0.0125	62.8
9/14/2010 11:25	4.203	11.9111	0.0105	62.8
9/14/2010 11:25	4.449	11.9056	0.005	62.8
9/14/2010 11:25	4.709	11.9096	0.009	62.8
9/14/2010 11:26	4.747	11.9087	0.0081	62.81
9/14/2010 11:26	4.751	11.9079	0.0073	62.84
9/14/2010 11:26	4.755	11.9087	0.0081	62.86

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:26	0.001	11.9052	0	62.95
9/14/2010 11:26	0.004	12.1962	0.291	62.95
9/14/2010 11:26	0.008	12.4978	0.5926	62.95
9/14/2010 11:26	0.013	12.9543	1.0491	62.96
9/14/2010 11:26	0.017	13.3905	1.4853	62.96
9/14/2010 11:26	0.021	14.1349	2.2297	62.96
9/14/2010 11:26	0.025	13.5823	1.6771	62.97
9/14/2010 11:26	0.029	14.2911	2.3859	62.97
9/14/2010 11:26	0.033	14.8103	2.9051	62.97
9/14/2010 11:26	0.038	14.6023	2.6971	62.97
9/14/2010 11:26	0.042	13.8729	1.9677	62.97
9/14/2010 11:26	0.048	12.8063	0.9011	62.95
9/14/2010 11:26	0.054	13.8961	1.9909	62.95
9/14/2010 11:26	0.064	12.7137	0.8085	62.93
9/14/2010 11:26	0.068	12.711	0.8058	62.94
9/14/2010 11:26	0.075	12.6721	0.7669	62.94
9/14/2010 11:26	0.083	12.7014	0.7962	62.92
9/14/2010 11:26	0.092	12.6321	0.7269	62.92
9/14/2010 11:26	0.100	12.5387	0.6335	62.92
9/14/2010 11:26	0.110	12.8239	0.9187	62.91
9/14/2010 11:26	0.120	12.5339	0.6287	62.9
9/14/2010 11:26	0.130	12.3671	0.4619	62.9
9/14/2010 11:26	0.141	12.3508	0.4456	62.9
9/14/2010 11:26	0.153	12.3131	0.4079	62.89
9/14/2010 11:26	0.166	12.2517	0.3465	62.89
9/14/2010 11:26	0.179	12.2298	0.3246	62.89
9/14/2010 11:26	0.193	12.1986	0.2934	62.88

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:26	0.214	12.1766	0.2714	62.91
9/14/2010 11:26	0.225	12.138	0.2328	62.95
9/14/2010 11:26	0.240	12.1222	0.217	62.9
9/14/2010 11:26	0.258	12.1135	0.2083	62.88
9/14/2010 11:26	0.277	12.0981	0.1929	62.88
9/14/2010 11:26	0.297	12.0867	0.1815	62.88
9/14/2010 11:26	0.318	12.0616	0.1564	62.87
9/14/2010 11:26	0.340	12.0459	0.1407	62.88
9/14/2010 11:26	0.364	12.0465	0.1413	62.87
9/14/2010 11:26	0.389	12.0467	0.1415	62.88
9/14/2010 11:26	0.415	12.032	0.1268	62.87
9/14/2010 11:26	0.443	12.0259	0.1207	62.86
9/14/2010 11:26	0.473	12.0311	0.1259	62.86
9/14/2010 11:26	0.504	12.0303	0.1251	62.86
9/14/2010 11:26	0.538	12.0182	0.113	62.86
9/14/2010 11:26	0.573	12.0255	0.1203	62.86
9/14/2010 11:26	0.610	12.0112	0.106	62.85
9/14/2010 11:26	0.650	11.9956	0.0904	62.86
9/14/2010 11:26	0.692	11.9842	0.079	62.85
9/14/2010 11:26	0.736	11.9838	0.0786	62.86
9/14/2010 11:26	0.783	11.9789	0.0737	62.85
9/14/2010 11:26	0.833	11.9719	0.0667	62.85
9/14/2010 11:26	0.886	11.9794	0.0742	62.85
9/14/2010 11:27	0.942	11.9689	0.0637	62.85
9/14/2010 11:27	1.002	11.9557	0.0505	62.85
9/14/2010 11:27	1.062	11.9609	0.0557	62.84
9/14/2010 11:27	1.132	11.9675	0.0623	62.84
9/14/2010 11:27	1.202	11.9631	0.0579	62.85
9/14/2010 11:27	1.272	11.9592	0.054	62.84
9/14/2010 11:27	1.352	11.9421	0.0369	62.84
9/14/2010 11:27	1.442	11.9482	0.043	62.84
9/14/2010 11:27	1.522	11.95	0.0448	62.84
9/14/2010 11:27	1.622	11.9566	0.0514	62.84
9/14/2010 11:27	1.722	11.9425	0.0373	62.84
9/14/2010 11:27	1.822	11.9407	0.0355	62.84
9/14/2010 11:27	1.932	11.95	0.0448	62.84
9/14/2010 11:28	2.052	11.9482	0.043	62.83
9/14/2010 11:28	2.182	11.9438	0.0386	62.83
9/14/2010 11:28	2.312	11.9419	0.0367	62.83
9/14/2010 11:28	2.452	11.9425	0.0373	62.83
9/14/2010 11:28	2.602	11.9359	0.0307	62.83
9/14/2010 11:28	2.762	11.9294	0.0242	62.83
9/14/2010 11:28	2.922	11.9258	0.0206	62.83
9/14/2010 11:29	3.102	11.9311	0.0259	62.83

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:29	3.292	11.9291	0.0239	62.83
9/14/2010 11:29	3.492	11.9359	0.0307	62.83
9/14/2010 11:29	3.702	11.9307	0.0255	62.83
9/14/2010 11:29	3.922	11.9263	0.0211	62.83
9/14/2010 11:30	4.162	11.9267	0.0215	62.83
9/14/2010 11:30	4.412	11.9258	0.0206	62.83
9/14/2010 11:30	4.672	11.9289	0.0237	62.84
9/14/2010 11:31	4.952	11.9245	0.0193	62.83
9/14/2010 11:31	5.252	11.9223	0.0171	62.84
9/14/2010 11:31	5.562	11.9149	0.0097	62.84
9/14/2010 11:31	5.902	11.921	0.0158	62.84
9/14/2010 11:32	6.252	11.9092	0.004	62.85
9/14/2010 11:32	6.622	11.9135	0.0083	62.85
9/14/2010 11:33	7.022	11.9228	0.0176	62.85
9/14/2010 11:33	7.271	11.9193	0.0141	62.86
9/14/2010 11:33	7.275	11.9247	0.0195	62.89
9/14/2010 11:33	7.279	11.9261	0.0209	62.91
9/14/2010 11:33	7.283	11.9221	0.0169	62.93
9/14/2010 11:33	7.287	11.9182	0.013	62.94
9/14/2010 11:33	7.291	11.8988	-0.0064	62.96
9/14/2010 11:33	7.296	10.6341	-1.2711	62.97
9/14/2010 11:33	7.300	11.5729	-0.3323	62.97
9/14/2010 11:33	7.304	10.9088	-0.9964	62.98
9/14/2010 11:33	7.308	10.0287	-1.8765	62.98
9/14/2010 11:33	7.312	10.566	-1.3392	62.99
9/14/2010 11:33	7.316	9.825	-2.0802	62.99
9/14/2010 11:33	7.321	9.1982	-2.707	62.99
9/14/2010 11:33	7.325	9.0994	-2.8058	63
9/14/2010 11:33	7.329	9.1714	-2.7338	63
9/14/2010 11:33	7.333	9.297	-2.6082	63
9/14/2010 11:33	7.337	9.4265	-2.4787	63.01
9/14/2010 11:33	7.341	9.5204	-2.3848	63.01
9/14/2010 11:33	7.346	9.6385	-2.2667	63.02
9/14/2010 11:33	7.350	9.7392	-2.166	63.01
9/14/2010 11:33	7.354	9.8301	-2.0751	63.02
9/14/2010 11:33	7.358	9.912	-1.9932	63.02
9/14/2010 11:33	7.362	9.9993	-1.9059	63.02
9/14/2010 11:33	7.366	10.1111	-1.7941	63.03
9/14/2010 11:33	7.371	10.1811	-1.7241	63.02
9/14/2010 11:33	7.377	10.2921	-1.6131	63.01
9/14/2010 11:33	7.383	10.4018	-1.5034	63
9/14/2010 11:33	7.390	10.5212	-1.384	62.99
9/14/2010 11:33	7.397	10.6213	-1.2839	62.98
9/14/2010 11:33	7.404	10.7196	-1.1856	62.99

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:33	7.412	10.8351	-1.0701	62.98
9/14/2010 11:33	7.421	10.9365	-0.9687	62.97
9/14/2010 11:33	7.429	11.0199	-0.8853	62.97
9/14/2010 11:33	7.439	11.1138	-0.7914	62.97
9/14/2010 11:33	7.449	11.213	-0.6922	62.96
9/14/2010 11:33	7.459	11.2828	-0.6224	62.96
9/14/2010 11:33	7.470	11.3658	-0.5394	62.95
9/14/2010 11:33	7.482	11.4271	-0.4781	62.95
9/14/2010 11:33	7.495	11.5008	-0.4044	62.94
9/14/2010 11:33	7.508	11.5738	-0.3314	62.94
9/14/2010 11:33	7.522	11.6182	-0.287	62.94
9/14/2010 11:33	7.537	11.6623	-0.2429	62.94
9/14/2010 11:33	7.553	11.697	-0.2082	62.94
9/14/2010 11:33	7.569	11.7273	-0.1779	62.94
9/14/2010 11:33	7.594	11.8051	-0.1001	62.96
9/14/2010 11:33	7.606	11.7611	-0.1441	62.99
9/14/2010 11:33	7.626	11.8073	-0.0979	62.95
9/14/2010 11:33	7.647	11.8115	-0.0937	62.94
9/14/2010 11:33	7.669	11.8508	-0.0544	62.93
9/14/2010 11:33	7.693	11.8791	-0.0261	62.93
9/14/2010 11:33	7.718	11.8558	-0.0494	62.93
9/14/2010 11:33	7.744	11.8637	-0.0415	62.92
9/14/2010 11:33	7.772	11.8725	-0.0327	62.92
9/14/2010 11:33	7.802	11.88	-0.0252	62.92
9/14/2010 11:33	7.833	11.9351	0.0299	62.92
9/14/2010 11:33	7.867	11.9491	0.0439	62.93
9/14/2010 11:33	7.902	11.8938	-0.0114	62.93
9/14/2010 11:34	7.939	11.9017	-0.0035	62.92
9/14/2010 11:34	7.979	11.8872	-0.018	62.92
9/14/2010 11:34	8.021	11.9067	0.0015	62.92
9/14/2010 11:34	8.065	11.9067	0.0015	62.92
9/14/2010 11:34	8.112	11.9063	0.0011	62.91
9/14/2010 11:34	8.162	11.8921	-0.0131	62.91
9/14/2010 11:34	8.215	11.9041	-0.0011	62.91
9/14/2010 11:34	8.271	11.9083	0.0031	62.91
9/14/2010 11:34	8.331	11.9052	0	62.91
9/14/2010 11:34	8.391	11.9124	0.0072	62.91
9/14/2010 11:34	8.461	11.9043	-0.0009	62.9
9/14/2010 11:34	8.531	11.8986	-0.0066	62.9
9/14/2010 11:34	8.601	11.9065	0.0013	62.9
9/14/2010 11:34	8.681	11.9035	-0.0017	62.9
9/14/2010 11:34	8.771	11.9096	0.0044	62.9
9/14/2010 11:34	8.851	11.9035	-0.0017	62.9
9/14/2010 11:35	8.951	11.9017	-0.0035	62.9

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:35	9.051	11.91	0.0048	62.89
9/14/2010 11:35	9.151	11.896	-0.0092	62.89
9/14/2010 11:35	9.261	11.9026	-0.0026	62.89
9/14/2010 11:35	9.381	11.9039	-0.0013	62.89
9/14/2010 11:35	9.511	11.9092	0.004	62.89
9/14/2010 11:35	9.641	11.9149	0.0097	62.89
9/14/2010 11:35	9.781	11.9004	-0.0048	62.89
9/14/2010 11:35	9.931	11.8899	-0.0153	62.89
9/14/2010 11:36	10.091	11.9092	0.004	62.88
9/14/2010 11:36	10.251	11.91	0.0048	62.88
9/14/2010 11:36	10.431	11.9079	0.0027	62.88
9/14/2010 11:36	10.621	11.9135	0.0083	62.88
9/14/2010 11:36	10.821	11.9149	0.0097	62.88
9/14/2010 11:37	11.031	11.9298	0.0246	62.88
9/14/2010 11:37	11.251	11.8947	-0.0105	62.88
9/14/2010 11:37	11.491	11.9114	0.0062	62.88
9/14/2010 11:37	11.741	11.9021	-0.0031	62.88
9/14/2010 11:38	12.001	11.9061	0.0009	62.88
9/14/2010 11:38	12.281	11.9114	0.0062	62.87
9/14/2010 11:38	12.581	11.9092	0.004	62.87
9/14/2010 11:38	12.891	11.9004	-0.0048	62.87
9/14/2010 11:39	13.231	11.8999	-0.0053	62.88
9/14/2010 11:39	13.581	11.9065	0.0013	62.88
9/14/2010 11:40	13.951	11.9087	0.0035	62.88
9/14/2010 11:40	14.351	11.9048	-0.0004	62.88
9/14/2010 11:40	14.771	11.9021	-0.0031	62.88

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:33	0.001	11.8988	0	62.96
9/14/2010 11:33	0.004	10.6341	-1.2647	62.97
9/14/2010 11:33	0.008	11.5729	-0.3259	62.97
9/14/2010 11:33	0.012	10.9088	-0.99	62.98
9/14/2010 11:33	0.017	10.0287	-1.8701	62.98
9/14/2010 11:33	0.021	10.566	-1.3328	62.99
9/14/2010 11:33	0.025	9.825	-2.0738	62.99
9/14/2010 11:33	0.029	9.1982	-2.7006	62.99
9/14/2010 11:33	0.033	9.0994	-2.7994	63
9/14/2010 11:33	0.037	9.1714	-2.7274	63
9/14/2010 11:33	0.042	9.297	-2.6018	63
9/14/2010 11:33	0.046	9.4265	-2.4723	63.01
9/14/2010 11:33	0.050	9.5204	-2.3784	63.01
9/14/2010 11:33	0.054	9.6385	-2.2603	63.02
9/14/2010 11:33	0.058	9.7392	-2.1596	63.01
9/14/2010 11:33	0.062	9.8301	-2.0687	63.02
9/14/2010 11:33	0.067	9.912	-1.9868	63.02
9/14/2010 11:33	0.071	9.9993	-1.8995	63.02
9/14/2010 11:33	0.075	10.1111	-1.7877	63.03
9/14/2010 11:33	0.079	10.1811	-1.7177	63.02
9/14/2010 11:33	0.085	10.2921	-1.6067	63.01
9/14/2010 11:33	0.091	10.4018	-1.497	63
9/14/2010 11:33	0.098	10.5212	-1.3776	62.99
9/14/2010 11:33	0.105	10.6213	-1.2775	62.98
9/14/2010 11:33	0.112	10.7196	-1.1792	62.99
9/14/2010 11:33	0.120	10.8351	-1.0637	62.98
9/14/2010 11:33	0.129	10.9365	-0.9623	62.97

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:33	0.137	11.0199	-0.8789	62.97
9/14/2010 11:33	0.147	11.1138	-0.785	62.97
9/14/2010 11:33	0.157	11.213	-0.6858	62.96
9/14/2010 11:33	0.167	11.2828	-0.616	62.96
9/14/2010 11:33	0.178	11.3658	-0.533	62.95
9/14/2010 11:33	0.190	11.4271	-0.4717	62.95
9/14/2010 11:33	0.203	11.5008	-0.398	62.94
9/14/2010 11:33	0.216	11.5738	-0.325	62.94
9/14/2010 11:33	0.230	11.6182	-0.2806	62.94
9/14/2010 11:33	0.245	11.6623	-0.2365	62.94
9/14/2010 11:33	0.261	11.697	-0.2018	62.94
9/14/2010 11:33	0.277	11.7273	-0.1715	62.94
9/14/2010 11:33	0.303	11.8051	-0.0937	62.96
9/14/2010 11:33	0.314	11.7611	-0.1377	62.99
9/14/2010 11:33	0.334	11.8073	-0.0915	62.95
9/14/2010 11:33	0.355	11.8115	-0.0873	62.94
9/14/2010 11:33	0.377	11.8508	-0.048	62.93
9/14/2010 11:33	0.401	11.8791	-0.0197	62.93
9/14/2010 11:33	0.426	11.8558	-0.043	62.93
9/14/2010 11:33	0.452	11.8637	-0.0351	62.92
9/14/2010 11:33	0.480	11.8725	-0.0263	62.92
9/14/2010 11:33	0.510	11.88	-0.0188	62.92
9/14/2010 11:33	0.541	11.9351	0.0363	62.92
9/14/2010 11:33	0.575	11.9491	0.0503	62.93
9/14/2010 11:33	0.610	11.8938	-0.005	62.93
9/14/2010 11:34	0.647	11.9017	0.0029	62.92
9/14/2010 11:34	0.687	11.8872	-0.0116	62.92
9/14/2010 11:34	0.729	11.9067	0.0079	62.92
9/14/2010 11:34	0.773	11.9067	0.0079	62.92
9/14/2010 11:34	0.820	11.9063	0.0075	62.91
9/14/2010 11:34	0.870	11.8921	-0.0067	62.91
9/14/2010 11:34	0.923	11.9041	0.0053	62.91
9/14/2010 11:34	0.979	11.9083	0.0095	62.91
9/14/2010 11:34	1.039	11.9052	0.0064	62.91
9/14/2010 11:34	1.099	11.9124	0.0136	62.91
9/14/2010 11:34	1.169	11.9043	0.0055	62.9
9/14/2010 11:34	1.239	11.8986	-0.0002	62.9
9/14/2010 11:34	1.309	11.9065	0.0077	62.9
9/14/2010 11:34	1.389	11.9035	0.0047	62.9
9/14/2010 11:34	1.479	11.9096	0.0108	62.9
9/14/2010 11:34	1.559	11.9035	0.0047	62.9
9/14/2010 11:35	1.659	11.9017	0.0029	62.9
9/14/2010 11:35	1.759	11.91	0.0112	62.89
9/14/2010 11:35	1.859	11.896	-0.0028	62.89

Withdrawal #2

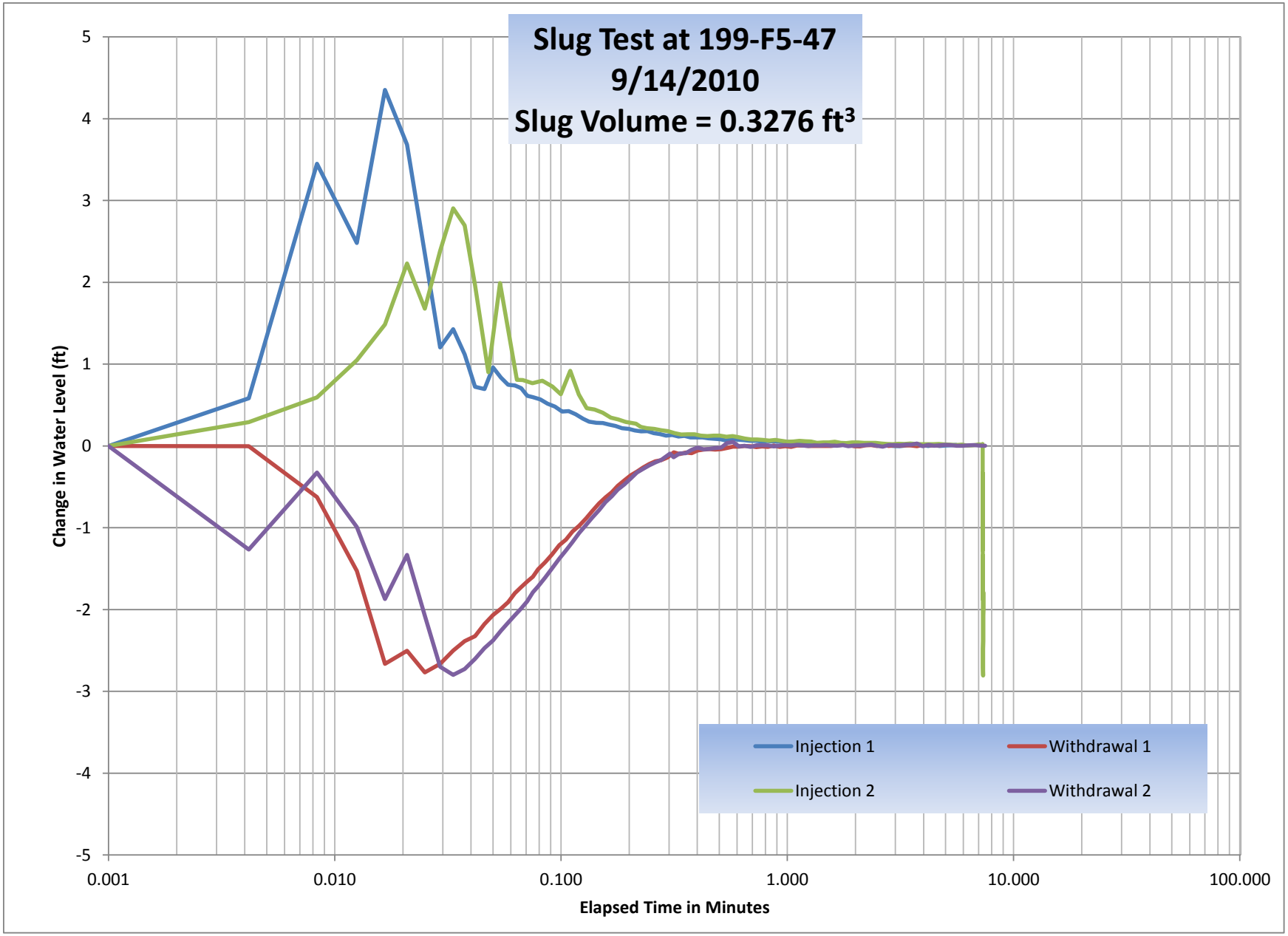
Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 11:35	1.969	11.9026	0.0038	62.89
9/14/2010 11:35	2.089	11.9039	0.0051	62.89
9/14/2010 11:35	2.219	11.9092	0.0104	62.89
9/14/2010 11:35	2.349	11.9149	0.0161	62.89
9/14/2010 11:35	2.489	11.9004	0.0016	62.89
9/14/2010 11:35	2.639	11.8899	-0.0089	62.89
9/14/2010 11:36	2.799	11.9092	0.0104	62.88
9/14/2010 11:36	2.959	11.91	0.0112	62.88
9/14/2010 11:36	3.139	11.9079	0.0091	62.88
9/14/2010 11:36	3.329	11.9135	0.0147	62.88
9/14/2010 11:36	3.529	11.9149	0.0161	62.88
9/14/2010 11:37	3.739	11.9298	0.031	62.88
9/14/2010 11:37	3.959	11.8947	-0.0041	62.88
9/14/2010 11:37	4.199	11.9114	0.0126	62.88
9/14/2010 11:37	4.449	11.9021	0.0033	62.88
9/14/2010 11:38	4.709	11.9061	0.0073	62.88
9/14/2010 11:38	4.989	11.9114	0.0126	62.87
9/14/2010 11:38	5.289	11.9092	0.0104	62.87
9/14/2010 11:38	5.599	11.9004	0.0016	62.87
9/14/2010 11:39	5.939	11.8999	0.0011	62.88
9/14/2010 11:39	6.289	11.9065	0.0077	62.88
9/14/2010 11:40	6.659	11.9087	0.0099	62.88
9/14/2010 11:40	7.059	11.9048	0.006	62.88
9/14/2010 11:40	7.479	11.9021	0.0033	62.88

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F


Slug Test at 199-F5-47
9/14/2010
Slug Volume = 0.3276 ft³
Change in Water Level (ft)
5
4
3
2
1
0
-1
-2
-3
-4
-5
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2

Slug Test Field Activity Report
Summary of FAR - F5-47

Time	Note
11:15	3 inch stainless slug (0.2985 ft 3) volume in
11:20	3 inch slug stainless slug out.
11:25	3 inch stainless slug in.
11:33	3 inch slug stainless slug out.
11:41	Stopped data logging and pulled slug from well.

Note* the slug volumes were recalculated by Robert Edrington, therefore there is a slight variation in the slug volumes in the field notes and raw data file name.

Slug Test at 199-F7-3

Slug Volume 0.3276 ft^3

Raw File:	199-F7-3 slug test 14Sept10_Append_2010-09-14_16-46-03-109.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	9/14/2010		5.64	3.44
Test start:	9:08	injection 1		
Test restart:	9:16	withdrawal 1		
Test restart:	9:27	injection 2	**Max Change Test 2**	
Test restart:	9:37	withdrawal 2	Injection 2	Withdrawal 2
Test Stop	9:45	end	6.25	3.45
Slug Volume:	0.3276 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:08	0.001	11.6009	0	60.17
9/14/2010 9:08	0.004	11.8145	0.2136	60.20
9/14/2010 9:08	0.008	13.7922	2.1913	60.22
9/14/2010 9:08	0.013	17.2407	5.6398	60.24
9/14/2010 9:08	0.017	12.4769	0.876	60.25
9/14/2010 9:08	0.025	12.8098	1.2089	60.27
9/14/2010 9:08	0.033	12.2512	0.6503	60.28
9/14/2010 9:08	0.038	12.9313	1.3304	60.29
9/14/2010 9:08	0.042	12.3163	0.7154	60.29
9/14/2010 9:08	0.046	12.9365	1.3356	60.29
9/14/2010 9:08	0.050	12.6301	1.0292	60.29
9/14/2010 9:08	0.054	12.5003	0.8994	60.30
9/14/2010 9:08	0.058	12.4938	0.8929	60.30
9/14/2010 9:08	0.063	12.1926	0.5917	60.31
9/14/2010 9:08	0.067	12.3438	0.7429	60.31
9/14/2010 9:08	0.071	12.1563	0.5554	60.31
9/14/2010 9:08	0.075	12.2153	0.6144	60.31
9/14/2010 9:08	0.079	12.2149	0.614	60.31
9/14/2010 9:08	0.083	12.1091	0.5082	60.32
9/14/2010 9:08	0.088	12.1078	0.5069	60.32
9/14/2010 9:08	0.092	12.1034	0.5025	60.32
9/14/2010 9:08	0.096	12.098	0.4971	60.32
9/14/2010 9:08	0.100	12.0862	0.4853	60.32
9/14/2010 9:08	0.106	12.068	0.4671	60.30
9/14/2010 9:08	0.112	12.0412	0.4403	60.30
9/14/2010 9:08	0.119	12.0326	0.4317	60.28
9/14/2010 9:08	0.126	11.9789	0.378	60.28

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:08	0.133	11.9714	0.3705	60.27
9/14/2010 9:08	0.141	11.9483	0.3474	60.26
9/14/2010 9:08	0.150	11.9225	0.3216	60.26
9/14/2010 9:08	0.158	11.929	0.3281	60.26
9/14/2010 9:08	0.168	11.9076	0.3067	60.25
9/14/2010 9:08	0.178	11.8759	0.275	60.24
9/14/2010 9:08	0.188	11.8462	0.2453	60.24
9/14/2010 9:08	0.199	11.8488	0.2479	60.23
9/14/2010 9:08	0.211	11.82	0.2191	60.23
9/14/2010 9:08	0.224	11.8134	0.2125	60.22
9/14/2010 9:08	0.237	11.8064	0.2055	60.22
9/14/2010 9:08	0.251	11.7916	0.1907	60.21
9/14/2010 9:08	0.266	11.7708	0.1699	60.24
9/14/2010 9:08	0.282	11.7686	0.1677	60.21
9/14/2010 9:08	0.298	11.7721	0.1712	60.21
9/14/2010 9:08	0.316	11.7645	0.1636	60.20
9/14/2010 9:08	0.335	11.7618	0.1609	60.19
9/14/2010 9:08	0.355	11.7461	0.1452	60.21
9/14/2010 9:08	0.376	11.7313	0.1304	60.20
9/14/2010 9:08	0.398	11.7242	0.1233	60.19
9/14/2010 9:08	0.424	11.7291	0.1282	60.23
9/14/2010 9:08	0.447	11.7164	0.1155	60.19
9/14/2010 9:08	0.473	11.7151	0.1142	60.17
9/14/2010 9:08	0.501	11.7229	0.122	60.17
9/14/2010 9:08	0.531	11.7087	0.1078	60.17
9/14/2010 9:08	0.562	11.709	0.1081	60.17
9/14/2010 9:08	0.598	11.6801	0.0792	60.18
9/14/2010 9:08	0.631	11.6858	0.0849	60.16
9/14/2010 9:08	0.668	11.6883	0.0874	60.14
9/14/2010 9:08	0.708	11.6793	0.0784	60.15
9/14/2010 9:08	0.750	11.655	0.0541	60.13
9/14/2010 9:09	0.794	11.6631	0.0622	60.14
9/14/2010 9:09	0.843	11.6556	0.0547	60.15
9/14/2010 9:09	0.891	11.6816	0.0807	60.12
9/14/2010 9:09	0.944	11.6371	0.0362	60.12
9/14/2010 9:09	1.000	11.6511	0.0502	60.10
9/14/2010 9:09	1.060	11.6367	0.0358	60.10
9/14/2010 9:09	1.120	11.6336	0.0327	60.08
9/14/2010 9:09	1.190	11.6183	0.0174	60.07
9/14/2010 9:09	1.260	11.6297	0.0288	60.06
9/14/2010 9:09	1.330	11.6218	0.0209	60.05
9/14/2010 9:09	1.410	11.621	0.0201	60.04
9/14/2010 9:09	1.500	11.6109	0.01	60.03
9/14/2010 9:09	1.580	11.6157	0.0148	60.02

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:09	1.680	11.6242	0.0233	60.01
9/14/2010 9:10	1.780	11.61	0.0091	60.00
9/14/2010 9:10	1.880	11.6157	0.0148	59.99
9/14/2010 9:10	1.990	11.624	0.0231	59.98
9/14/2010 9:10	2.110	11.61	0.0091	59.96
9/14/2010 9:10	2.240	11.6065	0.0056	59.96
9/14/2010 9:10	2.370	11.6013	0.0004	59.94
9/14/2010 9:10	2.510	11.6017	0.0008	59.93
9/14/2010 9:10	2.660	11.6087	0.0078	59.92
9/14/2010 9:11	2.820	11.5965	-0.0044	59.91
9/14/2010 9:11	2.980	11.603	0.0021	59.90
9/14/2010 9:11	3.160	11.5952	-0.0057	59.89
9/14/2010 9:11	3.350	11.596	-0.0049	59.88
9/14/2010 9:11	3.550	11.6131	0.0122	59.87
9/14/2010 9:11	3.760	11.6174	0.0165	59.86
9/14/2010 9:12	3.980	11.5987	-0.0022	59.85
9/14/2010 9:12	4.220	11.5939	-0.007	59.84
9/14/2010 9:12	4.470	11.6013	0.0004	59.82
9/14/2010 9:12	4.730	11.5761	-0.0248	59.84
9/14/2010 9:13	5.010	11.5956	-0.0053	59.83
9/14/2010 9:13	5.310	11.592	-0.0089	59.83
9/14/2010 9:13	5.620	11.5904	-0.0105	59.82
9/14/2010 9:14	5.963	11.584	-0.0169	59.84
9/14/2010 9:14	6.310	11.5866	-0.0143	59.82
9/14/2010 9:14	6.680	11.5842	-0.0167	59.81
9/14/2010 9:15	7.080	11.5726	-0.0283	59.81
9/14/2010 9:15	7.500	11.5904	-0.0105	59.80
9/14/2010 9:16	7.940	11.6589	0.058	59.80
9/14/2010 9:16	8.410	11.6036	0.0027	59.78

Log Notes:
Date and Time Note

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:16	0.001	11.6014	0	59.85
9/14/2010 9:16	0.004	11.5789	-0.0225	59.87
9/14/2010 9:16	0.007	8.42	-3.1814	59.89
9/14/2010 9:16	0.016	8.8004	-2.801	59.90
9/14/2010 9:16	0.020	8.1657	-3.4357	59.90
9/14/2010 9:16	0.024	8.5302	-3.0712	59.91
9/14/2010 9:16	0.028	8.5539	-3.0475	59.92
9/14/2010 9:16	0.032	8.6208	-2.9806	59.93
9/14/2010 9:16	0.035	8.7445	-2.8569	59.93
9/14/2010 9:16	0.039	8.8302	-2.7712	59.94
9/14/2010 9:16	0.043	8.9054	-2.696	59.94
9/14/2010 9:16	0.047	8.9933	-2.6081	59.94
9/14/2010 9:16	0.051	9.0882	-2.5132	59.95
9/14/2010 9:16	0.055	9.1673	-2.4341	59.95
9/14/2010 9:16	0.059	9.2521	-2.3493	59.94
9/14/2010 9:16	0.063	9.3238	-2.2776	59.95
9/14/2010 9:16	0.068	9.3986	-2.2028	59.95
9/14/2010 9:16	0.072	9.4764	-2.125	59.95
9/14/2010 9:16	0.076	9.5429	-2.0585	59.95
9/14/2010 9:16	0.080	9.6019	-1.9995	59.96
9/14/2010 9:16	0.084	9.6785	-1.9229	59.96
9/14/2010 9:16	0.090	9.7786	-1.8228	59.94
9/14/2010 9:16	0.096	9.8621	-1.7393	59.94
9/14/2010 9:16	0.103	9.9583	-1.6431	59.92
9/14/2010 9:16	0.110	10.0577	-1.5437	59.91
9/14/2010 9:16	0.117	10.1482	-1.4532	59.91
9/14/2010 9:16	0.125	10.2452	-1.3562	59.91

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:16	0.134	10.3497	-1.2517	59.89
9/14/2010 9:16	0.142	10.424	-1.1774	59.90
9/14/2010 9:16	0.152	10.5219	-1.0795	59.89
9/14/2010 9:16	0.162	10.6317	-0.9697	59.88
9/14/2010 9:16	0.172	10.7077	-0.8937	59.88
9/14/2010 9:16	0.183	10.8012	-0.8002	59.88
9/14/2010 9:16	0.195	10.8913	-0.7101	59.88
9/14/2010 9:17	0.208	10.977	-0.6244	59.87
9/14/2010 9:17	0.221	11.0543	-0.5471	59.87
9/14/2010 9:17	0.235	11.1182	-0.4832	59.87
9/14/2010 9:17	0.250	11.1798	-0.4216	59.86
9/14/2010 9:17	0.266	11.2326	-0.3688	59.86
9/14/2010 9:17	0.282	11.2693	-0.3321	59.86
9/14/2010 9:17	0.300	11.3192	-0.2822	59.86
9/14/2010 9:17	0.319	11.3743	-0.2271	59.85
9/14/2010 9:17	0.339	11.3991	-0.2023	59.85
9/14/2010 9:17	0.360	11.4236	-0.1778	59.85
9/14/2010 9:17	0.382	11.4572	-0.1442	59.85
9/14/2010 9:17	0.406	11.4765	-0.1249	59.84
9/14/2010 9:17	0.431	11.4961	-0.1053	59.84
9/14/2010 9:17	0.457	11.5014	-0.1	59.84
9/14/2010 9:17	0.485	11.511	-0.0904	59.84
9/14/2010 9:17	0.515	11.518	-0.0834	59.84
9/14/2010 9:17	0.546	11.5394	-0.062	59.84
9/14/2010 9:17	0.580	11.5433	-0.0581	59.83
9/14/2010 9:17	0.615	11.5423	-0.0591	59.83
9/14/2010 9:17	0.652	11.5551	-0.0463	59.83
9/14/2010 9:17	0.692	11.5647	-0.0367	59.82
9/14/2010 9:17	0.734	11.5621	-0.0393	59.83
9/14/2010 9:17	0.778	11.5611	-0.0403	59.82
9/14/2010 9:17	0.825	11.5778	-0.0236	59.82
9/14/2010 9:17	0.875	11.6397	0.0383	59.82
9/14/2010 9:17	0.928	11.5848	-0.0166	59.82
9/14/2010 9:17	0.984	11.591	-0.0104	59.81
9/14/2010 9:17	1.044	11.5725	-0.0289	59.81
9/14/2010 9:17	1.104	11.5834	-0.018	59.82
9/14/2010 9:17	1.174	11.5962	-0.0052	59.81
9/14/2010 9:18	1.244	11.5855	-0.0159	59.81
9/14/2010 9:18	1.314	11.5971	-0.0043	59.81
9/14/2010 9:18	1.394	11.6015	1E-04	59.81
9/14/2010 9:18	1.484	11.5919	-0.0095	59.80
9/14/2010 9:18	1.564	11.5886	-0.0128	59.80
9/14/2010 9:18	1.664	11.5939	-0.0075	59.80
9/14/2010 9:18	1.764	11.6009	-0.0005	59.79

