

# Little Spokane Groundwater Elevation & Stream Flow Monitoring Project

June 30, 2010

*Prepared for:*  
WRIA 55/57 Watershed  
Implementation Team

*Prepared by:*  
Spokane County  
Water Resources

*Funding provided by:*  
Washington Department of Ecology  
Grant G0700149

## Table of Contents

1.0 Introduction	3
2.0 Project Component 1: Continuous Water Level Data Collection	3
2.1 Well Selection	3
2.2 Data Collection	4
2.3 Discussion of Results	5
3.0 Project Component 2: Snap Shot Water Level Measurements	6
3.1 Well Selection	6
3.2 Data Collection	7
3.3 Discussion of Results	7
4.0 Project Component 3: Little Spokane River Seepage Run	9
4.1 Little Spokane River System	10
4.2 Data Collection	10
4.3 Discussion of Results	11
5.0 Recommendations for future work	13

### Appendices

- A. Well Logs – Continuous Water Level Monitoring Locations
- B. Water Level, Temperature & Conductivity Graphs
- C. Well Logs – Snap Shot Water Level Measurement Locations

### Figures

- 2-1 Continuous Groundwater Measurement Locations
- 2-2 Water Level & Temperature Changes with Seepage Run Data
- 3-1 Snap Shot Measurement Locations
- 4-1 Little Spokane River Seepage Run – October 7, 2009

## 1.0 Introduction

This report describes work completed and presents data collected for the Little Spokane Groundwater Elevation and Stream Flow Monitoring project. This project was Task 14 of the Water Resource Inventory Area (WRIA) 55-57 Phase 4 Implementation Project funded by Washington Department of Ecology (Ecology) Grant G0700149.

The scope of this project was developed from recommendations found in the *WRIA 55 Groundwater Inventory and Mapping Project Report* (Spokane County, 2009). That project identified the following data collection opportunities and needs:

- Existing wells suitable for continuous temperature and water level monitoring;
- A set of wells with historic snap shot water level measurements taken as part of two groundwater studies completed in 1991 and 1996; and
- A lack of stream flow data to determine the location and magnitude of groundwater contributions to the Little Spokane River.

This project focused on the above opportunities and needs, and had the following 3 components:

1. instrumentation and continuous monitoring of five wells within the Little Spokane Watershed;
2. “snap shot” water level measurements of 21 water wells that were measured in previous groundwater studies; and
3. A seepage run on the Little Spokane River.

The scope of this project was to collect data. As funding allows data collection activities initiated in this project will continue. The project scope did not include in-depth analysis of the data. When the project scope was developed it was envisioned that this data would be combined with existing and future data to further refine the hydrogeologic conceptual model of the Little Spokane Watershed.

## 2.0 Project Component 1: Continuous Water Level Data Collection

### 2.1 Well Selection

Utilization of existing groundwater monitoring infrastructure is a cost effective way to collect water level data. Eight existing wells were identified within the Little Spokane River Watershed (Figure 2-1) for installation of data loggers. These wells included production wells that are no longer in use, emergency standby wells that are not in regular use, monitoring wells located near active production wells, and dedicated monitoring wells.

The goal of this project component was to gather water level data in wells in close proximity to the Little Spokane River to further understand the surface water/ground water interaction. In the process of identifying suitable wells three additional wells which are not in close proximity to the Little Spokane River were identified. These wells were added to the data collection effort because the additional cost to add these wells was minimal and water level information in other portions of the Little Spokane River Basin provide useful data such as aquifer response to recharge and withdrawals. Table 2-1 presents characteristics of each well included in the data collection effort. Appendix A includes the well logs for each well.

**Table 2-1 Wells for Continuous Monitoring**

Well Name	Well Description	Elevation (ft msl <sup>1</sup> )	Well Depth (ft)	Screened Interval (ft bgs <sup>2</sup> )	Aquifer
Spokane County Colbert Landfill – North Glen	Monitoring well	1671	45	35-45	Upper Sand & Gravel
Whitworth Water Rivilla	Production well no longer in use	1585	30	21-29	Upper Sand & Gravel
Whitworth Water – Shady Slope	Emergency Standby well that is rarely used	1635	130	90-120	Upper Sand & Gravel
Whitworth Water – North Mt. View	Production well no longer in use	1955	90	60-68	Upper Sand & Gravel
Spokane County Water District 3 – River Estates	Monitoring well near a production well	1715	122	54-100	Upper Sand & Gravel
Spokane County Water District 3 – Pine River	Monitoring well near a production well	1610	208	203-208	Lower Sand & Gravel
Ecology – Chattaroy	Monitoring Well	1980	242	193-242	Upper Sand & Gravel
Ecology – Deer Park	Monitoring Well	2180	350	87-350	Basalt

1 – Land-surface elevation above mean sea level

2 – below ground surface

## 2.2 Data Collection

Data was collected in accordance with the Quality Assurance Project Plan (QAPP) developed for this project and approved by Department of Ecology on September 10, 2009. The QAPP details the process and procedures utilized for this study. Below is a brief description of key components of the data collection efforts.

Data was collected by data loggers installed in the selected wells. The data loggers automatically take measurements at a specified interval, which in the case of this study was every hour. Two types of data loggers were used in this study; Diver by Schlumberger and Level Logger by Solinst. The Divers used in this study measure water level, temperature, and conductivity, and the Level Loggers measure water level and temperature. The three wells selected for conductivity measurements were Whitworth Water North Mt. View, Whitworth Water Rivilla, and Spokane County Water District 3 – Pine River.

The data loggers were installed in 5 wells on September 23, 2009. A data logger was installed in the Deer Park well on September 28, 2009. Upon installation manual water level measurements were taken to calibrate the data logger. Throughout the study manual water level measurements were taken to assess the accuracy of the data logger measurements and correct for any instrument drift. Table 2-2 presents the manual measurements, the corresponding data logger measurement and the deviation of the data logger measurement. The Whitworth Water – Shady Slope and the Ecology – Chattaroy wells have data loggers installed and maintained by Ecology Water Resources staff. Data for those wells are provided to Spokane County by Ecology.

Water level measurements were not taken at each well on each field visit for a variety of reasons. On September 28, 2009 only three wells were visited to check the technique used to install the data logger in the wells. On November 3, 2009 the Rivilla well was not measured

because a new lock had been installed at the well. On December 7, 2009 two wells were not visited due to a problem with the computer used to download the data from the data loggers.

**Table 2-2 Manual Water Level vs. Data Logger Water Level**

Date & Measurement	Colbert Landfill North Glen	Whitworth Water Rivilla	Whitworth Water North Mt. View	Spokane County WD 3 River Estates	Spokane County WD 3 Pine River	Ecology Deer Park
September 28, 2009						
Manual Measurement		8.27	42.96			
Data Logger Measurement		8.28	42.82			
<i>Difference</i>		0.01	-0.14			
November 3, 2009						
Manual Measurement	9.84		43.31	20.63	22.74	40.54
Data Logger Measurement	9.82		43.31	20.54	22.65	40.64
<i>Difference</i>	-0.02		0.0	-0.09	-0.09	0.10
December 17, 2009						
Manual Measurement		8.05		21.92	19.18	39.84
Data Logger Measurement		8.14		21.85	19.20	39.70
<i>Difference</i>		-0.09		-0.07	0.02	-0.14
March 19, 2010						
Manual Measurement	9.67	7.85	42.49	20.14	16.27	39.51
Data Logger Measurement	9.64	7.85 <sup>2</sup>	42.52	20.06	15.92 <sup>1</sup>	39.53
<i>Difference</i>	-0.03	0	0.03	-0.08	-0.35	0.02
June 11, 2010						
Manual Measurement	9.56	7.62	42.56	20.47	18.77	39.98
Data Logger Measurement	10.27 <sup>3</sup>	7.60	42.52	20.56	18.89	40.02
<i>Difference</i>	0.71	-0.02	-0.04	0.09	0.12	0.04

note: measurements are depth to water from the top of casing or well completion. All values reported in feet.

1 – Spokane County Water District 3 working on nearby production well at the time of measurement

2 – Rivilla logger raised .15 feet sometime between Dec 17, 2009 and March 19, 2009 due to changes in well head. This measurement established a new baseline.

3 – On 4/20/10 the data logger was removed for water quality sampling and upon reinstallation was raised approximately ¾ of a foot. Data from this date forward was corrected based on measurements taken on June 11, 2010.

Changes in barometric pressure impact data logger water level measurements. To address this a data logger was kept at the Spokane County Public Works Building to measure changes in barometric pressure. This data was used to generate water level data that is compensated for changes in barometric pressure. Compensation is done with Levellogger software by Solinist. All data presented in this report has been compensated for barometric pressure.

### 2.3 Discussion of Results

Graphs depicting the changes in water level and temperature over the period of the study are included in Appendix B along with graphs showing the changes in conductivity of the three wells with Diver data loggers. Figure 2-2 shows the water level and temperature change graphs along with well location and seepage run data. While the scope of this project did not include in-depth analysis of the data some general observations can be made:

- The Whitworth Water Rivilla well and the Colbert Landfill North Glen well data indicate that water is apparently moving from the Little Spokane River to the groundwater in the vicinity of those wells. The temperature of each of those wells show a seasonal fluctuation while other wells in this study do not show this pattern. Also two substantial

increases in flow in the river during December and January corresponded with temporary increases in water level in each well.

- The Whitworth Shady Slope well and Water District 3 Pine River well both show large fluctuations in water levels (between 10 and 15 feet). Without more data it is difficult to interpret the large fluctuation. Both wells are relatively close to several large production wells so the response to summer withdrawals will be an important component to consider.
- The water level in the DOE Deer Park well rose almost 7 feet during the month of October and then fluctuated within a 6 inch interval over the winter and spring months. In late May some decline was beginning. As with the Whitworth Shady Slope and Water District 3 Pine River wells, data collected during the summer months will be an important component to consider.
- The DOE Chattaroy well and Whitworth Water North Mt. View well water level both increased over the study period. The Chattaroy well showed a steady increase while the North Mt. View well showed a potential response to discrete recharge events such as large amounts of precipitation over a short period of time.

### 3.0 Project Component 2: Snap Shot Water Level Measurements

The purpose of this project component is to assess changes in water levels within the Little Spokane Watershed over time. Two groundwater studies were conducted in the watershed that included measurements of water levels at domestic wells. The studies are the *Deer Park Ground-Water Characterization* (Deer Park study) completed by Emcon in 1992 on behalf of Spokane County, and *Aquifer Delineation and Baseline Groundwater Quality Investigation of a Portion of North Spokane County, Washington* (North Spokane Study) by Reanette Boese and John Buchanan in 1996. These studies provide historic snap shot water level data that is reliable. Static water level measurements are taken at the time a water well is drilled and included on the well log that is submitted to Ecology, but these measurements are often not an accurate representation of the static water level.