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:18	1.864	11.5904	-0.011	59.80
9/14/2010 9:18	1.974	11.6187	0.0173	59.79
9/14/2010 9:18	2.094	11.5934	-0.008	59.80
9/14/2010 9:19	2.224	11.6048	0.0034	59.80
9/14/2010 9:19	2.354	11.5982	-0.0032	59.79
9/14/2010 9:19	2.494	11.5956	-0.0058	59.80
9/14/2010 9:19	2.644	11.6093	0.0079	59.79
9/14/2010 9:19	2.804	11.5943	-0.0071	59.80
9/14/2010 9:19	2.964	11.5956	-0.0058	59.79
9/14/2010 9:19	3.144	11.6028	0.0014	59.79
9/14/2010 9:20	3.334	11.5921	-0.0093	59.79
9/14/2010 9:20	3.534	11.6028	0.0014	59.79
9/14/2010 9:20	3.744	11.6058	0.0044	59.80
9/14/2010 9:20	3.964	11.5943	-0.0071	59.79
9/14/2010 9:20	4.204	11.6013	-1E-04	59.79
9/14/2010 9:21	4.454	11.6465	0.0451	59.79
9/14/2010 9:21	4.714	11.6023	0.0009	59.79
9/14/2010 9:21	4.994	11.5962	-0.0052	59.79
9/14/2010 9:22	5.294	11.6036	0.0022	59.78
9/14/2010 9:22	5.604	11.5945	-0.0069	59.79
9/14/2010 9:22	5.944	11.5962	-0.0052	59.79
9/14/2010 9:23	6.294	11.6041	0.0027	59.79
9/14/2010 9:23	6.664	11.6172	0.0158	59.79
9/14/2010 9:23	7.064	11.6001	-0.0013	59.80
9/14/2010 9:24	7.484	11.6067	0.0053	59.80
9/14/2010 9:24	7.924	11.5901	-0.0113	59.81
9/14/2010 9:25	8.394	11.5919	-0.0095	59.81
9/14/2010 9:25	8.894	11.601	-0.0004	59.81
9/14/2010 9:26	9.424	11.6119	0.0105	59.81
40435.39359	9.984166667	11.5984	-0.003	59.810295
40435.39377	10.23845	11.6063	0.0049	59.806835

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:27	0.001	11.6008	0	59.90
9/14/2010 9:27	0.004	11.6729	0.0721	59.92
9/14/2010 9:27	0.008	13.9204	2.3196	59.92
9/14/2010 9:27	0.013	17.8542	6.2534	59.93
9/14/2010 9:27	0.021	16.59	4.9892	59.94
9/14/2010 9:27	0.025	12.7367	1.1359	59.94
9/14/2010 9:27	0.033	12.3135	0.7127	59.95
9/14/2010 9:27	0.038	12.5907	0.9899	59.95
9/14/2010 9:27	0.042	12.4622	0.8614	59.96
9/14/2010 9:27	0.046	12.8246	1.2238	59.96
9/14/2010 9:27	0.050	12.6524	1.0516	59.96
9/14/2010 9:27	0.054	12.5133	0.9125	59.97
9/14/2010 9:27	0.058	12.3	0.6992	59.96
9/14/2010 9:27	0.063	12.422	0.8212	59.97
9/14/2010 9:27	0.067	12.4403	0.8395	59.97
9/14/2010 9:27	0.071	12.2178	0.617	59.97
9/14/2010 9:27	0.075	12.3367	0.7359	59.97
9/14/2010 9:27	0.079	12.208	0.6072	59.97
9/14/2010 9:27	0.085	12.2917	0.6909	59.96
9/14/2010 9:27	0.091	12.203	0.6022	59.95
9/14/2010 9:27	0.098	12.2012	0.6004	59.94
9/14/2010 9:27	0.105	12.1107	0.5099	59.94
9/14/2010 9:27	0.112	12.0796	0.4788	59.93
9/14/2010 9:27	0.120	12.0832	0.4824	59.93
9/14/2010 9:27	0.129	12.0434	0.4426	59.92
9/14/2010 9:27	0.137	12.0149	0.4141	59.92
9/14/2010 9:27	0.147	11.9948	0.394	59.91

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:27	0.157	11.9701	0.3693	59.91
9/14/2010 9:27	0.167	11.943	0.3422	59.91
9/14/2010 9:27	0.178	11.9441	0.3433	59.90
9/14/2010 9:27	0.190	11.9115	0.3107	59.90
9/14/2010 9:27	0.203	11.8901	0.2893	59.89
9/14/2010 9:27	0.216	11.8827	0.2819	59.90
9/14/2010 9:27	0.230	11.8578	0.257	59.89
9/14/2010 9:27	0.245	11.842	0.2412	59.89
9/14/2010 9:27	0.261	11.8241	0.2233	59.88
9/14/2010 9:27	0.277	11.8276	0.2268	59.88
9/14/2010 9:27	0.295	11.8036	0.2028	59.88
9/14/2010 9:27	0.314	11.7913	0.1905	59.88
9/14/2010 9:27	0.334	11.7907	0.1899	59.88
9/14/2010 9:27	0.355	11.7745	0.1737	59.88
9/14/2010 9:27	0.377	11.7704	0.1696	59.88
9/14/2010 9:27	0.401	11.7614	0.1606	59.87
9/14/2010 9:27	0.426	11.7417	0.1409	59.87
9/14/2010 9:27	0.452	11.7234	0.1226	59.87
9/14/2010 9:27	0.480	11.73	0.1292	59.87
9/14/2010 9:27	0.510	11.7234	0.1226	59.86
9/14/2010 9:27	0.541	11.7365	0.1357	59.87
9/14/2010 9:27	0.575	11.716	0.1152	59.86
9/14/2010 9:27	0.610	11.7286	0.1278	59.86
9/14/2010 9:27	0.647	11.7133	0.1125	59.86
9/14/2010 9:27	0.687	11.7055	0.1047	59.86
9/14/2010 9:27	0.729	11.6845	0.0837	59.86
9/14/2010 9:27	0.773	11.6889	0.0881	59.85
9/14/2010 9:27	0.820	11.6919	0.0911	59.85
9/14/2010 9:27	0.870	11.6757	0.0749	59.87
9/14/2010 9:27	0.923	11.6801	0.0793	59.85
9/14/2010 9:28	0.979	11.6775	0.0767	59.85
9/14/2010 9:28	1.039	11.6788	0.078	59.85
9/14/2010 9:28	1.099	11.6544	0.0536	59.85
9/14/2010 9:28	1.169	11.6578	0.057	59.84
9/14/2010 9:28	1.239	11.6509	0.0501	59.84
9/14/2010 9:28	1.309	11.6504	0.0496	59.84
9/14/2010 9:28	1.389	11.6583	0.0575	59.84
9/14/2010 9:28	1.479	11.657	0.0562	59.84
9/14/2010 9:28	1.559	11.6356	0.0348	59.83
9/14/2010 9:28	1.659	11.6201	0.0193	59.83
9/14/2010 9:28	1.759	11.6386	0.0378	59.83
9/14/2010 9:28	1.859	11.6275	0.0267	59.83
9/14/2010 9:29	1.969	11.621	0.0202	59.82
9/14/2010 9:29	2.089	11.617	0.0162	59.82

Injection #2

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:29	2.219	11.6179	0.0171	59.82
9/14/2010 9:29	2.349	11.6194	0.0186	59.82
9/14/2010 9:29	2.489	11.6264	0.0256	59.82
9/14/2010 9:29	2.639	11.6091	0.0083	59.82
9/14/2010 9:29	2.799	11.6154	0.0146	59.82
9/14/2010 9:30	2.959	11.6131	0.0123	59.83
9/14/2010 9:30	3.139	11.6137	0.0129	59.82
9/14/2010 9:30	3.329	11.6187	0.0179	59.84
9/14/2010 9:30	3.529	11.6064	0.0056	59.83
9/14/2010 9:30	3.739	11.6146	0.0138	59.82
9/14/2010 9:31	3.959	11.6102	0.0094	59.83
9/14/2010 9:31	4.199	11.6248	0.024	59.83
9/14/2010 9:31	4.449	11.6085	0.0077	59.84
9/14/2010 9:31	4.709	11.6111	0.0103	59.84
9/14/2010 9:32	4.989	11.6049	0.0041	59.83
9/14/2010 9:32	5.289	11.6067	0.0059	59.84
9/14/2010 9:32	5.599	11.6089	0.0081	59.84
9/14/2010 9:32	5.939	11.6006	-0.0002	59.84
9/14/2010 9:33	6.289	11.6019	0.0011	59.84
9/14/2010 9:33	6.659	11.601	0.0002	59.84
9/14/2010 9:34	7.059	11.6124	0.0116	59.84
9/14/2010 9:34	7.479	11.6063	0.0055	59.84
9/14/2010 9:34	7.919	11.5936	-0.0072	59.85
9/14/2010 9:35	8.389	11.6085	0.0077	59.86
9/14/2010 9:35	8.889	11.5993	-0.0015	59.86
9/14/2010 9:36	9.419	11.6015	0.0007	59.87

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:37	0.001	11.6091	0	59.96
9/14/2010 9:37	0.004	11.6003	-0.0088	59.97
9/14/2010 9:37	0.008	8.3226	-3.2865	59.98
9/14/2010 9:37	0.017	8.932	-2.6771	60.00
9/14/2010 9:37	0.021	8.1559	-3.4532	60.00
9/14/2010 9:37	0.025	8.4472	-3.1619	60.01
9/14/2010 9:37	0.029	8.5652	-3.0439	60.01
9/14/2010 9:37	0.033	8.6824	-2.9267	60.02
9/14/2010 9:37	0.038	8.7707	-2.8384	60.03
9/14/2010 9:37	0.042	8.8809	-2.7282	60.03
9/14/2010 9:37	0.046	8.971	-2.6381	60.03
9/14/2010 9:37	0.050	9.0401	-2.569	60.04
9/14/2010 9:37	0.054	9.1236	-2.4855	60.04
9/14/2010 9:37	0.058	9.1989	-2.4102	60.04
9/14/2010 9:37	0.063	9.2832	-2.3259	60.05
9/14/2010 9:37	0.067	9.3623	-2.2468	60.04
9/14/2010 9:37	0.071	9.4244	-2.1847	60.05
9/14/2010 9:37	0.075	9.4994	-2.1097	60.05
9/14/2010 9:37	0.079	9.5549	-2.0542	60.06
9/14/2010 9:37	0.083	9.6319	-1.9772	60.05
9/14/2010 9:37	0.088	9.6721	-1.937	60.06
9/14/2010 9:37	0.094	9.7589	-1.8502	60.04
9/14/2010 9:37	0.100	9.8643	-1.7448	60.03
9/14/2010 9:37	0.107	9.9373	-1.6718	60.02
9/14/2010 9:37	0.113	10.0484	-1.5607	60.02
9/14/2010 9:37	0.121	10.1441	-1.465	60.01
9/14/2010 9:37	0.129	10.2215	-1.3876	60.01

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:37	0.138	10.3221	-1.287	60.00
9/14/2010 9:37	0.146	10.4034	-1.2057	60.00
9/14/2010 9:37	0.155	10.5087	-1.1004	59.99
9/14/2010 9:37	0.166	10.594	-1.0151	59.99
9/14/2010 9:37	0.176	10.6845	-0.9246	59.99
9/14/2010 9:37	0.187	10.7589	-0.8502	59.98
9/14/2010 9:37	0.199	10.8603	-0.7488	59.98
9/14/2010 9:37	0.212	10.932	-0.6771	59.98
9/14/2010 9:37	0.225	11.001	-0.6081	59.98
9/14/2010 9:37	0.238	11.0771	-0.532	59.97
9/14/2010 9:37	0.254	11.1304	-0.4787	59.97
9/14/2010 9:37	0.270	11.2091	-0.4	59.97
9/14/2010 9:37	0.286	11.2524	-0.3567	59.97
9/14/2010 9:37	0.304	11.3031	-0.306	59.96
9/14/2010 9:37	0.323	11.3455	-0.2636	59.97
9/14/2010 9:37	0.342	11.3831	-0.226	59.96
9/14/2010 9:37	0.363	11.4102	-0.1989	59.96
9/14/2010 9:37	0.386	11.4346	-0.1745	59.96
9/14/2010 9:37	0.409	11.4591	-0.15	59.96
9/14/2010 9:37	0.434	11.4862	-0.1229	59.96
9/14/2010 9:37	0.461	11.4993	-0.1098	59.95
9/14/2010 9:37	0.488	11.5072	-0.1019	59.95
9/14/2010 9:37	0.519	11.5181	-0.091	59.95
9/14/2010 9:37	0.550	11.5343	-0.0748	59.95
9/14/2010 9:37	0.584	11.55	-0.0591	59.95
9/14/2010 9:38	0.619	11.5544	-0.0547	59.95
9/14/2010 9:38	0.655	11.5614	-0.0477	59.95
9/14/2010 9:38	0.696	11.556	-0.0531	59.94
9/14/2010 9:38	0.738	11.5592	-0.0499	59.94
9/14/2010 9:38	0.782	11.5717	-0.0374	59.94
9/14/2010 9:38	0.829	11.5748	-0.0343	59.94
9/14/2010 9:38	0.879	11.5774	-0.0317	59.94
9/14/2010 9:38	0.932	11.5805	-0.0286	59.94
9/14/2010 9:38	0.988	11.5907	-0.0184	59.94
9/14/2010 9:38	1.048	11.6025	-0.0066	59.94
9/14/2010 9:38	1.108	11.5792	-0.0299	59.94
9/14/2010 9:38	1.178	11.5844	-0.0247	59.94
9/14/2010 9:38	1.248	11.5907	-0.0184	59.94
9/14/2010 9:38	1.318	11.5924	-0.0167	59.94
9/14/2010 9:38	1.398	11.5888	-0.0203	59.94
9/14/2010 9:38	1.488	11.5875	-0.0216	59.93
9/14/2010 9:38	1.568	11.598	-0.0111	59.93
9/14/2010 9:39	1.668	11.5953	-0.0138	59.93
9/14/2010 9:39	1.768	11.5958	-0.0133	59.94

Withdrawal #2

Date and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	F
9/14/2010 9:39	1.868	11.6108	0.0017	59.94
9/14/2010 9:39	1.977	11.5993	-0.0098	59.94
9/14/2010 9:39	2.098	11.6028	-0.0063	59.94
9/14/2010 9:39	2.227	11.613	0.0039	59.94
9/14/2010 9:39	2.358	11.6125	0.0034	59.94
9/14/2010 9:39	2.498	11.6056	-0.0035	59.94
9/14/2010 9:40	2.648	11.6012	-0.0079	59.94
9/14/2010 9:40	2.808	11.5988	-0.0103	59.94
9/14/2010 9:40	2.968	11.613	0.0039	59.94
9/14/2010 9:40	3.147	11.6156	0.0065	59.94
9/14/2010 9:40	3.338	11.62	0.0109	59.94
9/14/2010 9:40	3.538	11.6049	-0.0042	59.94
9/14/2010 9:41	3.747	11.6098	0.0007	59.95
9/14/2010 9:41	3.968	11.6082	-0.0009	59.94
9/14/2010 9:41	4.208	11.6187	0.0096	59.95
9/14/2010 9:41	4.458	11.6106	0.0015	59.95
9/14/2010 9:42	4.717	11.6125	0.0034	59.95
9/14/2010 9:42	4.998	11.6254	0.0163	59.95
9/14/2010 9:42	5.297	11.6086	-0.0005	59.95
9/14/2010 9:43	5.608	11.6051	-0.004	59.95
9/14/2010 9:43	5.947	11.6191	0.01	59.96
9/14/2010 9:43	6.297	11.5932	-0.0159	59.95
9/14/2010 9:44	6.667	11.6086	-0.0005	59.96
9/14/2010 9:44	7.067	11.6152	0.0061	59.96
9/14/2010 9:44	7.488	11.6147	0.0056	59.96

Slug Testing at 199-F5-52 (C7790)

Summary of test data

	Pre-Test	Post Test
D-T-W (ft TOC)	50.1	-
D-T-B (ft TOC)	66	-
Stick up (ft)	3.28	-
Top of Screen (TOC)	43.18	-
Screen length	20	-
Casing dia. (in)	6	-
Borehole Dia. (in)	10.75	-

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	**0.6877**	**0.6877**	**0.6877**	**0.6877**	**0.6877**	**0.6877**
Predicted WL Change	3.502	3.502	3.502	3.502	3.502	3.502
Max WL Change (ft)	5.48	5.57	6.48	4.39	5.92	6.38

Slug Test	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	**1.0112**	**1.0112**	**1.0112**	**1.0112**	**1.0112**	**1.0112**
Predicted WL Change	5.15	5.15	5.15	5.15	5.15	5.15
Max WL Change (ft)	7.58	4.13	7.71	6.48	7.66	4.56

Slug Testing was performed on 9/17/2010

Note* the slug volumes were recalculated by Robert Edrington and the above volumes reflect the new calculations. The Field Activity Report and raw data file names will indicate a slightly different volume.

Slug Test at 199-F5-52

Slug Volume 0.78 ft^3

Raw File:	C7790 - Test 7 - 0.78 cu ft SLUG 2010-09-17 15.21.31.wsl			
Device	Level TROLL 700		**Max Change Test 1**	
Site	FR-3		Injection 1	Withdrawal 1
Device SN	168983		5.48	5.57
Test Date:	9/17/2010			
Test start:	13:02	injection 1	**Max Change Test 2**	
Test restart:	13:12	withdrawal 1	Injection 2	Withdrawal 2
Test restart:	13:22	injection 2	6.48	4.39
Test restart:	13:32	withdrawal 2		
Test restart:	13:42	injection 3	**Max Change Test 3**	
Test restart:	13:52	withdrawal 3	Injection 3	Withdrawal 3
Test Stop	14:02	end	5.92	6.38
Slug Volume:	0.6877 cu ft			

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.275	0.015	64.0
0.004	12.276	0.016	64.0
0.008	12.277	0.017	64.0
0.017	12.275	0.015	64.1
0.025	12.279	0.019	64.1
0.029	12.275	0.015	64.1
0.033	12.278	0.018	64.1
0.038	13.130	0.870	64.1
0.042	14.522	2.262	64.1
0.046	16.791	4.531	64.1
0.05	16.644	4.384	64.1
0.054	15.274	3.014	64.1
0.063	17.739	5.479	64.1
0.071	14.769	2.509	64.1
0.074	13.820	1.560	64.1
0.078	15.427	3.167	64.1
0.089	16.898	4.638	64.1
0.097	14.148	1.888	64.1
0.1	13.265	1.005	64.1
0.104	13.804	1.544	64.1
0.108	13.331	1.071	64.2
0.112	13.564	1.304	64.1
0.119	13.343	1.083	64.1
0.126	13.373	1.113	64.1
0.133	13.397	1.137	64.1

0.141	13.396	1.136	64.1
0.15	13.322	1.062	64.1
0.158	13.338	1.078	64.1
0.171	13.236	0.976	64.1
0.178	13.206	0.946	64.1
0.188	13.180	0.920	64.1
0.204	13.127	0.867	64.1
0.211	13.097	0.837	64.1
0.224	13.054	0.794	64.1
0.237	13.011	0.751	64.1
0.251	12.990	0.730	64.1
0.271	12.930	0.670	64.1
0.282	12.916	0.656	64.1
0.304	12.859	0.599	64.1
0.316	12.841	0.581	64.1
0.338	12.791	0.531	64.1
0.355	12.774	0.514	64.1
0.376	12.741	0.481	64.1
0.404	12.702	0.442	64.1
0.422	12.673	0.413	64.0
0.447	12.646	0.386	64.1
0.473	12.616	0.356	64.1
0.504	12.601	0.341	64.1
0.537	12.556	0.296	64.1
0.571	12.534	0.274	64.1
0.604	12.508	0.248	64.1
0.637	12.488	0.228	64.1
0.671	12.471	0.211	64.1
0.708	12.454	0.194	64.0
0.75	12.438	0.178	64.0
0.794	12.418	0.158	64.0
0.841	12.407	0.147	64.0
0.891	12.392	0.132	64.0
0.944	12.381	0.121	64.0
1.004	12.373	0.113	64.1
1.06	12.380	0.120	64.0
1.12	12.355	0.095	64.0
1.19	12.346	0.086	64.0
1.26	12.358	0.098	64.0
1.338	12.338	0.078	64.0
1.41	12.329	0.069	64.0
1.504	12.323	0.063	64.0
1.58	12.322	0.062	64.0
1.68	12.316	0.056	64.0
1.78	12.310	0.050	64.0
1.88	12.301	0.041	64.0
1.99	12.299	0.039	64.0

2.11	12.299	0.039	64.0
2.24	12.296	0.036	64.0
2.37	12.290	0.030	63.9
2.51	12.289	0.029	63.9
2.66	12.286	0.026	63.9
2.82	12.283	0.023	63.9
2.98	12.276	0.016	63.9
3.16	12.276	0.016	63.9
3.35	12.276	0.016	63.9
3.55	12.276	0.016	63.9
3.76	12.279	0.019	63.9
3.98	12.273	0.013	63.9
4.22	12.276	0.016	63.9
4.47	12.274	0.014	63.9
4.73	12.276	0.016	63.9
5.01	12.274	0.014	63.9
5.31	12.279	0.019	64.0
5.62	12.280	0.020	64.0
5.96	12.274	0.014	64.0
6.31	12.272	0.012	64.0
6.68	12.269	0.009	64.0
7.08	12.273	0.013	64.0
7.5	12.273	0.013	64.0
7.94	12.276	0.016	64.0
8.41	12.281	0.021	64.0
8.91	12.282	0.022	64.0
9.44	12.265	0.005	64.0
9.808	12.299	0.039	64.0

Log Notes:

Date and Time	Note
9/17/2010 13:02	Manual Start Command
9/17/2010 13:12	Restart Command
9/17/2010 13:22	Restart Command
9/17/2010 13:32	Restart Command
9/17/2010 13:42	Restart Command
9/17/2010 13:52	Restart Command
9/17/2010 14:02	Manual Stop Command

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.295	0.035	64.1
0.004	12.290	0.030	64.1
0.008	12.288	0.028	64.1
0.012	12.287	0.027	64.1
0.025	6.694	-5.566	64.2
0.029	10.056	-2.204	64.2
0.033	8.979	-3.281	64.2
0.037	9.126	-3.134	64.2
0.041	9.254	-3.006	64.2
0.045	9.347	-2.913	64.2
0.05	9.456	-2.804	64.2
0.054	9.499	-2.761	64.2
0.058	9.561	-2.699	64.2
0.062	9.603	-2.657	64.2
0.066	9.654	-2.606	64.2
0.07	9.725	-2.535	64.2
0.075	9.780	-2.480	64.2
0.079	9.835	-2.425	64.2
0.083	9.886	-2.374	64.2
0.087	9.928	-2.332	64.2
0.091	9.976	-2.284	64.2
0.095	10.025	-2.235	64.2
0.101	10.084	-2.176	64.2
0.107	10.171	-2.089	64.2
0.114	10.245	-2.015	64.2

0.124	10.352	-1.908	64.1
0.128	10.389	-1.871	64.2
0.139	10.497	-1.763	64.1
0.145	10.550	-1.710	64.2
0.153	10.624	-1.636	64.1
0.163	10.712	-1.548	64.1
0.173	10.798	-1.462	64.1
0.183	10.874	-1.386	64.1
0.194	10.955	-1.305	64.1
0.206	11.040	-1.220	64.1
0.219	11.119	-1.141	64.1
0.232	11.201	-1.059	64.1
0.246	11.281	-0.979	64.1
0.261	11.364	-0.896	64.1
0.277	11.435	-0.825	64.1
0.293	11.503	-0.757	64.1
0.311	11.570	-0.690	64.1
0.33	11.633	-0.627	64.1
0.35	11.687	-0.573	64.1
0.371	11.739	-0.521	64.1
0.393	11.786	-0.474	64.1
0.417	11.833	-0.427	64.1
0.442	11.873	-0.387	64.1
0.468	11.912	-0.348	64.1
0.496	11.944	-0.316	64.1
0.526	11.985	-0.275	64.1
0.557	12.016	-0.244	64.1
0.591	12.046	-0.214	64.1
0.626	12.065	-0.195	64.1
0.663	12.094	-0.166	64.1
0.703	12.119	-0.141	64.1
0.745	12.135	-0.125	64.1
0.789	12.156	-0.104	64.1
0.836	12.172	-0.088	64.1
0.886	12.189	-0.071	64.1
0.939	12.206	-0.054	64.1
0.995	12.219	-0.041	64.1
1.055	12.233	-0.027	64.1
1.115	12.244	-0.016	64.1
1.185	12.252	-0.008	64.1
1.255	12.260	0.000	64.1
1.325	12.265	0.005	64.1
1.405	12.273	0.013	64.1
1.495	12.272	0.012	64.1
1.575	12.278	0.018	64.1
1.675	12.280	0.020	64.1
1.775	12.282	0.022	64.1

1.875	12.285	0.025	64.1
1.985	12.286	0.026	64.1
2.105	12.291	0.031	64.1
2.235	12.295	0.035	64.0
2.365	12.288	0.028	64.0
2.505	12.288	0.028	64.1
2.655	12.287	0.027	64.0
2.815	12.292	0.032	64.0
2.975	12.289	0.029	64.0
3.155	12.290	0.030	64.0
3.345	12.287	0.027	64.1
3.545	12.288	0.028	64.0
3.755	12.290	0.030	64.1
3.975	12.290	0.030	64.1
4.215	12.294	0.034	64.1
4.465	12.287	0.027	64.0
4.725	12.289	0.029	64.1
5.005	12.289	0.029	64.1
5.305	12.285	0.025	64.1
5.615	12.283	0.023	64.1
5.955	12.290	0.030	64.1
6.305	12.288	0.028	64.1
6.675	12.293	0.033	64.1
7.075	12.292	0.032	64.2
7.5	12.293	0.033	64.2
7.935	12.289	0.029	64.2
8.405	12.294	0.034	64.2
8.905	12.285	0.025	64.2
9.439	12.309389	0.049389	64.242844
9.995	12.301225	0.041225	64.20993
10.05	12.300845	0.040845	64.211693

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.301	0.031	64.2
0.004	12.298	0.028	64.3
0.008	12.298	0.028	64.3
0.012	12.303	0.033	64.3
0.016	12.296	0.026	64.3
0.02	12.292	0.022	64.3
0.025	12.309	0.039	64.3
0.029	12.641	0.371	64.3
0.033	14.175	1.905	64.3
0.037	16.079	3.809	64.4
0.041	17.590	5.320	64.4
0.045	18.755	6.485	64.4
0.054	18.650	6.380	64.4
0.058	16.372	4.102	64.4
0.066	16.529	4.259	64.4
0.078	13.281	1.011	64.3
0.082	13.500	1.230	64.4
0.086	13.870	1.600	64.4
0.094	13.317	1.047	64.3
0.097	13.861	1.591	64.4
0.101	13.462	1.192	64.4
0.105	13.462	1.192	64.4
0.108	13.751	1.481	64.4
0.114	13.550	1.280	64.4
0.121	13.471	1.201	64.4

0.128	13.396	1.126	64.3
0.136	13.364	1.094	64.3
0.145	13.270	1.000	64.3
0.153	13.322	1.052	64.3
0.163	13.260	0.990	64.3
0.173	13.240	0.970	64.3
0.183	13.196	0.926	64.3
0.194	13.146	0.876	64.3
0.206	13.113	0.843	64.3
0.219	13.087	0.817	64.3
0.232	13.047	0.777	64.3
0.254	12.989	0.719	64.3
0.261	12.977	0.707	64.3
0.277	12.938	0.668	64.3
0.293	12.905	0.635	64.3
0.311	12.873	0.603	64.3
0.339	12.822	0.552	64.3
0.354	12.814	0.544	64.3
0.371	12.768	0.498	64.3
0.393	12.737	0.467	64.3
0.421	12.698	0.428	64.3
0.442	12.673	0.403	64.3
0.468	12.650	0.380	64.3
0.496	12.618	0.348	64.3
0.526	12.595	0.325	64.3
0.557	12.570	0.300	64.3
0.591	12.541	0.271	64.3
0.626	12.519	0.249	64.3
0.663	12.501	0.231	64.3
0.703	12.478	0.208	64.3
0.745	12.460	0.190	64.3
0.789	12.443	0.173	64.3
0.836	12.431	0.161	64.3
0.888	12.411	0.141	64.3
0.939	12.400	0.130	64.3
0.995	12.390	0.120	64.3
1.055	12.378	0.108	64.3
1.121	12.369	0.099	64.4
1.188	12.367	0.097	64.4
1.255	12.358	0.088	64.4
1.325	12.348	0.078	64.4
1.405	12.341	0.071	64.3
1.495	12.333	0.063	64.3
1.575	12.326	0.056	64.3
1.675	12.321	0.051	64.3
1.775	12.314	0.044	64.3
1.875	12.305	0.035	64.3

1.988	12.304	0.034	64.4
2.105	12.302	0.032	64.3
2.235	12.294	0.024	64.4
2.365	12.292	0.022	64.4
2.505	12.292	0.022	64.4
2.655	12.290	0.020	64.4
2.822	12.289	0.019	64.4
2.975	12.282	0.012	64.4
3.156	12.285	0.015	64.4
3.345	12.283	0.013	64.4
3.545	12.284	0.014	64.3
3.755	12.282	0.012	64.3
3.975	12.282	0.012	64.3
4.215	12.274	0.004	64.3
4.465	12.272	0.002	64.3
4.725	12.278	0.008	64.3
5.01	12.275	0.005	64.4
5.311	12.275	0.005	64.4
5.615	12.274	0.004	64.4
5.955	12.275	0.005	64.4
6.311	12.274	0.004	64.5
6.678	12.275	0.005	64.5
7.078	12.274	0.004	64.5
7.495	12.276	0.006	64.4
7.935	12.284	0.014	64.4
8.412	12.289	0.019	64.5
8.912	12.280	0.010	64.5
9.435	12.286	0.016	64.4
9.995	12.286969	0.016969	64.421921

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.292	0.002	64.4
0.005	12.291	0.001	64.5
0.009	12.293	0.003	64.5
0.013	12.291	0.001	64.5
0.017	12.288	-0.002	64.5
0.021	12.830	0.540	64.5
0.026	7.898	-4.392	64.5
0.038	10.575	-1.715	64.5
0.042	9.063	-3.227	64.6
0.046	9.205	-3.085	64.6
0.051	9.317	-2.973	64.6
0.055	9.382	-2.908	64.6
0.059	9.442	-2.848	64.6
0.063	9.501	-2.789	64.6
0.067	9.556	-2.734	64.6
0.071	9.626	-2.664	64.6
0.076	9.684	-2.606	64.6
0.08	9.729	-2.561	64.6
0.084	9.775	-2.515	64.6
0.088	9.837	-2.453	64.6
0.092	9.880	-2.410	64.6
0.096	9.929	-2.361	64.6
0.101	9.998	-2.292	64.6
0.107	10.050	-2.240	64.6
0.113	10.141	-2.149	64.6

0.12	10.203	-2.087	64.6
0.127	10.272	-2.018	64.6
0.134	10.361	-1.929	64.6
0.142	10.425	-1.865	64.6
0.151	10.504	-1.786	64.5
0.159	10.586	-1.704	64.5
0.169	10.672	-1.618	64.5
0.179	10.754	-1.536	64.5
0.189	10.838	-1.452	64.5
0.2	10.921	-1.369	64.5
0.212	11.003	-1.287	64.5
0.229	11.119	-1.171	64.5
0.238	11.176	-1.114	64.5
0.252	11.257	-1.033	64.5
0.267	11.335	-0.955	64.5
0.283	11.418	-0.872	64.5
0.299	11.478	-0.812	64.5
0.317	11.552	-0.738	64.5
0.336	11.616	-0.674	64.5
0.363	11.695	-0.595	64.5
0.377	11.729	-0.561	64.5
0.399	11.777	-0.513	64.5
0.429	11.829	-0.461	64.5
0.448	11.865	-0.425	64.5
0.474	11.907	-0.383	64.5
0.502	11.946	-0.344	64.5
0.532	11.980	-0.310	64.5
0.563	12.018	-0.272	64.5
0.597	12.046	-0.244	64.5
0.632	12.073	-0.217	64.5
0.669	12.098	-0.192	64.5
0.709	12.124	-0.166	64.5
0.751	12.146	-0.144	64.5
0.796	12.169	-0.121	64.5
0.842	12.187	-0.103	64.5
0.896	12.203	-0.087	64.5
0.945	12.217	-0.073	64.5
1.001	12.230	-0.060	64.5
1.063	12.245	-0.045	64.5
1.121	12.250	-0.040	64.5
1.196	12.275	-0.015	64.5
1.263	12.267	-0.023	64.5
1.331	12.270	-0.020	64.5
1.411	12.276	-0.014	64.5
1.501	12.278	-0.012	64.5
1.581	12.278	-0.012	64.5
1.681	12.282	-0.008	64.5

1.781	12.284	-0.006	64.5
1.881	12.282	-0.008	64.5
1.997	12.297	0.007	64.5
2.111	12.287	-0.003	64.5
2.241	12.279	-0.011	64.5
2.371	12.291	0.001	64.5
2.51	12.290	0.000	64.5
2.664	12.289	-0.001	64.5
2.821	12.295	0.005	64.4
2.981	12.290	0.000	64.4
3.164	12.293	0.003	64.5
3.351	12.297	0.007	64.4
3.551	12.294	0.004	64.4
3.76	12.291	0.001	64.4
3.981	12.298	0.008	64.4
4.22	12.296	0.006	64.3
4.47	12.295	0.005	64.3
4.731	12.296	0.006	64.3
5.01	12.294	0.004	64.3
5.311	12.295	0.005	64.3
5.621	12.298	0.008	64.3
5.961	12.303	0.013	64.3
6.311	12.301	0.011	64.3
6.689	12.298	0.008	64.3
7.089	12.297	0.007	64.4
7.501	12.301	0.011	64.3
7.941	12.306	0.016	64.3
8.411	12.303	0.013	64.3
8.911	12.303475	0.013475	64.280029
9.441	12.305598	0.015598	64.255798

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.308	0.028	64.2
0.009	12.313	0.033	64.3
0.013	12.313	0.033	64.3
0.017	12.310	0.030	64.3
0.021	12.311	0.031	64.3
0.025	12.313	0.033	64.4
0.034	12.310	0.030	64.4
0.038	12.492	0.212	64.4
0.042	13.517	1.237	64.4
0.046	14.773	2.493	64.4
0.05	16.773	4.493	64.4
0.054	18.198	5.918	64.4
0.059	17.536	5.256	64.4
0.063	15.038	2.758	64.4
0.067	16.980	4.700	64.4
0.075	15.424	3.144	64.4
0.079	13.602	1.322	64.4
0.084	13.895	1.615	64.4
0.091	13.746	1.466	64.5
0.095	13.577	1.297	64.5
0.098	13.627	1.347	64.5
0.107	13.597	1.317	64.4
0.11	13.557	1.277	64.4
0.114	13.581	1.301	64.4
0.119	13.567	1.287	64.4

0.126	13.489	1.209	64.4
0.133	13.527	1.247	64.4
0.141	13.431	1.151	64.4
0.15	13.414	1.134	64.4
0.158	13.308	1.028	64.4
0.168	13.313	1.033	64.4
0.178	13.287	1.007	64.4
0.197	13.186	0.906	64.4
0.201	13.199	0.919	64.4
0.211	13.154	0.874	64.4
0.23	13.113	0.833	64.4
0.237	13.084	0.804	64.4
0.251	13.038	0.758	64.3
0.266	13.002	0.722	64.4
0.282	12.964	0.684	64.3
0.298	12.934	0.654	64.4
0.316	12.898	0.618	64.3
0.335	12.863	0.583	64.4
0.364	12.813	0.533	64.4
0.376	12.790	0.510	64.4
0.398	12.761	0.481	64.4
0.43	12.718	0.438	64.4
0.447	12.699	0.419	64.3
0.473	12.668	0.388	64.4
0.501	12.645	0.365	64.4
0.531	12.616	0.336	64.4
0.564	12.588	0.308	64.4
0.597	12.563	0.283	64.4
0.631	12.541	0.261	64.4
0.668	12.516	0.236	64.4
0.708	12.497	0.217	64.4
0.75	12.477	0.197	64.4
0.797	12.456	0.176	64.4
0.841	12.445	0.165	64.4
0.897	12.440	0.160	64.4
0.944	12.414	0.134	64.4
1	12.401	0.121	64.4
1.064	12.390	0.110	64.4
1.12	12.380	0.100	64.4
1.197	12.372	0.092	64.4
1.264	12.360	0.080	64.4
1.331	12.358	0.078	64.4
1.41	12.349	0.069	64.4
1.5	12.342	0.062	64.4
1.58	12.339	0.059	64.4
1.68	12.329	0.049	64.4
1.78	12.326	0.046	64.4

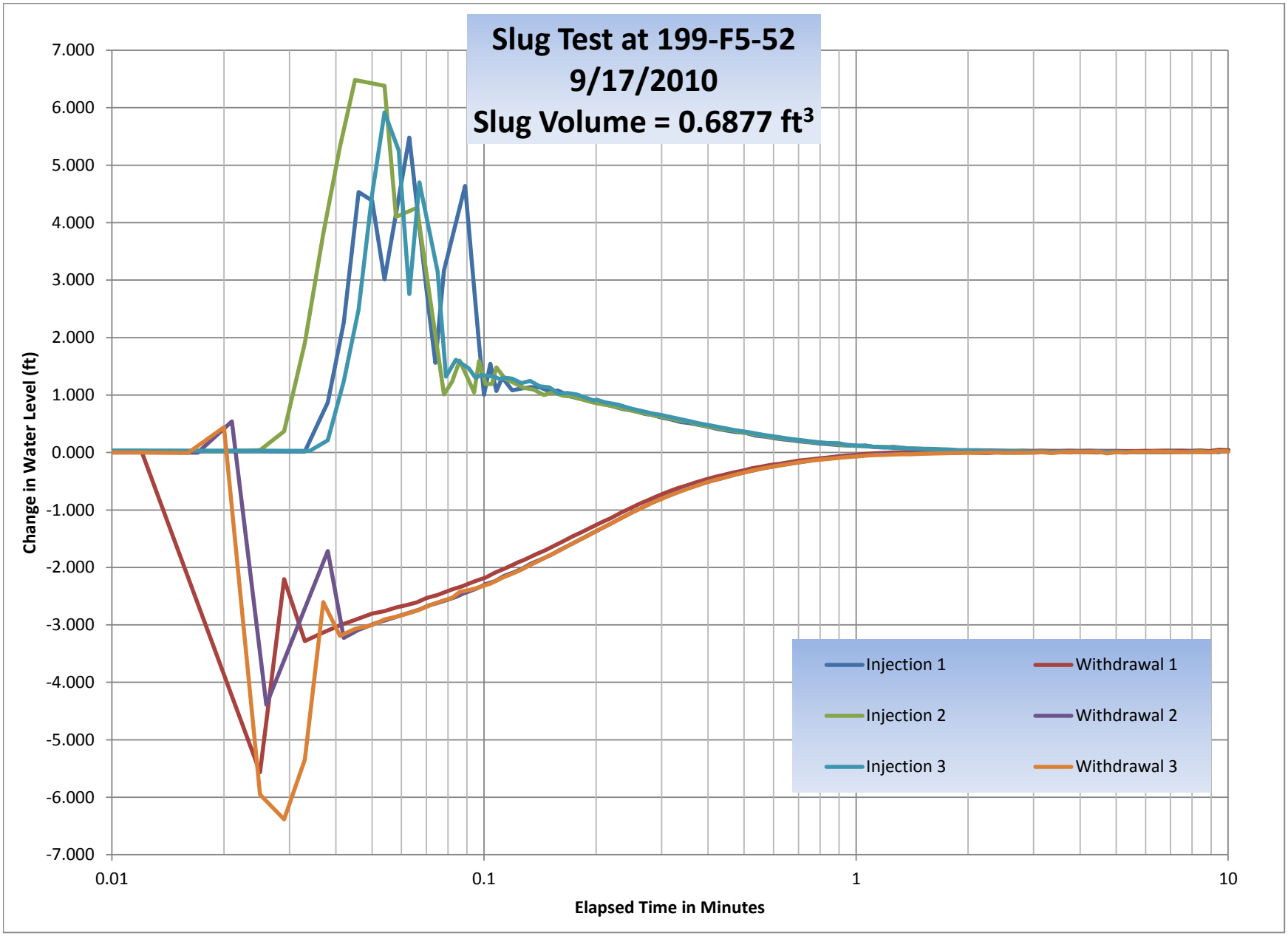
1.88	12.318	0.038	64.4
1.998	12.315	0.035	64.4
2.11	12.311	0.031	64.4
2.24	12.308	0.028	64.4
2.37	12.306	0.026	64.4
2.51	12.301	0.021	64.4
2.665	12.301	0.021	64.4
2.82	12.296	0.016	64.4
2.98	12.296	0.016	64.4
3.165	12.298	0.018	64.5
3.35	12.291	0.011	64.4
3.55	12.297	0.017	64.4
3.76	12.293	0.013	64.4
3.98	12.295	0.015	64.4
4.22	12.296	0.016	64.4
4.47	12.299	0.019	64.4
4.73	12.297	0.017	64.4
5.01	12.295	0.015	64.4
5.31	12.290	0.010	64.5
5.62	12.288	0.008	64.5
5.96	12.290	0.010	64.5
6.31	12.291	0.011	64.5
6.68	12.292	0.012	64.5
7.08	12.296	0.016	64.5
7.507	12.289	0.009	64.5
7.94	12.293	0.013	64.5
8.41	12.287	0.007	64.5
8.91	12.287	0.007	64.5
9.441	12.298313	0.018313	64.544739
10	12.291224	0.011224	64.494591

Withdrawal #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.298	-0.002	64.5
0.004	12.296	-0.004	64.5
0.008	12.302	0.002	64.6
0.012	12.299	-0.001	64.6
0.016	12.293	-0.007	64.6
0.02	12.738	0.438	64.6
0.025	6.348	-5.952	64.6
0.029	5.917	-6.383	64.6
0.033	6.956	-5.344	64.6
0.037	9.695	-2.605	64.6
0.041	9.107	-3.193	64.6
0.045	9.231	-3.069	64.6
0.05	9.298	-3.002	64.6
0.054	9.395	-2.905	64.6
0.058	9.440	-2.860	64.6
0.062	9.492	-2.808	64.6
0.066	9.546	-2.754	64.6
0.074	9.675	-2.625	64.6
0.078	9.726	-2.574	64.6
0.082	9.771	-2.529	64.6
0.086	9.872	-2.428	64.6
0.093	9.919	-2.381	64.6
0.097	9.954	-2.346	64.6
0.101	9.989	-2.311	64.7
0.104	10.018	-2.282	64.7

0.108	10.069	-2.231	64.7
0.112	10.121	-2.179	64.7
0.119	10.191	-2.109	64.6
0.126	10.261	-2.039	64.6
0.133	10.343	-1.957	64.6
0.141	10.421	-1.879	64.6
0.15	10.512	-1.788	64.6
0.158	10.576	-1.724	64.6
0.168	10.670	-1.630	64.6
0.178	10.760	-1.540	64.6
0.188	10.833	-1.467	64.6
0.199	10.927	-1.373	64.6
0.211	11.009	-1.291	64.6
0.224	11.094	-1.206	64.6
0.237	11.178	-1.122	64.6
0.251	11.262	-1.038	64.6
0.266	11.337	-0.963	64.6
0.282	11.420	-0.880	64.6
0.298	11.484	-0.816	64.6
0.316	11.555	-0.745	64.6
0.335	11.614	-0.686	64.5
0.355	11.675	-0.625	64.5
0.376	11.729	-0.571	64.5
0.398	11.782	-0.518	64.5
0.422	11.830	-0.470	64.5
0.447	11.871	-0.429	64.5
0.473	11.912	-0.388	64.5
0.501	11.952	-0.348	64.5
0.531	11.991	-0.309	64.5
0.562	12.022	-0.278	64.5
0.596	12.054	-0.246	64.5
0.631	12.076	-0.224	64.5
0.668	12.107	-0.193	64.5
0.708	12.131	-0.169	64.5
0.75	12.156	-0.144	64.5
0.799	12.176	-0.124	64.6
0.841	12.185	-0.115	64.5
0.899	12.208	-0.092	64.6
0.944	12.218	-0.082	64.5
1	12.232	-0.068	64.6
1.066	12.246	-0.054	64.6
1.12	12.253	-0.047	64.5
1.19	12.258	-0.042	64.5
1.266	12.267	-0.033	64.6
1.333	12.268	-0.032	64.6
1.41	12.270	-0.030	64.5
1.5	12.277	-0.023	64.6

1.58	12.281	-0.019	64.5
1.68	12.285	-0.015	64.5
1.78	12.289	-0.011	64.5
1.88	12.292	-0.008	64.5
1.99	12.292	-0.008	64.5
2.11	12.294	-0.006	64.5
2.24	12.296	-0.004	64.5
2.37	12.301	0.001	64.5
2.51	12.291	-0.009	64.5
2.667	12.296	-0.004	64.5
2.82	12.295	-0.005	64.5
2.98	12.296	-0.004	64.5
3.167	12.303	0.003	64.5
3.35	12.291	-0.009	64.5
3.55	12.306	0.006	64.5
3.76	12.306	0.006	64.5
3.98	12.309	0.009	64.5
4.22	12.307	0.007	64.4
4.47	12.313	0.013	64.4
4.73	12.286	-0.014	64.4
5.01	12.304	0.004	64.4
5.31	12.298	-0.002	64.4
5.62	12.311	0.011	64.4
5.96	12.308	0.008	64.4
6.31	12.315	0.015	64.3
6.68	12.314	0.014	64.3
7.08	12.307	0.007	64.4
7.508	12.307	0.007	64.4
7.941	12.305264	0.005264	64.413292
8.41	12.30839	0.00839	64.415054
8.91	12.304872	0.004872	64.421036
9.442	12.326	0.026	64.4
10	12.316	0.016	64.4


Slug Test at 199-F5-52
9/17/2010
Slug Volume = 0.6877 ft³
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
-1.000
-2.000
-3.000
-4.000
-5.000
-6.000
-7.000
Change in Water Level (ft)
0.01
0.1
1
10
Elapsed Time in Minutes
Injection 1
Withdrawal 1
Injection 2
Withdrawal 2
Injection 3
Withdrawal 3

Slug Test at 199-F5-52

Slug Volume 1.0112 ft^3

Raw File:	C7790 - Test 8 - 1.07 cu ft SLUG 2010-09-17 15.21.59.wsl			
Device	Danno			
Site	FR-3		**Max Change Test 4**	
Device SN	168983		Injection 4	Withdrawal 4
Test Date:	09/17/10		7.58	4.13
Test start:	14:06	injection 1		
Test restart:	14:16	withdrawal 1	**Max Change Test 5**	
Test restart:	14:26	injection 2	Injection 5	Withdrawal 5
Test restart:	14:36	withdrawal 2	7.71	6.48
Test restart:	14:46	injection 3		
Test restart:	14:56	withdrawal 3	**Max Change Test 6**	
Test Stop	15:06	end	Injection 6	Withdrawal 6
Slug Volume:	1.0112 cu ft		7.66	4.56

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.328	0.038	64.24
0.004	12.320	0.030	64.27
0.008	12.325	0.035	64.30
0.013	12.323	0.033	64.32
0.017	12.322	0.032	64.33
0.021	12.323	0.033	64.34
0.025	12.329	0.039	64.35
0.029	12.347	0.057	64.36
0.033	16.523	4.233	64.37
0.038	19.869	7.579	64.37
0.045	18.720	6.430	64.35
0.049	18.260	5.970	64.37
0.053	17.730	5.440	64.38
0.061	17.127	4.837	64.35
0.065	16.858	4.568	64.38
0.068	16.593	4.303	64.38
0.073	16.579	4.289	64.39
0.077	16.204	3.914	64.39
0.08	13.878	1.588	64.41
0.084	16.119	3.829	64.41
0.088	13.816	1.526	64.42
0.095	14.146	1.856	64.42
0.099	14.785	2.495	64.43
0.102	13.948	1.658	64.43

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.106	13.796	1.506	64.43
0.112	13.959	1.669	64.41
0.119	13.779	1.489	64.39
0.126	13.719	1.429	64.38
0.133	13.742	1.452	64.38
0.141	13.744	1.454	64.37
0.15	13.580	1.290	64.36
0.158	13.586	1.296	64.36
0.168	13.505	1.215	64.35
0.181	13.553	1.263	64.37
0.188	13.504	1.214	64.36
0.199	13.393	1.103	64.35
0.213	13.393	1.103	64.38
0.224	13.337	1.047	64.36
0.237	13.292	1.002	64.34
0.251	13.241	0.951	64.37
0.266	13.195	0.905	64.34
0.282	13.144	0.854	64.37
0.298	13.102	0.812	64.35
0.316	13.060	0.770	64.37
0.335	13.022	0.732	64.34
0.355	12.970	0.680	64.36
0.38	12.920	0.630	64.38
0.398	12.886	0.596	64.35
0.422	12.861	0.571	64.48
0.447	12.841	0.551	64.41
0.473	12.770	0.480	64.38
0.501	12.736	0.446	64.35
0.531	12.705	0.415	64.34
0.562	12.676	0.386	64.34
0.596	12.647	0.357	64.34
0.631	12.619	0.329	64.34
0.668	12.591	0.301	64.33
0.708	12.562	0.272	64.33
0.75	12.548	0.258	64.33
0.794	12.518	0.228	64.33
0.841	12.502	0.212	64.33
0.891	12.481	0.191	64.33
0.944	12.465	0.175	64.33
1	12.451	0.161	64.32
1.06	12.433	0.143	64.32
1.12	12.422	0.132	64.32

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.19	12.407	0.117	64.32
1.26	12.393	0.103	64.32
1.33	12.389	0.099	64.32
1.41	12.377	0.087	64.32
1.5	12.367	0.077	64.33
1.58	12.360	0.070	64.32
1.68	12.352	0.062	64.32
1.78	12.347	0.057	64.32
1.88	12.339	0.049	64.32
1.99	12.335	0.045	64.32
2.11	12.322	0.032	64.32
2.24	12.321	0.031	64.33
2.37	12.318	0.028	64.32
2.51	12.318	0.028	64.33
2.66	12.312	0.022	64.33
2.82	12.312	0.022	64.33
2.98	12.312	0.022	64.34
3.16	12.316	0.026	64.33
3.35	12.318	0.028	64.34
3.55	12.314	0.024	64.34
3.76	12.320	0.030	64.35
3.98	12.317	0.027	64.35
4.22	12.317	0.027	64.35
4.47	12.316	0.026	64.35
4.73	12.308	0.018	64.35
5.01	12.303	0.013	64.35
5.31	12.300	0.010	64.35
5.62	12.299	0.009	64.36
5.96	12.296	0.006	64.36
6.31	12.298	0.008	64.36
6.68	12.299	0.009	64.37
7.08	12.303	0.013	64.37
7.5	12.298	0.008	64.37
7.94	12.306	0.016	64.37
8.41	12.302	0.012	64.38
8.91	12.304	0.014	64.38
9.44	12.303	0.013	64.42

Log Notes:

Date and Time	Note
9/17/2010 14:06	Manual Start Command
9/17/2010 14:16	Restart Command
9/17/2010 14:26	Restart Command
9/17/2010 14:36	Restart Command
9/17/2010 14:46	Restart Command
9/17/2010 14:56	Restart Command
9/17/2010 15:06	Manual Stop Command

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	8.181	-4.129	64.42
0.005	8.209	-4.101	64.45
0.009	8.294	-4.016	64.47
0.013	8.382	-3.928	64.50
0.017	8.455	-3.855	64.51
0.021	8.519	-3.791	64.53
0.025	8.595	-3.715	64.53
0.03	8.674	-3.636	64.54
0.034	8.731	-3.579	64.55
0.038	8.796	-3.514	64.55
0.042	8.865	-3.445	64.56
0.046	8.933	-3.377	64.56
0.05	8.989	-3.321	64.56
0.055	9.060	-3.250	64.56
0.059	9.122	-3.188	64.57
0.063	9.177	-3.133	64.57
0.067	9.241	-3.069	64.58
0.075	9.353	-2.957	64.63
0.079	9.403	-2.907	64.63
0.082	9.444	-2.866	64.62
0.091	9.562	-2.748	64.57
0.094	9.600	-2.710	64.59
0.098	9.653	-2.657	64.60
0.103	9.707	-2.603	64.62

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.106	9.749	-2.561	64.62
0.11	9.791	-2.519	64.62
0.114	9.836	-2.474	64.63
0.119	9.899	-2.411	64.59
0.126	9.980	-2.330	64.57
0.133	10.057	-2.253	64.56
0.141	10.139	-2.171	64.56
0.15	10.235	-2.075	64.54
0.158	10.318	-1.992	64.54
0.168	10.408	-1.902	64.53
0.178	10.506	-1.804	64.52
0.188	10.592	-1.718	64.52
0.199	10.681	-1.629	64.52
0.211	10.776	-1.534	64.51
0.224	10.872	-1.438	64.50
0.237	10.965	-1.345	64.50
0.251	11.052	-1.258	64.50
0.266	11.142	-1.168	64.50
0.282	11.237	-1.073	64.49
0.298	11.321	-0.989	64.50
0.316	11.507	-0.803	64.49
0.335	11.705	-0.605	64.49
0.355	11.815	-0.495	64.48
0.376	11.898	-0.412	64.48
0.398	11.966	-0.344	64.47
0.422	12.030	-0.280	64.48
0.447	12.088	-0.222	64.48
0.473	12.120	-0.190	64.47
0.501	12.157	-0.153	64.47
0.531	12.189	-0.121	64.47
0.562	12.661	0.351	64.46
0.596	11.567	-0.743	64.46
0.631	11.730	-0.580	64.45
0.668	11.853	-0.457	64.44
0.708	11.950	-0.360	64.44
0.75	12.019	-0.291	64.45
0.794	12.073	-0.237	64.43
0.841	12.116	-0.194	64.42
0.891	12.146	-0.164	64.42
0.944	12.178	-0.132	64.41
1	12.202	-0.108	64.40
1.06	12.224	-0.086	64.39

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.12	12.238	-0.072	64.39
1.19	12.252	-0.058	64.38
1.264	12.264	-0.046	64.43
1.331	12.278	-0.032	64.42
1.41	12.287	-0.023	64.39
1.5	12.288	-0.022	64.40
1.58	12.290	-0.020	64.38
1.68	12.299	-0.011	64.38
1.78	12.301	-0.009	64.37
1.88	12.301	-0.009	64.37
1.998	12.315	0.005	64.39
2.11	12.310	0.000	64.36
2.24	12.308	-0.002	64.36
2.37	12.310	0.000	64.36
2.51	12.310	0.000	64.34
2.665	12.308	-0.002	64.35
2.82	12.310	0.000	64.32
2.98	12.311	0.001	64.32
3.165	12.307	-0.003	64.34
3.35	12.306	-0.004	64.30
3.55	12.307	-0.003	64.29
3.765	12.312	0.002	64.32
3.98	12.313	0.003	64.28
4.22	12.312	0.002	64.27
4.47	12.310	0.000	64.28
4.732	12.309	-0.001	64.29
5.01	12.314	0.004	64.25
5.31	12.315	0.005	64.25
5.62	12.316	0.006	64.23
5.966	12.324	0.014	64.26
6.31	12.311	0.001	64.23
6.68	12.317	0.007	64.22
7.08	12.313	0.003	64.18
7.5	12.314	0.004	64.15
7.94	12.321	0.011	64.17
8.41	12.325	0.015	64.13
8.91	12.323	0.013	64.11
9.44	12.322	0.012	64.10
10	12.324	0.014	64.15
10.214	12.333	0.023	64.12

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.3265	0.016	64.15
0.004	12.3346	0.025	64.17
0.009	12.3322	0.022	64.19
0.013	12.3259	0.016	64.21
0.017	12.3279	0.018	64.22
0.021	12.3327	0.023	64.23
0.025	12.3403	0.030	64.23
0.029	15.6547	3.345	64.24
0.034	20.0180	7.708	64.25
0.038	19.4110	7.101	64.25
0.042	18.8319	6.522	64.25
0.046	18.0638	5.754	64.26
0.05	17.5322	5.222	64.27
0.054	17.1528	4.843	64.27
0.059	16.9715	4.661	64.27
0.063	16.7258	4.416	64.27
0.067	16.7356	4.426	64.27
0.071	16.6984	4.388	64.27
0.075	16.5514	4.241	64.27
0.079	14.9499	2.640	64.28
0.088	14.4224	2.112	64.28
0.092	14.4504	2.140	64.29
0.096	14.4443	2.134	64.28
0.102	13.8207	1.511	64.27

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.108	13.7685	1.458	64.26
0.117	13.7391	1.429	64.24
0.122	13.8588	1.549	64.25
0.132	13.6479	1.338	64.23
0.137	13.8018	1.492	64.24
0.146	13.8141	1.504	64.23
0.154	13.7257	1.416	64.23
0.164	13.5852	1.275	64.21
0.174	13.5494	1.239	64.22
0.184	13.5236	1.214	64.21
0.195	13.4562	1.146	64.21
0.207	13.4291	1.119	64.20
0.22	13.3324	1.022	64.20
0.233	13.2991	0.989	64.23
0.247	13.1728	0.863	64.20
0.266	13.2801	0.970	64.23
0.278	13.1544	0.844	64.21
0.3	13.0350	0.725	64.23
0.312	13.0736	0.764	64.21
0.333	13.0185	0.709	64.24
0.351	13.0274	0.717	64.21
0.372	12.9467	0.637	64.22
0.4	12.8861	0.576	64.24
0.418	12.8655	0.555	64.20
0.443	12.8069	0.497	64.22
0.469	12.7732	0.463	64.23
0.5	12.7502	0.440	64.24
0.533	12.7148	0.405	64.24
0.566	12.6791	0.369	64.25
0.6	12.6448	0.335	64.24
0.633	12.6172	0.307	64.25
0.666	12.5940	0.284	64.25
0.704	12.5728	0.263	64.24
0.746	12.5496	0.240	64.22
0.79	12.5323	0.222	64.22
0.837	12.5162	0.206	64.25
0.887	12.4951	0.185	64.23
0.94	12.4812	0.171	64.26
1	12.4643	0.154	64.28
1.056	12.4509	0.141	64.25
1.116	12.4393	0.129	64.25
1.186	12.4289	0.119	64.26

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.256	12.4198	0.110	64.26
1.333	12.4176	0.108	64.31
1.406	12.3950	0.085	64.30
1.5	12.3875	0.077	64.32
1.576	12.3795	0.069	64.31
1.676	12.3724	0.062	64.31
1.776	12.3660	0.056	64.33
1.876	12.3607	0.051	64.34
1.986	12.3583	0.048	64.33
2.106	12.3548	0.045	64.36
2.236	12.3526	0.043	64.38
2.367	12.3490	0.039	64.40
2.506	12.3508	0.041	64.40
2.656	12.3443	0.034	64.39
2.816	12.3479	0.038	64.41
2.976	12.3396	0.030	64.43
3.156	12.3309	0.021	64.43
3.346	12.3341	0.024	64.43
3.546	12.3337	0.024	64.43
3.756	12.3274	0.017	64.47
3.976	12.3254	0.015	64.50
4.216	12.3201	0.010	64.52
4.466	12.3215	0.011	64.57
4.726	12.3268	0.017	64.53
5.006	12.3239	0.014	64.53
5.306	12.3278	0.018	64.54
5.616	12.3218	0.012	64.54
5.956	12.3197	0.010	64.55
6.306	12.3158	0.006	64.55
6.676	12.3189	0.009	64.55
7.076	12.3241	0.014	64.56
7.496	12.3247	0.015	64.57
7.936	12.3189	0.009	64.58
8.406	12.3161	0.006	64.60
8.906	12.3198	0.010	64.62
9.436	12.3180	0.008	64.68
9.796	12.3335	0.024	64.67

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.323	0.003	64.71
0.004	12.329	0.009	64.74
0.008	12.327	0.007	64.76
0.012	12.326	0.006	64.77
0.017	12.310	-0.010	64.78
0.025	5.842	-6.478	64.80
0.033	7.500	-4.820	64.81
0.037	7.792	-4.528	64.81
0.042	7.944	-4.376	64.81
0.046	8.030	-4.290	64.82
0.05	8.099	-4.221	64.83
0.054	8.168	-4.152	64.82
0.058	8.252	-4.068	64.83
0.062	8.347	-3.973	64.83
0.067	8.419	-3.901	64.84
0.071	8.539	-3.781	64.84
0.075	8.606	-3.714	64.85
0.079	8.676	-3.644	64.84
0.083	8.765	-3.555	64.85
0.087	8.778	-3.542	64.85
0.092	8.834	-3.486	64.85
0.096	8.920	-3.400	64.85
0.102	8.993	-3.327	64.83
0.108	9.097	-3.223	64.83

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.115	9.198	-3.122	64.82
0.122	9.301	-3.019	64.81
0.129	9.400	-2.920	64.81
0.137	9.508	-2.812	64.80
0.147	9.641	-2.679	64.79
0.154	9.717	-2.603	64.79
0.164	9.845	-2.475	64.79
0.174	9.967	-2.353	64.78
0.184	10.070	-2.250	64.78
0.195	10.185	-2.135	64.78
0.207	10.307	-2.013	64.77
0.22	10.432	-1.888	64.77
0.233	10.551	-1.769	64.76
0.247	10.669	-1.651	64.76
0.264	10.814	-1.506	64.79
0.278	10.904	-1.416	64.77
0.298	11.044	-1.276	64.79
0.312	11.129	-1.191	64.77
0.331	11.241	-1.079	64.79
0.351	11.337	-0.983	64.75
0.372	11.427	-0.893	64.77
0.398	11.531	-0.789	64.78
0.418	11.589	-0.731	64.75
0.443	11.662	-0.658	64.76
0.469	11.725	-0.595	64.76
0.498	11.788	-0.532	64.77
0.531	11.851	-0.469	64.77
0.565	11.907	-0.413	64.77
0.598	11.957	-0.363	64.76
0.631	11.999	-0.321	64.76
0.665	12.033	-0.287	64.75
0.704	12.069	-0.251	64.73
0.746	12.110	-0.210	64.71
0.798	12.147	-0.173	64.73
0.837	12.162	-0.158	64.71
0.887	12.188	-0.132	64.68
0.94	12.214	-0.106	64.69
0.998	12.230	-0.090	64.70
1.065	12.249	-0.071	64.69
1.116	12.259	-0.061	64.65
1.186	12.275	-0.045	64.63
1.256	12.281	-0.039	64.61

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.332	12.288	-0.032	64.64
1.406	12.294	-0.026	64.62
1.498	12.305	-0.015	64.62
1.576	12.308	-0.012	64.59
1.676	12.313	-0.007	64.58
1.776	12.311	-0.009	64.56
1.876	12.320	0.000	64.55
1.986	12.316	-0.004	64.52
2.106	12.321	0.001	64.52
2.236	12.319	-0.001	64.51
2.366	12.324	0.004	64.52
2.506	12.321	0.001	64.48
2.656	12.324	0.004	64.45
2.816	12.324	0.004	64.44
2.976	12.323	0.003	64.44
3.156	12.324	0.004	64.41
3.346	12.327	0.007	64.37
3.546	12.325	0.005	64.35
3.756	12.327	0.007	64.33
3.976	12.323	0.003	64.33
4.216	12.324	0.004	64.33
4.466	12.327	0.007	64.33
4.73	12.330	0.010	64.33
5.006	12.327	0.007	64.26
5.306	12.330	0.010	64.24
5.616	12.331	0.011	64.22
5.956	12.326	0.006	64.19
6.306	12.335	0.015	64.17
6.676	12.330	0.010	64.15
7.076	12.331	0.011	64.14
7.496	12.331	0.011	64.12
7.936	12.332	0.012	64.11
8.406	12.335	0.015	64.15
8.906	12.330	0.010	64.16
9.436	12.335	0.015	64.15
9.996	12.339	0.019	64.12
10.234	12.338	0.018	64.11

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	12.342	0.022	64.14
0.005	12.339	0.019	64.16
0.009	12.344	0.024	64.19
0.013	12.344	0.024	64.19
0.017	12.346	0.026	64.21
0.021	12.431	0.111	64.22
0.025	17.879	5.559	64.22
0.03	19.982	7.662	64.23
0.034	19.184	6.864	64.24
0.038	18.386	6.066	64.24
0.042	17.675	5.355	64.25
0.046	17.299	4.979	64.25
0.05	17.159	4.839	64.25
0.055	17.037	4.717	64.26
0.059	16.749	4.429	64.26
0.063	16.553	4.233	64.26
0.067	16.480	4.160	64.26
0.071	16.655	4.335	64.27
0.075	16.395	4.075	64.27
0.087	14.329	2.009	64.33
0.091	14.284	1.964	64.32
0.094	13.263	0.943	64.40
0.103	14.001	1.681	64.36
0.106	13.593	1.273	64.35

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.11	14.383	2.063	64.37
0.115	13.501	1.181	64.34
0.122	13.474	1.154	64.30
0.129	13.714	1.394	64.27
0.137	13.625	1.305	64.25
0.146	13.365	1.045	64.24
0.154	13.403	1.083	64.23
0.167	13.534	1.214	64.25
0.174	13.576	1.256	64.24
0.184	13.479	1.159	64.23
0.197	13.385	1.065	64.25
0.207	13.373	1.053	64.23
0.22	13.257	0.937	64.21
0.233	13.236	0.916	64.24
0.247	13.200	0.880	64.21
0.264	13.152	0.832	64.24
0.278	13.117	0.797	64.22
0.297	13.065	0.745	64.24
0.312	13.033	0.713	64.21
0.331	12.988	0.668	64.24
0.351	12.951	0.631	64.21
0.372	12.915	0.595	64.22
0.397	12.871	0.551	64.24
0.418	12.836	0.516	64.21
0.443	12.803	0.483	64.22
0.469	12.765	0.445	64.24
0.498	12.737	0.417	64.26
0.531	12.704	0.384	64.26
0.564	12.685	0.365	64.26
0.598	12.645	0.325	64.27
0.631	12.617	0.297	64.27
0.664	12.597	0.277	64.27
0.704	12.573	0.253	64.26
0.746	12.555	0.235	64.25
0.798	12.531	0.211	64.29
0.837	12.514	0.194	64.28
0.887	12.500	0.180	64.27
0.94	12.483	0.163	64.29
0.998	12.469	0.149	64.32
1.064	12.457	0.137	64.33
1.116	12.441	0.121	64.30
1.186	12.434	0.114	64.31

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.264	12.423	0.103	64.35
1.331	12.413	0.093	64.36
1.406	12.404	0.084	64.35
1.498	12.398	0.078	64.38
1.576	12.391	0.071	64.37
1.676	12.382	0.062	64.38
1.776	12.373	0.053	64.39
1.876	12.365	0.045	64.40
1.986	12.362	0.042	64.41
2.106	12.359	0.039	64.43
2.236	12.349	0.029	64.45
2.366	12.343	0.023	64.47
2.506	12.342	0.022	64.47
2.665	12.339	0.019	64.50
2.816	12.336	0.016	64.48
2.976	12.333	0.013	64.49
3.156	12.331	0.011	64.50
3.346	12.331	0.011	64.49
3.546	12.327	0.007	64.49
3.764	12.324	0.004	64.54
3.976	12.332	0.012	64.54
4.216	12.331	0.011	64.54
4.466	12.330	0.010	64.58
4.726	12.334	0.014	64.55
5.006	12.329	0.009	64.54
5.306	12.329	0.009	64.54
5.616	12.330	0.010	64.54
5.956	12.328	0.008	64.54
6.306	12.323	0.003	64.54
6.676	12.322	0.002	64.54
7.076	12.323	0.003	64.54
7.496	12.317	-0.003	64.55
7.936	12.317	-0.003	64.56
8.406	12.318	-0.002	64.56
8.906	12.328	0.008	64.62
9.444	12.356	0.036	64.66

Withdrawal #3

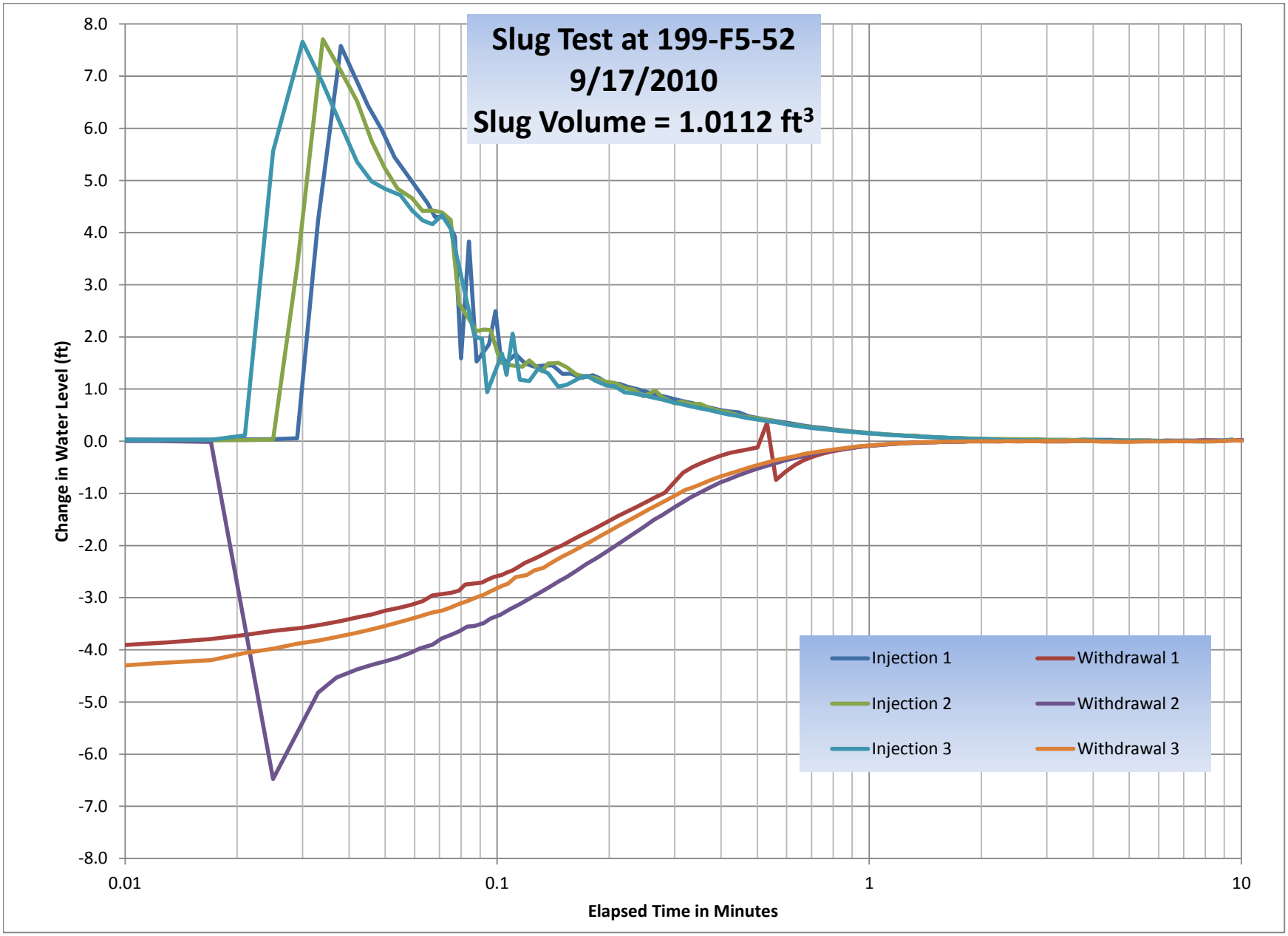
Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	7.766	-4.564	64.63
0.004	7.844	-4.486	64.66
0.008	7.984	-4.346	64.69
0.012	8.070	-4.260	64.71
0.017	8.132	-4.198	64.72
0.021	8.272	-4.058	64.73
0.025	8.352	-3.978	64.74
0.029	8.445	-3.885	64.75
0.033	8.507	-3.823	64.75
0.037	8.579	-3.751	64.75
0.042	8.658	-3.672	64.77
0.046	8.725	-3.605	64.77
0.05	8.789	-3.541	64.77
0.054	8.852	-3.478	64.77
0.058	8.914	-3.416	64.77
0.062	8.975	-3.355	64.78
0.067	9.049	-3.281	64.78
0.071	9.082	-3.248	64.78
0.075	9.143	-3.187	64.79
0.079	9.212	-3.118	64.79
0.083	9.261	-3.069	64.79
0.087	9.324	-3.006	64.79
0.092	9.390	-2.940	64.79
0.096	9.451	-2.879	64.80

Withdrawal #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.103	9.558	-2.772	64.85
0.107	9.601	-2.729	64.84
0.112	9.724	-2.606	64.78
0.12	9.762	-2.568	64.79
0.126	9.854	-2.476	64.79
0.133	9.901	-2.429	64.78
0.141	10.014	-2.316	64.76
0.15	10.122	-2.208	64.75
0.158	10.204	-2.126	64.74
0.168	10.309	-2.021	64.73
0.178	10.402	-1.928	64.72
0.19	10.519	-1.811	64.76
0.199	10.594	-1.736	64.74
0.211	10.700	-1.630	64.73
0.224	10.799	-1.531	64.75
0.237	10.895	-1.435	64.72
0.255	11.020	-1.310	64.74
0.266	11.086	-1.244	64.73
0.288	11.219	-1.111	64.74
0.298	11.273	-1.057	64.73
0.321	11.399	-0.931	64.74
0.335	11.440	-0.890	64.72
0.355	11.514	-0.816	64.74
0.376	11.588	-0.742	64.70
0.398	11.652	-0.678	64.71
0.422	11.710	-0.620	64.73
0.455	11.783	-0.547	64.72
0.473	11.820	-0.510	64.69
0.501	11.872	-0.458	64.70
0.531	11.921	-0.409	64.70
0.562	11.966	-0.364	64.69
0.596	12.008	-0.322	64.69
0.631	12.043	-0.287	64.68
0.668	12.083	-0.247	64.67
0.708	12.114	-0.216	64.66
0.755	12.145	-0.185	64.68
0.794	12.168	-0.162	64.66
0.841	12.190	-0.140	64.64
0.891	12.214	-0.116	64.66
0.944	12.238	-0.092	64.62
1	12.247	-0.083	64.62
1.06	12.262	-0.068	64.62

Withdrawal #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.122	12.277	-0.053	64.63
1.19	12.286	-0.044	64.61
1.26	12.298	-0.032	64.60
1.33	12.304	-0.026	64.58
1.41	12.312	-0.018	64.55
1.5	12.315	-0.015	64.56
1.589	12.321	-0.009	64.56
1.689	12.322	-0.008	64.56
1.789	12.328	-0.002	64.54
1.889	12.326	-0.004	64.54
1.99	12.330	0.000	64.51
2.11	12.329	-0.001	64.47
2.24	12.326	-0.004	64.46
2.37	12.332	0.002	64.45
2.51	12.330	0.000	64.43
2.66	12.330	0.000	64.44
2.822	12.329	-0.001	64.43
2.98	12.335	0.005	64.40
3.16	12.331	0.001	64.40
3.35	12.337	0.007	64.34
3.55	12.333	0.003	64.32
3.76	12.333	0.003	64.29
3.98	12.331	0.001	64.29
4.226	12.324	-0.006	64.32
4.47	12.320	-0.010	64.29
4.73	12.320	-0.010	64.29
5.01	12.319	-0.011	64.27
5.31	12.321	-0.009	64.26
5.627	12.326	-0.004	64.28
5.96	12.325	-0.005	64.28
6.31	12.328	-0.002	64.24
6.68	12.330	0.000	64.23
7.08	12.327	-0.003	64.22
7.5	12.332	0.002	64.23
7.94	12.326	-0.004	64.18
8.41	12.333	0.003	64.14
8.91	12.332	0.002	64.13
9.44	12.347	0.017	64.11
10	12.341	0.011	64.10


Slug Test at 199-F5-52
9/17/2010
Slug Volume = 1.0112 ft³
Change in Water Level (ft)
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
0.01
0.1
1
10
Elapsed Time in Minutes
Injection 1
Injection 2
Injection 3
Withdrawal 1
Withdrawal 2
Withdrawal 3

Slug Test Field Activity Report

Summary of FAR - F5-52

Time	Notes
12:30	Well development complete, pump removed from well. Prepare for slug test.
12:45	RCTs on site - No contamination detected by survey.
13:02	Inject 0.78 ft^3 Slug.
13:12	Withdraw 0.78 ft^3 Slug.
13:22	Inject 0.78 ft^3 Slug.
13:32	Withdraw 0.78 ft^3 Slug.
13:42	Inject 0.78 ft^3 Slug.
13:44	IH on site, no survey performed.
13:52	Withdraw 0.78 ft^3 Slug.
14:02	Switch to larger slug for second set of tests.
14:06	Inject 1.07 ft^3 Slug.
14:16	Withdraw 1.07 ft^3 Slug.
14:26	Inject 1.07 ft^3 Slug.
14:36	Withdraw 1.07 ft^3 Slug.
14:46	Inject 1.07 ft^3 Slug.
14:56	Withdraw 1.07 ft^3 Slug.
15:06	Remove slug from well, testing completed.
15:10	Final well measurements, DTW = 50.08' toc; DTB = 66.02' toc.