#### 3.1 Well Selection

Wells were selected based on the following criteria:

- The well could be accurately located with the information provided in each study (referenced above);
- The current well owner contact information was publicly available; and
- The current well owner responded to our request and agreed to have a water level measurement taken.

The Deer Park study included water level measurements taken in 1991 and 1992 for 55 wells. There was sufficient information to determine the owner and location of 25 wells. Of those 25 wells 11 well owners responded to our request to allow a water level measurement of their well. The North Spokane study included water level measurements taken in 1996 for 37 wells.

There was sufficient information to determine the location and owner of all 37 wells, but two of the wells are located in the Spokane Valley Rathdrum Prairie Aquifer and 2 have been decommissioned since 1996. Of the 33 that could potentially be measured 10 well owners responded to our request to take a water level measurement of their well. Table 3-1 presents the wells that were measured for this project and Figure 3-1 shows the location of each well. Well logs are provided in Appendix C

**Table 3-1 Selected Snap Shot Wells**

Study Well ID	Original Study	Original Study Well ID	Aquifer Description from Original Study	Well Log Data				
				Date Completed	Total Depth	Static Water Level	Yield	Screened Interval
2	Deer Park	Hytein	Basalt/Deep	3/26/74	102	15	27.5	83-90
4	Deer Park	Love	Basalt/Deep	4/23/81	160	70	17.5	130-160
6	Deer Park	Bunke	-	-	-	-	-	-
8	Deer Park	Helm	Basalt/Deep	9/30/79	160	80	12.5	120-160
9	Deer Park	Neff	Basalt/Deep	1/30/76	260	30	37.5	73-260
16	Deer Park	Wolf	Basalt/Deep	2/6/77	260	0	60	80-260
19	Deer Park	Booher	Basalt/Deep	12/2/74	100	35	30	86-100
20	Deer Park	McCann	Granite/Deep	3/6/80	280	145	4.5	174-280
22	Deer Park	Ramsay	Granite/Deep	9/21/83	197	108	8	180-197
24	Deer Park	Vielllette	Granite/Deep	7/20/77	140	80	8	66-140
25	Deer Park	DOE-33	Basalt/Deep	1/23/78	350	67	200	87-350
32	North Spokane	6404B02	Lower Sand & Gravel	5/26/93	65	15	20	35-65
34	North Spokane	6404N01	Basalt	11/24/93	125	70	40	105-125
40	North Spokane	7312P01	Lower Sand & Gravel	10/9/86	316	-	20	311-316
42	North Spokane	7315F02	Lower Sand & Gravel	-	244	95	20	239-244
46	North Spokane	7321C02	Lower Sand & Gravel	6/23/86	100	12	6	79-84
47	North Spokane	7321C01	Lower Sand & Gravel	3/29/90	185	66	60	175-185
51	North Spokane	7407P02	Granite	10/27/96	85		15	65-85
55	North Spokane	7433P01	Lower Sand & Gravel	9/11/92	159	35	60	154-159
56	North Spokane	8222Q01	Granite	11/23/94	285	70	11	25-285
57	North Spokane	8225C01	Lower Sand & Gravel	9/21/92	290	20	22	280-290

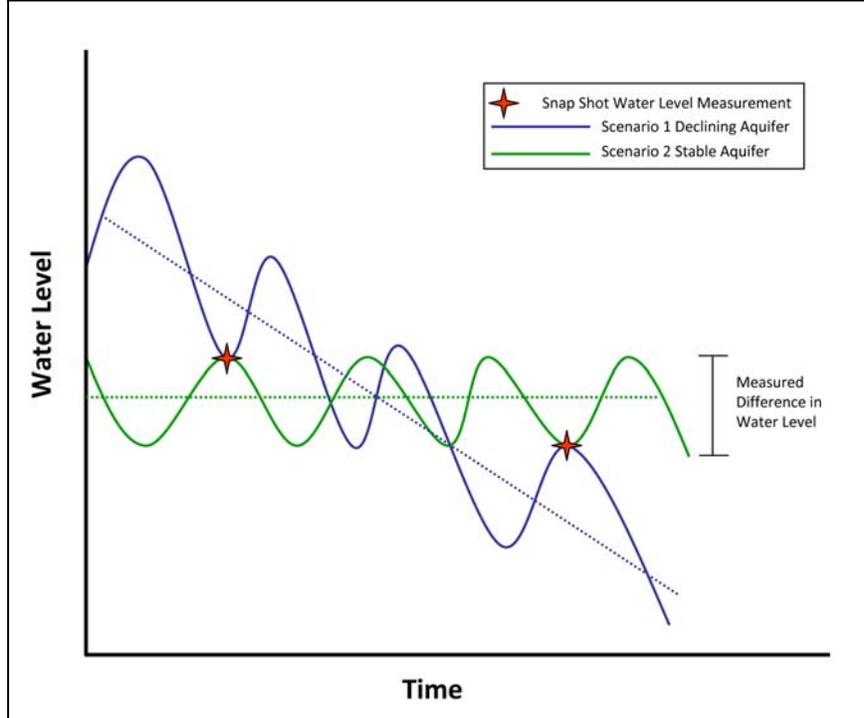
### 3.2 Data Collection

Data was collected in accordance with the Quality Assurance Project Plan (QAPP) developed for this project and approved by Department of Ecology on September 10, 2009. The QAPP details the process and procedures utilized for this study. Data was collected from the wells at the same time of year that it was collected during the original study. Refer to tables 3-2 and 3-3 for existing and new data.

### 3.3 Discussion of Results

As the terminology “snap shot” implies the measurements taken for this project component represent water level at one time and do not capture the variance of water level over time that most wells exhibit. Figure 3-2 below demonstrates the potential problem with basing conclusions on two snapshot measurements. Two measurements, represented by the red star, could represent two separate and different scenarios, one a declining aquifer and one a stable aquifer.

Figure 3-2 – Snap Shot Water Level Measurement Interpretation



The objective of this study component was to identify any trends that warrant further investigation. Many wells do exhibit fluctuations that follow an annual pattern, so new measurements were taken at the same time of year as the historical measurements used for comparison.

Of the 21 total wells measured water levels declined a potentially significant amount in 3 wells. All three are located in the Deer Park area. Two are completed in a basalt aquifer and one in a lower sand and gravel aquifer. It is important to note that well 2, which has a -78.69 foot difference with the measurement taken in November of 1992, is located 3500 feet north of well 9 which has a 4.69 foot increase over the measurement taken in 1991. Based on the well logs these wells appear to be within the same aquifer. This demonstrates the complexity of the aquifer systems and the need for additional information to draw conclusions on the cause of the difference in water level measurements in well 2.

**Table 3-2 Deer Park Study Wells Results**

Study Well ID	Elev	Data from Original Study						Data from Current Study				
		Date	DTW	Date	DTW	Date	DTW	Date	DTW	Date	DTW	Change
2	2100	6/20/91	42.46	11/1/91	56	1/30/92	43.9	4/1/92	35.9	12/1/09	134.69	<b>-78.69</b>
4	2147	6/25/91	44.1	10/29/91	44	1/29/92	44.2	4/1/92	44.3	12/1/09	38.89	5.11
6	2071	10/10/91	32.2	11/4/91	32.4	1/30/92	32.8	4/3/92	32.1	12/1/09	29.71	2.69
8	2090	6/18/91	63.95	11/1/91	53.7	1/29/92	47.6	4/2/92	51	12/1/09	52.34	1.36
9	2135	10/3/91	73.4	10/1/91	72	1/30/92	69.4	4/2/92	69	12/1/09	67.31	4.69
16	2200	6/18/91	16.8	10/28/91	18	1/28/92	18.3	4/1/92	18.1	12/17/09	33.02	<b>-15.02</b>
19	2151	6/14/91	31.6	10/29/91	31.3	1/27/92	32.2	4/2/92	32.9	12/1/09	33.19	-1.89
20	2130	6/14/91	148.94	10/29/91	149.5	1/27/92	149.4	4/1/92	149.7	12/1/09	146.52	2.98
22	2240	9/5/91	111	10/28/91	107.08	1/28/92	106.8	4/1/92	107.6	12/1/09	106.32	0.76
24	2198	9/21/91	76.9	10/28/91	76.7	1/27/92	76.7	4/1/92	76.1	12/1/09	71.99	4.71
25	2180					2/4/92	40.8	4/2/92	43.3	12/17/09	39.84	0.96

**Table 3-3 North Spokane Study Wells Results**

Study Well ID	Elev	Data from Original Study		Data from Current Study		
		Date	DTW	Date	DTW	Change
32	1840	4/23/96	8.9	3/8/2010	10.56	-1.66
34	1865	4/28/96	63	3/8/2010	62.55	0.45
40	1895	4/23/96	193.9	4/20/2010	184.6	9.3
42	1847	5/5/96	160.96	3/8/2010	160.33	0.63
46	1680	5/7/96	14.47	4/20/2010	15.15	-0.68
47	1740	5/7/96	74.65	4/20/2010	72.65	2
51	2030	5/7/96	42.4	4/20/2010	43.23	-0.83
55	1840	4/23/96	27.1	3/8/2010	27.61	-0.51
56	2030	4/28/96	57.4	4/20/2010	57.02	0.38
57	2035	4/28/96	60.2	4/20/2010	85.44	<b>-25.24</b>

#### 4.0 Project Component 3: Little Spokane River Seepage Run

The objective of this project component was to assess the connection of ground and surface water in the Little Spokane River Basin north of the USGS Little Spokane River at Dartford gage. During low flow months groundwater contributions are critical to maintaining stream flow necessary to protect instream resources. When evaluating surface water quantities during the low flow season, the use of seepage runs (multiple stream flow measurements on a single stream or creek) can provide insight into the ground water and surface water interactions. A better understanding of the ground/surface water interactions will improve the understanding of the impacts of ground water withdrawals on surface water flows. The WRIA 55 Ground-Water Inventory and Mapping project completed in June 2009 concluded that adequate seepage run data for the Little Spokane above the Dartford gage did not exist and a new data collection effort was needed.

#### 4.1 Little Spokane River System

The headwaters of the Little Spokane River are split approximately evenly between the West Branch of the Little Spokane River and the mainstem. Some studies suggest the mainstem may receive baseflow from the Pend Oreille River system in the form of inter-basin underflow. The West Branch of the Little Spokane River heads in the Diamond Lake drainage and flows through several lakes (Sacheen, Fan, Horseshoe, and Eloika) before merging with the main stem at approximately River Mile 33.

Above Dartford, the Little Spokane River flows are a combination of ground water contributions and tributaries flows (such as from Deadman and Dragoon Creeks). In the lower reach between the Dartford gage and the mouth, flow increases significantly as a result of groundwater discharge from the Spokane Valley Rathdrum Prairie Aquifer. The Little Spokane River has few artificial controls and the hydrograph responds to seasonal influences, such as snowpack melt.