Note* the slug volumes were recalculated by Robert Edrington, therefore the field notes and raw data file names may vary slightly when referring to slug volumes.

Slug Testing at 199-F5-53 (C7791)

Summary of test data

	Pre-Test	
D-T-W (ft TOC)	41.3	
D-T-B (ft TOC)	113.06	
Stick up (ft)	3.06	
Top of Screen (TOC)	98.12	
Screen length	10	
Casing dia. (in)	6	
Borehole Dia. (in)	10.75"	0'- 55.7'
Borehole Dia. (in)	13.625"	55.7' - 110'
Borehole Dia. (in)	9"	110'- 116'

Slug Test	Injection #1	Withdrawal #1
Slug Volume (ft^3)	0.6877	0.6877
Predicted WL Change	3.502	3.502
Max WL Change (ft)	5.39	3.77

Slug Test	Injection #1	Withdrawal #1
Slug Volume (ft^3)	1.0112	1.0112
Predicted WL Change	5.15	5.15
Max WL Change (ft)	6.00	4.91

Slug Testing was performed on 12/20/2010

The slug volumes in the FARs and raw data file names vary slightly because the slug volumes have been recalculated by Robert Edrington. The volumes listed above reflect the new established volumes.

Slug Test at 199-F5-53

Slug Volume 0.6877 ft^3

Raw File:	C7791 0.7 cu ft Slug Test 12-20 2010-12-20 12.52.44.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	12/20/2010		5.39	3.77
Test start:	8:40	injection 1		
Test restart:	9:28	withdrawal 1		
Test Stop	10:21	end		
Slug Volume:	0.6877 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 8:40	0.001	23.581	0.051	20.331
12/20/2010 8:40	0.004	23.568	0.038	20.349
12/20/2010 8:40	0.008	23.567	0.037	20.365
12/20/2010 8:40	0.013	23.580	0.050	20.374
12/20/2010 8:40	0.021	23.590	0.060	20.369
12/20/2010 8:40	0.024	23.578	0.048	20.380
12/20/2010 8:40	0.028	23.592	0.062	20.388
12/20/2010 8:40	0.032	23.567	0.037	20.390
12/20/2010 8:40	0.036	24.929	1.399	20.397
12/20/2010 8:40	0.040	26.923	3.393	20.401
12/20/2010 8:40	0.047	28.425	4.895	20.410
12/20/2010 8:40	0.067	28.919	5.389	20.417
12/20/2010 8:40	0.071	25.689	2.159	20.421
12/20/2010 8:40	0.083	28.885	5.355	20.423
12/20/2010 8:40	0.088	24.377	0.847	20.419
12/20/2010 8:40	0.092	28.084	4.554	20.419
12/20/2010 8:40	0.096	25.412	1.882	20.422
12/20/2010 8:40	0.100	27.302	3.772	20.420
12/20/2010 8:40	0.106	27.005	3.475	20.415
12/20/2010 8:40	0.112	26.798	3.268	20.412
12/20/2010 8:40	0.119	26.681	3.151	20.405
12/20/2010 8:40	0.126	26.979	3.449	20.402
12/20/2010 8:40	0.133	26.756	3.226	20.403
12/20/2010 8:40	0.141	26.714	3.184	20.398
12/20/2010 8:40	0.150	26.639	3.109	20.392
12/20/2010 8:40	0.158	26.685	3.155	20.392
12/20/2010 8:40	0.168	26.728	3.198	20.389
12/20/2010 8:40	0.181	26.695	3.165	20.400
12/20/2010 8:40	0.188	26.698	3.168	20.399

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 8:40	0.199	26.694	3.164	20.390
12/20/2010 8:40	0.212	26.661	3.131	20.402
12/20/2010 8:40	0.224	26.685	3.155	20.389
12/20/2010 8:40	0.244	26.657	3.127	20.393
12/20/2010 8:40	0.251	26.647	3.117	20.400
12/20/2010 8:40	0.266	26.677	3.147	20.385
12/20/2010 8:40	0.282	26.639	3.109	20.382
12/20/2010 8:40	0.298	26.654	3.124	20.392
12/20/2010 8:40	0.316	26.650	3.120	20.393
12/20/2010 8:40	0.344	26.627	3.097	20.394
12/20/2010 8:40	0.355	26.640	3.110	20.393
12/20/2010 8:40	0.377	26.634	3.104	20.398
12/20/2010 8:40	0.398	26.627	3.097	20.381
12/20/2010 8:40	0.422	26.603	3.073	20.384
12/20/2010 8:40	0.447	26.591	3.061	20.390
12/20/2010 8:40	0.477	26.655	3.125	20.395
12/20/2010 8:40	0.501	26.581	3.051	20.381
12/20/2010 8:40	0.531	26.582	3.052	20.391
12/20/2010 8:40	0.562	26.592	3.062	20.381
12/20/2010 8:40	0.596	26.578	3.048	20.383
12/20/2010 8:40	0.631	26.565	3.035	20.381
12/20/2010 8:40	0.668	26.618	3.088	20.381
12/20/2010 8:40	0.712	26.546	3.016	20.397
12/20/2010 8:40	0.750	26.533	3.003	20.391
12/20/2010 8:40	0.794	26.532	3.002	20.383
12/20/2010 8:41	0.846	26.572	3.042	20.399
12/20/2010 8:41	0.891	26.510	2.980	20.385
12/20/2010 8:41	0.946	26.492	2.962	20.397
12/20/2010 8:41	1.000	26.488	2.958	20.382
12/20/2010 8:41	1.060	26.478	2.948	20.386
12/20/2010 8:41	1.120	26.448	2.918	20.388
12/20/2010 8:41	1.190	26.437	2.907	20.385
12/20/2010 8:41	1.260	26.437	2.907	20.386
12/20/2010 8:41	1.330	26.409	2.879	20.386
12/20/2010 8:41	1.414	26.394	2.864	20.401
12/20/2010 8:41	1.500	26.394	2.864	20.384
12/20/2010 8:41	1.580	26.349	2.819	20.406
12/20/2010 8:41	1.680	26.338	2.808	20.400
12/20/2010 8:41	1.780	26.313	2.783	20.410
12/20/2010 8:42	1.880	26.288	2.758	20.403
12/20/2010 8:42	1.990	26.292	2.762	20.392
12/20/2010 8:42	2.114	26.268	2.738	20.406
12/20/2010 8:42	2.247	26.239	2.709	20.406

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 8:42	2.370	26.209	2.679	20.389
12/20/2010 8:42	2.514	26.234	2.704	20.406
12/20/2010 8:42	2.660	26.165	2.635	20.394
12/20/2010 8:42	2.820	26.136	2.606	20.398
12/20/2010 8:43	2.981	26.121	2.591	20.408
12/20/2010 8:43	3.160	26.075	2.545	20.399
12/20/2010 8:43	3.350	26.068	2.538	20.406
12/20/2010 8:43	3.550	26.027	2.497	20.411
12/20/2010 8:43	3.760	25.977	2.447	20.399
12/20/2010 8:44	3.982	25.963	2.433	20.415
12/20/2010 8:44	4.220	25.920	2.390	20.408
12/20/2010 8:44	4.470	25.895	2.365	20.402
12/20/2010 8:44	4.730	25.842	2.312	20.405
12/20/2010 8:45	5.016	25.806	2.276	20.418
12/20/2010 8:45	5.316	25.809	2.279	20.419
12/20/2010 8:45	5.620	25.706	2.176	20.413
12/20/2010 8:46	5.960	25.673	2.143	20.409
12/20/2010 8:46	6.316	25.664	2.134	20.420
12/20/2010 8:46	6.683	25.587	2.057	20.423
12/20/2010 8:47	7.083	25.526	1.996	20.419
12/20/2010 8:47	7.500	25.477	1.947	20.406
12/20/2010 8:48	7.940	25.426	1.896	20.403
12/20/2010 8:48	8.410	25.383	1.853	20.401
12/20/2010 8:49	8.910	25.310	1.780	20.408
12/20/2010 8:49	9.440	25.263	1.733	20.411
12/20/2010 8:50	10.001	25.201	1.671	20.421
12/20/2010 8:50	10.601	25.137	1.607	20.422
12/20/2010 8:51	11.200	25.111	1.581	20.401
12/20/2010 8:52	11.900	25.035	1.505	20.376
12/20/2010 8:52	12.604	24.974	1.444	20.391
12/20/2010 8:53	13.305	24.928	1.398	20.401
12/20/2010 8:54	14.105	24.837	1.307	20.406
12/20/2010 8:55	15.005	24.782	1.252	20.405
12/20/2010 8:55	15.800	24.719	1.189	20.372
12/20/2010 8:56	16.800	24.664	1.134	20.378
12/20/2010 8:57	17.800	24.595	1.065	20.351
12/20/2010 8:58	18.800	24.546	1.016	20.344
12/20/2010 9:00	19.908	24.477	0.947	20.354
12/20/2010 9:01	21.103	24.394	0.864	20.385
12/20/2010 9:02	22.400	24.362	0.832	20.365
12/20/2010 9:03	23.700	24.293	0.763	20.383
12/20/2010 9:05	25.100	24.233	0.703	20.384
12/20/2010 9:06	26.600	24.175	0.645	20.358

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 9:08	28.200	24.119	0.589	20.344
12/20/2010 9:09	29.800	24.075	0.545	20.333
12/20/2010 9:11	31.600	24.029	0.499	20.327
12/20/2010 9:13	33.500	23.973	0.443	20.329
12/20/2010 9:15	35.500	23.919	0.389	20.338
12/20/2010 9:17	37.600	23.893	0.363	20.372
12/20/2010 9:19	39.800	23.859	0.329	20.334
12/20/2010 9:22	42.200	23.814	0.284	20.346
12/20/2010 9:24	44.700	23.772	0.242	20.340
12/20/2010 9:27	47.300	23.742	0.212	20.328

Log Notes:

Date and Time	Note
12/20/2010 8:24	Sensor: 141741 Factory calibration has expired.: 2/20/10 8:53:49 AM
12/20/2010 8:40	Manual Start Command
12/20/2010 9:28	Restart Command
12/20/2010 10:21	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 9:28	0.001	23.735	0.035	20.338
12/20/2010 9:28	0.004	23.739	0.039	20.359
12/20/2010 9:28	0.009	23.735	0.035	20.369
12/20/2010 9:28	0.012	23.741	0.041	20.379
12/20/2010 9:28	0.017	23.735	0.035	20.387
12/20/2010 9:28	0.021	23.730	0.030	20.392
12/20/2010 9:28	0.025	23.757	0.057	20.397
12/20/2010 9:28	0.040	22.861	-0.839	20.406
12/20/2010 9:28	0.045	20.254	-3.446	20.405
12/20/2010 9:28	0.048	20.547	-3.153	20.411
12/20/2010 9:28	0.052	20.522	-3.178	20.415
12/20/2010 9:28	0.056	20.526	-3.174	20.421
12/20/2010 9:28	0.060	20.554	-3.146	20.421
12/20/2010 9:28	0.063	20.576	-3.124	20.426
12/20/2010 9:28	0.067	20.543	-3.157	20.428
12/20/2010 9:28	0.071	20.561	-3.139	20.428
12/20/2010 9:28	0.075	20.601	-3.099	20.429
12/20/2010 9:28	0.087	20.589	-3.111	20.417
12/20/2010 9:28	0.091	20.566	-3.134	20.422
12/20/2010 9:28	0.095	20.569	-3.131	20.429
12/20/2010 9:28	0.098	20.596	-3.104	20.431
12/20/2010 9:28	0.102	20.573	-3.127	20.435
12/20/2010 9:28	0.106	20.575	-3.125	20.437
12/20/2010 9:28	0.110	20.564	-3.136	20.435
12/20/2010 9:28	0.113	20.578	-3.122	20.439
12/20/2010 9:28	0.119	20.587	-3.113	20.429
12/20/2010 9:28	0.126	20.581	-3.119	20.418
12/20/2010 9:28	0.139	20.581	-3.119	20.421
12/20/2010 9:28	0.142	20.540	-3.160	20.431

Withdrawal #1

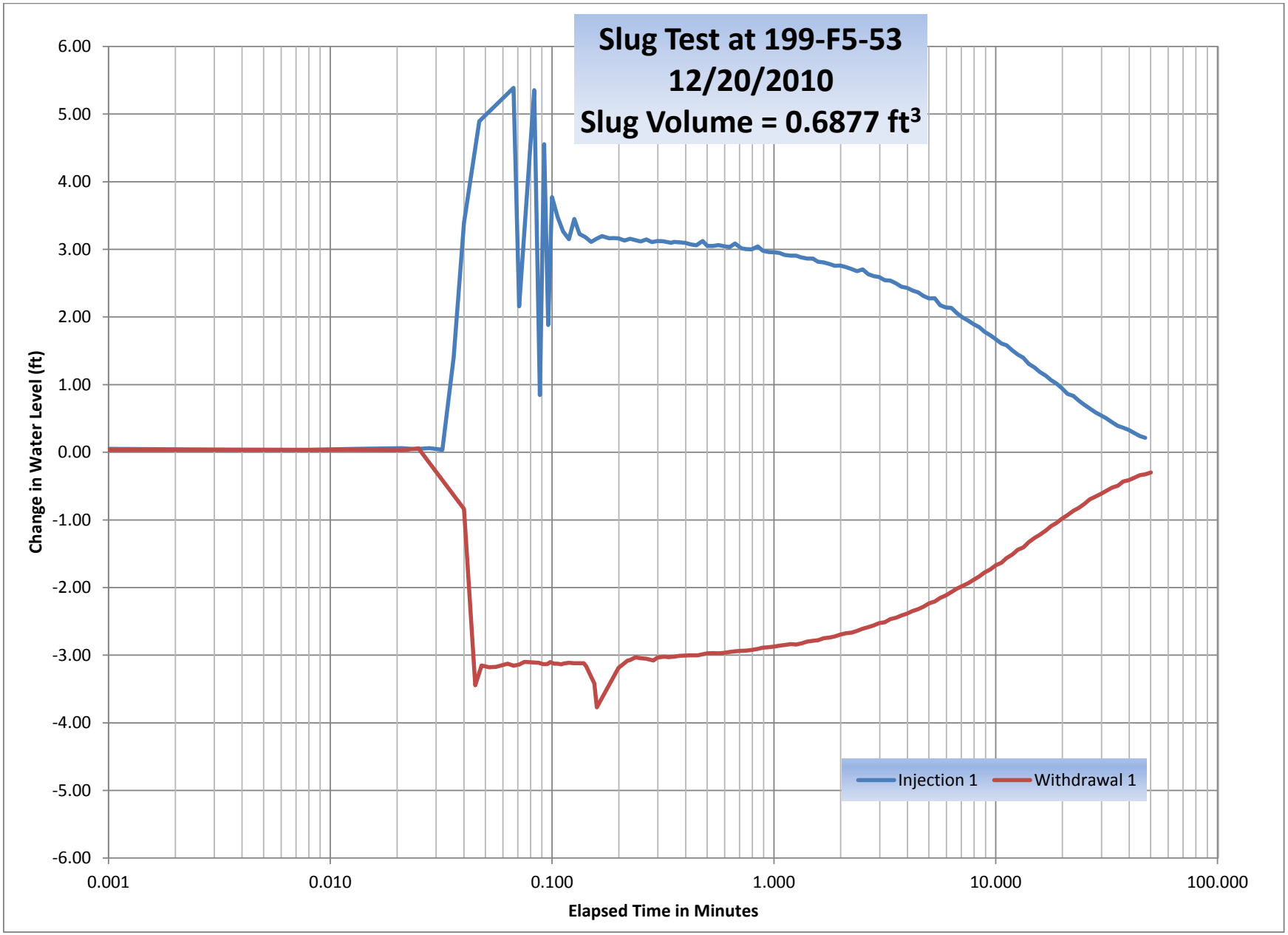
Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 9:28	0.155	20.283	-3.417	20.422
12/20/2010 9:28	0.159	19.928	-3.772	20.429
12/20/2010 9:28	0.199	20.510	-3.190	20.410
12/20/2010 9:28	0.219	20.622	-3.078	20.407
12/20/2010 9:28	0.224	20.627	-3.073	20.414
12/20/2010 9:28	0.237	20.668	-3.032	20.402
12/20/2010 9:28	0.252	20.655	-3.045	20.409
12/20/2010 9:28	0.266	20.647	-3.053	20.400
12/20/2010 9:28	0.286	20.620	-3.080	20.403
12/20/2010 9:28	0.298	20.665	-3.035	20.399
12/20/2010 9:28	0.319	20.677	-3.024	20.404
12/20/2010 9:28	0.335	20.670	-3.030	20.396
12/20/2010 9:28	0.355	20.678	-3.022	20.405
12/20/2010 9:28	0.376	20.690	-3.010	20.390
12/20/2010 9:28	0.398	20.693	-3.007	20.393
12/20/2010 9:28	0.422	20.697	-3.003	20.400
12/20/2010 9:28	0.453	20.697	-3.003	20.404
12/20/2010 9:28	0.473	20.711	-2.989	20.391
12/20/2010 9:28	0.501	20.727	-2.973	20.392
12/20/2010 9:28	0.534	20.731	-2.969	20.390
12/20/2010 9:28	0.562	20.729	-2.971	20.398
12/20/2010 9:28	0.596	20.733	-2.967	20.386
12/20/2010 9:28	0.631	20.746	-2.954	20.385
12/20/2010 9:28	0.668	20.759	-2.941	20.383
12/20/2010 9:28	0.708	20.764	-2.936	20.381
12/20/2010 9:29	0.750	20.767	-2.933	20.388
12/20/2010 9:29	0.794	20.778	-2.922	20.387
12/20/2010 9:29	0.841	20.789	-2.911	20.398
12/20/2010 9:29	0.891	20.810	-2.890	20.388
12/20/2010 9:29	0.944	20.817	-2.883	20.398
12/20/2010 9:29	1.006	20.827	-2.873	20.402
12/20/2010 9:29	1.060	20.840	-2.860	20.391
12/20/2010 9:29	1.120	20.851	-2.849	20.392
12/20/2010 9:29	1.190	20.862	-2.838	20.391
12/20/2010 9:29	1.260	20.857	-2.843	20.390
12/20/2010 9:29	1.330	20.874	-2.826	20.391
12/20/2010 9:29	1.410	20.899	-2.801	20.405
12/20/2010 9:29	1.509	20.915	-2.785	20.408
12/20/2010 9:29	1.580	20.921	-2.779	20.403
12/20/2010 9:29	1.680	20.950	-2.750	20.401
12/20/2010 9:30	1.780	20.960	-2.740	20.403
12/20/2010 9:30	1.880	20.978	-2.722	20.404
12/20/2010 9:30	1.990	21.003	-2.697	20.396

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 9:30	2.110	21.022	-2.678	20.411
12/20/2010 9:30	2.243	21.034	-2.666	20.411
12/20/2010 9:30	2.376	21.060	-2.640	20.413
12/20/2010 9:30	2.510	21.090	-2.610	20.413
12/20/2010 9:30	2.660	21.113	-2.587	20.396
12/20/2010 9:31	2.820	21.139	-2.561	20.404
12/20/2010 9:31	2.980	21.174	-2.526	20.410
12/20/2010 9:31	3.160	21.188	-2.512	20.389
12/20/2010 9:31	3.350	21.232	-2.468	20.386
12/20/2010 9:31	3.550	21.252	-2.448	20.374
12/20/2010 9:32	3.760	21.287	-2.413	20.371
12/20/2010 9:32	3.980	21.313	-2.387	20.369
12/20/2010 9:32	4.220	21.353	-2.347	20.369
12/20/2010 9:32	4.470	21.379	-2.321	20.362
12/20/2010 9:32	4.730	21.416	-2.284	20.358
12/20/2010 9:33	5.010	21.465	-2.235	20.359
12/20/2010 9:33	5.310	21.494	-2.206	20.356
12/20/2010 9:33	5.620	21.547	-2.153	20.355
12/20/2010 9:34	5.960	21.582	-2.118	20.351
12/20/2010 9:34	6.310	21.634	-2.066	20.346
12/20/2010 9:34	6.680	21.682	-2.018	20.346
12/20/2010 9:35	7.080	21.723	-1.977	20.342
12/20/2010 9:35	7.500	21.764	-1.936	20.339
12/20/2010 9:36	7.940	21.813	-1.887	20.339
12/20/2010 9:36	8.410	21.864	-1.836	20.338
12/20/2010 9:37	8.910	21.923	-1.777	20.337
12/20/2010 9:37	9.440	21.965	-1.735	20.337
12/20/2010 9:38	10.000	22.028	-1.672	20.336
12/20/2010 9:38	10.600	22.065	-1.635	20.336
12/20/2010 9:39	11.200	22.134	-1.566	20.337
12/20/2010 9:40	11.900	22.188	-1.512	20.333
12/20/2010 9:40	12.600	22.259	-1.441	20.348
12/20/2010 9:41	13.300	22.293	-1.407	20.364
12/20/2010 9:42	14.100	22.372	-1.328	20.374
12/20/2010 9:43	15.000	22.435	-1.265	20.355
12/20/2010 9:44	15.800	22.480	-1.220	20.345
12/20/2010 9:45	16.800	22.543	-1.157	20.342
12/20/2010 9:46	17.800	22.607	-1.093	20.342
12/20/2010 9:47	18.800	22.654	-1.046	20.339
12/20/2010 9:48	19.900	22.717	-0.983	20.338
12/20/2010 9:49	21.100	22.771	-0.929	20.337
12/20/2010 9:50	22.400	22.835	-0.865	20.338
12/20/2010 9:51	23.700	22.877	-0.823	20.361

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 9:53	25.100	22.935	-0.765	20.384
12/20/2010 9:54	26.600	23.004	-0.696	20.391
12/20/2010 9:56	28.200	23.044	-0.656	20.398
12/20/2010 9:58	29.800	23.085	-0.615	20.409
12/20/2010 9:59	31.600	23.132	-0.568	20.364
12/20/2010 10:01	33.500	23.177	-0.523	20.352
12/20/2010 10:03	35.500	23.205	-0.495	20.337
12/20/2010 10:05	37.600	23.266	-0.434	20.336
12/20/2010 10:08	39.800	23.286	-0.414	20.371
12/20/2010 10:10	42.200	23.325	-0.375	20.395
12/20/2010 10:12	44.703	23.361	-0.339	20.409
12/20/2010 10:15	47.300	23.375	-0.325	20.402
12/20/2010 10:18	50.101	23.402	-0.298	20.416


Slug Test at 199-F5-53
12/20/2010
Slug Volume = 0.6877 ft³
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
-6.00
Change in Water Level (ft)
0.001
0.010
0.100
1.000
10.000
100.000
Elapsed Time in Minutes
Injection 1
Withdrawal 1

Slug Test at 199-F5-53

Slug Volume 1.0112 ft^3

Raw File:	C7791 1.0 cu ft Slug Test 12-20 2010-12-20 12.52.18.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	141741		Injection 1	Withdrawal 1
Test Date:	12/20/2010		6.00	4.91
Test start:	10:22	injection 1		
Test restart:	11:23	withdrawal 1		
Test Stop	12:43	end		
Slug Volume:	1.0112 cu ft			

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 10:22	0.001	23.449	0.009	20.367
12/20/2010 10:22	0.004	23.459	0.019	20.387
12/20/2010 10:22	0.008	23.441	0.001	20.397
12/20/2010 10:22	0.013	23.447	0.007	20.410
12/20/2010 10:22	0.017	23.493	0.053	20.417
12/20/2010 10:22	0.025	23.460	0.020	20.457
12/20/2010 10:22	0.028	23.483	0.043	20.457
12/20/2010 10:22	0.032	23.480	0.040	20.459
12/20/2010 10:22	0.071	29.439	5.999	20.469
12/20/2010 10:22	0.079	24.771	1.331	20.466
12/20/2010 10:22	0.083	27.923	4.483	20.463
12/20/2010 10:22	0.092	25.405	1.965	20.463
12/20/2010 10:22	0.096	29.253	5.813	20.465
12/20/2010 10:22	0.1	28.016	4.576	20.465
12/20/2010 10:22	0.106	28.658	5.218	20.456
12/20/2010 10:22	0.112	27.572	4.132	20.451
12/20/2010 10:22	0.119	28.035	4.595	20.445
12/20/2010 10:22	0.126	28.062	4.622	20.441
12/20/2010 10:22	0.133	28.046	4.606	20.441
12/20/2010 10:22	0.141	28.043	4.603	20.436
12/20/2010 10:22	0.15	28.056	4.616	20.430
12/20/2010 10:22	0.158	28.043	4.603	20.428
12/20/2010 10:22	0.174	28.007	4.567	20.434
12/20/2010 10:22	0.178	28.036	4.596	20.445
12/20/2010 10:22	0.188	28.035	4.595	20.433
12/20/2010 10:22	0.207	28.036	4.596	20.435
12/20/2010 10:22	0.212	28.019	4.579	20.442
12/20/2010 10:22	0.224	28.010	4.570	20.426
12/20/2010 10:22	0.241	27.976	4.536	20.438
12/20/2010 10:22	0.251	28.013	4.573	20.429
12/20/2010 10:22	0.274	27.988	4.548	20.433

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 10:22	0.282	28.012	4.572	20.432
12/20/2010 10:23	0.298	27.974	4.534	20.418
12/20/2010 10:23	0.316	27.990	4.550	20.426
12/20/2010 10:23	0.341	27.965	4.525	20.433
12/20/2010 10:23	0.355	27.959	4.519	20.421
12/20/2010 10:23	0.376	27.947	4.507	20.430
12/20/2010 10:23	0.398	27.959	4.519	20.415
12/20/2010 10:23	0.444	27.944	4.504	20.427
12/20/2010 10:23	0.448	27.958	4.518	20.445
12/20/2010 10:23	0.478	27.934	4.494	20.431
12/20/2010 10:23	0.501	27.936	4.496	20.417
12/20/2010 10:23	0.531	27.939	4.499	20.419
12/20/2010 10:23	0.562	27.917	4.477	20.417
12/20/2010 10:23	0.596	27.908	4.468	20.418
12/20/2010 10:23	0.631	27.897	4.457	20.416
12/20/2010 10:23	0.668	27.892	4.452	20.416
12/20/2010 10:23	0.711	27.862	4.422	20.435
12/20/2010 10:23	0.75	27.857	4.417	20.425
12/20/2010 10:23	0.794	27.849	4.409	20.418
12/20/2010 10:23	0.844	27.819	4.379	20.432
12/20/2010 10:23	0.891	27.821	4.381	20.421
12/20/2010 10:23	0.944	27.792	4.352	20.430
12/20/2010 10:23	1	27.795	4.355	20.415
12/20/2010 10:23	1.06	27.763	4.323	20.418
12/20/2010 10:23	1.12	27.756	4.316	20.421
12/20/2010 10:23	1.19	27.742	4.302	20.418
12/20/2010 10:23	1.26	27.707	4.267	20.419
12/20/2010 10:24	1.33	27.707	4.267	20.415
12/20/2010 10:24	1.411	27.677	4.237	20.431
12/20/2010 10:24	1.5	27.652	4.212	20.415
12/20/2010 10:24	1.58	27.632	4.192	20.428
12/20/2010 10:24	1.68	27.604	4.164	20.427
12/20/2010 10:24	1.78	27.570	4.130	20.426
12/20/2010 10:24	1.88	27.551	4.111	20.425
12/20/2010 10:24	1.99	27.534	4.094	20.420
12/20/2010 10:24	2.112	27.487	4.047	20.429
12/20/2010 10:24	2.245	27.516	4.076	20.430
12/20/2010 10:25	2.378	27.437	3.997	20.428
12/20/2010 10:25	2.512	27.406	3.966	20.430
12/20/2010 10:25	2.66	27.356	3.916	20.416
12/20/2010 10:25	2.82	27.323	3.883	20.417
12/20/2010 10:25	2.98	27.293	3.853	20.425
12/20/2010 10:25	3.16	27.243	3.803	20.413
12/20/2010 10:26	3.35	27.200	3.760	20.401
12/20/2010 10:26	3.55	27.162	3.722	20.392

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 10:26	3.76	27.121	3.681	20.389
12/20/2010 10:26	3.98	27.071	3.631	20.384
12/20/2010 10:26	4.22	27.026	3.586	20.379
12/20/2010 10:27	4.47	26.975	3.535	20.378
12/20/2010 10:27	4.73	26.923	3.483	20.372
12/20/2010 10:27	5.01	26.859	3.419	20.366
12/20/2010 10:28	5.31	26.797	3.357	20.365
12/20/2010 10:28	5.62	26.735	3.295	20.360
12/20/2010 10:28	5.96	26.674	3.234	20.361
12/20/2010 10:29	6.31	26.615	3.175	20.355
12/20/2010 10:29	6.68	26.525	3.085	20.352
12/20/2010 10:29	7.08	26.454	3.014	20.353
12/20/2010 10:30	7.5	26.386	2.946	20.348
12/20/2010 10:30	7.94	26.291	2.851	20.348
12/20/2010 10:31	8.41	26.239	2.799	20.345
12/20/2010 10:31	8.91	26.150	2.710	20.344
12/20/2010 10:32	9.44	26.085	2.645	20.347
12/20/2010 10:32	10	25.996	2.556	20.340
12/20/2010 10:33	10.6	25.912	2.472	20.342
12/20/2010 10:33	11.2	25.826	2.386	20.339
12/20/2010 10:34	11.9	25.747	2.307	20.337
12/20/2010 10:35	12.6	25.671	2.231	20.335
12/20/2010 10:36	13.3	25.568	2.128	20.333
12/20/2010 10:36	14.1	25.501	2.061	20.334
12/20/2010 10:37	15	25.401	1.961	20.336
12/20/2010 10:38	15.8	25.321	1.881	20.336
12/20/2010 10:39	16.8	25.215	1.775	20.335
12/20/2010 10:40	17.8	25.121	1.681	20.335
12/20/2010 10:41	18.8	25.040	1.600	20.339
12/20/2010 10:42	19.9	24.944	1.504	20.336
12/20/2010 10:43	21.1	24.869	1.429	20.332
12/20/2010 10:45	22.4	24.786	1.346	20.331
12/20/2010 10:46	23.7	24.692	1.252	20.329
12/20/2010 10:47	25.1	24.607	1.167	20.329
12/20/2010 10:49	26.6	24.541	1.101	20.327
12/20/2010 10:50	28.2	24.453	1.013	20.327
12/20/2010 10:52	29.8	24.379	0.939	20.328
12/20/2010 10:54	31.6	24.308	0.868	20.331
12/20/2010 10:56	33.5	24.234	0.794	20.372
12/20/2010 10:58	35.5	24.169	0.729	20.389
12/20/2010 11:00	37.6	24.107	0.667	20.368
12/20/2010 11:02	39.8	24.049	0.609	20.342
12/20/2010 11:04	42.2	23.987	0.547	20.335
12/20/2010 11:07	44.7	23.933	0.493	20.335
12/20/2010 11:10	47.3	23.892	0.452	20.341

Injection #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 11:12	50.1	23.833	0.393	20.394
12/20/2010 11:15	53.101	23.809	0.369	20.404
12/20/2010 11:18	56.2	23.778	0.338	20.396
12/20/2010 11:22	59.6	23.748	0.308	20.399

Log Notes:

Date and Time	Note
12/20/2010 10:22	Sensor: 141741 Factory calibration has expired.: 2/20/10 8:53:49 AM
12/20/2010 10:22	Manual Start Command
12/20/2010 11:23	Restart Command
12/20/2010 12:43	Manual Stop Command

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 11:23	0.001	23.735	0.035	20.378
12/20/2010 11:23	0.004	23.742	0.042	20.399
12/20/2010 11:23	0.008	23.742	0.042	20.408
12/20/2010 11:23	0.012	23.732	0.032	20.418
12/20/2010 11:23	0.016	23.739	0.039	20.423
12/20/2010 11:23	0.02	23.737	0.037	20.431
12/20/2010 11:23	0.025	23.748	0.048	20.436
12/20/2010 11:23	0.041	18.902	-4.798	20.428
12/20/2010 11:23	0.045	18.788	-4.912	20.441
12/20/2010 11:23	0.048	18.843	-4.857	20.446
12/20/2010 11:23	0.052	18.928	-4.772	20.446
12/20/2010 11:23	0.057	18.962	-4.738	20.452
12/20/2010 11:23	0.061	19.023	-4.677	20.457
12/20/2010 11:23	0.065	19.027	-4.673	20.461
12/20/2010 11:23	0.068	19.037	-4.663	20.465
12/20/2010 11:23	0.072	19.042	-4.658	20.464
12/20/2010 11:23	0.076	19.044	-4.656	20.467
12/20/2010 11:23	0.079	19.040	-4.660	20.471
12/20/2010 11:23	0.083	19.059	-4.641	20.472
12/20/2010 11:23	0.087	19.122	-4.578	20.470
12/20/2010 11:23	0.091	19.097	-4.603	20.470
12/20/2010 11:23	0.095	19.039	-4.661	20.472
12/20/2010 11:23	0.1	19.002	-4.698	20.470
12/20/2010 11:23	0.106	19.029	-4.671	20.461
12/20/2010 11:23	0.112	19.171	-4.529	20.455
12/20/2010 11:23	0.119	19.160	-4.540	20.450
12/20/2010 11:23	0.126	19.162	-4.538	20.446
12/20/2010 11:23	0.14	19.199	-4.501	20.447
12/20/2010 11:23	0.144	19.212	-4.488	20.457
12/20/2010 11:23	0.15	19.135	-4.565	20.451
12/20/2010 11:23	0.158	19.267	-4.433	20.445