#### 4.2 Data Collection

The Spokane County Conservation District completed 14 stream flow measurements along the Little Spokane River mainstem on October 7, 2009 to evaluate ground water/surface water interactions (Figure 4-1). Along with the flow measurements, the rated flows at three established stream gaging sites were also obtained. The measurements, known as a seepage run, provide estimations of the amounts of ground water flow to the river or the losses from the surface waters to the ground water system.

The discharge measurements were done during the low flow period (late September through early October). Measurements were made five days after a small weather system increased the river flow, Figure 3-3. The measurements were made after the flow stabilized. No large scale irrigation was in operation prior to, or during the measurements. The Colbert landfill treatment discharge to the creek was 0.89 cfs.

**Table 4-1 Measurement Site Types and Locations identified in the Approved QAPP**

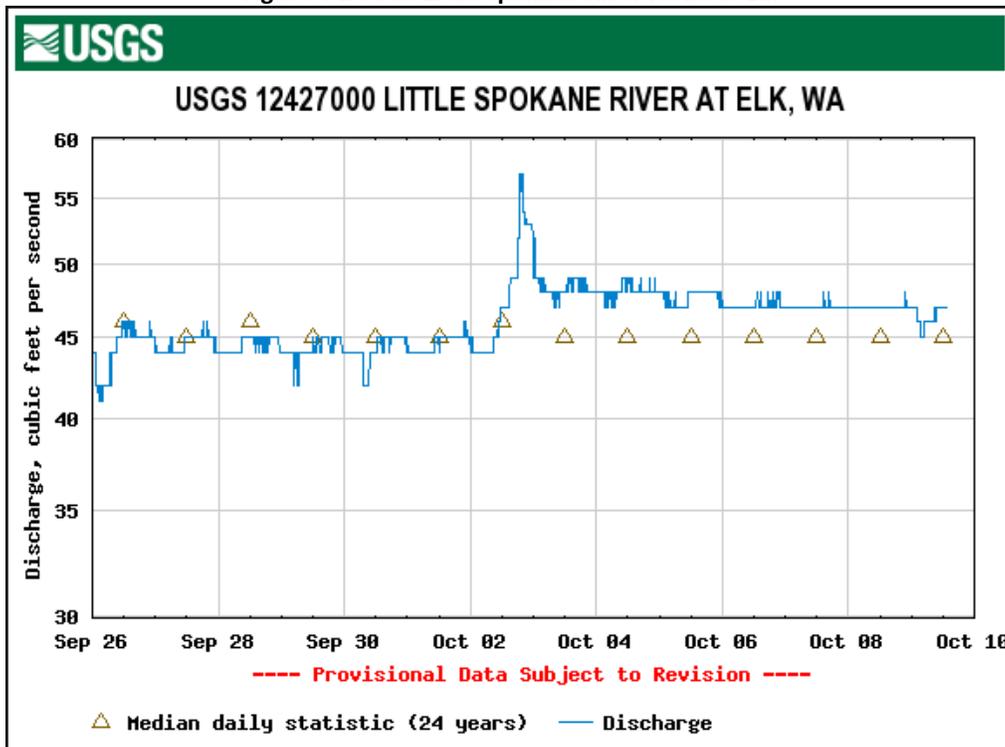
Site	Type	Location
5	Main Stem	USGS <sup>1</sup> Dartford gage – rated discharge
6	Tributary	Deadman Creek at mouth
7	Main Stem	Little Spokane River upstream of Deadman Creek
8	Main Stem	Little Spokane River downstream of Dragoon Creek
9	Tributary	Dragoon Creek at mouth
10	Tributary	Deer Creek at mouth
11	Main Stem	SCC <sup>2</sup> Chattaroy gage – rated discharge
12	Tributary	Bear Creek at mouth
13	Main Stem	Little Spokane River upstream of Bear Creek
14	Main Stem	Little Spokane River at Milan
15	Main Stem	Little Spokane River downstream of West Branch
16	Tributary	West Branch Little Spokane River at mouth
17	Tributary	Otter Creek at mouth
18	Tributary	Dry Creek at mouth
19	Main Stem	USGS Elk gage – rated discharge
20	Main Stem	Little Spokane River at Scotia Road

1-USGS is U. S. Geological Survey. 2-SCC is Spokane Community College

All sites were measured on a single day. Cross-sections were modified to meet the measurement requirements for depth and velocity outlined in Rantz and others. All sites identified in the QAPP (Table 4-1) were measured, with the following exceptions:

1. The measurement at Site 15, Little Spokane River downstream of West Branch, could not be waded. The Little Spokane River at Eloika Road immediately upstream of the West Branch confluence was substituted.
2. The outfall from Reflection Lake was added.

Figure 4-2 USGS Little Spokane River Flows at Elk



#### 4.3 Discussion of Results

Flow measurements along the mainstem of the Little Spokane River increased downstream from the headwaters near Newport, Washington to the confluence with the Spokane River. The seepage run data were collected to differentiate between the contributions to the Little Spokane River from ground water or from tributaries. The flow measurements completed on October 7, 2009 do show significant ground water/surface water interactions, with both gaining and losing reaches (Figure 4-1).

For the Little Spokane River, the 2009 flows show significant increases from Scotia to Elk (River Mile 46.9 to 37.6). From Elk to Milan, although the Little Spokane River flow increases (47.0 cfs to 58.4 cfs), the contribution from tributaries was 25.4 cfs. The tributary surface flows were 43 percent of the measured flow at Milan. From Elk to Milan, after accounting for the surface water contributions from the tributaries, 14.0 cfs were lost from the Little Spokane River

mainstem to ground water. This is approximately 2.41 cfs per mile. After Milan, the flows increase to the Dartford gage with significant increases downstream of Colbert.

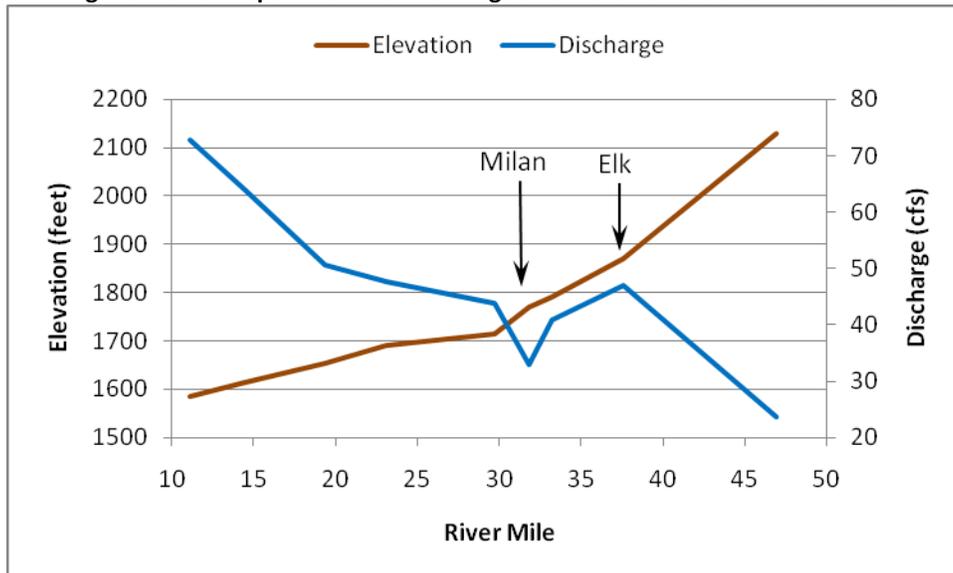
**Table 4-2 Little Spokane River Discharge Measurement Summary**

River Mile	Description	Discharge (cfs)	Elevation (feet)
46.9	Little Spokane River at Scotia Road	23.6	2130
37.6	USGS Elk gage – rated discharge	47.0	1870
34.6	Dry Creek at mouth	1.72	NA
NA	Outlet Reflection Lake	5.26	NA
33.5	Otter Creek at mouth	6.89	NA
33.2	Little Spokane River upstream of West Branch	54.7	1790
32.8	West Branch Little Spokane River at mouth	11.5	NA
31.8	Little Spokane River at Milan	58.4	1770
29.7	Little Spokane River upstream of Bear Creek	69.2	1715
27.8	Bear Creek at mouth	3.00	NA
23.1	SCC Chattaroy gage – rated discharge	76.0	1690
23.0	Deer Creek at mouth	0.767	NA
21.4	Dragoon Creek at mouth	20.0	NA
19.4	Little Spokane River downstream of Dragoon Creek	99.8	1655
19.3	Colbert landfill discharge	0.89	NA
14.5	Little Spokane River upstream of Deadman Creek	114	1615
13.0	Deadman Creek at mouth	9.22	NA
11.1	USGS Dartford gage – rated discharge	132	1585

**Notes:**

River miles are for main stem Little Spokane River only, and are measured from the mouth of the Little Spokane River (RM 0.0) upstream. Measurements are from USGS 7.5 minute topographic maps.  
 No discharge was measured at the USGS or SCC sites, the rated flows were used for the stations at Dartford, at Chattaroy, and at Elk. cfs is cubic feet per second.  
 NM is not measured.  
 NA is not applicable.

**Figure 4-3 Little Spokane River Discharge and Elevation at Select River Miles**



**Table 4-3: Change in Little Spokane River Flow due to Ground Water/Surface Water Interactions**

Reach	Reach Length (miles)	Change in Flow due to Ground Water Interactions ( $\Delta$ cfs)	Change in Flow per mile (cfs/mile)
Scotia to Elk	9.3	23	2.5
Elk to West Branch	4.4	-6.2	-1.4
West Branch to Milan	1.4	-7.8	-5.6
Milan to Bear Creek	2.1	11	5.1
Bear Creek to Chattaroy	6.6	3.8	0.58
Chattaroy to Colbert	3.7	3.1	0.84
Colbert to Deadman Creek	4.9	13	2.7
Deadman Creek to Dartford	3.4	8.8	2.6

Notes: cfs is cubic feet per second.

Reach lengths are based on distance between measurements on the Little Spokane River mainstem as listed in Table 4-2

### 5.0 Recommendations for Future Work

There are two components we recommend for future work: 1. continued data collection, and 2. focused hydrogeologic study. Three data collection activities are recommended:

- Data collection at the seven continuous water level measurement sites should continue. Long term data sets are essential to understanding influences on water level. Data collection includes regular downloading of data and manual measurements for calibration.
- Accurate surveys of the well head and the river in close proximity to the well should be taken so the relative water levels can be accurately assessed.
- A second Little Spokane seepage run should be conducted in late summer/early fall to establish a higher degree of confidence in the identification of gaining and losing reaches of the river.

Three areas are suggested for focused hydrogeologic study:

- *The Deer Park area* – The only wells to show significant groundwater decline are located in the Deer Park area. The majority of the wells in that area, though, showed no decline and some showed increases. Therefore further study is needed to determine if these are localized issues, or indicate groundwater mining in the larger Deer Park area.
- *Losing Reaches of the Little Spokane River* – 5.4 miles of the Little Spokane River in the northern portion of Spokane County are losing water to the groundwater system. It is unclear whether this is a function of the geology in this area or a result of withdrawals from groundwater in the area.
- *Lower portion of the Spokane River* – The Water District 3 Pine River well and the Whitworth Water Shady Slope well both showed a 10-15 foot water level change over the course of this project and the Little Spokane River in the vicinity of these wells is gaining water from the groundwater system. In this same area are other production wells. Well logs show that the production wells are withdrawing water from a lower aquifer unit disconnected from the Little Spokane by a layer of clay. It is unclear how this lower unit is recharged and whether a connection to an upper aquifer in connection with the Little Spokane exists.

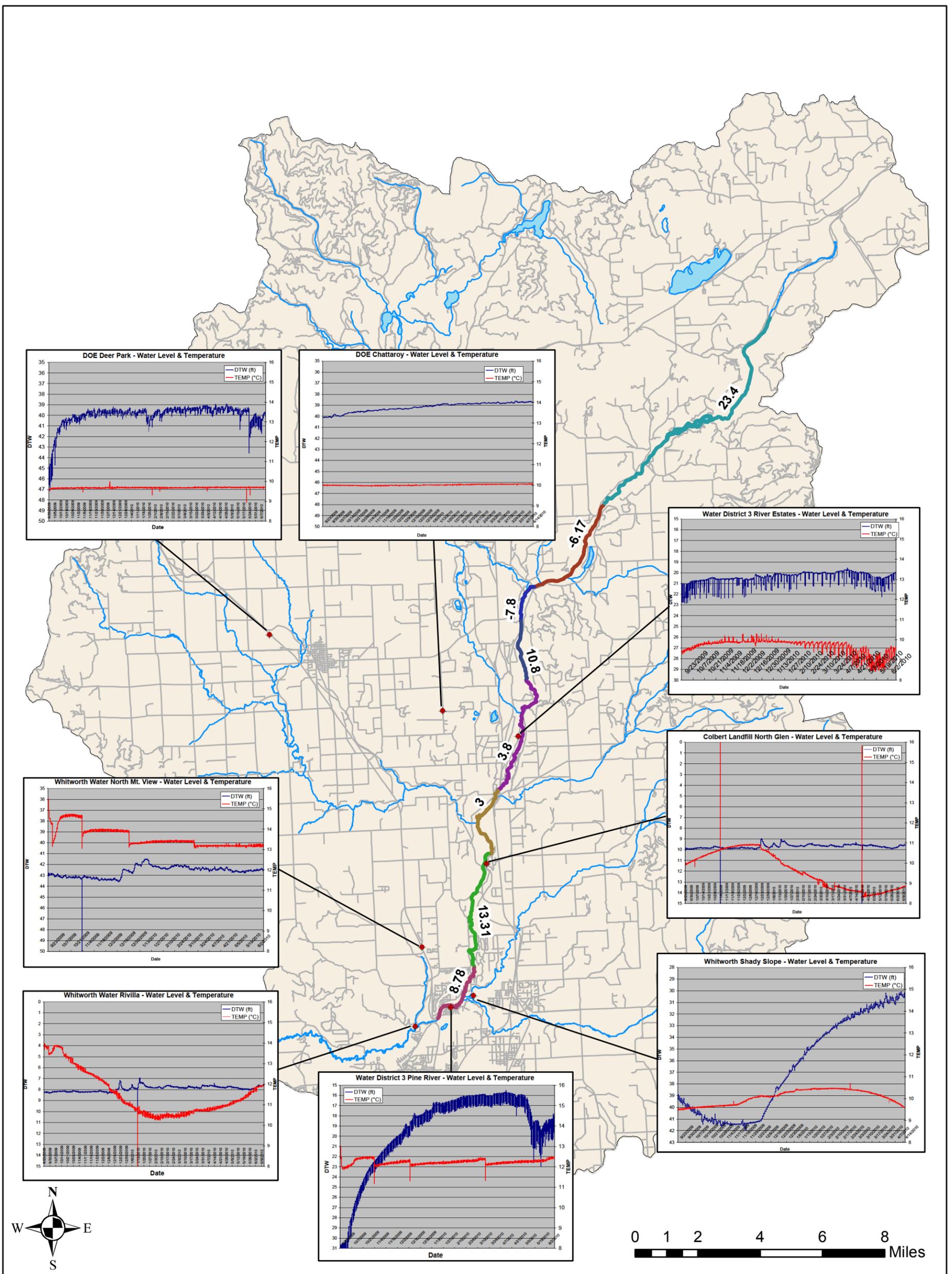


**Figure 2-1**  
**Continuous Groundwater Elevation**  
**Measurement Locations**

◆ Monitoring Locations



*Little Spokane Groundwater Elevation  
 & Stream Flow Monitoring Project*



**Figure 2.2 - Water Level & Temperature Changes with Seepage Run Data**

Notes:  
 Water level and temperature changes over the study period (September 23 - June 11) are shown in each graph with a line drawn to the appropriate well location.

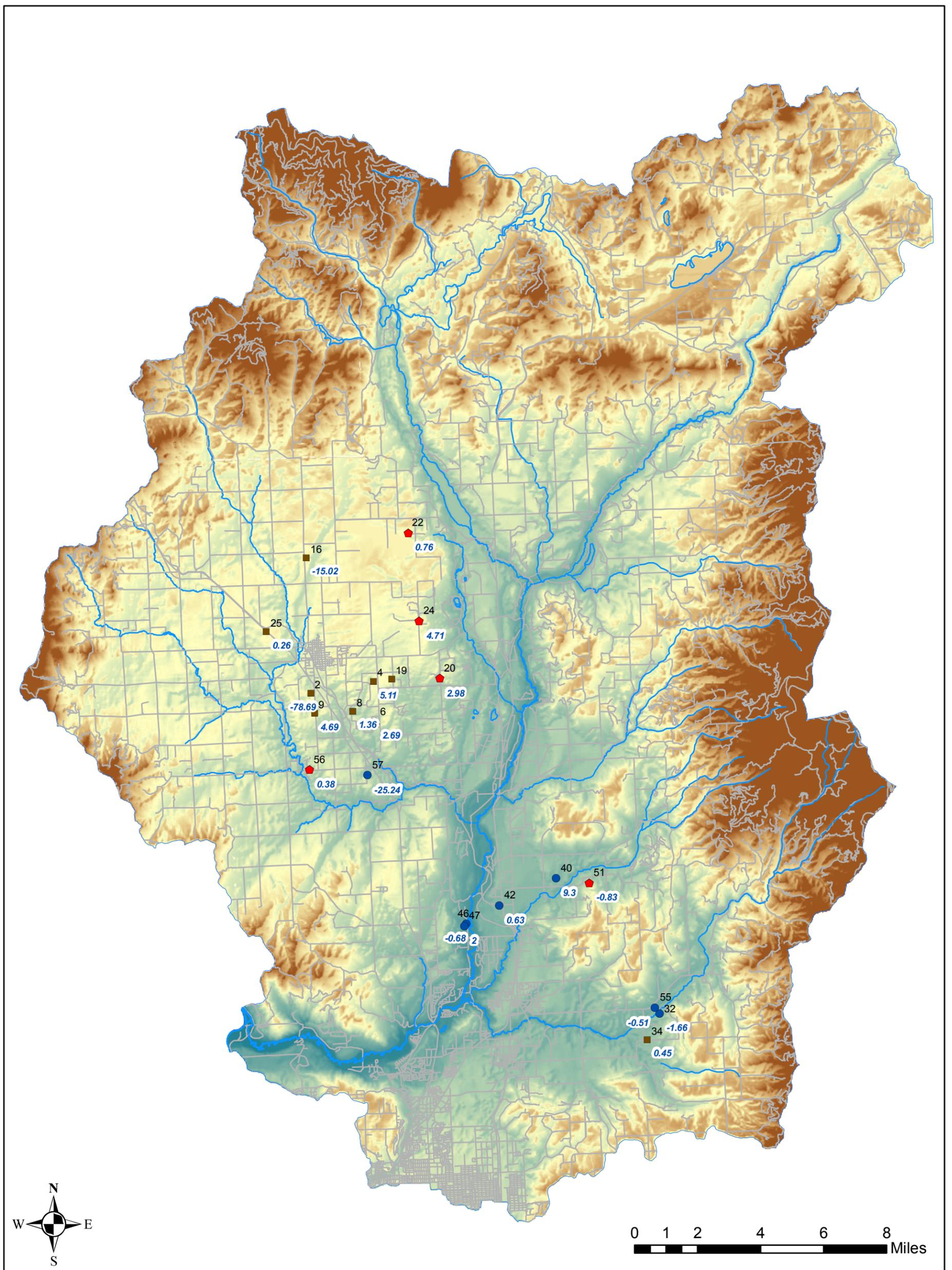
Water level changes are shown in blue and temperature changes are shown in red.  
 The y-axis of each graph has the same scale so changes in water level between sites are comparable.

Little Spokane seepage run data is depicted with changes in color with the associated groundwater contribution or loss in cfs along each reach.