Withdrawal #1

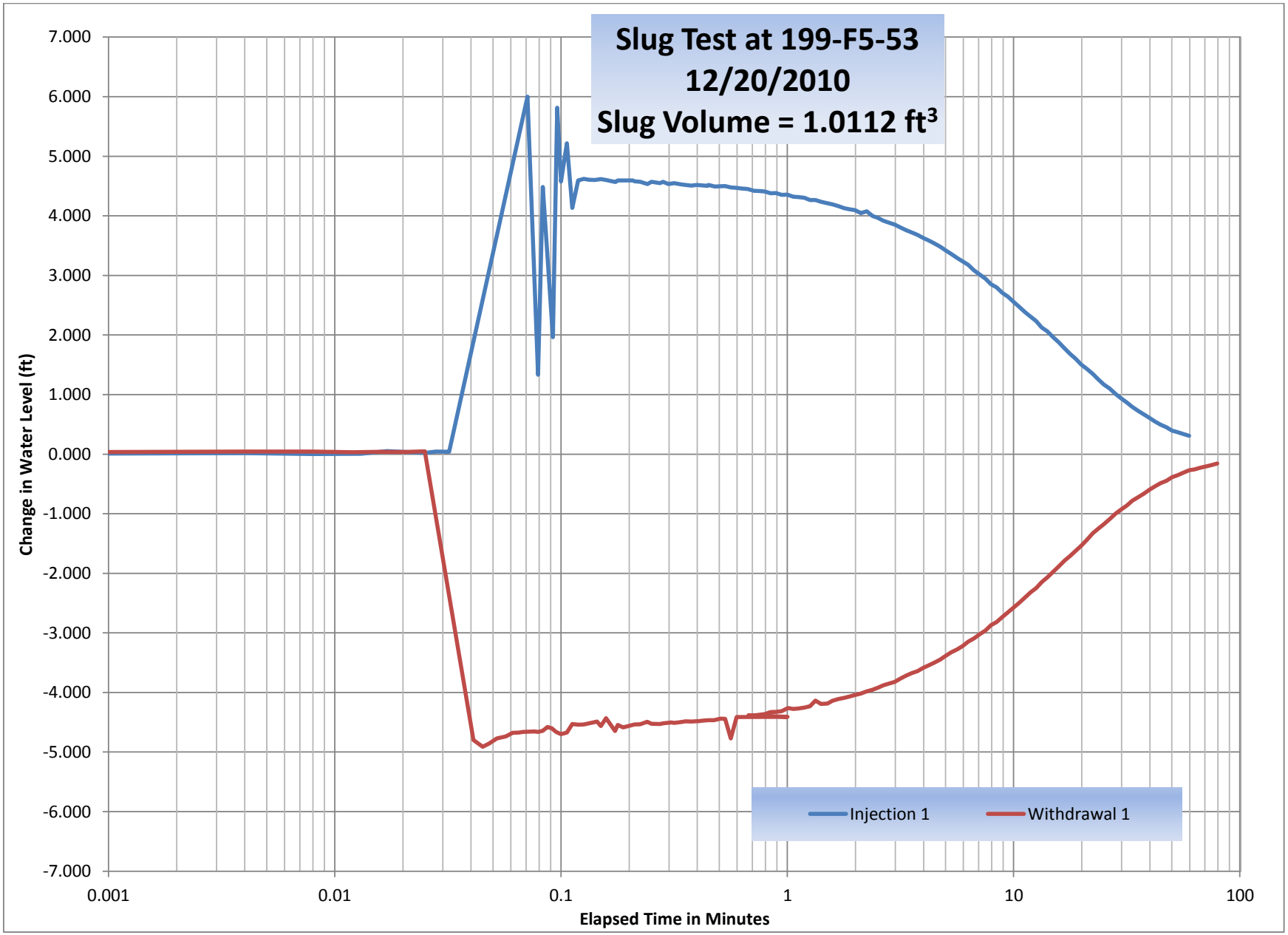
Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 11:23	0.173	19.052	-4.648	20.444
12/20/2010 11:23	0.178	19.156	-4.544	20.453
12/20/2010 11:23	0.188	19.115	-4.585	20.438
12/20/2010 11:23	0.207	19.154	-4.546	20.439
12/20/2010 11:23	0.211	19.163	-4.537	20.451
12/20/2010 11:23	0.224	19.165	-4.535	20.432
12/20/2010 11:23	0.24	19.208	-4.492	20.444
12/20/2010 11:23	0.251	19.174	-4.526	20.434
12/20/2010 11:23	0.273	19.171	-4.529	20.435
12/20/2010 11:23	0.282	19.183	-4.517	20.434
12/20/2010 11:23	0.307	19.196	-4.504	20.437
12/20/2010 11:23	0.316	19.190	-4.510	20.433
12/20/2010 11:24	0.34	19.203	-4.497	20.438
12/20/2010 11:24	0.355	19.215	-4.485	20.422
12/20/2010 11:24	0.376	19.211	-4.489	20.433
12/20/2010 11:24	0.407	19.218	-4.482	20.433
12/20/2010 11:24	0.422	19.225	-4.475	20.424
12/20/2010 11:24	0.447	19.234	-4.466	20.426
12/20/2010 11:24	0.473	19.233	-4.467	20.435
12/20/2010 11:24	0.507	19.260	-4.440	20.432
12/20/2010 11:24	0.531	19.259	-4.441	20.415
12/20/2010 11:24	0.562	18.927	-4.773	20.418
12/20/2010 11:24	0.596	19.287	-4.413	20.416
12/20/2010 11:24	1.001	19.291	-4.409	20.416
12/20/2010 11:24	0.673	19.319	-4.381	20.435
12/20/2010 11:24	0.708	19.312	-4.388	20.432
12/20/2010 11:24	0.75	19.325	-4.375	20.419
12/20/2010 11:24	0.794	19.335	-4.365	20.414
12/20/2010 11:24	0.841	19.372	-4.328	20.428
12/20/2010 11:24	0.891	19.376	-4.324	20.414
12/20/2010 11:24	0.944	19.387	-4.313	20.423
12/20/2010 11:24	1.007	19.438	-4.262	20.430
12/20/2010 11:24	1.06	19.424	-4.276	20.413
12/20/2010 11:24	1.12	19.430	-4.270	20.412
12/20/2010 11:24	1.19	19.446	-4.254	20.412
12/20/2010 11:24	1.26	19.469	-4.231	20.411
12/20/2010 11:25	1.33	19.563	-4.137	20.413
12/20/2010 11:25	1.41	19.508	-4.192	20.422
12/20/2010 11:25	1.507	19.513	-4.187	20.425
12/20/2010 11:25	1.58	19.560	-4.140	20.417
12/20/2010 11:25	1.68	19.590	-4.110	20.416
12/20/2010 11:25	1.78	19.610	-4.090	20.417
12/20/2010 11:25	1.88	19.630	-4.070	20.415
12/20/2010 11:25	1.99	19.657	-4.043	20.410
12/20/2010 11:25	2.11	19.682	-4.018	20.420

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 11:25	2.241	19.718	-3.982	20.421
12/20/2010 11:26	2.374	19.746	-3.954	20.423
12/20/2010 11:26	2.51	19.781	-3.919	20.418
12/20/2010 11:26	2.66	19.819	-3.881	20.408
12/20/2010 11:26	2.82	19.851	-3.849	20.408
12/20/2010 11:26	2.98	19.878	-3.822	20.414
12/20/2010 11:26	3.16	19.933	-3.767	20.405
12/20/2010 11:27	3.35	19.982	-3.718	20.396
12/20/2010 11:27	3.55	20.024	-3.676	20.387
12/20/2010 11:27	3.76	20.057	-3.643	20.382
12/20/2010 11:27	3.98	20.111	-3.589	20.378
12/20/2010 11:27	4.22	20.158	-3.542	20.372
12/20/2010 11:28	4.47	20.201	-3.499	20.372
12/20/2010 11:28	4.73	20.250	-3.450	20.366
12/20/2010 11:28	5.01	20.314	-3.386	20.366
12/20/2010 11:28	5.31	20.377	-3.323	20.363
12/20/2010 11:29	5.62	20.422	-3.278	20.358
12/20/2010 11:29	5.96	20.480	-3.220	20.360
12/20/2010 11:29	6.31	20.553	-3.147	20.361
12/20/2010 11:30	6.68	20.607	-3.093	20.356
12/20/2010 11:30	7.08	20.678	-3.022	20.353
12/20/2010 11:31	7.5	20.739	-2.961	20.354
12/20/2010 11:31	7.94	20.829	-2.871	20.352
12/20/2010 11:32	8.41	20.884	-2.816	20.349
12/20/2010 11:32	8.91	20.966	-2.734	20.346
12/20/2010 11:33	9.44	21.044	-2.656	20.349
12/20/2010 11:33	10	21.125	-2.575	20.344
12/20/2010 11:34	10.6	21.209	-2.491	20.343
12/20/2010 11:34	11.2	21.289	-2.411	20.343
12/20/2010 11:35	11.9	21.383	-2.317	20.345
12/20/2010 11:36	12.6	21.454	-2.246	20.343
12/20/2010 11:36	13.3	21.552	-2.148	20.341
12/20/2010 11:37	14.1	21.630	-2.070	20.341
12/20/2010 11:38	15	21.728	-1.972	20.346
12/20/2010 11:39	15.8	21.812	-1.888	20.350
12/20/2010 11:40	16.8	21.914	-1.786	20.353
12/20/2010 11:41	17.8	21.995	-1.705	20.355
12/20/2010 11:42	18.8	22.078	-1.622	20.359
12/20/2010 11:43	19.9	22.163	-1.537	20.351
12/20/2010 11:44	21.1	22.261	-1.439	20.348
12/20/2010 11:46	22.4	22.373	-1.327	20.352
12/20/2010 11:47	23.7	22.452	-1.248	20.361
12/20/2010 11:48	25.1	22.526	-1.174	20.353
12/20/2010 11:50	26.6	22.608	-1.092	20.350
12/20/2010 11:51	28.2	22.699	-1.001	20.349

Withdrawal #1

Data and Time	Elapsed Time	Head	Delta WL	Temp
	Min	(ft)	(ft)	C
12/20/2010 11:53	29.8	22.767	-0.933	20.354
12/20/2010 11:55	31.6	22.835	-0.865	20.352
12/20/2010 11:57	33.5	22.918	-0.782	20.345
12/20/2010 11:59	35.5	22.977	-0.723	20.345
12/20/2010 12:01	37.6	23.038	-0.662	20.353
12/20/2010 12:03	39.8	23.101	-0.599	20.348
12/20/2010 12:05	42.2	23.161	-0.539	20.344
12/20/2010 12:08	44.7	23.216	-0.484	20.345
12/20/2010 12:10	47.3	23.251	-0.449	20.339
12/20/2010 12:13	50.1	23.312	-0.388	20.338
12/20/2010 12:16	53.1	23.346	-0.354	20.332
12/20/2010 12:19	56.2	23.388	-0.312	20.336
12/20/2010 12:23	59.6	23.431	-0.269	20.344
12/20/2010 12:26	63.1	23.443	-0.257	20.336
12/20/2010 12:30	66.8	23.471	-0.229	20.344
12/20/2010 12:34	70.8	23.492	-0.208	20.340
12/20/2010 12:38	75.003	23.519	-0.181	20.399
12/20/2010 12:43	79.401	23.545	-0.155	20.416


Slug Test at 199-F5-53
12/20/2010
Slug Volume = 1.0112 ft³
Change in Water Level (ft)
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
-1.000
-2.000
-3.000
-4.000
-5.000
-6.000
-7.000
0.001
0.01
0.1
1
10
100
Elapsed Time in Minutes
Injection 1
Withdrawal 1

Slug Test Field Activity Report

Summary of FAR - 199-F5-53

Time	Note
8:40	Start - Slug 1: Injection (Final XD reading 23.70') - slug volume 0.6877 cu ft
9:28	Restart - Slug 1 : Withdrawal (Final XD reading 23.40')
10:21	Stop Slug 1 test
10:22	Start - Slug 2: Injection (Final XD reading 23.70') - slug volume 1.0112 cu ft.
11:23	Restart - Slug 2 : Withdrawal (Final XD reading 23.50')
12:43	Stop Slug 2 test

Note * the slug volumes were recalculated by Robert Edrington, therefore the field notes and raw data file names may vary slightly when referring to slug volumes.

Slug Testing at 199-F5-54 (C7792)

Summary of test data

	Pre-Test	Post Test
D-T-W (ft TOC)	46.24	-
D-T-B (ft TOC)	64.11	-
Stick up (ft)	3.04	-
Top of Screen (TOC)	41.16	-
Screen length	20.00	-
Casing dia. (in)	6.00	-
Borehole Dia. (in)	10.75	-

Slug Test #1	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	**0.6877**	**0.6877**	**0.6877**	**0.6877**	**0.6877**	**0.6877**
Predicted WL Change	3.502	3.502	3.502	3.502	3.502	3.502
Max WL Change (ft)	1.51	2.84	1.52	2.59	1.82	2.39

Slug Test #2	Injection #1	Withdrawal #1	Injection #2	Withdrawal #2	Injection #3	Withdrawal #3
Slug Volume (ft^3)	**1.0112**	**1.0112**	**1.0112**	**1.0112**	**1.0112**	**1.0112**
Predicted WL Change	5.15	5.15	5.15	5.15	5.15	5.15
Max WL Change (ft)	3.68	4.05	3.38	5.07	3.25	4.94

Slug Testing was performed on 9/10/2010

Note* The slug volumes were recalculated by Robert Edrington and the above volumes reflect the new calculations. The Field Activity Report and raw data file names will reflect slightly different slug volumes.

Slug Test at 199-F5-54

Slug Volume 0.6877 ft^3

Raw File:	C7792 - Test 7 - 0.78 cu ft SLUG 2010-09-10 14.26.25.wsl			
Device	Level TROLL 700			
Site	FR-3		**Max Change Test 1**	
Device SN	168983		Injection 1	Withdrawal 1
Test Date:	9/10/2010		1.51	2.84
Test start:	12:17	injection 1		
Test restart:	12:26	withdrawal 1	**Max Change Test 2**	
Test restart:	12:36	injection 2	Injection 2	Withdrawal 2
Test restart:	12:46	withdrawal 2	1.52	2.59
Test restart:	12:56	injection 3		
Test restart:	13:06	withdrawal 3	**Max Change Test 3**	
Test Stop	13:16	end	Injection 3	Withdrawal 3
Slug Volume:	0.6877 cu ft		1.82	2.39

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.048388	0.008	67.71
0.004	15.04624	0.006	67.75
0.008	15.04978	0.010	67.77
0.013	15.047393	0.007	67.79
0.017	15.048348	0.008	67.80
0.021	15.046738	0.007	67.82
0.025	15.045403	0.005	67.82
0.029	15.041805	0.002	67.83
0.033	15.048058	0.008	67.83
0.037	15.048058	0.008	67.84
0.042	15.047393	0.007	67.84
0.046	15.039663	0.000	67.85
0.05	15.044472	0.004	67.85
0.054	15.045661	0.006	67.85
0.058	15.048453	0.008	67.86
0.063	15.077486	0.037	67.86
0.067	15.494091	0.454	67.86
0.071	15.753453	0.713	67.86
0.106	16.174017	1.134	67.86
0.112	16.359207	1.319	67.85
0.15	16.360806	1.321	67.81
0.158	16.545052	1.505	67.81
0.168	16.301039	1.261	67.81
0.178	15.990445	0.950	67.80
0.199	15.949964	0.910	67.79

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.211	15.85452	0.815	67.78
0.224	15.778212	0.738	67.78
0.237	15.71472	0.675	67.78
0.251	15.654667	0.615	67.78
0.266	15.604465	0.564	67.77
0.282	15.560129	0.520	67.77
0.298	15.514688	0.475	67.76
0.316	15.474882	0.435	67.77
0.335	15.442566	0.403	67.77
0.355	15.409152	0.369	67.76
0.376	15.37746	0.337	67.76
0.398	15.348021	0.308	67.75
0.422	15.320728	0.281	67.75
0.447	15.297717	0.258	67.77
0.473	15.273354	0.233	67.79
0.505	15.253637	0.214	67.79
0.538	15.230207	0.190	67.80
0.562	15.214759	0.175	67.76
0.605	15.187608	0.148	67.79
0.638	15.173753	0.134	67.80
0.671	15.160436	0.120	67.79
0.708	15.147787	0.108	67.78
0.75	15.135798	0.096	67.77
0.794	15.139397	0.099	67.75
0.841	15.109301	0.069	67.78
0.891	15.102536	0.063	67.75
0.944	15.089737	0.050	67.77
1.005	15.084021	0.044	67.79
1.06	15.076851	0.037	67.76
1.12	15.070482	0.030	67.76
1.19	15.069227	0.029	67.75
1.26	15.071933	0.032	67.75
1.338	15.089856	0.050	67.78
1.41	15.071632	0.032	67.77
1.505	15.069761	0.030	67.78
1.58	15.0666	0.027	67.76
1.68	15.067101	0.027	67.76
1.78	15.06257	0.023	67.76
1.88	15.062749	0.023	67.76
1.99	15.062441	0.022	67.75
2.11	15.05703	0.017	67.76
2.24	15.060306	0.020	67.78
2.372	15.059517	0.020	67.78
2.51	15.058716	0.019	67.76

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
2.66	15.054616	0.015	67.74
2.82	15.058446	0.018	67.75
2.98	15.058446	0.018	67.75
3.16	15.053823	0.014	67.74
3.35	15.061524	0.022	67.74
3.55	15.059944	0.020	67.72
3.76	15.057958	0.018	67.70
3.98	15.055955	0.016	67.68
4.22	15.05703	0.017	67.69
4.47	15.058852	0.019	67.68
4.73	15.064869	0.025	67.67
5.01	15.065551	0.026	67.66
5.31	15.05969	0.020	67.64
5.62	15.056355	0.016	67.64
5.96	15.034783	-0.005	67.63
6.31	15.030671	-0.009	67.61
6.68	15.03426	-0.006	67.61
7.087	15.036268	-0.004	67.64
7.502	15.03647	-0.004	67.67
7.94	15.03426	-0.006	67.66
8.41	15.033286	-0.007	67.67
8.91	15.034524	-0.005	67.66

Log Notes:

Date and Time	Note
9/10/2010 12:17	Manual Start Command
9/10/2010 12:26	Restart Command
9/10/2010 12:36	Restart Command
9/10/2010 12:46	Restart Command
9/10/2010 12:56	Restart Command
9/10/2010 13:06	Restart Command
9/10/2010 13:16	Manual Stop Command

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.043853	0.004	67.65
0.004	15.043056	0.003	67.68
0.008	15.039192	-0.001	67.70
0.012	15.022943	-0.017	67.72
0.017	15.039549	0.000	67.74
0.021	15.030354	-0.010	67.75
0.025	15.04206	0.002	67.75
0.029	15.041533	0.002	67.76
0.033	15.038205	-0.002	67.77
0.037	15.038342	-0.002	67.78
0.042	15.046992	0.007	67.78
0.046	15.040866	0.001	67.78
0.05	15.037027	-0.003	67.79
0.054	15.04354	0.004	67.79
0.058	15.047256	0.007	67.79
0.062	15.040866	0.001	67.79
0.067	15.037277	-0.003	67.80
0.071	15.04007	0.000	67.80
0.075	15.042856	0.003	67.80
0.079	15.039272	-0.001	67.81
0.083	15.028235	-0.012	67.80
0.092	14.445144	-0.595	67.80
0.112	14.235971	-0.804	67.79
0.119	13.627127	-1.413	67.77
0.126	12.905222	-2.135	67.76

Injection #2

Elapsed Time
Min
0.001
0.004
0.008
0.013
0.017
0.021
0.025
0.029
0.033
0.038
0.042
0.046
0.05
0.071
0.075
0.079
0.119
0.126
0.141
0.171
0.178
0.188
0.199
0.211
0.224

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.133	12.203989	-2.836	67.76
0.141	12.41085	-2.629	67.76
0.15	12.620727	-2.419	67.75
0.158	12.774549	-2.265	67.74
0.168	12.970066	-2.070	67.74
0.178	13.133067	-1.907	67.73
0.188	13.291013	-1.749	67.73
0.199	13.446288	-1.594	67.72
0.211	13.593651	-1.446	67.72
0.224	13.745246	-1.295	67.71
0.237	13.858852	-1.181	67.72
0.251	13.989344	-1.051	67.71
0.266	14.105564	-0.934	67.70
0.282	14.21367	-0.826	67.70
0.298	14.322642	-0.717	67.70
0.316	14.404814	-0.635	67.69
0.335	14.47821	-0.562	67.69
0.355	14.547696	-0.492	67.69
0.376	14.607195	-0.433	67.68
0.398	14.662601	-0.377	67.69
0.429	14.720222	-0.320	67.72
0.447	14.754438	-0.286	67.70
0.473	14.791578	-0.248	67.70
0.501	14.825113	-0.215	67.71
0.531	14.865108	-0.175	67.72
0.562	14.904659	-0.135	67.73
0.596	14.914511	-0.125	67.73
0.631	14.935163	-0.105	67.72
0.668	14.951927	-0.088	67.71
0.708	14.966642	-0.073	67.70
0.75	14.982275	-0.058	67.70
0.795	14.992408	-0.048	67.73
0.841	14.998442	-0.042	67.70
0.896	15.007704	-0.032	67.73
0.944	15.0125	-0.027	67.70
1	15.014434	-0.026	67.72
1.063	15.016688	-0.023	67.73
1.12	15.026218	-0.014	67.70
1.19	15.031323	-0.009	67.68
1.26	15.031749	-0.008	67.68
1.33	15.034133	-0.006	67.67
1.41	15.035977	-0.004	67.67
1.5	15.037576	-0.002	67.66
1.58	15.035586	-0.004	67.66

Injection #2

Elapsed Time
Min
0.237
0.258
0.266
0.291
0.298
0.324
0.335
0.358
0.376
0.398
0.424
0.447
0.473
0.501
0.531
0.562
0.596
0.631
0.668
0.708
0.758
0.794
0.841
0.891
0.944
1
1.06
1.125
1.191
1.26
1.33
1.41
1.5
1.58
1.68
1.78
1.88
1.992
2.11
2.24
2.37
2.51
2.66
2.825

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.68	15.037576	-0.002	67.65
1.78	15.039978	0.000	67.65
1.88	15.040123	0.000	67.65
1.99	15.040123	0.000	67.66
2.11	15.042605	0.003	67.68
2.24	15.045544	0.006	67.69
2.372	15.040386	0.000	67.71
2.51	15.051401	0.011	67.70
2.66	15.045182	0.005	67.68
2.82	15.042917	0.003	67.68
2.98	15.048494	0.008	67.70
3.16	15.050735	0.011	67.68
3.35	15.04824	0.008	67.69
3.55	15.045573	0.006	67.69
3.76	15.050637	0.011	67.68
3.98	15.046107	0.006	67.70
4.22	15.04624	0.006	67.69
4.472	15.061543	0.022	67.71
4.73	15.052105	0.012	67.68
5.01	15.062084	0.022	67.67
5.31	15.059015	0.019	67.68
5.62	15.053197	0.013	67.67
5.965	15.051	0.011	67.712761
6.310	15.050	0.010	67.660629
6.680	15.051	0.011	67.639755
7.080	15.053	0.013	67.625809
7.500	15.056	0.016	67.609329
7.940	15.059	0.019	67.623222
8.41	15.057673	0.017673	67.655411
8.91	15.055284	0.015284	67.670189
9.44	15.060699	0.020699	67.696228

Injection #2

Elapsed Time
Min
2.98
3.16
3.35
3.55
3.76
3.98
4.22
4.47
4.73
5.01
5.31
5.626
5.96
6.31
6.68
7.08
7.5
7.94
8.41
8.91

Head	Delta WL	Temp
(ft)	(ft)	F
15.067009	0.007	67.65
15.061674	0.002	67.69
15.061839	0.002	67.71
15.060883	0.001	67.73
15.063375	0.003	67.75
15.062749	0.003	67.75
15.063649	0.004	67.77
15.067502	0.008	67.77
15.067224	0.007	67.78
15.084814	0.025	67.79
15.371598	0.312	67.79
15.720832	0.661	67.79
15.979004	0.919	67.80
16.138077	1.078	67.81
16.239929	1.180	67.81
16.334856	1.275	67.82
16.40114	1.341	67.79
16.577152	1.517	67.78
16.312361	1.252	67.77
15.921743	0.862	67.77
15.86635	0.806	67.77
15.804318	0.744	67.76
15.753453	0.693	67.75
15.688255	0.628	67.74
15.646947	0.587	67.77

Withdrawal #2

Elapsed Time	Head
Min	(ft)
0.001	15.076997
0.005	15.079252
0.009	15.078988
0.013	15.07819
0.017	15.078952
0.021	15.084281
0.025	15.082405
0.03	15.134367
0.042	14.881027
0.045	14.129601
0.049	13.588864
0.064	13.437626
0.068	12.991509
0.072	13.035857
0.075	12.975112
0.079	12.631124
0.083	12.483952
0.086	12.570927
0.09	12.655352
0.094	12.728599
0.097	12.810372
0.101	12.876693
0.106	12.977248
0.112	13.08964
0.119	13.19885

Head	Delta WL	Temp
(ft)	(ft)	F
15.607134	0.547	67.75
15.55933	0.499	67.76
15.529371	0.469	67.76
15.477602	0.418	67.76
15.467875	0.408	67.77
15.422083	0.362	67.76
15.403172	0.343	67.75
15.379478	0.319	67.76
15.3523	0.292	67.73
15.332205	0.272	67.74
15.313435	0.253	67.76
15.293198	0.233	67.73
15.275732	0.216	67.73
15.251792	0.192	67.73
15.232206	0.172	67.74
15.22128	0.161	67.74
15.2016	0.142	67.75
15.18615	0.126	67.74
15.172431	0.112	67.72
15.168551	0.109	67.72
15.145391	0.085	67.75
15.142054	0.082	67.74
15.132761	0.073	67.72
15.122221	0.062	67.75
15.113078	0.053	67.71
15.10841	0.048	67.73
15.107874	0.048	67.74
15.105341	0.045	67.75
15.099845	0.040	67.74
15.091637	0.032	67.74
15.0944	0.034	67.73
15.084977	0.025	67.72
15.09054	0.031	67.72
15.084577	0.025	67.71
15.09452	0.035	67.71
15.08725	0.027	67.71
15.08378	0.024	67.70
15.082313	0.022	67.74
15.095062	0.035	67.70
15.088439	0.028	67.71
15.085612	0.026	67.71
15.085911	0.026	67.71
15.078952	0.019	67.74
15.086411	0.026	67.74

Withdrawal #2

Elapsed Time	Head
Min	(ft)
0.132	13.387697
0.136	13.446417
0.141	13.518382
0.15	13.625669
0.164	13.774684
0.168	13.82142
0.178	13.918232
0.197	14.074701
0.201	14.10786
0.211	14.178834
0.231	14.298277
0.237	14.337824
0.251	14.407454
0.266	14.477369
0.282	14.531168
0.298	14.587893
0.316	14.63996
0.335	14.687899
0.364	14.757794
0.376	14.76857
0.398	14.803734
0.431	14.8462
0.447	14.869776
0.473	14.897194
0.501	14.920513
0.531	14.944071
0.564	14.958917
0.598	14.979756
0.631	14.996799
0.668	15.007313
0.708	15.020106
0.75	15.028482
0.798	15.037814
0.841	15.03958
0.898	15.046367
0.944	15.051418
1	15.055165
1.064	15.064031
1.12	15.068708
1.198	15.06353
1.265	15.06448
1.332	15.083612
1.41	15.068973
1.5	15.068584

Head	Delta WL	Temp
(ft)	(ft)	F
15.074825	0.015	67.70
15.070975	0.011	67.73
15.070482	0.010	67.68
15.078314	0.018	67.67
15.073658	0.014	67.66
15.077137	0.017	67.65
15.070598	0.011	67.64
15.067585	0.008	67.63
15.071259	0.011	67.63
15.073298	0.013	67.62
15.086835	0.027	67.64
15.093636	0.034	67.69
15.082273	0.022	67.70
15.077918	0.018	67.66
15.067805	0.008	67.64
15.073298	0.013	67.63
15.072884	0.013	67.62
15.079564	0.020	67.61
15.079515	0.020	67.64
15.072566	0.013	67.67

Withdrawal #2

Elapsed Time	Head
Min	(ft)
1.58	15.061283
1.68	15.067558
1.78	15.073131
1.88	15.069532
1.998	15.076147
2.11	15.072064
2.24	15.072165
2.37	15.072566
2.51	15.069281
2.665	15.070426
2.82	15.069281
2.98	15.071132
3.16	15.07845
3.35	15.083245
3.55	15.078629
3.76	15.086311
3.98	15.086178
4.22	15.091491
4.47	15.092573
4.73	15.086209
5.01	15.088711
5.31	15.089671
5.620	15.092
5.960	15.090
6.310	15.095
6.689	15.095
7.080	15.089
7.500	15.091
7.94	15.084946
8.41	15.078683
8.91	15.078858
9.44	15.083872

Delta WL	Temp
(ft)	F
0.007	67.65
0.009	67.68
0.009	67.71
0.008	67.72
0.009	67.74
0.014	67.75
0.012	67.75
0.064	67.77
-0.189	67.84
-0.940	67.84
-1.481	67.83
-1.632	67.81
-2.078	67.82
-2.034	67.82
-2.095	67.83
-2.439	67.83
-2.586	67.83
-2.499	67.83
-2.415	67.83
-2.341	67.83
-2.260	67.84
-2.193	67.84
-2.093	67.82
-1.980	67.81
-1.871	67.79

Injection #3

Elapsed Time	Head	Delta WL
Min	(ft)	(ft)
0.001	15.089907	0.010
0.005	15.086311	0.006
0.009	15.08244	0.002
0.013	15.086724	0.007
0.017	15.084839	0.005
0.021	15.088007	0.008
0.025	15.089473	0.009
0.03	15.086549	0.007
0.034	15.088007	0.008
0.038	15.089341	0.009
0.042	15.087738	0.008
0.046	15.087479	0.007
0.05	15.085755	0.006
0.055	15.086411	0.006
0.059	15.084946	0.005
0.063	15.08668	0.007
0.067	15.089072	0.009
0.071	15.089737	0.010
0.075	15.101457	0.021
0.08	15.141539	0.062
0.092	15.551745	0.472
0.096	15.854229	0.774
0.1	16.198807	1.119
0.103	16.493406	1.413
0.107	16.649418	1.569

Delta WL	Temp
(ft)	F
-1.682	67.80
-1.624	67.81
-1.552	67.80
-1.444	67.78
-1.295	67.79
-1.249	67.80
-1.152	67.77
-0.995	67.77
-0.962	67.80
-0.891	67.76
-0.772	67.77
-0.732	67.77
-0.663	67.75
-0.593	67.76
-0.539	67.74
-0.482	67.77
-0.430	67.74
-0.382	67.75
-0.312	67.76
-0.301	67.75
-0.266	67.77
-0.224	67.76
-0.200	67.74
-0.173	67.74
-0.149	67.75
-0.126	67.76
-0.111	67.76
-0.090	67.76
-0.073	67.76
-0.063	67.74
-0.050	67.73
-0.042	67.72
-0.032	67.76
-0.030	67.73
-0.024	67.75
-0.019	67.73
-0.015	67.75
-0.006	67.75
-0.001	67.72
-0.006	67.75
-0.006	67.76
0.014	67.75
-0.001	67.73
-0.001	67.74

Injection #3

Elapsed Time	Head	Delta WL
Min	(ft)	(ft)
0.159	16.901379	1.821
0.168	16.292643	1.213
0.178	16.045544	0.966
0.192	15.969001	0.889
0.199	15.907491	0.827
0.211	15.835068	0.755
0.225	15.762644	0.683
0.237	15.710316	0.630
0.259	15.633091	0.553
0.266	15.615788	0.536
0.282	15.573726	0.494
0.298	15.536427	0.456
0.316	15.502353	0.422
0.335	15.470522	0.391
0.355	15.442318	0.362
0.376	15.409813	0.330
0.406	15.37506	0.295
0.422	15.358294	0.278
0.447	15.333389	0.253
0.473	15.312489	0.232
0.506	15.290794	0.211
0.539	15.263215	0.183
0.562	15.256033	0.176
0.596	15.239126	0.159
0.639	15.222877	0.143
0.672	15.209971	0.130
0.708	15.194923	0.115
0.75	15.178944	0.099
0.794	15.173897	0.094
0.841	15.17056	0.091
0.891	15.156303	0.076
0.944	15.143397	0.063
1.006	15.143264	0.063
1.06	15.141397	0.061
1.12	15.130223	0.050
1.19	15.131931	0.052
1.26	15.128884	0.049
1.339	15.121425	0.041
1.41	15.114532	0.035
1.506	15.117702	0.038
1.58	15.118078	0.038
1.68	15.112625	0.033
1.78	15.110679	0.031
1.88	15.110781	0.031

Delta WL	Temp
(ft)	F
-0.009	67.72
-0.002	67.72
0.003	67.72
0.000	67.72
0.006	67.75
0.002	67.72
0.002	67.72
0.003	67.73
-0.001	67.72
0.000	67.75
-0.001	67.71
0.001	67.71
0.008	67.71
0.013	67.68
0.009	67.67
0.016	67.67
0.016	67.65
0.021	67.64
0.023	67.64
0.016	67.63
0.019	67.63
0.020	67.62
0.022	67.614487
0.020	67.643219
0.025	67.648438
0.025	67.695343
0.019	67.655411
0.021	67.632782
0.014946	67.669312
0.008683	67.683212
0.008858	67.693588
0.014	67.72

Injection #3

Elapsed Time	Head	Delta WL
Min	(ft)	(ft)
1.99	15.108541	0.029
2.11	15.112911	0.033
2.24	15.106248	0.026
2.373	15.102923	0.023
2.51	15.105455	0.025
2.66	15.097903	0.018
2.82	15.092441	0.012
2.98	15.095767	0.016
3.16	15.102153	0.022
3.35	15.09682	0.017
3.55	15.091361	0.011
3.76	15.0931	0.013
3.98	15.08362	0.004
4.22	15.081915	0.002
4.47	15.081648	0.002
4.73	15.085642	0.006
5.01	15.086835	0.007
5.31	15.083114	0.003
5.62	15.08244	0.002
5.96	15.078314	-0.002
6.31	15.085505	0.006
6.68	15.081383	0.001
7.080	15.075	-0.005
7.500	15.082	0.002
7.940	15.081	0.001
8.410	15.071	-0.009
8.910	15.069	-0.011
9.440	15.072	-0.008
10	15.071796	-0.008204

Withdrawal #3

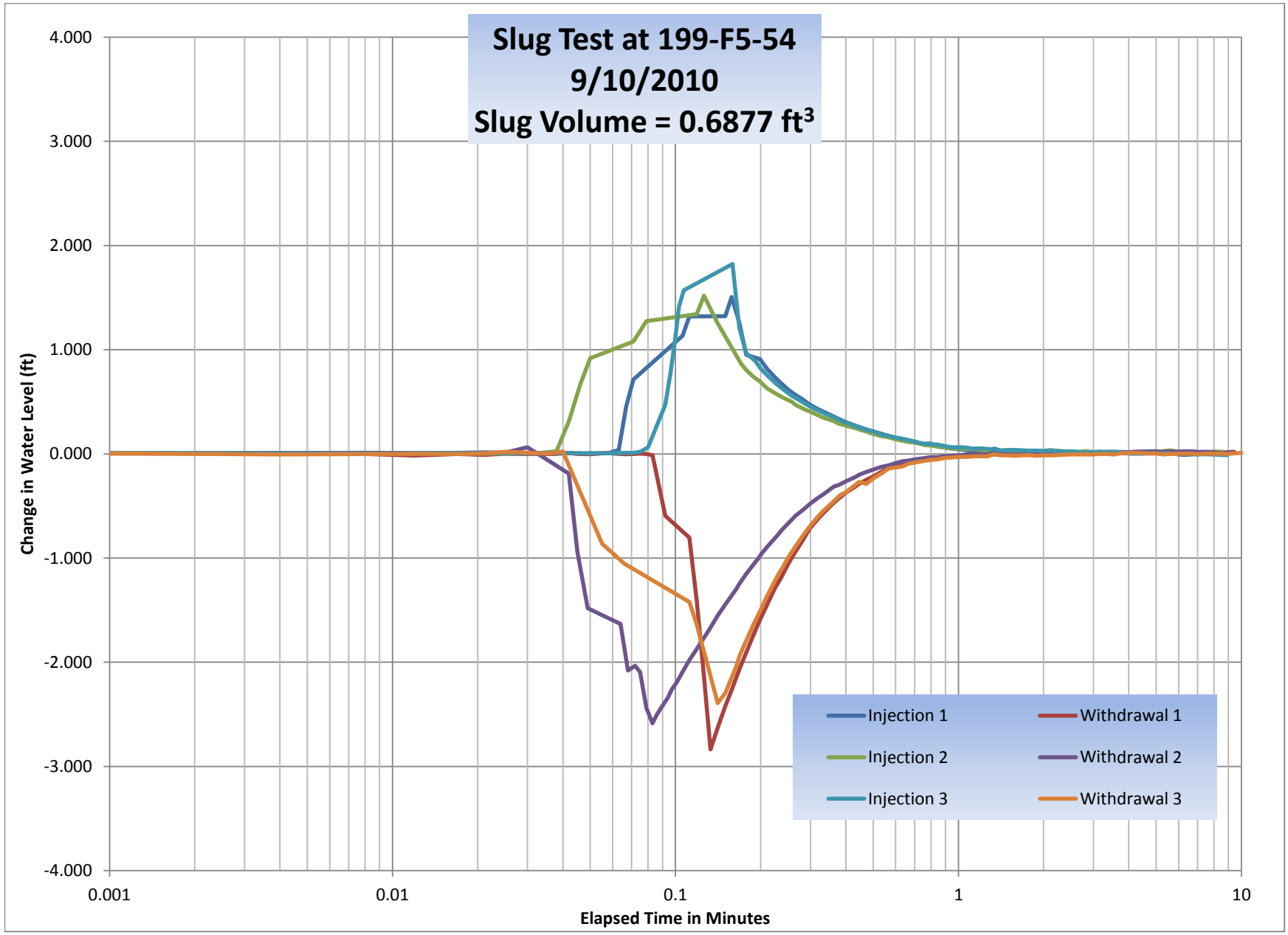
Temp	Elapsed Time	Head	Delta WL	Temp
F	Min	(ft)	(ft)	F
67.67	0.001	15.085774	0.006	67.66
67.71	0.004	15.074059	-0.006	67.70
67.74	0.009	15.079491	-0.001	67.72
67.75	0.013	15.081383	0.001	67.74
67.76	0.017	15.079491	-0.001	67.75
67.77	0.021	15.082273	0.002	67.76
67.78	0.025	15.100187	0.020	67.86
67.79	0.033	15.085704	0.006	67.84
67.80	0.036	15.085047	0.005	67.83
67.80	0.04	15.101923	0.022	67.92
67.81	0.055	14.217102	-0.863	67.87
67.81	0.066	14.026505	-1.053	67.86
67.82	0.112	13.659963	-1.420	67.82
67.82	0.119	13.441124	-1.639	67.81
67.82	0.141	12.687976	-2.392	67.78
67.82	0.15	12.786414	-2.294	67.77
67.83	0.165	13.060352	-2.020	67.79
67.83	0.168	13.135204	-1.945	67.81
67.83	0.178	13.288352	-1.792	67.78
67.83	0.188	13.43231	-1.648	67.77
67.82	0.201	13.593591	-1.486	67.79
67.83	0.211	13.717813	-1.362	67.77
67.83	0.231	13.923806	-1.156	67.78
67.85	0.237	13.971092	-1.109	67.78
67.85	0.251	14.09015	-0.990	67.76