**SPOKANE COUNTY**  
 WATER RESOURCES

**Little Spokane Groundwater Elevation & Stream Flow Monitoring Project**



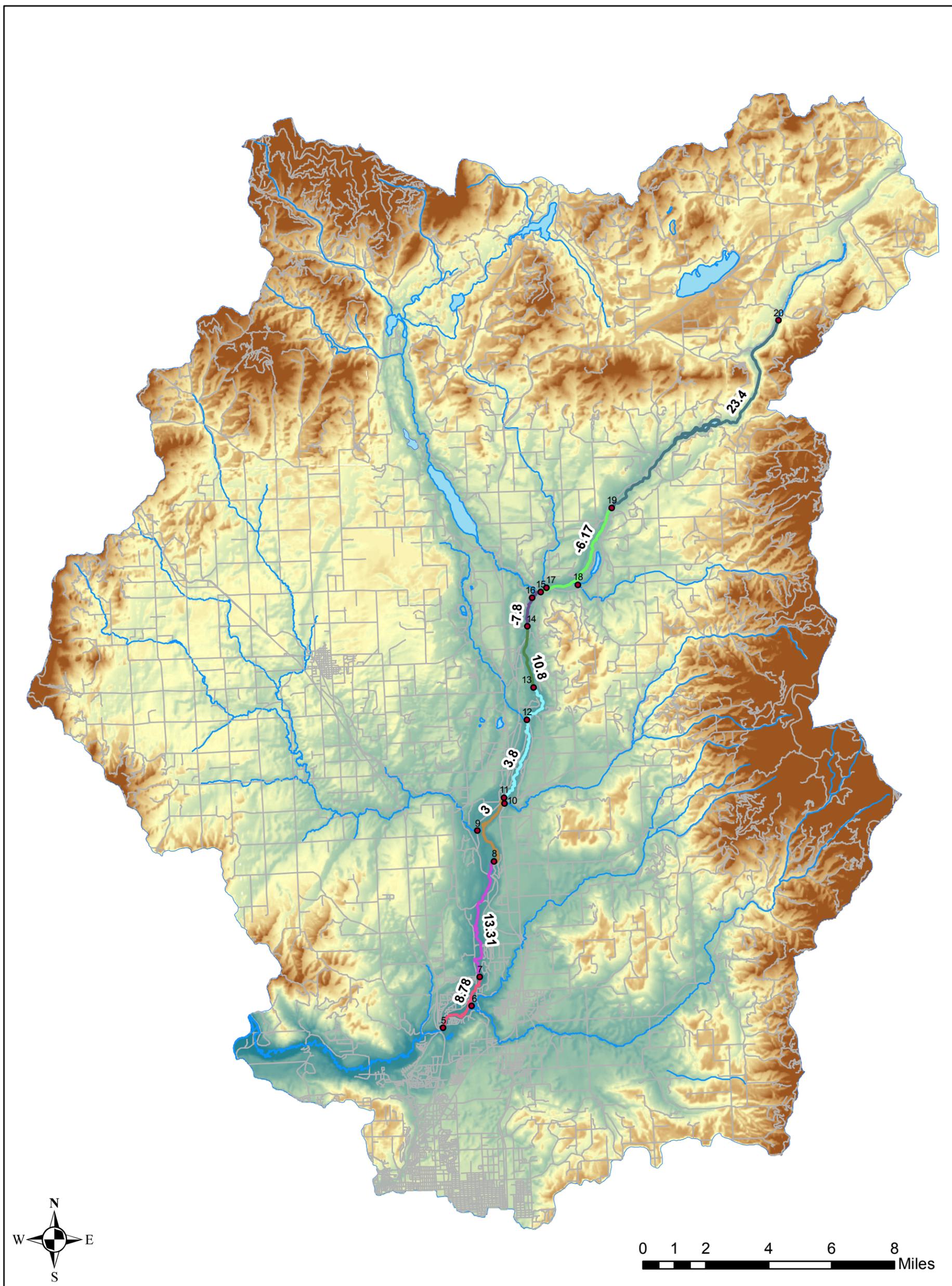
**Figure 3-1  
Snap Shot Measurement  
Locations**

Notes:  
 -Number in black are the study ID for each location.  
 -Numbers in blue are the change in water level in feet from 1991/96 to 2009/10.  
 See report for specific dates of the measurements.

- Aquifer**
- Basalt
  - ◆ Granite
  - Lower Sand and Gravel
  - ▲ Unknown
  - Upper Sand and Gravel



**Spokane County  
Water Resources**  
*Little Spokane Groundwater Elevation  
& Stream Flow Monitoring Project*



**Figure 4-1**  
**Little Spokane River Seepage Run - October 7, 2009**

- Discharge Measurement Locations

Notes:  
 Each stream reach evaluated is depicted with a different color.  
 Streamflow gains or losses in cfs to and from groundwater are noted along each reach



*Little Spokane Groundwater Elevation  
 & Stream Flow Monitoring Project*

Appendix A  
Well Logs – Continuous Water Level Monitoring Locations

File Original and First Copy with Department of Ecology
Second Copy - Owner's Copy
Third Copy - Driller's Copy

WATER WELL REPORT

UNIQUE WELL ID # AGC028

STATE OF WASHINGTON

Water Right Permit No

89457

(1) OWNER Name Whitworth Water District #2 Address 10828 N. Waikiki Road, Spokane, WA.

(2) LOCATION OF WELL County Spokane SW 1/4 ne 1/4 Sec 33 T 27R N R 43R W

(2a) STREET ADDRESS OF WELL (or nearest address) N. 15212 Shady Slope Road, Spokane, WA.

(3) PROPOSED USE: Domestic Irrigation DeWater Industrial Test Well Municipal Other

(4) TYPE OF WORK: Owner's number of well (If more than one) 2
Abandoned New well Deepened Reconditioned Method Dug Cable Rotary Bored Driven Jetted

(5) DIMENSIONS: Diameter of well 12 inches
Drilled 130 feet. Depth of completed well 130 ft

(6) CONSTRUCTION DETAILS: Casing installed 12 Diam from plus 2' 38' ft to ft
Welded Liner installed Threaded

Perforations: Yes No
Type of perforator used
SIZE of perforations in by in
perforations from ft to ft

Screens: Yes No
Manufacturer's Name Houston
Type 10" pipe size Model No 304 St
Diam 10 Slot size 40 from 90' ft to 115 ft
Diam 10 Slot size 25 from 115 ft to 120 ft

Gravel packed Yes No
Gravel placed from ft to ft

Surface seal Yes No
Material used in seal Bentinite to 8', neat cement to 0'
Did any strata contain unusable water? Yes No
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP Manufacturer's Name
Type HP

(8) WATER LEVELS: Land surface elevation above mean sea level ft
Static level 30 ft below top of well Date 1-10-01
Artesian pressure lbs per square inch Date
Artesian water is controlled by (Cap valve etc)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes No If yes by whom? Driller
Yield 512 gal/min with 38 ft drawdown after 12 hrs

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)
Time Water Level Time Water Level Time Water Level
Recovered to static level in 28 seconds

Date of test
Baker test gal/min with ft drawdown after hrs
Artest gal/min with stem set at ft for JAN 3 2001
Artesian flow gpm Date
Was a chemical analysis made? Yes No

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation Describe by color character, size of material and structure and show thickness of aquifer and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information

Table with columns MATERIAL, FROM, TO. Rows include Top Soil, Sand & Gravel, 1" minus, brown clay, Coarse gravel & boulders, Sand & gravel 1" minus, some brown clay, Gravel 1" minus, some med. coarse sand, cemented with clay & boulders, Gravel 1" minus 10%, sand coarse 40%, sand fine & silt 40%, brown clay 10%, Boulders 6" minus with brown clay & med. to fine sand, Brown clay with very fine silt laid thru it, 3/8 minus gravel 40%, fine gravel 30%, coarse sand 30%, some silt, 3/8 coarse gravel 30%, coarse sand 50%, med. sand 20%, clay balls, Coarse sand 40%, med. sand 40%, fine sand 20%, some clay balls, Brown clay, some very fine sand, Coarse sand 20%, med. sand 40%, fine sand 40%, brown clay

Work Started Nov. 1 19 Completed Jan. 11 19

WELL CONSTRUCTOR CERTIFICATION continued

I constructed and/or accept responsibility for construction of this well, and compliance with all Washington well construction standards. Materials used the information reported above are true to my best knowledge and belief

NAME CJ WARREN & SON DRILLING (PERSON FIRM OR CORPORATION) (TYPE OR PRINT)

Address S 3005 Best Road, Veradale WA.

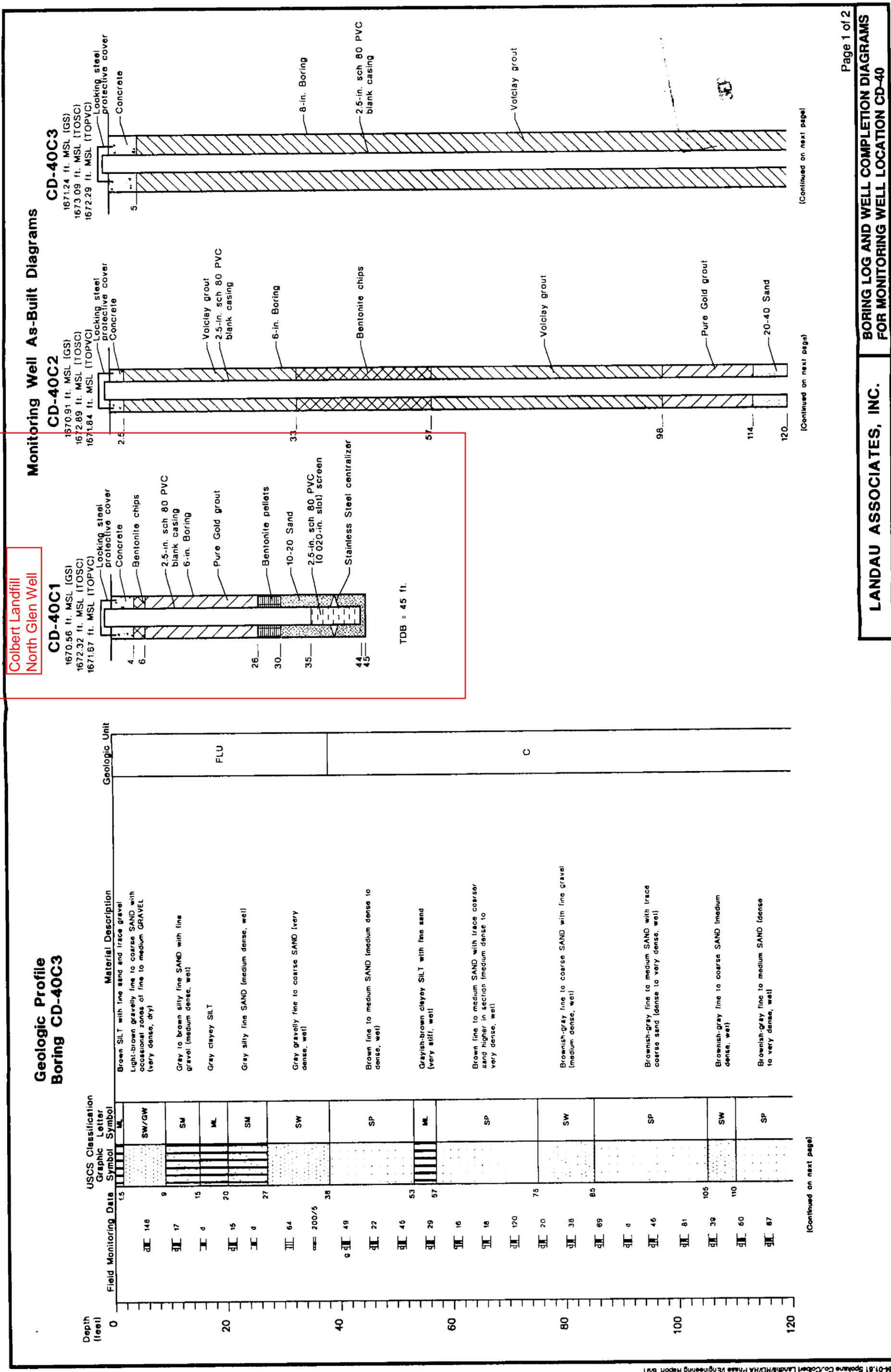
(Signed) [Signature] License No 0515 (WELL DRILLER)