Withdrawal #3

Temp	Elapsed Time	Head	Delta WL	Temp
F	Min	(ft)	(ft)	F
67.81	0.266	14.193482	-0.887	67.78
67.82	0.282	14.296276	-0.784	67.75
67.79	0.298	14.381626	-0.698	67.78
67.81	0.316	14.465919	-0.614	67.75
67.80	0.335	14.540091	-0.540	67.77
67.78	0.355	14.601337	-0.479	67.74
67.80	0.383	14.686705	-0.393	67.77
67.78	0.398	14.708799	-0.371	67.79
67.79	0.422	14.759397	-0.321	67.74
67.78	0.447	14.810657	-0.269	67.75
67.76	0.473	14.791758	-0.288	67.75
67.75	0.501	14.845684	-0.234	67.77
67.75	0.532	14.889204	-0.191	67.77
67.76	0.565	14.938759	-0.141	67.77
67.75	0.598	14.950205	-0.130	67.77
67.77	0.632	14.958449	-0.122	67.77
67.78	0.668	14.986681	-0.093	67.76
67.75	0.708	14.999587	-0.080	67.75
67.76	0.75	15.009232	-0.071	67.73
67.78	0.798	15.023831	-0.056	67.77
67.78	0.841	15.027474	-0.053	67.75
67.78	0.898	15.042856	-0.037	67.77
67.74	0.944	15.044738	-0.035	67.75
67.74	1	15.05085	-0.029	67.76
67.78	1.065	15.051668	-0.028	67.77
67.78	1.12	15.054361	-0.026	67.74
67.77	1.198	15.058446	-0.022	67.77
67.75	1.265	15.055659	-0.024	67.76
67.74	1.332	15.076297	-0.004	67.77
67.77	1.41	15.06537	-0.015	67.74
67.74	1.5	15.065411	-0.015	67.76
67.76	1.58	15.061155	-0.019	67.74
67.77	1.68	15.065277	-0.015	67.74
67.74	1.78	15.069227	-0.011	67.73
67.74	1.88	15.062596	-0.017	67.73
67.74	1.999	15.065551	-0.014	67.76
67.73	2.11	15.066485	-0.014	67.73
67.77	2.24	15.068462	-0.012	67.74
67.75	2.37	15.07283	-0.007	67.75
67.76	2.51	15.074293	-0.006	67.74
67.74	2.666	15.075502	-0.004	67.76
67.74	2.82	15.0742	-0.006	67.73
67.74	2.98	15.074325	-0.006	67.73
67.74	3.166	15.078683	-0.001	67.76

Withdrawal #3

Temp	Elapsed Time	Head	Delta WL	Temp
F	Min	(ft)	(ft)	F
67.73	3.35	15.079784	0.000	67.70
67.75	3.55	15.075174	-0.005	67.69
67.75	3.76	15.085382	0.005	67.67
67.76	3.98	15.090443	0.010	67.66
67.75	4.22	15.089631	0.010	67.66
67.72	4.47	15.086835	0.007	67.65
67.73	4.73	15.08378	0.004	67.64
67.74	5.01	15.08362	0.004	67.64
67.71	5.31	15.075024	-0.005	67.63
67.70	5.62	15.079124	-0.001	67.63
67.68	5.96	15.081418	0.001	67.62
67.67	6.31	15.080444	0.000	67.67
67.66	6.68	15.08244	0.002	67.68
67.66	7.08	15.077918	-0.002	67.69
67.65	7.505	15.083754	0.004	67.72
67.64	7.94	15.081915	0.002	67.73
67.64	8.41	15.082313	0.002	67.72
67.63	8.91	15.07909	-0.001	67.72
67.63	9.44	15.085505	0.006	67.74
67.62	10	15.090569	0.011	67.70
67.65				
67.66				
67.67453				
67.653656				
67.637115				
67.624924				
67.671951				
67.704086				
67.662338				


Slug Test at 199-F5-54
9/10/2010
Slug Volume = 0.6877 ft³
4.000
3.000
2.000
1.000
0.000
-1.000
-2.000
-3.000
-4.000
Change in Water Level (ft)
0.001
0.01
0.1
1
10
Elapsed Time in Minutes
Injection 1
Injection 2
Injection 3
Withdrawal 1
Withdrawal 2
Withdrawal 3

Slug Test at 199-F5-54

Slug Volume 1.0112 ft^3

Raw File:	C7792 - Test 8 - 1.07 cu ft SLUG 2010-09-10 14.27.15.wsl			
Device	Level TROLL 700			
Site	FR-3		Max Change Test 1	
Device SN	168983		Injection 3	Withdrawal 3
Test Date:	09/10/10		3.68	4.05
Test start:	13:19	injection 1		
Test restart:	13:32	withdrawal 1	Max Change Test 2	
Test restart:	13:41	injection 2	Injection 4	Withdrawal 4
Test restart:	13:51	withdrawal 2	3.38	5.07
Test restart:	14:01	injection 3		
Test restart:	14:11	withdrawal 3	Max Change Test 3	
Test Stop	14:22	end	Injection 4	Withdrawal 4
Slug Volume:	1.0112 cu ft		3.25	4.94

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.099925	0.009925	67.65
0.004	15.096044	0.006044	67.68
0.008	15.09483	0.00483	67.71
0.013	15.099078	0.009078	67.73
0.017	15.097219	0.007219	67.74
0.021	15.097096	0.007096	67.75
0.025	15.099215	0.009215	67.76
0.029	15.12086	0.03086	67.77
0.037	15.113139	0.023139	67.84
0.041	15.114734	0.024734	67.82
0.044	15.127779	0.037779	67.83
0.052	15.140965	0.050965	67.88
0.056	15.134047	0.044047	67.86
0.06	15.119103	0.029103	67.86
0.064	15.09467	0.00467	67.87
0.068	15.10904	0.01904	67.86
0.072	15.102923	0.012923	67.86
0.075	15.10506	0.01506	67.85
0.079	15.112506	0.022506	67.85
0.083	15.124185	0.034185	67.85
0.086	15.137516	0.047516	67.85
0.09	17.715052	2.625052	67.85
0.094	17.61755	2.52755	67.85
0.097	17.053555	1.963555	67.85

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.101	16.352556	1.262556	67.85
0.106	16.452538	1.362538	67.84
0.112	16.499527	1.409527	67.82
0.119	16.614019	1.524019	67.80
0.126	16.296234	1.206234	67.79
0.503	18.766169	3.676169	67.76
0.57	15.848376	0.758376	67.77
0.603	15.702455	0.612455	67.76
0.637	15.548557	0.458557	67.77
0.67	15.533327	0.443327	67.76
0.708	15.442828	0.352828	67.75
0.75	15.413812	0.323812	67.74
0.794	15.371351	0.281351	67.73
0.841	15.342194	0.252194	67.75
0.891	15.309291	0.219291	67.73
0.947	15.316094	0.226094	67.76
1	15.260301	0.170301	67.72
1.06	15.241271	0.151271	67.71
1.12	15.215705	0.125705	67.70
1.19	15.202268	0.112268	67.70
1.26	15.189078	0.099078	67.70
1.33	15.180157	0.090157	67.69
1.41	15.171102	0.081102	67.68
1.5	15.16778	0.07778	67.68
1.58	15.166734	0.076734	67.68
1.68	15.165244	0.075244	67.67
1.78	15.161382	0.071382	67.67
1.88	15.164716	0.074716	67.66
1.99	15.162311	0.072311	67.66
2.11	15.159137	0.069137	67.65
2.24	15.156194	0.066194	67.65
2.37	15.148078	0.058078	67.65
2.51	15.14529	0.05529	67.65
2.66	15.145017	0.055017	67.64
2.82	15.137033	0.047033	67.64
2.98	15.131699	0.041699	67.63
3.16	15.128238	0.038238	67.64
3.35	15.124155	0.034155	67.63
3.55	15.127052	0.037052	67.63
3.76	15.123442	0.033442	67.63
3.98	15.126652	0.036652	67.62
4.22	15.12677	0.03677	67.62

Injection #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
4.47	15.119866	0.029866	67.62
4.73	15.114532	0.024532	67.62
5.01	15.112409	0.022409	67.62
5.31	15.113595	0.023595	67.61
5.62	15.113859	0.023859	67.61
5.96	15.115066	0.025066	67.61
6.31	15.118923	0.028923	67.61
6.68	15.12279	0.03279	67.61
7.08	15.125712	0.035712	67.61
7.5	15.121733	0.031733	67.61
7.94	15.122397	0.032397	67.61
8.41	15.121451	0.031451	67.61
8.91	15.117601	0.027601	67.61
9.44	15.121451	0.031451	67.61
10	15.11426	0.02426	67.60
10.6	15.114162	0.024162	67.60
11.2	15.132369	0.042369	67.60
11.9	15.129044	0.039044	67.60
12.603	15.14883	0.05883	67.67
12.769	15.126652	0.036652	67.63

Log Notes:

Date and Time	Note
9/10/2010 13:19	Manual Start Command
9/10/2010 13:32	Restart Command
9/10/2010 13:41	Restart Command
9/10/2010 13:51	Restart Command
9/10/2010 14:01	Restart Command
9/10/2010 14:11	Restart Command
9/10/2010 14:22	Manual Stop Command

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.114532	0.004532	67.66
0.004	15.125841	0.015841	67.69
0.008	15.113595	0.003595	67.71
0.012	15.108277	-0.001723	67.72
0.016	15.115066	0.005066	67.73
0.02	15.118399	0.008399	67.74
0.025	15.119578	0.009578	67.74
0.029	15.114624	0.004624	67.75
0.033	15.108676	-0.001324	67.76
0.037	15.118896	0.008896	67.77
0.041	15.119033	0.009033	67.77
0.045	15.122353	0.012353	67.77
0.05	15.109301	-0.000699	67.77
0.054	15.121022	0.011022	67.79
0.058	15.11052	0.00052	67.78
0.062	15.114492	0.004492	67.78
0.066	15.119685	0.009685	67.79
0.07	15.117052	0.007052	67.79
0.075	15.116637	0.006637	67.79
0.079	15.112506	0.002506	67.80
0.083	15.117567	0.007567	67.80
0.087	15.117052	0.007052	67.80
0.091	15.113969	0.003969	67.80
0.095	15.117434	0.007434	67.80

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.101	15.107852	-0.002148	67.78
0.109	15.120728	0.010728	67.76
0.114	15.120442	0.010442	67.77
0.125	15.121544	0.011544	67.74
0.128	15.126554	0.016554	67.77
0.137	15.119578	0.009578	67.75
0.153	13.124149	-1.985851	67.74
0.163	12.027784	-3.082216	67.73
0.173	11.062778	-4.047222	67.73
0.183	11.117114	-3.992886	67.72
0.194	11.459575	-3.650425	67.73
0.206	11.759408	-3.350592	67.72
0.219	12.088251	-3.021749	67.71
0.235	12.454268	-2.655732	67.74
0.246	12.698498	-2.411502	67.73
0.268	13.056226	-2.053774	67.75
0.277	13.21777	-1.89223	67.74
0.301	13.523923	-1.586077	67.75
0.311	13.648447	-1.461553	67.73
0.334	13.884017	-1.225983	67.75
0.35	14.005723	-1.104277	67.72
0.371	14.155263	-0.954737	67.73
0.401	14.328497	-0.781503	67.75
0.417	14.407454	-0.702546	67.73
0.442	14.508268	-0.601732	67.72
0.468	14.590415	-0.519585	67.75
0.501	14.67551	-0.43449	67.74
0.534	14.743556	-0.366444	67.74
0.557	14.786558	-0.323442	67.72
0.591	14.838484	-0.271516	67.72
0.634	14.8867	-0.2233	67.75
0.668	14.919445	-0.190555	67.76
0.703	14.946739	-0.163261	67.74
0.745	14.9771	-0.1329	67.72
0.789	15.000264	-0.109736	67.71
0.836	15.015455	-0.094545	67.74
0.886	15.032081	-0.077919	67.71
0.939	15.044605	-0.065395	67.73
1.001	15.054339	-0.055661	67.75
1.055	15.059548	-0.050452	67.72
1.115	15.065687	-0.044313	67.72
1.185	15.073658	-0.036342	67.72

Withdrawal #1

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.255	15.078595	-0.031405	67.72
1.325	15.082039	-0.027961	67.72
1.405	15.079648	-0.030352	67.73
1.501	15.078595	-0.031405	67.75
1.575	15.088178	-0.021822	67.73
1.675	15.084977	-0.025023	67.73
1.775	15.087765	-0.022235	67.73
1.875	15.092164	-0.017836	67.72
1.985	15.092705	-0.017295	67.71
2.105	15.103179	-0.006821	67.73
2.235	15.0963	-0.0137	67.74
2.368	15.10305	-0.00695	67.75
2.505	15.102153	-0.007847	67.74
2.655	15.102954	-0.007046	67.72
2.815	15.10638	-0.00362	67.72
2.975	15.102686	-0.007314	67.72
3.155	15.100956	-0.009044	67.72
3.345	15.10002	-0.00998	67.70
3.545	15.102153	-0.007847	67.68
3.755	15.106416	-0.003584	67.67
3.975	15.108001	-0.001999	67.65
4.215	15.104948	-0.005052	67.65
4.465	15.102178	-0.007822	67.64
4.725	15.106015	-0.003985	67.64
5.005	15.104407	-0.005593	67.63
5.305	15.113348	0.003348	67.63
5.615	15.113595	0.003595	67.62
5.955	15.111599	0.001599	67.62
6.305	15.113183	0.003183	67.61
6.675	15.113078	0.003078	67.61
7.075	15.108798	-0.001202	67.65
7.495	15.111599	0.001599	67.65
7.94	15.106416	-0.003584	67.70
8.405	15.110538	0.000538	67.65
8.445	15.116928	0.006928	67.66

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.116121	0.006121	67.69
0.004	15.11533	0.00533	67.71
0.008	15.116673	0.006673	67.74
0.012	15.120663	0.010663	67.75
0.016	15.114387	0.004387	67.76
0.021	15.122353	0.012353	67.77
0.029	15.124481	0.014481	67.75
0.032	15.121791	0.011791	67.77
0.036	15.124591	0.014591	67.77
0.044	15.125797	0.015797	67.76
0.048	15.124185	0.014185	67.77
0.052	15.119962	0.009962	67.79
0.056	15.126617	0.016617	67.79
0.06	15.123169	0.013169	67.80
0.064	15.127149	0.017149	67.81
0.067	15.129932	0.019932	67.81
0.071	15.132347	0.022347	67.82
0.074	15.135151	0.025151	67.82
0.078	15.142867	0.032867	67.83
0.082	15.142054	0.032054	67.83
0.085	15.14818	0.03818	67.83
0.089	15.153648	0.043648	67.84
0.093	18.162819	3.052819	67.84
0.096	17.112028	2.002028	67.84

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.102	17.21773	2.10773	67.83
0.108	17.397566	2.287566	67.81
0.115	17.526947	2.416947	67.80
0.158	17.662331	2.552331	67.80
0.164	18.083628	2.973628	67.80
0.191	18.485867	3.375867	67.78
0.195	18.117348	3.007348	67.80
0.233	15.932642	0.822642	67.77
0.247	15.837057	0.727057	67.75
0.262	15.782215	0.672215	67.77
0.278	15.716709	0.606709	67.75
0.294	15.663588	0.553588	67.77
0.312	15.62604	0.51604	67.74
0.331	15.580779	0.470779	67.76
0.358	15.534705	0.424705	67.77
0.372	15.514732	0.404732	67.75
0.394	15.488239	0.378239	67.76
0.425	15.448444	0.338444	67.77
0.443	15.42354	0.31354	67.74
0.469	15.400629	0.290629	67.74
0.497	15.381587	0.271587	67.75
0.527	15.363747	0.253747	67.76
0.558	15.339251	0.229251	67.77
0.592	15.313823	0.203823	67.76
0.627	15.298778	0.188778	67.76
0.664	15.278532	0.168532	67.75
0.704	15.274274	0.164274	67.74
0.746	15.262841	0.152841	67.73
0.792	15.251387	0.141387	67.76
0.837	15.238594	0.128594	67.74
0.892	15.224081	0.114081	67.76
0.94	15.213702	0.103702	67.74
0.996	15.211046	0.101046	67.75
1.058	15.205696	0.095696	67.76
1.116	15.203972	0.093972	67.73
1.192	15.192518	0.082518	67.76
1.258	15.184261	0.074261	67.76
1.326	15.179742	0.069742	67.77
1.406	15.17577	0.06577	67.73
1.496	15.179078	0.069078	67.75
1.576	15.169658	0.059658	67.73
1.676	15.168833	0.058833	67.73

Injection #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.776	15.166441	0.056441	67.73
1.876	15.165236	0.055236	67.72
1.992	15.157114	0.047114	67.76
2.106	15.157929	0.047929	67.73
2.236	15.151271	0.041271	67.74
2.366	15.153648	0.043648	67.74
2.506	15.151271	0.041271	67.73
2.659	15.147248	0.037248	67.76
2.816	15.14768	0.03768	67.72
2.976	15.142206	0.032206	67.72
3.159	15.14193	0.03193	67.76
3.346	15.144216	0.034216	67.72
3.546	15.143419	0.033419	67.72
3.759	15.144594	0.034594	67.76
3.976	15.141556	0.031556	67.72
4.216	15.137825	0.027825	67.71
4.466	15.140098	0.030098	67.69
4.726	15.142894	0.032894	67.67
5.006	15.138499	0.028499	67.67
5.306	15.13648	0.02648	67.66
5.616	15.133157	0.023157	67.64
5.96	15.129044	0.019044	67.71
6.306	15.129176	0.019176	67.66
6.676	15.125969	0.015969	67.65
7.076	15.125176	0.015176	67.64
7.496	15.132911	0.022911	67.64
7.936	15.132114	0.022114	67.64
8.406	15.121182	0.011182	67.64
8.906	15.124516	0.014516	67.64
9.436	15.126396	0.016396	67.64
9.996	15.128884	0.018884	67.70
10.209	15.129972	0.019972	67.68

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.13262	0.00262	67.72
0.004	15.134337	0.004337	67.74
0.008	15.129541	-0.000459	67.75
0.012	15.132474	0.002474	67.77
0.017	15.134337	0.004337	67.78
0.021	15.128616	-0.001384	67.79
0.025	15.127687	-0.002313	67.79
0.029	15.043941	-0.086059	67.80
0.037	13.674962	-1.455038	67.82
0.042	12.684387	-2.445613	67.82
0.046	11.206899	-3.923101	67.82
0.054	10.06035	-5.06965	67.83
0.058	10.613867	-4.516133	67.84
0.062	10.86297	-4.26703	67.83
0.067	11.019478	-4.110522	67.84
0.071	11.155222	-3.974778	67.84
0.075	11.276949	-3.853051	67.84
0.079	11.39377	-3.73623	67.84
0.083	11.507253	-3.622747	67.85
0.087	11.620616	-3.509384	67.85
0.092	11.734499	-3.395501	67.85
0.096	11.847044	-3.282956	67.85
0.102	12.001144	-3.128856	67.83
0.108	12.171637	-2.958363	67.83

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.115	12.326265	-2.803735	67.82
0.122	12.467568	-2.662432	67.81
0.129	12.606493	-2.523507	67.80
0.137	12.760713	-2.369287	67.79
0.146	12.92678	-2.20322	67.79
0.154	13.056891	-2.073109	67.79
0.164	13.213893	-1.916107	67.78
0.174	13.354941	-1.775059	67.78
0.184	13.485313	-1.644687	67.77
0.195	13.612742	-1.517258	67.77
0.207	13.745347	-1.384653	67.76
0.22	13.864427	-1.265573	67.77
0.233	13.974829	-1.155171	67.76
0.247	14.089759	-1.040241	67.76
0.262	14.192147	-0.937853	67.76
0.278	14.286425	-0.843575	67.79
0.294	14.367911	-0.762089	67.76
0.312	14.450066	-0.679934	67.79
0.331	14.526641	-0.603359	67.76
0.351	14.589759	-0.540241	67.77
0.378	14.665648	-0.464352	67.79
0.394	14.701075	-0.428925	67.76
0.418	14.752193	-0.377807	67.78
0.444	14.800676	-0.329324	67.79
0.478	14.851397	-0.278603	67.79
0.497	14.872712	-0.257288	67.76
0.527	14.905589	-0.224411	67.76
0.558	14.936875	-0.193125	67.76
0.592	14.963391	-0.166609	67.76
0.627	14.981803	-0.148197	67.76
0.664	15.00245	-0.12755	67.76
0.711	15.037137	-0.092863	67.78
0.746	15.036202	-0.093798	67.78
0.79	15.051787	-0.078213	67.76
0.844	15.056856	-0.073144	67.78
0.887	15.062341	-0.067659	67.76
0.944	15.074825	-0.055175	67.78
0.996	15.077486	-0.052514	67.75
1.056	15.080728	-0.049272	67.76
1.116	15.084814	-0.045186	67.77
1.186	15.093076	-0.036924	67.76
1.256	15.093762	-0.036238	67.75

Withdrawal #2

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.326	15.094299	-0.035701	67.75
1.411	15.095362	-0.034638	67.78
1.496	15.103456	-0.026544	67.75
1.578	15.104394	-0.025606	67.78
1.678	15.121696	-0.008304	67.78
1.778	15.105309	-0.024691	67.78
1.878	15.123701	-0.006299	67.78
1.986	15.102954	-0.027046	67.76
2.112	15.107447	-0.022553	67.78
2.236	15.106275	-0.023725	67.74
2.366	15.104676	-0.025324	67.74
2.512	15.10638	-0.02362	67.77
2.656	15.104948	-0.025052	67.75
2.816	15.102813	-0.027187	67.76
2.979	15.115545	-0.014455	67.77
3.156	15.10228	-0.02772	67.75
3.346	15.112775	-0.017225	67.79
3.546	15.120226	-0.009774	67.77
3.756	15.104948	-0.025052	67.75
3.976	15.10428	-0.02572	67.72
4.216	15.108798	-0.021202	67.70
4.466	15.108133	-0.021867	67.69
4.726	15.110679	-0.019321	67.68
5.006	15.114003	-0.015997	67.67
5.306	15.110538	-0.019462	67.66
5.616	15.109076	-0.020924	67.64
5.956	15.112928	-0.017072	67.64
6.306	15.113595	-0.016405	67.63
6.676	15.116673	-0.013327	67.63
7.076	15.119729	-0.010271	67.63
7.496	15.115198	-0.014802	67.62
7.936	15.11426	-0.01574	67.62
8.406	15.112409	-0.017591	67.62
8.906	15.115066	-0.014934	67.61
9.436	15.120095	-0.009905	67.66
9.996	15.118241	-0.011759	67.69
10.585	15.130104	0.000104	67.67

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.127192	0.007192	67.71
0.004	15.128369	0.008369	67.74
0.009	15.12479	0.00479	67.76
0.013	15.133016	0.013016	67.77
0.017	15.14259	0.02259	67.78
0.021	15.128078	0.008078	67.78
0.025	15.130487	0.010487	67.79
0.029	15.131672	0.011672	67.79
0.034	15.129017	0.009017	67.80
0.038	15.128884	0.008884	67.81
0.042	15.129932	0.009932	67.81
0.046	15.129276	0.009276	67.81
0.05	15.129672	0.009672	67.82
0.054	15.129417	0.009417	67.82
0.059	15.13461	0.01461	67.83
0.063	15.13262	0.01262	67.83
0.067	15.130065	0.010065	67.83
0.071	15.119962	-3.8E-05	67.83
0.075	15.122353	0.002353	67.84
0.079	15.126362	0.006362	67.83
0.084	15.127551	0.007551	67.84
0.088	15.129276	0.009276	67.84
0.092	15.134068	0.014068	67.84
0.096	15.141631	0.021631	67.84

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.102	15.141141	0.021141	67.82
0.108	17.342991	2.222991	67.81
0.195	17.6457	2.5257	67.81
0.233	18.365122	3.245122	67.78
0.247	16.081638	0.961638	67.76
0.262	15.854909	0.734909	67.78
0.278	15.811124	0.691124	67.76
0.294	15.749326	0.629326	67.78
0.312	15.700877	0.580877	67.75
0.331	15.656266	0.536266	67.77
0.357	15.588495	0.468495	67.78
0.372	15.564661	0.444661	67.76
0.394	15.532042	0.412042	67.77
0.423	15.495163	0.375163	67.78
0.443	15.472274	0.352274	67.75
0.469	15.426451	0.306451	67.76
0.497	15.40901	0.28901	67.76
0.527	15.383871	0.263871	67.77
0.558	15.365208	0.245208	67.77
0.592	15.339515	0.219515	67.77
0.627	15.321255	0.201255	67.76
0.664	15.308766	0.188766	67.76
0.704	15.290111	0.170111	67.75
0.746	15.288511	0.168511	67.74
0.79	15.270949	0.150949	67.77
0.837	15.254703	0.134703	67.75
0.89	15.244721	0.124721	67.78
0.94	15.233128	0.113128	67.74
0.996	15.222889	0.102889	67.76
1.057	15.222227	0.102227	67.77
1.123	15.226873	0.106873	67.77
1.19	15.210633	0.090633	67.77
1.257	15.198402	0.078402	67.76
1.326	15.199975	0.079975	67.76
1.406	15.187749	0.067749	67.73
1.496	15.189342	0.069342	67.75
1.576	15.182685	0.062685	67.74
1.676	15.179623	0.059623	67.73
1.776	15.170437	0.050437	67.74
1.876	15.170709	0.050709	67.73
1.991	15.167362	0.047362	67.77
2.106	15.165892	0.045892	67.74

Injection #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
2.236	15.160991	0.040991	67.74
2.366	15.154986	0.034986	67.75
2.506	15.155532	0.035532	67.73
2.657	15.153907	0.033907	67.76
2.824	15.151657	0.031657	67.76
2.976	15.145555	0.025555	67.73
3.158	15.15246	0.03246	67.76
3.346	15.146739	0.026739	67.73
3.546	15.146598	0.026598	67.70
3.756	15.144619	0.024619	67.70
3.976	15.144364	0.024364	67.69
4.216	15.138247	0.018247	67.68
4.466	15.137825	0.017825	67.67
4.726	15.137825	0.017825	67.67
5.006	15.137565	0.017565	67.66
5.306	15.133835	0.013835	67.66
5.616	15.138089	0.018089	67.66
5.956	15.142206	0.022206	67.66
6.306	15.140362	0.020362	67.66
6.676	15.13796	0.01796	67.66
7.076	15.134501	0.014501	67.66
7.496	15.132632	0.012632	67.66
7.936	15.131968	0.011968	67.66
8.406	15.132501	0.012501	67.67
8.906	15.133959	0.013959	67.67
9.436	15.131038	0.011038	67.68
9.996	15.138861	0.018861	67.73
10.112	15.132347	0.012347	67.72

Withdrawal #3

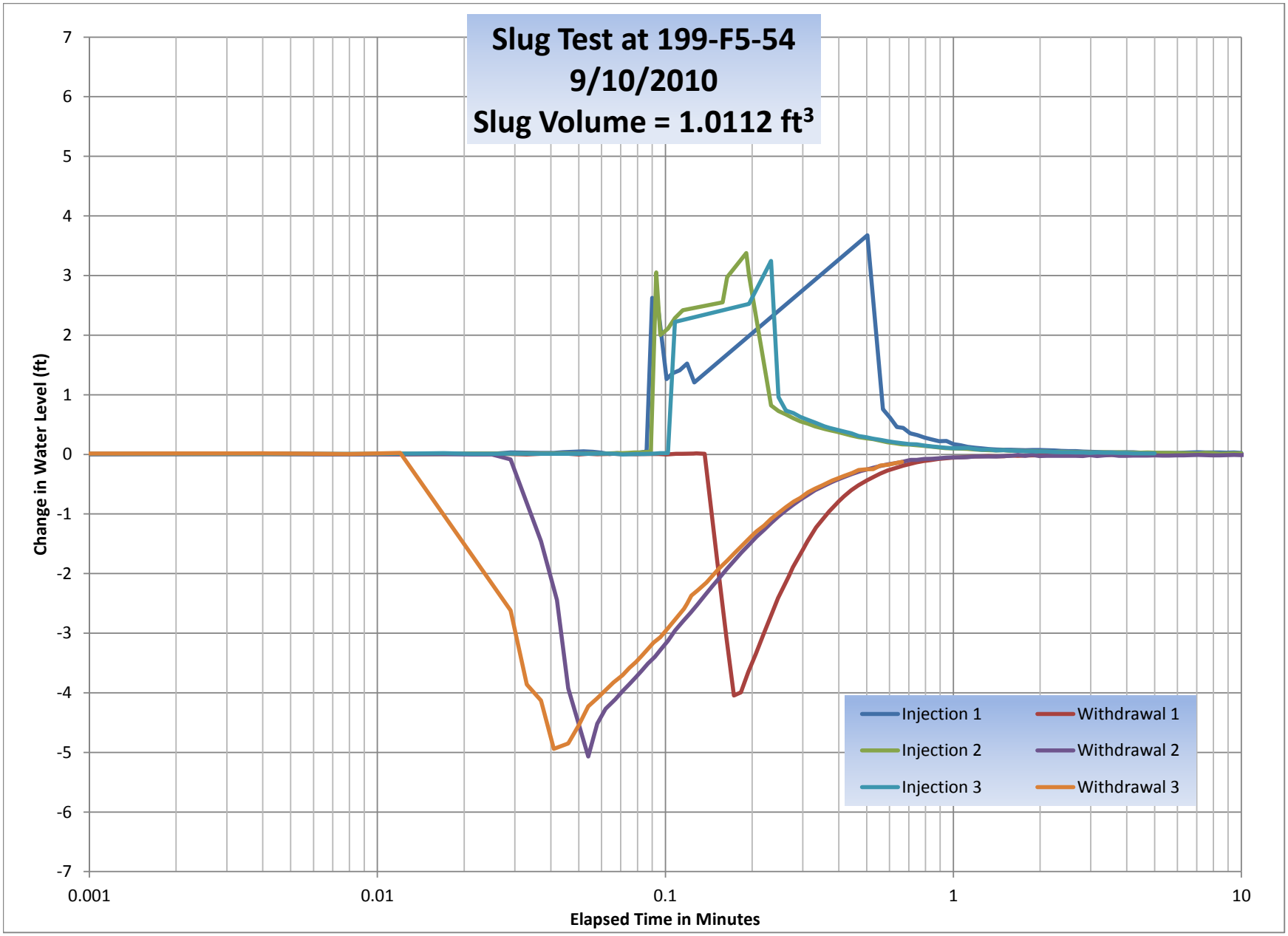
Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.001	15.141803	0.011803	67.76
0.004	15.148051	0.018051	67.78
0.008	15.136592	0.006592	67.80
0.012	15.152852	0.022852	67.81
0.029	12.51005	-2.61995	67.85
0.033	11.269217	-3.860783	67.85
0.037	10.999692	-4.130308	67.86
0.041	10.189694	-4.940306	67.86
0.046	10.27903	-4.85097	67.86
0.05	10.587462	-4.542538	67.86
0.054	10.903642	-4.226358	67.87
0.058	11.038067	-4.091933	67.87
0.062	11.173573	-3.956427	67.87
0.066	11.301599	-3.828401	67.87
0.071	11.42229	-3.70771	67.88
0.075	11.546863	-3.583137	67.88
0.079	11.645459	-3.484541	67.88
0.083	11.757074	-3.372926	67.89
0.087	11.865545	-3.264455	67.89
0.091	11.971167	-3.158833	67.88
0.096	12.062572	-3.067428	67.89
0.102	12.213497	-2.916503	67.87
0.116	12.536922	-2.593078	67.86
0.119	12.624726	-2.505274	67.88

Withdrawal #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
0.123	12.761131	-2.368869	67.86
0.13	12.855835	-2.274165	67.92
0.139	12.980516	-2.149484	67.88
0.152	13.192037	-1.937963	67.88
0.156	13.24906	-1.88094	67.89
0.164	13.346952	-1.783048	67.86
0.174	13.474958	-1.655042	67.85
0.184	13.593098	-1.536902	67.83
0.202	13.788507	-1.341493	67.85
0.207	13.837633	-1.292367	67.87
0.22	13.934747	-1.195253	67.83
0.233	14.047009	-1.082991	67.82
0.247	14.145703	-0.984297	67.85
0.262	14.243947	-0.886053	67.82
0.279	14.340963	-0.789037	67.85
0.294	14.400533	-0.729467	67.82
0.313	14.494264	-0.635736	67.84
0.331	14.553541	-0.576459	67.81
0.351	14.611595	-0.518405	67.83
0.379	14.689877	-0.440123	67.84
0.394	14.721712	-0.408288	67.82
0.418	14.769777	-0.360223	67.83
0.446	14.818032	-0.311968	67.84
0.469	14.86884	-0.26116	67.81
0.497	14.880424	-0.249576	67.81
0.527	14.884691	-0.245309	67.81
0.558	14.942739	-0.187261	67.81
0.592	14.955935	-0.174065	67.81
0.627	14.981887	-0.148113	67.80
0.664	15.003852	-0.126148	67.80
0.704	15.029552	-0.100448	67.80
0.746	15.036202	-0.093798	67.83
0.79	15.045799	-0.084201	67.80
0.837	15.049931	-0.080069	67.79
0.887	15.068584	-0.061416	67.81
0.946	15.075366	-0.054634	67.83
0.996	15.080146	-0.049854	67.80
1.056	15.100646	-0.029354	67.80
1.116	15.088265	-0.041735	67.82
1.186	15.090807	-0.039193	67.80
1.256	15.092137	-0.037863	67.80
1.326	15.091103	-0.038897	67.79

Withdrawal #3

Elapsed Time	Head	Delta WL	Temp
Min	(ft)	(ft)	F
1.413	15.100646	-0.029354	67.82
1.496	15.101184	-0.028816	67.79
1.58	15.105309	-0.024691	67.81
1.68	15.105583	-0.024417	67.82
1.78	15.105847	-0.024153	67.81
1.88	15.102923	-0.027077	67.81
1.986	15.110635	-0.019365	67.79
2.113	15.10891	-0.02109	67.81
2.236	15.111172	-0.018828	67.77
2.366	15.108953	-0.021047	67.77
2.513	15.114624	-0.015376	67.80
2.656	15.109594	-0.020406	67.78
2.816	15.115444	-0.014556	67.80
2.98	15.120503	-0.009497	67.80
3.156	15.113183	-0.016817	67.78
3.346	15.117206	-0.012794	67.74
3.546	15.112008	-0.017992	67.72
3.756	15.117856	-0.012144	67.72
3.976	15.114387	-0.015613	67.71
4.216	15.117729	-0.012271	67.70
4.466	15.120663	-0.009337	67.69
4.726	15.126652	-0.003348	67.68
5.006	15.131171	0.001171	67.67
5.306	15.129044	-0.000956	67.67
5.616	15.127842	-0.002158	67.66
5.956	15.125453	-0.004547	67.66
6.306	15.123868	-0.006132	67.65
6.676	15.117329	-0.012671	67.65
7.076	15.118399	-0.011601	67.65
7.496	15.120125	-0.009875	67.63
7.936	15.121058	-0.008942	67.64
8.414	15.130223	0.000223	67.69
8.906	15.125827	-0.004173	67.68
9.436	15.130898	0.000898	67.70
9.996	15.127192	-0.002808	67.69


Slug Test at 199-F5-54
9/10/2010
Slug Volume = 1.0112 ft³
Change in Water Level (ft)
7
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0.001
0.01
0.1
1
10
Elapsed Time in Minutes
Injection 1
Injection 2
Injection 3
Withdrawal 1
Withdrawal 2
Withdrawal 3

Slug Test Field Activity Report

Summary of FAR - F5-54

Time	Note
9/10/2010 11:48	Well development complete, pump removed from well. Prepare for slug test.
9/10/2010 12:17	Inject 0.78 ft^3 Slug.
9/10/2010 12:26	Withdraw 0.78 ft^3 Slug.
9/10/2010 12:36	Inject 0.78 ft^3 Slug.
9/10/2010 12:46	Withdraw 0.78 ft^3 Slug.
9/10/2010 12:56	Inject 0.78 ft^3 Slug.
9/10/2010 13:06	Withdraw 0.78 ft^3 Slug.
9/10/2010 13:16	Switch to larger slug for second set of tests.
9/10/2010 13:19	Inject 1.07 ft^3 Slug.
9/10/2010 13:32	Withdraw 1.07 ft^3 Slug.
9/10/2010 13:41	Inject 1.07 ft^3 Slug.
9/10/2010 13:51	Withdraw 1.07 ft^3 Slug.
9/10/2010 14:01	Inject 1.07 ft^3 Slug.
9/10/2010 14:07	Mark Cherry and Jim Geiger visit site.
9/10/2010 14:11	Withdraw 1.07 ft^3 Slug.
9/10/2010 14:22	Remove slug from well, testing completed.
9/10/2010 14:25	Final well measurements, DTW = 46.30' toc; DTB = 64.10' toc.