Contractor's Registration No CJWARSD011JA Date Jan. 29 19

(USE ADDITIONAL SHEETS IF NECESSARY)

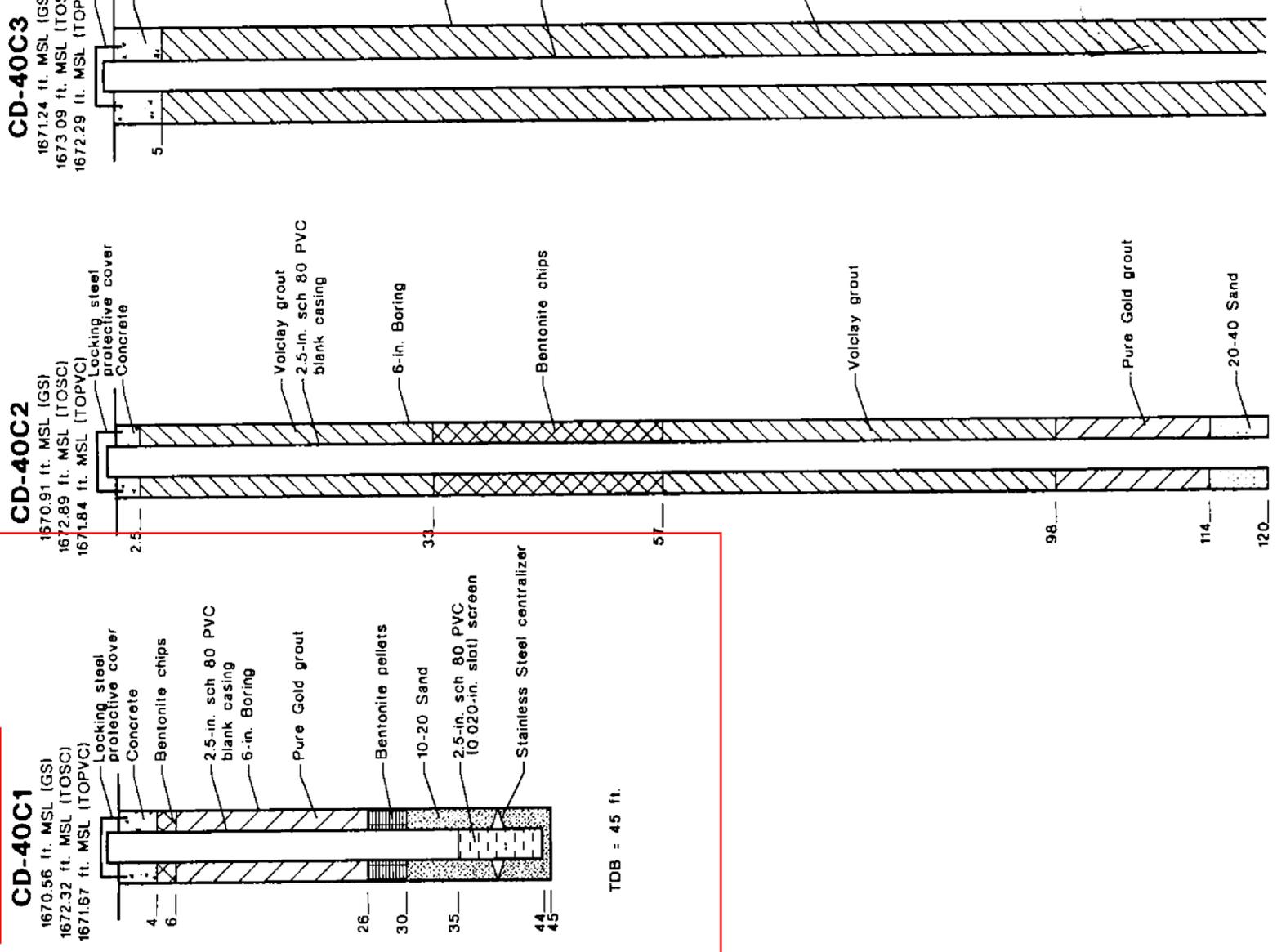
Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at 407-6600. The TDD number is (206) 407-6006

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.



Colbert Landfill  
North Glen Well

### Monitoring Well As-Built Diagrams



(Continued on next page)

(Continued on next page)

(Continued on next page)

# WATER WELL LOG

N Mt View Well #2  
Standing Well

OWNER: Name John Fleming Address \_\_\_\_\_ Zip \_\_\_\_\_  
 (2) LOCATION OF WELL: County Spokane  
 Bearing and distance from section or subdivision corner Lot 1 Blk 1 (Original Well) 1/4 Sec \_\_\_\_\_ T. \_\_\_\_\_ N. R. \_\_\_\_\_ W.M.

(3) PROPOSED USE: Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other

(4) TYPE OF WORK: Owner's number of well (if more than one) \_\_\_\_\_  
 Method: Dug  Bored   
 Cable  Driven   
 Rotary  Jetted   
 New well   
 Deepened   
 Reconditioned

(5) DIMENSIONS: Diameter of well 8 inches.  
 Drilled 90 ft. Depth of completed well 90 ft.

(6) CONSTRUCTION DETAILS:  
 Casing installed: 8 " Diam. from 0 ft. to 60 ft.  
 Threaded  " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Welded  " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes  No   
 Type of perforator used \_\_\_\_\_  
 SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
 perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
 Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_ Model No. \_\_\_\_\_  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel: \_\_\_\_\_  
 Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? \_\_\_\_\_ ft.  
 Material used in seal \_\_\_\_\_  
 Did any strata contain unusable water? Yes  No   
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

7) PUMP: Manufacturer's Name \_\_\_\_\_  
 Type: \_\_\_\_\_ H.P.

8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.  
 static level 66 ft. below top of well Date \_\_\_\_\_  
 Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
 Artesian water is controlled by \_\_\_\_\_ (Cap. valve, etc.)

9) WELL TESTS: Drawdown is amount water level is lowered below static level  
 Is a pump test made? Yes  No  If yes, by whom? \_\_\_\_\_  
 Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test \_\_\_\_\_  
 Pump test 12 gal./min. with 16 ft. drawdown after 1 hr.  
 Discharge flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

## (10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Dirty sand	0	30
Clay and sand	30	55
Clay	55	68
Sand vein & water	68	68
Clay	68	90

The water in this well flows from a narrow vein of sand between clay layers at the 68 ft. level.

*Permitted*

Work started Dec. 63, 19\_\_\_\_. Completed Jan, 1964

### WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME D. E. BARTHOLOMEW  
 (Person, Representative or Institution) (Type or print)  
 Address Nine Mile Falls, Wash.

[Signed] D. E. Bartholomew  
 (Well Driller)

License No. \_\_\_\_\_ Date Jan, 1964

# WATER WELL REPORT

Date Printed 15 Aug 2002

Unique Well ID No AGG618

Log No 14702

# 118135

State of Washington

Water Right Permit Number 8711020139

(1) OWNER SPOKANE WATER DIST NO 3 Address P O BOX 11187 Spokane WA 99211

(2) LOCATION OF WELL County SPOKANE NE 1/4 NW 1/4 Sec 23 T 28 R 43E WM

(2a) Street Address of well RIVER ESTATES RD

Tax Parcel No

(3) PROPOSED USE DOMESTIC

(4) TYPE OF WORK Owners s Well Number 1  
NEW WELL (If more than one well)

(10) Well Log

Method CABLE

(5) DIMENSIONS Diameter of well 18 inches  
Drilled 122 ft Depth of completed well 122 ft

Formation Describe by color character size of material and structure Show thickness of aquifers and the kind and nature of the material in each stratum penetrated Show at least one entry for each change in formation

(6) CONSTRUCTION DETAILS Casing installed WELDED

Material	From	To
BROWN SAND GRAVEL BOULDERS	0	14
SMALLER BOULDERS SAND/GRAVEL	14	17
HARD GRAVEL BOULDERS	17	23
SATURATED GRAVEL BOULDERS	23	26
GRAY SILT BOULDERS	26	28
BROWN SATURATED SAND/GRAVEL	28	37
GRAY SAND FINE SATURATED	37	45
GRAY SAND COARSE W/WATER	45	48
GRAY CLAY	48	53
GRAY SATURATED SAND	53	58
BROWN SAND COARSE SATURATED	58	63
BROWN CLAY SILT	63	66
COARSER BROWN SAND	66	80
CLAYEY BROWN SAND SATURATED	80	98
BROWN SAND COARSE SATURATED	98	105
GRAY SAND FINE	105	112
COARSER SAND W/WATER	112	117
CLAYEY SAND LESS WATER	117	122

Liner installed NONE  
14 Dia from +2 ft to 54 ft  
14 Dia from 61 ft to 67 ft  
16 Dia from 100 ft to 121 5 ft

Perforations used? No Used In

Type of perforator used

SIZE of perforations in by in  
Perforations from ft to ft  
Perforations from ft to ft  
Perforations from ft to ft

Screens Yes K Pac Location

Manufacture s Name JOHNSON

Type SLOTTED Model No STAINLESS

Diam 14 slot size 040 from 67 ft to 100 ft

Diam 14 slot size 040 from 54 ft to 61 ft

Gravel packed No Size of Gravel 060

Gravel placed from 122 ft to 25 ft

Surface seal Yes To what depth 25 ft

Seal method Material used in seal CEMENT

Did any strata contain unusable water? No

Type of water Depth of strata

Method of sealing strata off

(7) PUMP Manufacture s name  
Type NONE H P 0

Notes

(8) WATER LEVELS Land surface elevation  
above mean sea level 0 ft

Static level 21 ft below top of well Date 05/20/2002

Artesian Pressure lbs per square inch Date

Artesian water controlled by

(9) WELL TEST Drawdown is amount water level is lowered below static level

Was a pump test made? Yes If yes by whom FOGLE PUMP

Yield gal/min with ft drawdown after  
800 38 77 4

Recovery data Test Date 6/18/02  
Time Water Level Time Water Level Time Water Level

Bailer test gal/min ft drawdown after hrs  
Air test gal/min w/ stem set at ft for hours  
Artesian flow gpm Date  
Temperature of water Was a chemical analysis made No

Work started 05/10/2002 Completed 06/21/2002

### WELL CONSTRUCTION CERTIFICATION

I constructed and/or accept responsibility for construction of this well and its compliance with all Washington well construction standards. Materials used and the information reported are true to my best knowledge and belief.

JAMES F NOONAN License No 0362  
(Driller/Licensed Engineer)

Traine Name License No  
NAME FOGLE PUMP & SUPPLY INC Shop AIRWAY HEIGHTS  
ADDRESS PO BOX 1450

Airway Heights WA 99001

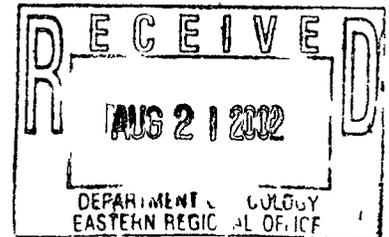
Phone 5092440846 Toll Free 8883439355

E Mail

FAX 5092442815 WEB Site WWW.FOGLEPUMP.COM

[SIGNED] James F Noonan License No 0362  
(Driller/Licensed Engineer)

Contractor s Registration No Date Log Created 8/15/02



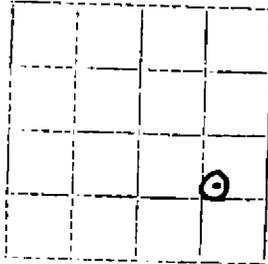
The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Appl.: 6502  
 Permit 6145  
 Cert.: 6017  
**WELL LOG**

STATE OF WASHINGTON  
 DEPARTMENT OF CONSERVATION  
 DIVISION OF WATER RESOURCES

Record by Driller  
 Source Driller's Record



Location: State of WASHINGTON  
 County Spokane  
 Area .....

Map  
 Plat of Greenleaf Park Subdivision  
 1/4 sec. 32 T. 27 N. R. 43 E.

Diagram of Section

Drilling Co. Clyde Reeder - Well Driller  
 Address .....

Method of Drilling Bored Date May 5, 1961

Owner Washington Water Power Co.  
 Address P. O. Drawer 1445, Spokane, Wash.

Land surface, datum 1600' ft. <sup>above</sup> ~~below~~  
 SWL: 15.3' Date May 5, 1961 Dims: 6"x208'

CORRE-LATION	MATERIAL	From (feet)	To (feet)
--------------	----------	-------------	-----------

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

	Domestic supply and municipal		
	Fill material	0	9
	Top soil	9	10
	Sand	10	12
	Sand & gravel	12	19
	Clay, sand, silt	19	56
	Clay, blue, & silt	56	116
	Sand, coarse, & silt	116	187
	Sand, coarse, & gravel in clay	187	202
	Gravite, broken	202	208
	Granite	208	
	Casing: 6" from 0' to 203'		
	Sealed with concrete to 1'		
	Yield: 330 gpm with 43' DD after 24 hrs.		
	immediate recovery		
	Date of test: May 5, 1961		

File Original and First Copy with Department of Ecology  
Second Copy - Owner's Copy  
Third Copy - Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Application No

Permit No.

**OWNER:** Name D.A.E. (Observation) Address 103 E. Johnson  
**LOCATION OF WELL:** County SPOKANE SW 1/4 NW 1/4 Sec. 16 T. 28 N. R. 43E, W.M.  
Bearing and distance from section or subdivision corner 1400' S and 50' E from NW corner of Sec. 16

**(3) PROPOSED USE:** Domestic  Industrial  Municipal   
Irrigation  Test Well  Other

**(4) TYPE OF WORK:** Owner's number of well (if more than one) \_\_\_\_\_  
New well  Method: Dug  Bored   
Deepened  Cable  Driven   
Reconditioned  Rotary  Jetted

**(5) DIMENSIONS:** Diameter of well 6" inches.  
Drilled 242 ft. Depth of completed well 242 ft.

**(6) CONSTRUCTION DETAILS:**  
Casing installed: 6" Diam. from 0 ft. to 193 ft.  
Threaded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Welded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Perforations: Yes  No   
Type of perforator used \_\_\_\_\_  
SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
Manufacturer's Name \_\_\_\_\_  
Type \_\_\_\_\_ Model No. \_\_\_\_\_  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel: \_\_\_\_\_  
Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18  
Material used in seal BENTONITE  
Did any strata contain unusable water? Yes  No   
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

**(7) PUMP:** Manufacturer's Name \_\_\_\_\_  
Type: \_\_\_\_\_ H.P. \_\_\_\_\_

**(8) WATER LEVELS:** Land-surface elevation above mean sea level 1980  
Static level \_\_\_\_\_ ft. below top of well Date \_\_\_\_\_  
Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

**(9) WELL TESTS:** Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes  No  If yes, by whom? \_\_\_\_\_  
Yield: \_\_\_\_\_ gal/min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  
Time Water Level Time Water Level Time Water Level

Date of test \_\_\_\_\_  
Baller test \_\_\_\_\_ gal/min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

**(10) WELL LOG:**  
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
SOLL, GREY	0	3
SAND, BRN, FINE TO MEDIUM	3	37
SAND, BRN, MED TO COARSE	37	40
SAND, BRN, MED TO COARSE W.B.	40	57
SAND, BRN, FINE, MED W/CLAY	57	83
CLAY, GREY, FINE SAND	83	86
SAND, BRN, FINE, MED W/CLAY	86	91
SAND, BRN, FINE W.B.	91	127
SAND, BRN, FINE TO MED. W.B.	127	138
SAND, BRN, FINE W.B.	138	173
CLAY, GREY, COARSE	173	179
CLAY, LT. BRN	179	188
CLAY, BRN, FINE W/BRN CLAY	188	192
GRAVITE, LT. BRN	192	198
CLAY, ALK GREY	198	227
GRAVITE, GREY	227	242

Dear Park 7th Valley  
4755 46 11722 50

Work started 20 JAN 1978 Completed 23 JAN 1978

**WELL DRILLER'S STATEMENT:**  
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME B.I.B. WELL DRILLING  
(Person, firm, or corporation) (Type, or print)

Address Rt 7, Barbours VAKINA WA 97903

[Signed] C. C.  
(Well Driller)

License No. \_\_\_\_\_ 1978

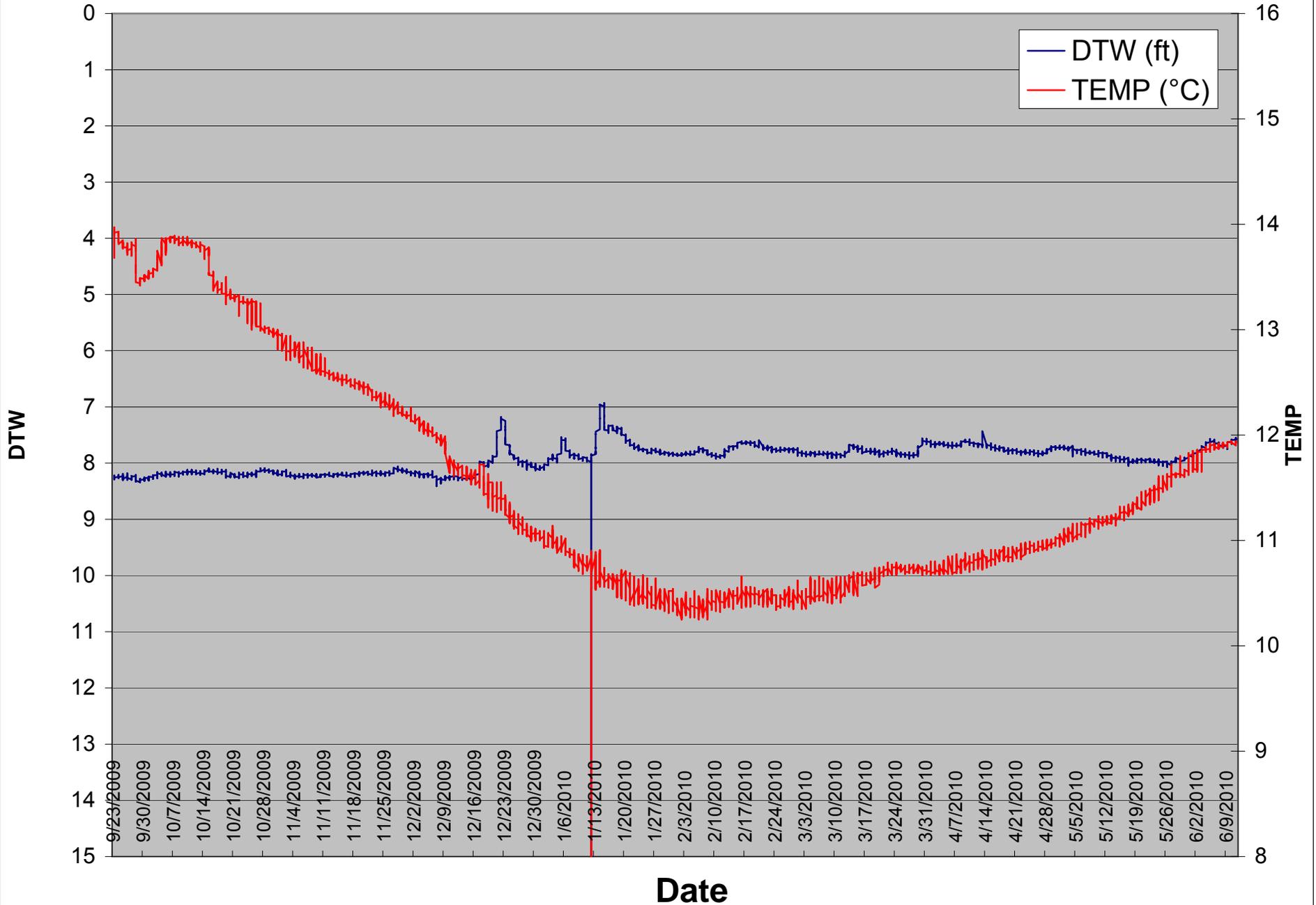
2/7/78

(USE ADDITIONAL SHEETS IF NECESSARY)