Note* the slug volumes were recalculated by Robert Edrington, therefore the field notes and the raw data files names will vary slightly when referring to slug volumes.

ECF-100FR3-12-0028
Revision 0

Hydraulic Gradients in 100-FR-3, 2010 and 2011

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

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Approved for Public Release;
Further Dissemination Unlimited

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Hydraulic Gradients in 100-FR-3, 2010 and 2011

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Environmental Calculation Cover Page

Part 1: Completed by the Responsible Manager

Project: Groundwater and Vadose Zone Remediation Project **Date: 6/26/2012**

Calculation Title & Description: Hydraulic Gradients in 100-FR-3, 2010 and 2011

Preparer: M.J. Hartman	**Basis of Qualification: 100-BC-5 project scientist**
Checker: K.M. Hanson	**Basis of Qualification:** Scientist
Senior Reviewer: J. P. McDonald	**Basis of Qualification: Subject matter expert**

Part 2: Completed by Preparer

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Terms

ANOVA	Analysis of variance
Df	Degrees of freedom
Diff	Difference
DOE	United States Department of Energy
m/d	Meters per day
NAVD88	North American Vertical Datum of 1988

1 Purpose

The purpose of these environmental calculations is to estimate hydraulic gradients and groundwater flow velocity in the 100-F Area using least squares-regression analysis of water-level data collected in 2010 and 2011. Results of these calculations are to be included in the Remedial Investigation/Feasibility Study report for 100-F.

2 Methodology

A Microsoft Excel 2007®[1] spreadsheet was used to calculate hydraulic gradients and groundwater velocity based on water-level data from 100-F wells.

Water-level data were analyzed by trend-surface analysis calculations in a Microsoft Excel 2007 spreadsheet created by J.P. McDonald. The method was described by Davis (2002, *Statistics and Data Analysis in Geology*). A first-order, linear trend surface (i.e., a plane) was fitted to the water-level elevation data using least squares regression. The slope of the fitted surface represented the hydraulic gradient magnitude, and the dip direction represented the hydraulic gradient direction. To determine if the fitted plane was valid for determining the hydraulic gradient, a statistical test was used to evaluate the goodness of fit of the plane to the water-level data. Sections 2.1 and 2.2, written by J.P. McDonald, describe the trend-surface analysis and statistical test. Section 2.3 describes calculation of average linear velocity.

2.1 Trend-Surface Analysis

The following linear regression equation was used for the trend-surface analysis (from Davis [2002]):

$$z = b_0 + b_1 x + b_2 y \qquad \text{Equation 1}$$

where z is the predicted water-level elevation (meters NAVD88) at a location x,y, in which x is the easting geographic coordinate (meters) and y is the northing geographic coordinate (meters), b_0 is the offset (meters), b_1 is the slope in the x-direction (meter/meter), and b_2 is the slope in the y-direction (meter/meter). Equation 1 can be rearranged as follows:

$$b_1 x + b_2 y - z + b_0 = 0 \qquad \text{Equation 2}$$

This equation has the same form as

$$ax + by + cz + d = 0 \qquad \text{Equation 3}$$

which is the familiar equation of a plane in standard form.

The least-squares regression was performed by solving the following matrix equation for the regression coefficients, b_0, b_1, and b_2 (from Davis [2002]):

[1] Microsoft Excel is a registered product of the Microsoft Corporation.

$$\begin{bmatrix} k & \sum_{j=1}^{k} x_j & \sum_{j=1}^{k} y_j \\ \sum_{j=1}^{k} x_j & \sum_{j=1}^{k} x_j^2 & \sum_{j=1}^{k} x_j y_j \\ \sum_{j=1}^{k} y_j & \sum_{j=1}^{k} x_j y_j & \sum_{j=1}^{k} y_j^2 \end{bmatrix} \cdot \begin{bmatrix} b_0 \\ b_1 \\ b_2 \end{bmatrix} = \begin{bmatrix} \sum_{j=1}^{k} z_j \\ \sum_{j=1}^{k} x_j z_j \\ \sum_{j=1}^{k} y_j z_j \end{bmatrix} \qquad \text{Equation 4}$$

where k is the number of wells, x_j is the easting geographic coordinate of the jth well, y_j is the northing geographic coordinate of the jth well, and z_j is the measured water-level elevation in the jth well. Equation 4 was solved in a spreadsheet modeled after the spreadsheet of Devlin (2003, *A Spreadsheet Method of Estimating Best-Fit Hydraulic Gradients Using Head Data from Multiple Wells*).

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 3, and therefore, vector $<b_1,b_2,-1>$ is a normal vector to the plane represented in Equation 2. 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 follows:

$$i = \left(b_1^2 + b_2^2\right)^{1/2} \qquad \text{Equation 5}$$

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.

2.2 Statistical Test

It is possible to use the equations in Section 2.1 to fit a plane to any set of x_j,y_j,z_j data, even random data, and calculate the slope and dip direction of the fitted plane. When applying these equations to water-level measurements, how can it be known that the results are due to the hydraulic gradient and not due to random error? In other words, how can it be known that the hydraulic gradient has been measured successfully? This question was answered by performing a statistical test.

In a statistical test, a null hypothesis and alternative hypothesis are established such that if the null hypothesis is false, then the alternative hypothesis will be true (Davis, 2002; Ott and Mendenhall, 1985, *Understanding Statistics*). The test is designed such that the null hypothesis will only be rejected if the probability of obtaining the observed result or a result more contradictory to the null hypothesis, assuming the null hypothesis is true, is below some threshold value. In statistical testing, there is always a chance that the decision to reject or not reject the null hypothesis will be incorrect. A Type I error occurs when the null hypothesis is rejected when it is true, and a Type II error occurs when the null hypothesis is not rejected when it is false. The acceptable probability of committing a Type I error is denoted by α (alpha), and the probability of committing a Type II error is denoted by β (beta). The threshold value for rejecting or not rejecting the null hypothesis is α, and the probability of obtaining the observed result or a result more contradictory to the null hypothesis, assuming the null hypothesis is true, is referred to as the level of significance (denoted as the p-value). Thus, if the p-value is less than or equal to α, the null hypothesis will be rejected and the alternative hypothesis will be accepted. However, if the p-value is greater than α, it does not mean that the null hypothesis is true. Instead, it means there is

insufficient justification to reject the null hypothesis. To emphasize, a statistical test does not choose between the null and alternative hypotheses. Rather, it tests whether or not there is sufficient justification to accept the alternative hypothesis.

The statistical test used for the 100-F analyses is known as an analysis of variance (ANOVA). In this test, the variance (i.e., the variability) of the set of deviations of each measurement from a horizontal plane centered on the mean of the measurements is compared to the variance of the set of deviations of each measurement from the fitted plane. If the deviations from the fitted plane are much smaller than the deviations from the horizontal plane, it can be concluded that there is a linear trend in the data not explainable by random error. Thus, the fitted plane would be deemed statistically significant.

For the ANOVA analysis at 100-F, the specific null hypothesis was both b_1 and b_2 in Equation 1 were equal to zero (i.e., the best fit plane is horizontal). The alternative hypothesis was that either b_1 was not equal to zero, b_2 was not equal to zero, or both b_1 and b_2 were not equal to zero (i.e., the best fit plane is distinguishable from a horizontal plane). To evaluate the null hypothesis, the ratio of the variance about the horizontal plane to the variance about the fitted plane was computed (this value is known as the test statistic), and then the probability of obtaining that ratio or a larger ratio (i.e., the *p*-value) was determined using the *f* probability distribution[2]. The acceptable probability of committing a Type I error (α) was chosen, *a priori*, to be 0.05 for this study. Thus, when the *p*-value for a given trend-surface analysis was less than or equal to 0.05, the null hypothesis (both coefficients are equal to zero) was rejected and the alternative hypothesis (one or both coefficients are nonzero) was accepted, and there was a 95% chance that this decision was correct. In other words, if the probability of obtaining the observed deviations about the fitted plane (or a set of smaller deviations) from a random sampling of deviations about a horizontal plane was less than or equal to 0.05, then there was high confidence that a spatial trend really exists in the water-level measurements and that the hydraulic gradient was measured successfully.

The goodness of fit coefficient (R^2) was another statistic used in this study to ascertain whether or not the water-level measurements fit a plane. This statistic is the ratio of the sum of squares due to the regression (SS_R) to the total sum of squares (SS_T), as follows (Davis 2002):

$$R^2 = \frac{SS_R}{SS_T} \qquad \text{Equation 6}$$

where the sum of squares due to the regression is given by:

$$SS_R = \sum_{j=1}^{k} (\hat{z}_j - Z)^2 \qquad \text{Equation 7}$$

and the total sum of squares is given by:

$$SS_T = \sum_{j=1}^{k} (z_j - Z)^2 \qquad \text{Equation 8}$$

in which z_j is the measured water-level elevation in the jth well, Z is the average water-level elevation in all k wells, and $\hat{z}_j$ is the predicted water-level elevation for the jth well from the trend-surface regression

[2] The *f* probability 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 (Davis, 2002).

equation. 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.

2.3 Average Linear Velocity

The average linear velocity of groundwater can be calculated using a form of the Darcy equation (Freeze and Cherry, 1979):

$$\bar{v} = \frac{Ki}{n_e}$$

in which $\bar{v}$ is average linear velocity, K is hydraulic conductivity, i is hydraulic gradient, and n_e is effective porosity.

3 Assumptions and Inputs

Manually-measured water-level data were retrieved from the "Environmental Monitoring" module of the Hanford Site's Virtual Library for wells screened across the water table within and south of 100-F Area (Figure 1). Concurrent dates were chosen as much as possible for the following time periods, which cover a range of seasonal conditions: February, March, July, and September 2010 and March and December 2011. Appendix A includes the data used in these calculations.

Well coordinates (northing and easting) were retrieved from the Hanford Site's "Environmental Dashboard Application" (http://environet.rl.gov/EDA), rounded to the nearest hundredth of a meter and are listed in the Tables of Appendix A.

The calculation assumes that the water table is planar. This is of course a simplification, because water table contours form a varied "topography." The water table near the river in 100-F is much more variable and responsive to changes in river stage than it is inland. For this evaluation the 100-F Area was divided along a line that runs parallel to the river, approximately through wells 199-F7-2 and 199-F8-4, and the two regions were analyzed separately. A third region, located south of 100-F where a nitrate plume is present, was also evaluated (Figure 1).

As applied here, the Darcy equation assumes that flow is horizontal (vertical gradients are insignificant) and the aquifer is homogeneous.

Hydraulic conductivity and effective porosity values were chosen from those used for groundwater modeling in support of the Remedial Investigation/Feasibility Study. Recent slug tests in 100-F provided a range of results for the Hanford formation (ECF-100FR3-11-0146). The 10th and 90th percentiles were 10 m/d and 75 m/d, respectively, and the median was approximately 35 m/day. Effective porosity was assumed to be 18 percent, the value used in the computer model.

4 Software Applications

A Microsoft Excel 2007®[3] spreadsheet was used to perform calculations described in Section 2, using the default calculation formulae available in that software. The spreadsheet previously was validated by comparison of results with a commercial software (personal communication, e-mail from Dennis Weier,

[3] Microsoft Excel is a registered product of the Microsoft Corporation.

Pacific Northwest National laboratory, to John McDonald, Fluor Hanford, Inc., "Spreadsheet verification," April 7, 2008).

4.1 Description

Software Title: Microsoft® Excel 2007

Software Version: 2007

Hanford Information System Number: 1915

Workstation Type and property number: HLAN Standard Workstation #WC96718

4.2 Software Installation and Checkout

Calculations are presented and discussed in Section 5. The Microsoft® Excel 2007 spreadsheet is attached in Appendix A. Inclusion of the calculation spreadsheet files in their complete configuration is exempt from the validation and verification requirements of PRC-PRO-IRM-309.

4.3 Statement of Valid Software Application

Microsoft® Excel 2007 is approved software for use in performing calculations at Hanford and the calculations were performed within the limitations of the software as approved, and consistent with the requirements of PRC-PRO-IRM-309.

5 Calculations

As an example of hydraulic gradient calculations, Table 1 shows the September 2010 spreadsheet for southwestern 100-F, with formulae visible to illustrate the calculations. On sheet 1 of Table 1, well names, easting, northing, observed hydraulic head, and measurement dates were input data with consistent units (meters) in the blue-shaded cells (B9 through F15). The spreadsheet calculation fits a plane through the data and computes what the head "should" be at each well based on that approximation.

Also on sheet 1 of Table 1, computed data with formulae for predicted hydraulic head and predicted difference from mean and residuals are shown in cells G9 through I28. The magnitude and direction of the gradient are displayed in cells L10 and L11. Statistical indicators goodness of fit (L15) and correlation coefficient (L16) should be very close to 1.0. The level of significance is set at 0.05. If the P value (L18) is less than the level of significance, there is a statistically significant trend (L19). Additional intermediate calculations are displayed in columns K and L such as number of observations (cell L23). Columns N through S, rows 13 through 17, display an ANOVA table.

On sheet 2 of Table 1, computed data formulae continue in cells G24 through I28. Intermediate computations continue in cells K24 through L36. Matrix equation computations are shown in cells K40 through O42. Inverse Matrix and coefficients of the Fitted Plane equations are shown in cells K46 through M48 and L54.

On sheet 3 of Table 1, normal vector to the fitted plane, gradient magnitude and gradient direction formulae are in columns K, L, and M.

Table 2 shows a spreadsheet, with formulae visible, to calculate groundwater velocity using the Darcy equation. A range of hydraulic conductivity (K) and effective porosity (n) are input and the spreadsheet calculates the rate of groundwater linear velocities for three regions: Southwest (inland 100-F), Northeast (near-river 100-F) and South of 100-F.

6 Results

Table 3 lists the calculated hydraulic gradients and fit statistics for each of the three regions at various time periods in 2010 and 2011. Table 4 lists a range of groundwater velocity estimates. Sections 6.1 through 6.3 provide additional discussion and Tables A.1 through A.12 in Appendix A provide the calculations.

Figure 2 is a water-table map for 100-F for March 2011, when river stage was relatively high. Groundwater flow is variable in northeastern 100-F, where the water table responds rapidly to changing river stage. The gradient is more consistent in the southwestern (inland) portion of 100-F. Groundwater flows toward the southeast (parallel to the river) in the region south of 100-F.

6.1 Northeastern 100-F

In northeastern 100-F (near the Columbia River), the slope of the hydraulic gradient varies widely, depending on river stage (Table 3). Excluding data from well 199-F8-4 improved the goodness of fit and reduced residuals for most of the data sets. This well has lower head than the other wells in 100-F.

During low river stage (February and September 2010), the water table sloped to the northeast, perpendicular to the river. The maximum gradient was 1.6×10^{-3} in September 2010. December 2011 was a time of fairly low, but variable river stage. The gradient sloped toward the east-northeast. Using the median value for hydraulic conductivity, velocity ranged from 0.17 to 0.31 m/d (Table 4) during these periods of low river stage.

During high and moderately high river stage (early July 2010 and March 2011, respectively), the gradient reversed and sloped gently to the south or south-southwest (Table 3). The July data set did not form a good plane: goodness of fit (0.24) and correlation coefficient (0.49) were far below 1.0 and the P Value (0.28) far above the 0.05 level of significance. March 2011 data were a fairly good fit if well 199-F8-4 was excluded. The gradient magnitude was 3.5×10^{-4} in March 2011. Using the median value for hydraulic conductivity, velocity was 0.07 m/d in March 2011 (Table 4).

6.2 Southwestern 100-F

Groundwater flow in the inland portion of 100-F was consistently to the east or east-northeast during the periods studied (Table 3). All of the data sets had a good fit and low P values, indicating the water table could be approximated by a plane. The magnitude of the gradient varied little (1.04×10^{-3} to 1.5×10^{-3}). Using the median value for hydraulic conductivity, velocity ranged from 0.20 to 0.29 m/d (Table 4).

6.3 South of 100-F Area

A large nitrate plume extends southward several kilometers from 100-F. The gradient in this region was calculated from water-level data from five wells in March 2010 and three wells in March 2011. During both periods the gradient sloped to the south-southeast at 1.2×10^{-3} and velocity was estimated at 0.24 m/d (Tables 3 and 4). In March 2010 the data achieved a good fit and low P value, but the two wells near the river had high residuals. Because only three wells had data in March 2011, fit statistics could not be calculated for that period.

Water levels are not measured as frequently in these wells as in 100-F, so calculations could not be performed for periods of high or low river stage.

7 References

Davis, J. C., 2002, *Statistics and Data Analysis in Geology*, 3rd Edition, John Wiley & Sons, New York.

Devlin, J. F., 2003, "A Spreadsheet Method of Estimating Best-Fit Hydraulic Gradients Using Head Data from Multiple Wells," in *Ground Water*, 41(3):316-320.

ECF-100FR3-11-0146, 2011, *Analysis of Slug Test Data at the 100-FR-3 Operable Unit*, CH2M HILL Plateau Remediation Company, Richland, Washington.

Freeze, R. Allan, and John A. Cherry, *Groundwater*, 1979. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

Ott, L., and W. Mendenhall, 1985, *Understanding Statistics*, 4th Edition, Duxbury Press, Boston.

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Table 1. Hydraulic Gradient Calculation Spreadsheet with Data for September 2010, Southwestern 100-F (3 sheets)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
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)**	**Date**	**Predicted Hydraulic Head**	**Predicted Diff from Mean**	**Residuals (Observed - Predicted)**		**Hydraulic Gradient**								
9		199-F7-1	579687.17	147022.43	114.63	40447	=IF(ISBLANK(E9),,$L$52+$L$53*C9+$L$54*D9)	=IF(G9=0,0,G9-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E9),,G9-E9)										
10		199-F7-3	579884.71	147112.53	114.57	40447	=IF(ISBLANK(E10),,$L$52+$L$53*C10+$L$54*D10)	=IF(G10=0,0,G10-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E10),,G10-E10)		**Gradient Magnitude:**	=L64							
11		199-F8-3	580253.99	147253.37	114.25	40447	=IF(ISBLANK(E11),,$L$52+$L$53*C11+$L$54*D11)	=IF(G11=0,0,G11-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E11),,G11-E11)		**Gradient Direction (azimuth):**	=INDEX(M69:M77,MATCH("Yes",L69:L77,0))							
12		199-F8-4	580958.51	147123.53	113.21	40447	=IF(ISBLANK(E12),,$L$52+$L$53*C12+$L$54*D12)	=IF(G12=0,0,G12-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E12),,G12-E12)										
13		199-F8-7	580242.91	147116.74	114.3	40447	=IF(ISBLANK(E13),,$L$52+$L$53*C13+$L$54*D13)	=IF(G13=0,0,G13-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E13),,G13-E13)		**Statistics**			**ANOVA**					
14		199-F5-4	580583.19	147533.73	113.89	40447	=IF(ISBLANK(E14),,$L$52+$L$53*C14+$L$54*D14)	=IF(G14=0,0,G14-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E14),,G14-E14)					**Var Source**	Sum of Squares	Df	Mean Squares	F-Test	P-Value
15		199-F5-48	580517.58	147690.10	113.77	40447	=IF(ISBLANK(E15),,$L$52+$L$53*C15+$L$54*D15)	=IF(G15=0,0,G15-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E15),,G15-E15)		**Goodness of Fit (R^2):**	=L36/L35		**Regression**	=SUM(H9:H28*H9:H28)	2	=O15/P15	=Q15/Q16	=FDIST(R15,P15,P16)
16		8					=IF(ISBLANK(E16),,$L$52+$L$53*C16+$L$54*D16)	=IF(G16=0,0,G16-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E16),,G16-E16)		**Correlation Coefficient (R):**	=SQRT(L15)		**Deviation**	=SUM(I9:I28*I9:I28)	=L23-3	=O16/P16		
17		9					=IF(ISBLANK(E17),,$L$52+$L$53*C17+$L$54*D17)	=IF(G17=0,0,G17-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E17),,G17-E17)		**Level of Significance:**	0.05		**Total**	=O15+O16	=L23-1			
18		10					=IF(ISBLANK(E18),,$L$52+$L$53*C18+$L$54*D18)	=IF(G18=0,0,G18-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E18),,G18-E18)		**P-Value:**	=ROUND(S15,4)							
19		11					=IF(ISBLANK(E19),,$L$52+$L$53*C19+$L$54*D19)	=IF(G19=0,0,G19-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E19),,E19-G19)		**Statistically Significant Trend?:**	=IF(L23=3,"N/A - 3 pts",IF(L18<=L17,"Yes","No"))							
20		12					=IF(ISBLANK(E20),,$L$52+$L$53*C20+$L$54*D20)	=IF(G20=0,0,G20-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E20),,E20-G20)										
21		13					=IF(ISBLANK(E21),,$L$52+$L$53*C21+$L$54*D21)	=IF(G21=0,0,G21-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E21),,E21-G21)		**Intermediate Computations**								
22		14					=IF(ISBLANK(E22),,$L$52+$L$53*C22+$L$54*D22)	=IF(G22=0,0,G22-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E22),,E22-G22)										
23		15					=IF(ISBLANK(E23),,$L$52+$L$53*C23+$L$54*D23)	=IF(G23=0,0,G23-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E23),,E23-G23)		**# of Observations:**	=COUNT(C9:C28)							

Table 1. Hydraulic Gradient Calculation Spreadsheet with Data for September 2010, Southwestern 100-F (3 sheets)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
24		16					=IF(ISBLANK(E24),,$L$52+$L$53*C24+$L$54*D24)	=IF(G24=0,0,G24-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E24),,E24-G24)		**Sum of Easting:**	=SUM(C9:C28)							
25		17					=IF(ISBLANK(E25),,$L$52+$L$53*C25+$L$54*D25)	=IF(G25=0,0,G25-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E25),,E25-G25)		**Sum of Northing:**	=SUM(D9:D28)							
26		18					=IF(ISBLANK(E26),,$L$52+$L$53*C26+$L$54*D26)	=IF(G26=0,0,G26-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E26),,E26-G26)		**Sum of Easting*Northing:**	=SUM(C9:C28*D9:D28)							
27		19					=IF(ISBLANK(E27),,$L$52+$L$53*C27+$L$54*D27)	=IF(G27=0,0,G27-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E27),,E27-G27)		**Sum of Easting^2:**	=SUM(C9:C28^2)							
28		20					=IF(ISBLANK(E28),,$L$52+$L$53*C28+$L$54*D28)	=IF(G28=0,0,G28-SUM($G$9:$G$28)/$L$23)	=IF(ISBLANK(E28),,E28-G28)		**Sum of Northing^2:**	=SUM(D9:D28^2)							
29											**Sum of Observed Heads:**	=SUM(E9:E28)							
30											**Sum of Easting*Observed Heads:**	=SUM(C9:C28*E9:E28)							
31											**Sum of Northing*Observed Heads:**	=SUM(D9:D28*E9:E28)							
32											**Sum of Observed Heads^2:**	=SUM(E9:E28^2)							
33											**Sum of Predicted Heads:**	=SUM(G9:G28)							
34											**Sum of Predicted Heads^2:**	=SUM(G9:G28^2)							
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																			

Table 1. Hydraulic Gradient Calculation Spreadsheet with Data for September 2010, Southwestern 100-F (3 sheets)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
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")						

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Table 2. Velocity Calculation Spreadsheet

	A	B	C	D	E	F	G	H	I	J
1	**Date**	**Gradient**	**Gradient Azimuth (E of N)**	**K low (m/d)**	**K high (m/d)**	**K median (m/d)**	**n**	**v low (m/d)**	**v high (m/d)**	**v median (m/d)**
2	**Southwest (inland 100-F)**									
3	Feb-10	0.00151	77	10	75	35	0.18	=(D3*B3)/G3	=(E3*B3)/G3	=(F3*B3)/G3
4	Jul-10	0.00125	83.4	10	75	35	0.18	=(D4*B4)/G4	=(E4*B4)/G4	=(F4*B4)/G4
5	Sep-10	0.00116	95.2	10	75	35	0.18	=(D5*B5)/G5	=(E5*B5)/G5	=(F5*B5)/G5
6	Mar-11	0.0012	90.1	10	75	35	0.18	=(D6*B6)/G6	=(E6*B6)/G6	=(F6*B6)/G6
7	Dec-11	0.00104	97.9	10	75	35	0.18	=(D7*B7)/G7	=(E7*B7)/G7	=(F7*B7)/G7
8	**Northeast (near-river 100-F)**									
9	Feb-10	0.000974	52.9	10	75	35	0.18	=(D9*B9)/G9	=(E9*B9)/G9	=(F9*B9)/G9
10	Jul-10	0.000853	202.4	10	75	35	0.18	=(D10*B10)/G10	=(E10*B10)/G10	=(F10*B10)/G10
11	Sep-10	0.00157	42.7	10	75	35	0.18	=(D11*B11)/G11	=(E11*B11)/G11	=(F11*B11)/G11
12	Mar-11	0.000354	169.7	10	75	35	0.18	=(D12*B12)/G12	=(E12*B12)/G12	=(F12*B12)/G12
13	Dec-11	0.000865	73.6	10	75	35	0.18	=(D13*B13)/G13	=(E13*B13)/G13	=(F13*B13)/G13
14	**South of 100-F**									
15	Mar-10	0.00121	157.4	10	75	35	0.18	=(D15*B15)/G15	=(E15*B15)/G15	=(F15*B15)/G15
16	Mar-11	0.00122	158.5	10	75	35	0.18	=(D16*B16)/G16	=(E16*B16)/G16	=(F16*B16)/G16

Table 3. Hydraulic Gradient and Fit Statistics, 100-F

Region	Date	# Wells	Gradient	Azimuth (E of N)	R2	R	P Value	Comment
North-eastern 100-F (near river)	Feb. 2010	8	9.74×10^{-4}	52.9	0.94	0.97	0.0009	
	July 2010	13	3.88×10^{-4}	215.9	0.24	0.49	0.2848	Reversed gradient. Poor fit; large residuals. Water table not planar.
	Sept. 2010	8	1.57×10^{-3}	42.7	0.99	1.00	0.000	
	Mar. 2011	9	3.54×10^{-4}	169.7	0.78	0.89	0.010	Reversed gradient
	Dec. 2011	9	8.65×10^{-4}	73.6	0.85	0.92	0.0037	
South-western 100-F (inland)	Feb. 2010	7	1.51×10^{-3}	77.0	0.93	0.97	0.0045	
	July 2010	7	1.25×10^{-3}	83.4	0.96	0.98	0.0019	
	Sept. 2010	7	1.16×10^{-3}	95.2	0.94	0.97	0.0037	
	Mar. 2011	7	1.20×10^{-3}	90.1	0.93	0.96	0.0054	
	Dec. 2011	7	1.04×10^{-3}	97.9	0.88	0.94	0.0155	
South of 100-F	Mar. 2010	5	1.21×10^{-3}	157.4	0.95	0.98	0.0467	
	Mar. 2011	3	1.22×10^{-3}	158.5	NC[a]	NC[a]	NC[a]	

NC = Not calculated

R = Correlation coefficient

R2 = Goodness of fit

Yellow highlight indicates case where P value is greater than 0.05 (trend not statistically significant at 0.05 level)

[a] These parameters are not meaningful for case with three data points (plane is perfect fit)

Table 4. Groundwater Velocity Estimates for 100-F

Date	Gradient	Azimuth (E of N)	v low[a] (m/d)	v high[b] (m/d)	v median[c] (m/d)
Northeastern 100-F (Near River)					
Feb-10	9.74×10^{-4}	53	0.054	0.406	0.189
Jul-10	NC	NC	NC	NC	NC
Sep-10	1.57×10^{-3}	43	0.087	0.654	0.305
Mar-11	3.54×10^{-4}	170	0.020	0.148	0.069
Dec-11	8.65×10^{-4}	74	0.048	0.360	0.168
Southwestern 100-F (Inland)					
Feb-10	1.51×10^{-3}	77	0.084	0.629	0.294
Jul-10	1.25×10^{-3}	83	0.069	0.521	0.243
Sep-10	1.16×10^{-3}	95	0.064	0.483	0.226
Mar-11	1.20×10^{-3}	90	0.067	0.500	0.233
Dec-11	1.04×10^{-3}	98	0.058	0.433	0.202
South of 100-F					
Mar-10	1.21×10^{-3}	157	0.067	0.504	0.235
Mar-11	1.22×10^{-3}	159	0.068	0.508	0.237

Notes

a. 10th percentile from 100-F aquifer tests (10 m/d)

b. 90th percentile from 100-F aquifer tests (75 m/d)

c. Median from 100-F aquifer tests (35 m/d)

Blue shading indicates periods with reversed gradient.

Effective porosity of 0.18 used for all calculations

NC = Not calculated. Water table in northeastern region was not planar in July 2010.

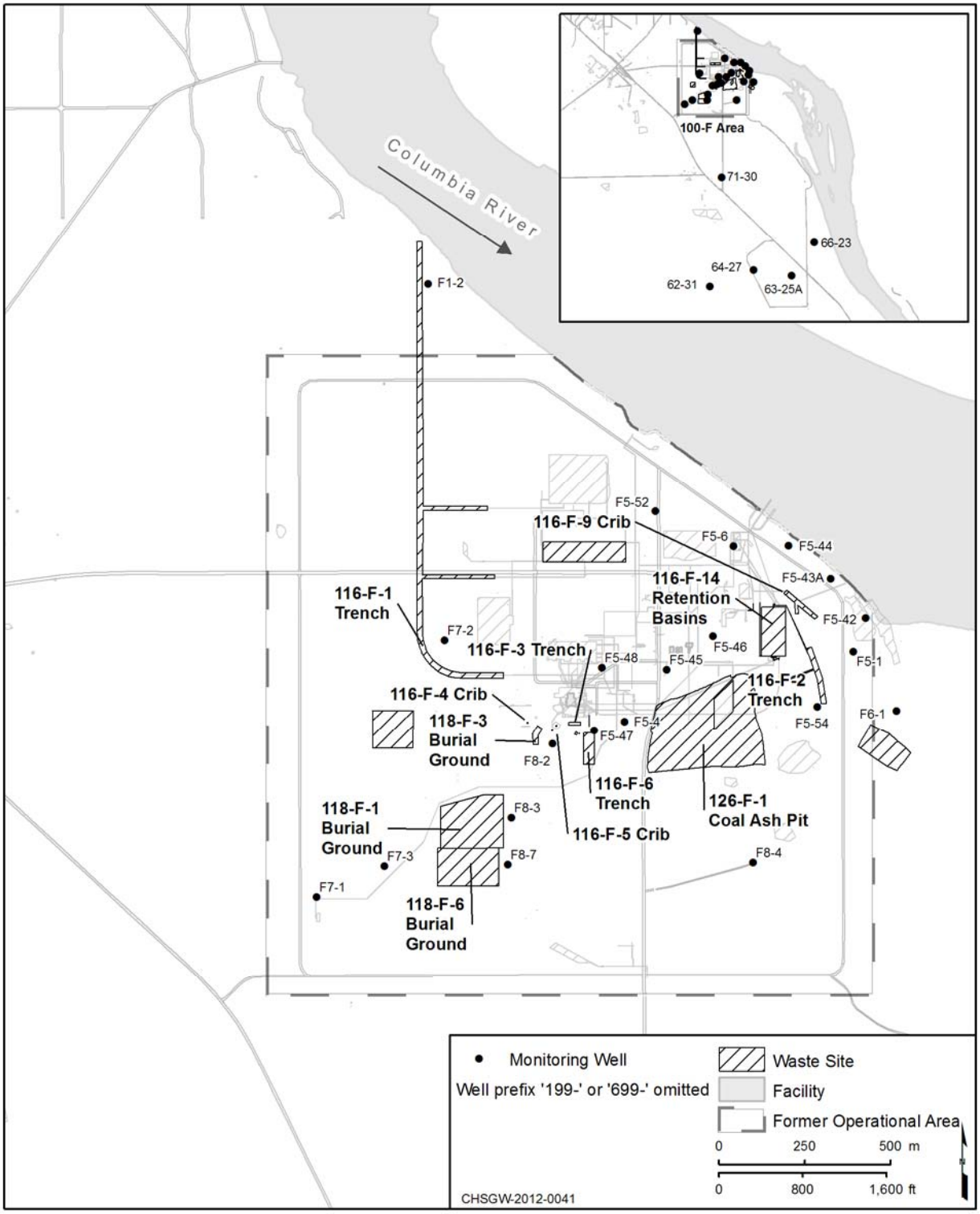

Figure 1. Water Table Wells in and near 100-F

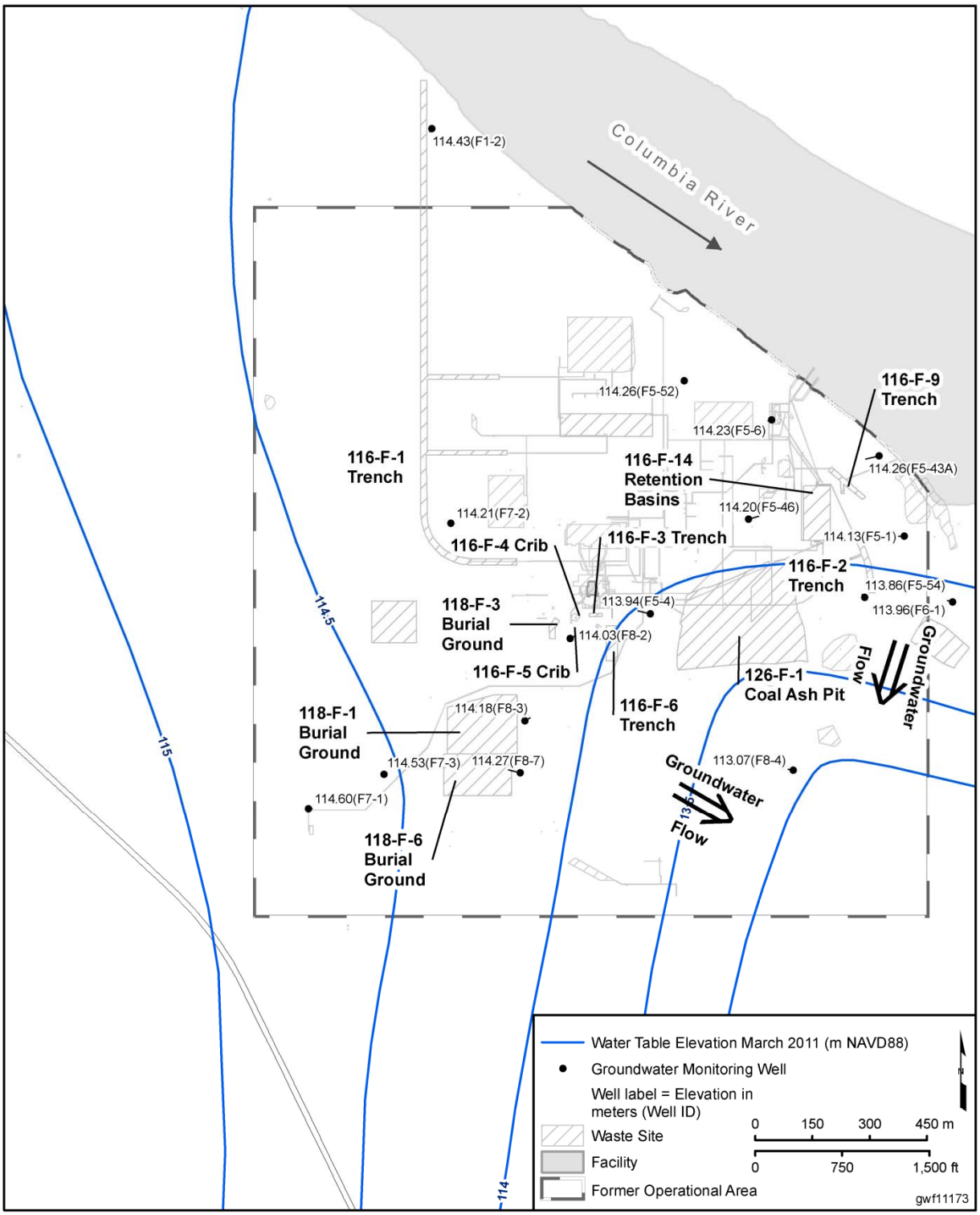

Figure 2. 100-F Water Table, March 2011

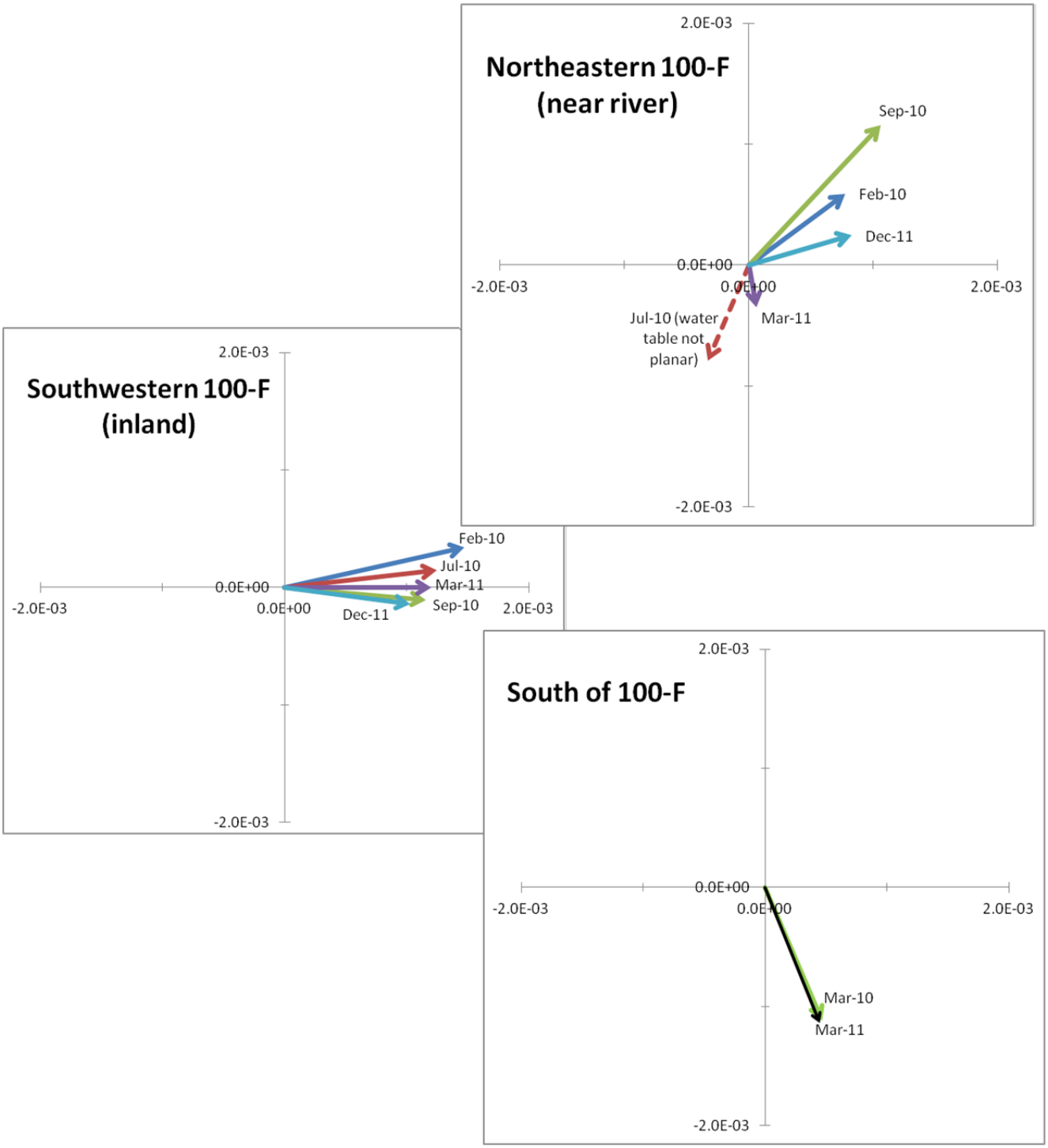

Figure 3. Magnitude and Direction of Hydraulic Gradients in 100-F Region

Appendix A

Hydraulic Gradient Calculations

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Table A.1. Hydraulic Gradient Calculations for February 2010, Northeastern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F1-2	580011.04	148805.30	113.33	2/26/2010	113.379	0.060	0.049
199-F5-1	581250.12	147736.87	113.13	2/26/2010	113.045	-0.274	-0.085
199-F5-4	580583.19	147533.73	113.61	2/26/2010	113.683	0.364	0.073
199-F5-6	580901.65	148041.99	113.15	2/26/2010	113.136	-0.183	-0.014
199-F5-43A	581183.87	147948.07	113.07	2/26/2010	112.972	-0.346	-0.098
199-F5-46	580841.34	147781.51	113.23	2/26/2010	113.336	0.018	0.106
199-F6-1	581375.87	147564.51	112.97	2/26/2010	113.049	-0.270	0.079
199-F7-2	580060.04	147770.40	114.06	2/26/2010	113.950	0.631	-0.110
					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	9.74E-04
Gradient Direction (azimuth):	52.9

Statistics

Goodness of Fit (R^2):	0.94
Correlation Coefficient (R):	0.97
Level of Significance:	0.05
P-Value:	0.0009
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	8
Sum of Easting:	4646207.125
Sum of Northing:	1183182.375
Sum of Easting*Northing:	6.87163E+11
Sum of Easting^2:	2.69841E+12
Sum of Northing^2:	1.74991E+11
Sum of Observed Heads:	906.55
Sum of Easting*Observed Heads:	526501361
Sum of Northing*Observed Heads:	134076677.6
Sum of Observed Heads^2:	102730.0027
Sum of Predicted Heads:	906.5500004
Sum of Predicted Heads^2:	102729.9485
SSt:	0.8898875
SSr:	0.835593341

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	0.835593341	2	0.417796671	38.47528872	0.000919486
Deviation	0.054294157	5	0.010858831		
Total	0.889887498	7			

Matrix Equation (Equation 5.86 in Davis, 2002)

8	4646207.125	1183182.375	b0	906.55
4646207.125	2.69841E+12	6.87163E+11	b1	526501361
1183182.375	6.87163E+11	1.74991E+11	b2	134076677.6

Inverse Matrix

355822.8594	-0.494354868	-0.464600197
-0.494354868	7.25747E-07	4.92628E-07
-0.464600197	4.92628E-07	1.20687E-06

Table A.1. Hydraulic Gradient Calculations for February 2010, Northeastern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	651.4567409	
b1=	-0.000776731	
b2=	-0.000588454	
Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)		
a:	0.000776731	
b:	0.000588454	
c:	1	
Gradient Magnitude		
	0.000974469	
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?:	Yes	52.85232294
Second Quadrant?:	No	n/a
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.2. Hydraulic Gradient Calculations for February 2010, Southwestern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F7-1	579687.17	147022.43	114.76	2/26/2010	114.968	0.853	0.208
199-F7-2	580060.04	147770.40	114.06	2/26/2010	114.163	0.047	0.103
199-F7-3	579884.71	147112.53	114.7	2/26/2010	114.646	0.530	-0.054
199-F8-2	580373.89	147468.47	113.89	2/26/2010	113.803	-0.312	-0.087
199-F8-3	580253.99	147253.37	114.19	2/26/2010	114.054	-0.062	-0.136
199-F8-7	580242.91	147116.74	114.33	2/26/2010	114.117	0.001	-0.213
199-F8-4	580958.51	147123.53	112.88	2/26/2010	113.059	-1.057	0.179
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.51E-03
Gradient Direction (azimuth):	77.0

Statistics

Goodness of Fit (R^2):	0.93
Correlation Coefficient (R):	0.97
Level of Significance:	0.05
P-Value:	0.0045
Statistically Significant Trend?:	Yes

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	2.228360435	2	1.114180218	27.74854169	0.004519898
Deviation	0.160610994	4	0.040152749		
Total	2.388971429	6			

Intermediate Computations

# of Observations:	7
Sum of Easting:	4061461.219
Sum of Northing:	1030867.472
Sum of Easting*Northing:	5.98118E+11
Sum of Easting^2:	2.3565E+12
Sum of Northing^2:	1.51813E+11
Sum of Observed Heads:	798.81
Sum of Easting*Observed Heads:	463475077.9
Sum of Northing*Observed Heads:	117638000.6
Sum of Observed Heads^2:	91159.1627
Sum of Predicted Heads:	798.8099999
Sum of Predicted Heads^2:	91159.00207
SSt:	2.388971429
SSr:	2.228360435

Matrix Equation (Equation 5.86 in Davis, 2002)

7	4061461.219	1030867.472	b0	798.81
4061461.219	2.3565E+12	5.98118E+11	b1	463475077.9
1030867.472	5.98118E+11	1.51813E+11	b2	117638000.6

Inverse Matrix

382116.3342	-0.577712304	-0.318622159
-0.577712304	1.00952E-06	-5.4452E-08
-0.318622159	-5.4452E-08	2.3781E-06

Table A.2. Hydraulic Gradient Calculations for February 2010, Southwestern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	1019.941504	
b1=	-0.001474523	
b2=	-0.000341521	
Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)		
a:	0.001474523	
b:	0.000341521	
c:	1	
Gradient Magnitude		
	0.001513557	
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?:	Yes	76.95941966
Second Quadrant?:	No	n/a
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.3. Hydraulic Gradient Calculations for March 2010, Region South of 100-F (2 sheets)

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	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
699-71-30	580603.35	145226.91	113.86	3/6/2010	113.754	2.430	-0.106
699-64-27	581375.457	142946.078	110.75	3/6/2010	110.843	-0.481	0.093
699-66-23	582864.757	143617.192	110.56	3/6/2010	110.902	-0.422	0.342
699-63-25A	582315.476	142798.003	110.71	3/6/2010	110.241	-1.083	-0.469
699-62-31	580302.597	142532.469	110.74	3/6/2010	110.880	-0.444	0.140
6					0.000	0.000	0.000
7					0.000	0.000	0.000
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.21E-03
Gradient Direction (azimuth):	157.4

Statistics

Goodness of Fit (R^2):	0.95
Correlation Coefficient (R):	0.98
Level of Significance:	0.05
P-Value:	0.0467
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	5
Sum of Easting:	2907461.635
Sum of Northing:	717120.65
Sum of Easting*Northing:	4.16999E+11
Sum of Easting^2:	1.69067E+12
Sum of Northing^2:	1.02857E+11
Sum of Observed Heads:	556.62
Sum of Easting*Observed Heads:	323667212.5
Sum of Northing*Observed Heads:	79838343.16
Sum of Observed Heads^2:	61973.2274
Sum of Predicted Heads:	556.62
Sum of Predicted Heads^2:	61972.85094
SSt:	8.06252
SSr:	7.686053903

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	7.686053903	2	3.843026952	20.41632426	0.046693354
Deviation	0.376466097	2	0.188233048		
Total	8.06252	4			

Matrix Equation (Equation 5.86 in Davis, 2002)

5	2907461.635	717120.65	b0	556.62
2907461.635	1.69067E+12	4.16999E+11	b1	323667212.5
717120.65	4.16999E+11	1.02857E+11	b2	79838343.16

Inverse Matrix

82559.68652	-0.129457127	-0.050766634
-0.129457127	2.14351E-07	3.3562E-08
-0.050766634	3.3562E-08	2.17889E-07

Table A.3. Hydraulic Gradient Calculations for March 2010, Region South of 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	221.2249559	
b1=	-0.000464945	
b2=	0.001118787	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.000464945	
b:	-0.001118787	
c:	1	
Gradient Magnitude		
	0.001211552	
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?:	Yes	157.4332235
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.4. Hydraulic Gradient Calculations for July 2010, Northeastern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F1-2	580011.04	148805.30	114.64	7/8/2010	114.507	0.111	-0.133
199-F5-1	581250.12	147736.87	114.44	7/13/2010	114.453	0.057	0.013
199-F5-4	580583.19	147533.73	113.95	7/8/2010	114.238	-0.158	0.288
199-F5-6	580901.65	148041.99	114.23	7/13/2010	114.470	0.074	0.240
199-F5-42	581285.48	147834.82	114.48	7/8/2010	114.492	0.096	0.012
199-F5-43A	581183.87	147948.07	114.39	7/8/2010	114.504	0.108	0.114
199-F5-44	581060.85	148043.20	114.3	7/8/2010	114.506	0.110	0.206
199-F5-45	580706.88	147683.92	114.53	7/8/2010	114.313	-0.083	-0.217
199-F5-46	580841.34	147781.51	114.72	7/8/2010	114.374	-0.022	-0.346
199-F5-48	580517.58	147690.10	114.23	7/8/2010	114.272	-0.124	0.042
199-F6-1	581375.87	147564.51	114.68	7/8/2010	114.427	0.032	0.253
199-F7-2	580060.04	147770.40	114.16	7/8/2010	114.193	-0.203	-0.033
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	3.88E-04
Gradient Direction (azimuth):	215.9

Statistics

Goodness of Fit (R^2):	0.24
Correlation Coefficient (R):	0.49
Level of Significance:	0.05
P-Value:	0.2848
Statistically Significant Trend?:	No

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	0.143964661	2	0.071982331	1.448896997	0.284768724
Deviation	0.447127005	9	0.049680778		
Total	0.591091667	11			

Intermediate Computations

# of Observations:	12
Sum of Easting:	6969777.909
Sum of Northing:	1774434.413
Sum of Easting*Northing:	1.03062E+12
Sum of Easting^2:	4.04815E+12
Sum of Northing^2:	2.62386E+11
Sum of Observed Heads:	1372.75
Sum of Easting*Observed Heads:	797313858.6
Sum of Northing*Observed Heads:	202988140.1
Sum of Observed Heads^2:	157037.4713
Sum of Predicted Heads:	1372.75
Sum of Predicted Heads^2:	157037.0242
SSt:	0.591091667
SSr:	0.143964661

Matrix Equation (Equation 5.86 in Davis, 2002)

12	6969777.909	1774434.413	b0	1372.75
6969777.909	4.04815E+12	1.03062E+12	b1	797313858.6
1774434.413	1.03062E+12	2.62386E+11	b2	202988140.1

Inverse Matrix

245450.1094	-0.344331569	-0.307413869
-0.344331569	5.20097E-07	2.85734E-07
-0.307413869	2.85734E-07	9.56621E-07

Table A.4. Hydraulic Gradient Calculations for July 2010, Northeastern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	-63.93875416	
b1=	0.000227086	
b2=	0.00031406	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	-0.000227086	
b:	-0.00031406	
c:	1	
Gradient Magnitude		
	0.000387558	
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	215.869345
Fourth Quadrant?:	No	n/a

Table A.5. Hydraulic Gradient Calculations for July 2010, Southwestern 100-F (2 sheets)

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	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F7-1	579687.17	147022.43	114.71	7/8/2010	114.811	0.684	0.101
199-F7-2	580060.04	147770.40	114.16	7/8/2010	114.240	0.113	0.080
199-F7-3	579884.71	147112.53	114.54	7/8/2010	114.553	0.426	0.013
199-F8-2	580373.89	147468.47	113.99	7/13/2010	113.893	-0.235	-0.097
199-F8-3	580253.99	147253.37	114.14	7/13/2010	114.073	-0.054	-0.067
199-F8-4	580958.51	147123.53	113.09	7/8/2010	113.214	-0.913	0.124
199-F8-7	580242.91	147116.74	114.26	7/13/2010	114.106	-0.021	-0.154
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.25E-03
Gradient Direction (azimuth):	83.4

Statistics

Goodness of Fit (R^2):	0.96
Correlation Coefficient (R):	0.98
Level of Significance:	0.05
P-Value:	0.0019
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	7
Sum of Easting:	4061461.219
Sum of Northing:	1030867.472
Sum of Easting*Northing:	5.98118E+11
Sum of Easting^2:	2.3565E+12
Sum of Northing^2:	1.51813E+11
Sum of Observed Heads:	798.89
Sum of Easting*Observed Heads:	463521726.9
Sum of Northing*Observed Heads:	117649870.5
Sum of Observed Heads^2:	91176.6567
Sum of Predicted Heads:	798.8899997
Sum of Predicted Heads^2:	91176.58663
SSt:	1.623542857
SSr:	1.553542655

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	1.553542655	2	0.776771327	44.3868039	0.001858964
Deviation	0.070000204	4	0.017500051		
Total	1.623542858	6			

Matrix Equation (Equation 5.86 in Davis, 2002)

7	4061461.219	1030867.472	b0	798.89
4061461.219	2.3565E+12	5.98118E+11	b1	463521726.9
1030867.472	5.98118E+11	1.51813E+11	b2	117649870.5

Inverse Matrix

382116.3342	-0.577712304	-0.318622159
-0.577712304	1.00952E-06	-5.4452E-08
-0.318622159	-5.4452E-08	2.3781E-06

Table A.5. Hydraulic Gradient Calculations for July 2010, Southwestern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	857.5081828	
b1=	-0.001244766	
b2=	-0.000143665	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.001244766	
b:	0.000143665	
c:	1	
Gradient Magnitude		
	0.001253029	
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?:	Yes	83.41630729
Second Quadrant?:	No	n/a
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.6. Hydraulic Gradient Calculations for September 2010, Northeastern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F1-2	580011.04	148805.30	113	9/26/2010	112.999	-0.196	-0.001
199-F5-1	581250.12	147736.87	112.93	9/26/2010	112.914	-0.281	-0.016
199-F5-4	580583.19	147533.73	113.89	9/26/2010	113.860	0.665	-0.030
199-F5-42	581285.48	147834.82	112.83	9/26/2010	112.763	-0.432	-0.067
199-F5-43A	581183.87	147948.07	112.7	9/26/2010	112.741	-0.454	0.041
199-F5-45	580706.88	147683.92	113.49	9/26/2010	113.554	0.359	0.064
199-F5-48	580517.58	147690.10	113.77	9/26/2010	113.749	0.554	-0.021
199-F6-1	581375.87	147564.51	112.95	9/26/2010	112.979	-0.216	0.029
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.57E-03
Gradient Direction (azimuth):	42.7

Statistics

Goodness of Fit (R^2):	0.99
Correlation Coefficient (R):	1.00
Level of Significance:	0.05
P-Value:	0.0000
Statistically Significant Trend?:	Yes

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	1.434483676	2	0.717241838	282.0162325	7.2374E-06
Deviation	0.012716322	5	0.002543264		
Total	1.447199998	7			

Intermediate Computations

# of Observations:	8
Sum of Easting:	4646914.03
Sum of Northing:	1182797.316
Sum of Easting*Northing:	6.87044E+11
Sum of Easting^2:	2.69923E+12
Sum of Northing^2:	1.74877E+11
Sum of Observed Heads:	905.56
Sum of Easting*Observed Heads:	526006619.3
Sum of Northing*Observed Heads:	133886252.1
Sum of Observed Heads^2:	102506.3114
Sum of Predicted Heads:	905.5600002
Sum of Predicted Heads^2:	102506.2987
SSt:	1.4472
SSr:	1.434483676

Matrix Equation (Equation 5.86 in Davis, 2002)

8	4646914.03	1182797.316	b0	905.56
4646914.03	2.69923E+12	6.87044E+11	b1	526006619.3
1182797.316	6.87044E+11	1.74877E+11	b2	133886252.1

Inverse Matrix

449925.3405	-0.631253986	-0.563087783
-0.631253986	9.24035E-07	6.39264E-07
-0.563087783	6.39264E-07	1.29701E-06

Table A.6. Hydraulic Gradient Calculations for September 2010, Northeastern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	903.1896873	
b1=	-0.001065737	
b2=	-0.001156215	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.001065737	
b:	0.001156215	
c:	1	
Gradient Magnitude		
	0.00157246	
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?:	Yes	42.66820782
Second Quadrant?:	No	n/a
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.7. Hydraulic Gradient Calculations for September 2010, Southwestern 100-F (2 sheets)

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	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F7-1	579687.17	147022.43	114.63	9/26/2010	114.775	0.687	0.145
199-F7-3	579884.71	147112.53	114.57	9/26/2010	114.557	0.468	-0.013
199-F8-3	580253.99	147253.37	114.25	9/26/2010	114.145	0.057	-0.105
199-F8-4	580958.51	147123.53	113.21	9/26/2010	113.318	-0.770	0.108
199-F8-7	580242.91	147116.74	114.3	9/26/2010	114.144	0.055	-0.156
199-F5-4	580583.19	147533.73	113.89	9/26/2010	113.795	-0.294	-0.095
199-F5-48	580517.58	147690.10	113.77	9/26/2010	113.887	-0.202	0.117
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.16E-03
Gradient Direction (azimuth):	95.2

Statistics

Goodness of Fit (R^2):	0.94
Correlation Coefficient (R):	0.97
Level of Significance:	0.05
P-Value:	0.0037
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	7
Sum of Easting:	4062128.06
Sum of Northing:	1030852.432
Sum of Easting*Northing:	5.98208E+11
Sum of Easting^2:	2.35727E+12
Sum of Northing^2:	1.51808E+11
Sum of Observed Heads:	798.62
Sum of Easting*Observed Heads:	463441132
Sum of Northing*Observed Heads:	117608178.9
Sum of Observed Heads^2:	91114.9234
Sum of Predicted Heads:	798.62
Sum of Predicted Heads^2:	91114.83223
SSt:	1.508485714
SSr:	1.417312373

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	1.417312373	2	0.708656186	31.09049904	0.003653031
Deviation	0.091173343	4	0.022793336		
Total	1.508485716	6			

Matrix Equation (Equation 5.86 in Davis, 2002)

7	4062128.06	1030852.432	b0	798.62
4062128.06	2.35727E+12	5.98208E+11	b1	463441132
1030852.432	5.98208E+11	1.51808E+11	b2	117608178.9

Inverse Matrix

302332.0873	-0.527011899	0.023733961
-0.527011899	1.13443E-06	-8.91621E-07
0.023733961	-8.91621E-07	3.35231E-06

Table A.7. Hydraulic Gradient Calculations for September 2010, Southwestern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	768.4859308	
b1=	-0.001154415	
b2=	0.000105349	
Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)		
a:	0.001154415	
b:	-0.000105349	
c:	1	
Gradient Magnitude		
	0.001159212	
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?:	Yes	95.21421872
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.8. Hydraulic Gradient Calculations for March 2011, Northeastern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F1-2	580011.04	148805.30	114.43	3/6/2011	114.503	0.368	0.073
199-F5-1	581250.12	147736.87	114.13	3/6/2011	114.052	-0.082	-0.078
199-F5-4	580583.19	147533.73	113.94	3/6/2011	114.024	-0.111	0.084
199-F5-6	580901.65	148041.99	114.23	3/6/2011	114.181	0.046	-0.049
199-F5-46	580841.34	147781.51	114.19	3/6/2011	114.094	-0.041	-0.096
199-F5-52	580672.81	148143.82	114.26	3/6/2011	114.231	0.096	-0.029
199-F5-54	581145.51	147576.44	113.86	3/6/2011	114.003	-0.131	0.143
199-F6-1	581375.87	147564.51	113.96	3/6/2011	113.984	-0.150	0.024
199-F7-2	580060.04	147770.40	114.21	3/6/2011	114.139	0.005	-0.071
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	3.54E-04
Gradient Direction (azimuth):	169.7

Statistics

Goodness of Fit (R^2):	0.78
Correlation Coefficient (R):	0.89
Level of Significance:	0.05
P-Value:	0.01
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	9
Sum of Easting:	5226841.573
Sum of Northing:	1330954.565
Sum of Easting*Northing:	7.72964E+11
Sum of Easting^2:	3.03554E+12
Sum of Northing^2:	1.96828E+11
Sum of Observed Heads:	1027.21
Sum of Easting*Observed Heads:	596562211
Sum of Northing*Observed Heads:	151908274.5
Sum of Observed Heads^2:	117240.3073
Sum of Predicted Heads:	1027.210001
Sum of Predicted Heads^2:	117240.2505
SSt:	0.264622222
SSr:	0.207637745

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	0.207637745	2	0.103818872	10.93127919	0.009985982
Deviation	0.056984478	6	0.009497413		
Total	0.264622222	8			

Matrix Equation (Equation 5.86 in Davis, 2002)

9	5226841.573	1330954.565	b0	1027.21
5226841.573	3.03554E+12	7.72964E+11	b1	596562211
1330954.565	7.72964E+11	1.96828E+11	b2	151908274.5

Inverse Matrix

410539.9447	-0.572577143	-0.527507479
-0.572577143	8.32536E-07	6.02319E-07
-0.527507479	6.02319E-07	1.20165E-06

Table A.8. Hydraulic Gradient Calculations for March 2011, Northeastern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	99.2705514	
b1=	-6.31414E-05	
b2=	0.000348476	
Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)		
a:	6.31414E-05	
b:	-0.000348476	
c:	1	
Gradient Magnitude		
	0.00035415	
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?:	Yes	169.7298195
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.9. Hydraulic Gradient Calculations for March 2011, Southwestern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F7-1	579687.17	147022.43	114.6	3/6/2011	114.753	0.626	0.153
199-F7-2	580060.04	147770.40	114.21	3/6/2011	114.307	0.180	0.097
199-F7-3	579884.71	147112.53	114.53	3/6/2011	114.516	0.389	-0.014
199-F8-2	580373.89	147468.47	114.03	3/6/2011	113.929	-0.198	-0.101
199-F8-3	580253.99	147253.37	114.18	3/6/2011	114.073	-0.054	-0.107
199-F8-4	580958.51	147123.53	113.07	3/6/2011	113.226	-0.901	0.156
199-F8-7	580242.91	147116.74	114.27	3/6/2011	114.086	-0.041	-0.184
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.20E-03
Gradient Direction (azimuth):	90.1

Statistics

Goodness of Fit (R^2):	0.93
Correlation Coefficient (R):	0.96
Level of Significance:	0.05
P-Value:	0.0054
Statistically Significant Trend?:	Yes

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	1.429919229	2	0.714959615	25.30301403	0.005365853
Deviation	0.113023629	4	0.028255907		
Total	1.542942858	6			

Intermediate Computations

# of Observations:	7
Sum of Easting:	4061461.219
Sum of Northing:	1030867.472
Sum of Easting*Northing:	5.98118E+11
Sum of Easting^2:	2.3565E+12
Sum of Northing^2:	1.51813E+11
Sum of Observed Heads:	798.89
Sum of Easting*Observed Heads:	463521773.9
Sum of Northing*Observed Heads:	117649933
Sum of Observed Heads^2:	91176.5761
Sum of Predicted Heads:	798.8899999
Sum of Predicted Heads^2:	91176.46306
SSt:	1.542942857
SSr:	1.429919229

Matrix Equation (Equation 5.86 in Davis, 2002)

7	4061461.219	1030867.472	b0	798.89
4061461.219	2.3565E+12	5.98118E+11	b1	463521773.9
1030867.472	5.98118E+11	1.51813E+11	b2	117649933

Inverse Matrix

382116.3342	-0.577712304	-0.318622159
-0.577712304	1.00952E-06	-5.4452E-08
-0.318622159	-5.4452E-08	2.3781E-06

Table A.9. Hydraulic Gradient Calculations for March 2011, Southwestern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	810.4769808	
b1=	-0.001200782	
b2=	2.40476E-06	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.001200782	
b:	-2.40476E-06	
c:	1	
Gradient Magnitude		
	0.001200784	
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?:	Yes	90.11474397
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.10. Hydraulic Gradient Calculations for March 2011, Region South of 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
699-71-30	580603.35	145226.91	113.82	3/6/2011	113.820	1.957	0.000
699-64-27	581375.457	142946.078	110.88	3/6/2011	110.880	-0.983	0.000
699-62-31	580302.597	142532.469	110.89	3/6/2011	110.890	-0.973	0.000
4					0.000	0.000	0.000
5					0.000	0.000	0.000
6					0.000	0.000	0.000
7					0.000	0.000	0.000
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.22E-03
Gradient Direction (azimuth):	158.5

Statistics

Goodness of Fit (R^2):	1.00
Correlation Coefficient (R):	1.00
Level of Significance:	0.05
P-Value:	#DIV/0!
Statistically Significant Trend?:	N/A - 3 pts

Intermediate Computations

# of Observations:	3
Sum of Easting:	1742281.402
Sum of Northing:	430705.455
Sum of Easting*Northing:	2.50137E+11
Sum of Easting^2:	1.01185E+12
Sum of Northing^2:	61839940742
Sum of Observed Heads:	335.59
Sum of Easting*Observed Heads:	194896938.7
Sum of Northing*Observed Heads:	48185013.28
Sum of Observed Heads^2:	37545.9589
Sum of Predicted Heads:	335.59
Sum of Predicted Heads^2:	37545.95891
SSt:	5.742866667
SSr:	5.742866667

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	5.742866667	2	2.871433333	#DIV/0!	#DIV/0!
Deviation	6.98224E-16	0	#DIV/0!		
Total	5.742866667	2			

Matrix Equation (Equation 5.86 in Davis, 2002)

3	1742281.402	430705.455	b0	335.59
1742281.402	1.01185E+12	2.50137E+11	b1	194896938.7
430705.455	2.50137E+11	61839940742	b2	48185013.28

Inverse Matrix

572786.3801	-0.968236057	-0.072946522
-0.968236057	1.65081E-06	6.6244E-08
-0.072946522	6.6244E-08	2.40127E-07

Table A.10. Hydraulic Gradient Calculations for March 2011, Region South of 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	208.6404353	
b1=	-0.000447815	
b2=	0.00113741	
Normal Vector to the Fitted Plane (<a,b,c> where a = -b1, b = -b2, c = 1)		
a:	0.000447815	
b:	-0.00113741	
c:	1	
Gradient Magnitude		
	0.001222391	
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?:	Yes	158.5097039
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.11. Hydraulic Gradient Calculations for December 2011, Northeastern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F5-1	581250.12	147736.87	113.55	12/7/2011	113.470	-0.379	-0.080
199-F5-6	580901.65	148041.99	113.65	12/7/2011	113.684	-0.164	0.034
199-F5-44	581060.85	148043.20	113.80	12/7/2011	113.552	-0.297	-0.248
199-F5-46	580841.34	147781.51	113.66	12/7/2011	113.798	-0.051	0.138
199-F5-47	580495.51	147508.45	114.28	12/7/2011	114.152	0.303	-0.128
199-F5-48	580517.58	147690.10	114.00	12/7/2011	114.089	0.240	0.089
199-F5-52	580672.81	148143.82	113.71	12/6/2011	113.850	0.001	0.140
199-F5-54	581145.51	147576.44	113.47	12/15/2011	113.596	-0.253	0.126
199-F7-2	580060.04	147770.40	114.52	12/6/2011	114.449	0.601	-0.071
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	8.65E-04
Gradient Direction (azimuth):	73.6

Statistics

Goodness of Fit (R^2):	0.85
Correlation Coefficient (R):	0.92
Level of Significance:	0.05
P-Value:	0.0037
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	9
Sum of Easting:	5226945.407
Sum of Northing:	1330292.77
Sum of Easting*Northing:	7.72596E+11
Sum of Easting^2:	3.03566E+12
Sum of Northing^2:	1.96631E+11
Sum of Observed Heads:	1024.64
Sum of Easting*Observed Heads:	595080967.8
Sum of Northing*Observed Heads:	151452190.9
Sum of Observed Heads^2:	116655.1144
Sum of Predicted Heads:	1024.64
Sum of Predicted Heads^2:	116654.9616
SSt:	0.988888889
SSr:	0.836039782

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	0.836039782	2	0.418019891	16.40912022	0.003692719
Deviation	0.152849105	6	0.025474851		
Total	0.988888888	8			

Matrix Equation (Equation 5.86 in Davis, 2002)

9	5226945.407	1330292.77	b0	1024.64
5226945.407	3.03566E+12	7.72596E+11	b1	595080967.8
1330292.77	7.72596E+11	1.96631E+11	b2	151452190.9

Inverse Matrix

327454.7161	-0.49333732	-0.27696475
-0.49333732	8.97979E-07	-1.90674E-07
-0.27696475	-1.90674E-07	2.62298E-06

Table A.11. Hydraulic Gradient Calculations for December 2011, Northeastern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	632.1188551	
b1=	-0.0008302	
b2=	-0.00024432	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.0008302	
b:	0.00024432	
c:	1	
Gradient Magnitude		
	0.000865405	
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?:	Yes	73.60132523
Second Quadrant?:	No	n/a
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a

Table A.12. Hydraulic Gradient Calculations for December 2011, Southwestern 100-F (2 sheets)

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)	Date	Predicted Hydraulic Head	Predicted Diff from Mean	Residuals (Observed - Predicted)
199-F5-47	580495.51	147508.45	114.28	12/7/2011	114.164	-0.243	-0.116
199-F7-1	579687.17	147022.43	114.77	12/7/2011	114.925	0.518	0.155
199-F7-2	580060.04	147770.40	114.52	12/6/2011	114.648	0.241	0.128
199-F7-3	579884.71	147112.53	114.74	12/6/2011	114.735	0.328	-0.005
199-F8-3	580253.99	147253.37	114.56	12/6/2011	114.376	-0.031	-0.184
199-F8-4	580958.51	147123.53	113.44	12/7/2011	113.634	-0.773	0.194
199-F8-7	580242.91	147116.74	114.54	12/6/2011	114.368	-0.039	-0.172
8					0.000	0.000	0.000
9					0.000	0.000	0.000
10					0.000	0.000	0.000
11					0.000	0.000	0.000
12					0.000	0.000	0.000
13					0.000	0.000	0.000
14					0.000	0.000	0.000
15					0.000	0.000	0.000
16					0.000	0.000	0.000
17					0.000	0.000	0.000
18					0.000	0.000	0.000
19					0.000	0.000	0.000
20					0.000	0.000	0.000

Hydraulic Gradient

Gradient Magnitude:	1.04E-03
Gradient Direction (azimuth):	97.9

Statistics

Goodness of Fit (R^2):	0.88
Correlation Coefficient (R):	0.94
Level of Significance:	0.05
P-Value:	0.0155
Statistically Significant Trend?:	Yes

Intermediate Computations

# of Observations:	7
Sum of Easting:	4061582.841
Sum of Northing:	1030907.453
Sum of Easting*Northing:	5.98159E+11
Sum of Easting^2:	2.35664E+12
Sum of Northing^2:	1.51825E+11
Sum of Observed Heads:	800.85
Sum of Easting*Observed Heads:	464673024.3
Sum of Northing*Observed Heads:	117943178.9
Sum of Observed Heads^2:	91624.2081
Sum of Predicted Heads:	800.8499998
Sum of Predicted Heads^2:	91624.05286
SSt:	1.247742857
SSr:	1.092547235

ANOVA

Var Source	Sum of Squares	Df	Mean Squares	F-Test	P-Value
Regression	1.092547235	2	0.546273617	14.07961401	0.015470657
Deviation	0.155195623	4	0.038798906		
Total	1.247742858	6			

Matrix Equation (Equation 5.86 in Davis, 2002)

7	4061582.841	1030907.453	b0	800.85
4061582.841	2.35664E+12	5.98159E+11	b1	464673024.3
1030907.453	5.98159E+11	1.51825E+11	b2	117943178.9

Inverse Matrix

352683.6498	-0.540752024	-0.264306369
-0.540752024	9.64347E-07	-1.27568E-07
-0.264306369	-1.27568E-07	2.29727E-06

Table A.12. Hydraulic Gradient Calculations for December 2011, Southwestern 100-F (2 sheets)

Coefficients of the Fitted Plane (z = b0 + b1x + b2y)		
b0=	689.0837798	
b1=	-0.00102644	
b2=	0.00014185	
Normal Vector to the Fitted Plane (<a,b,c> w here a = -b1, b = -b2, c = 1)		
a:	0.00102644	
b:	-0.00014185	
c:	1	
Gradient Magnitude		
	0.001036195	
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?:	Yes	97.86823526
Third Quadrant?:	No	n/a
Fourth Quadrant?:	No	n/a