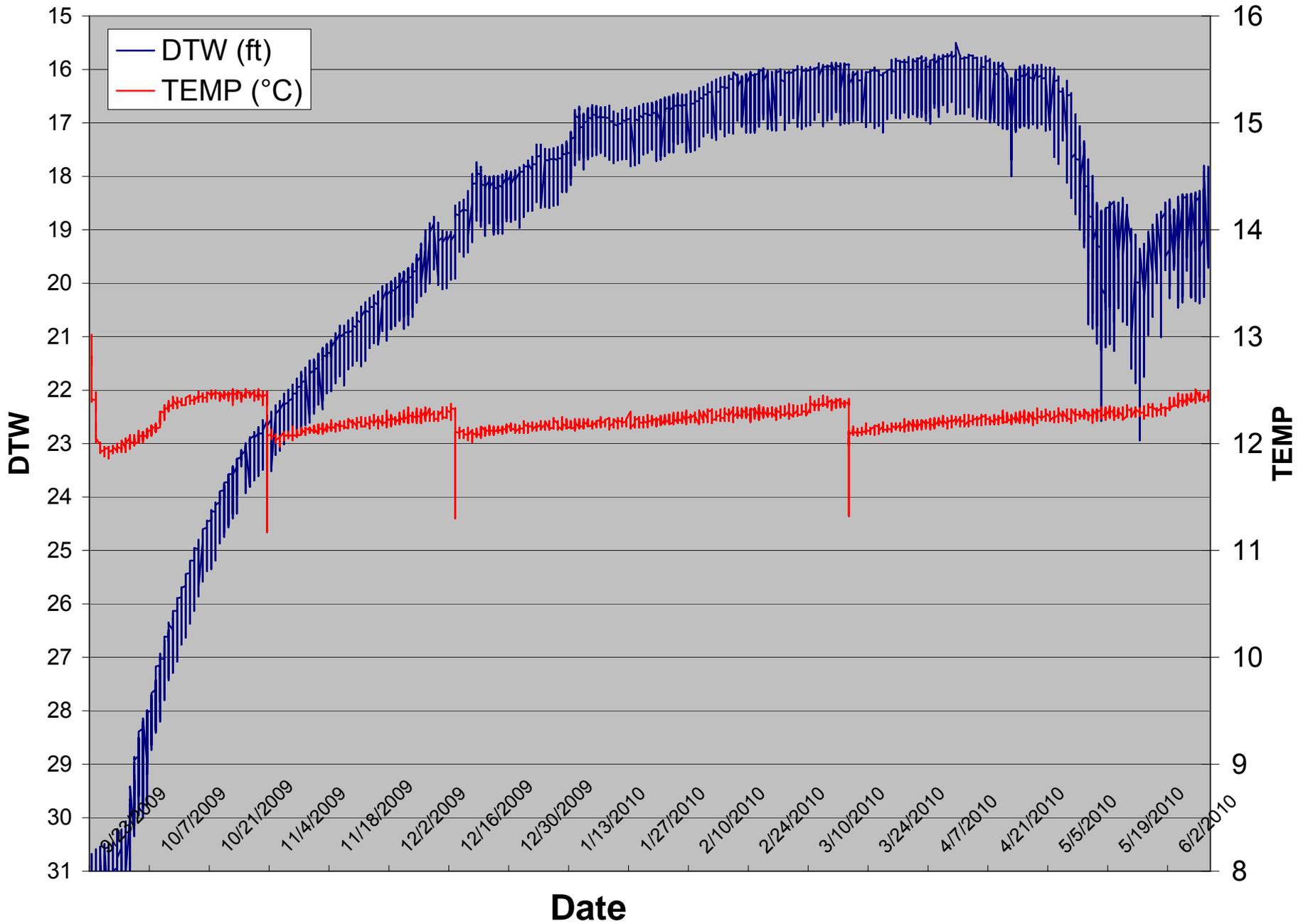


Appendix B  
Water Level, Temperature & Conductivity Graphs

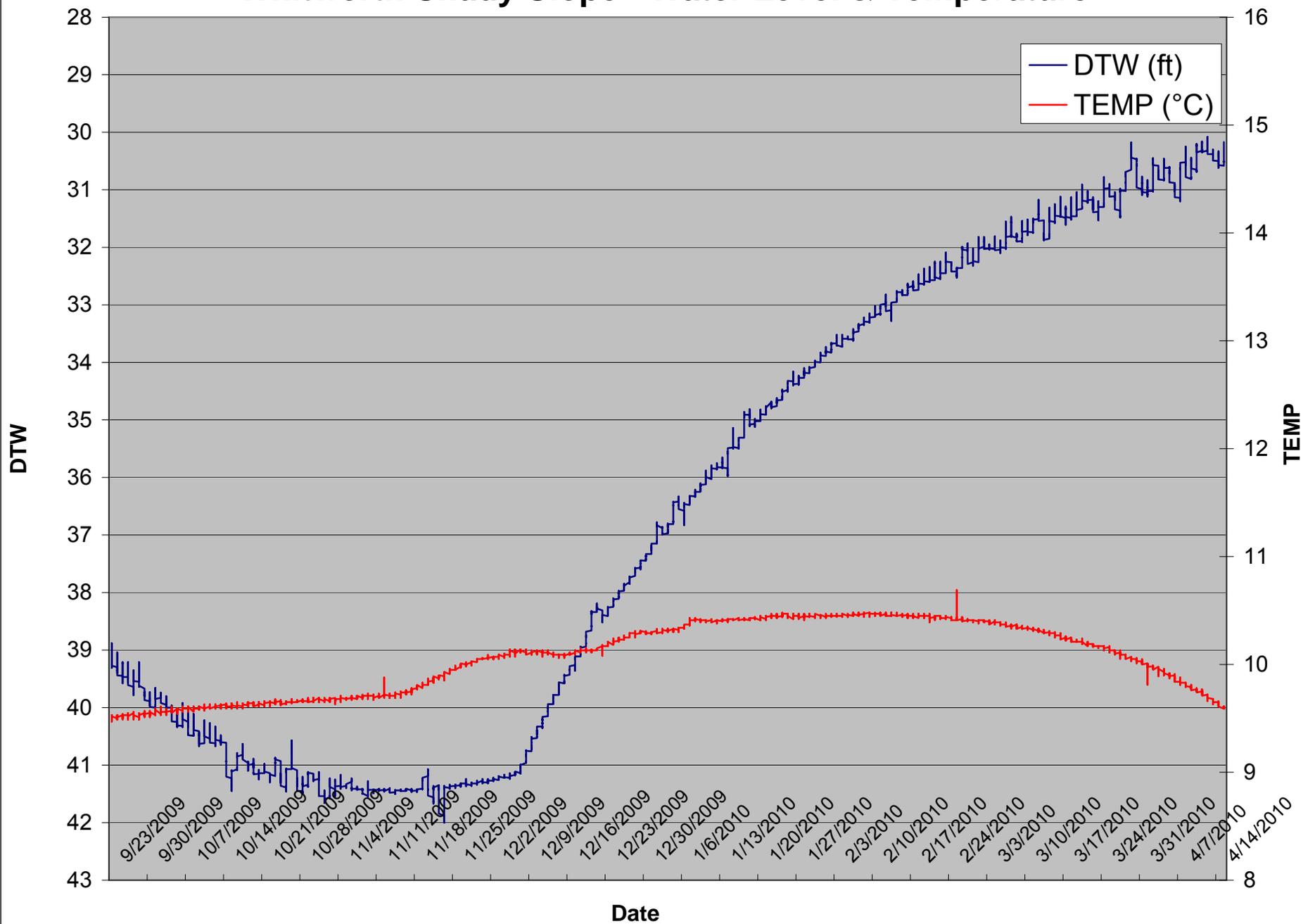
# Whitworth Water Rivilla - Water Level & Temperature



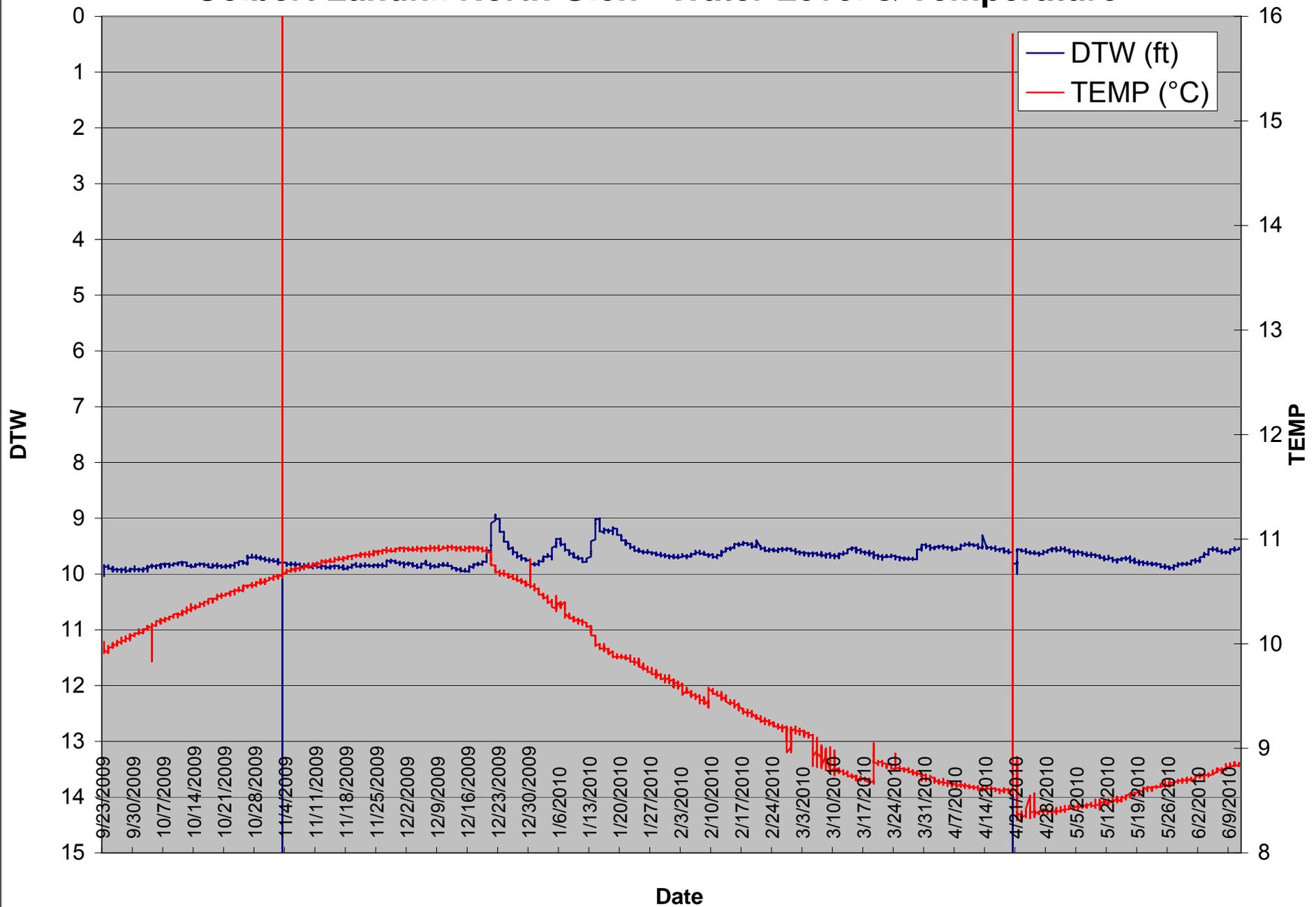
# Water District 3 Pine River - Water Level & Temperature



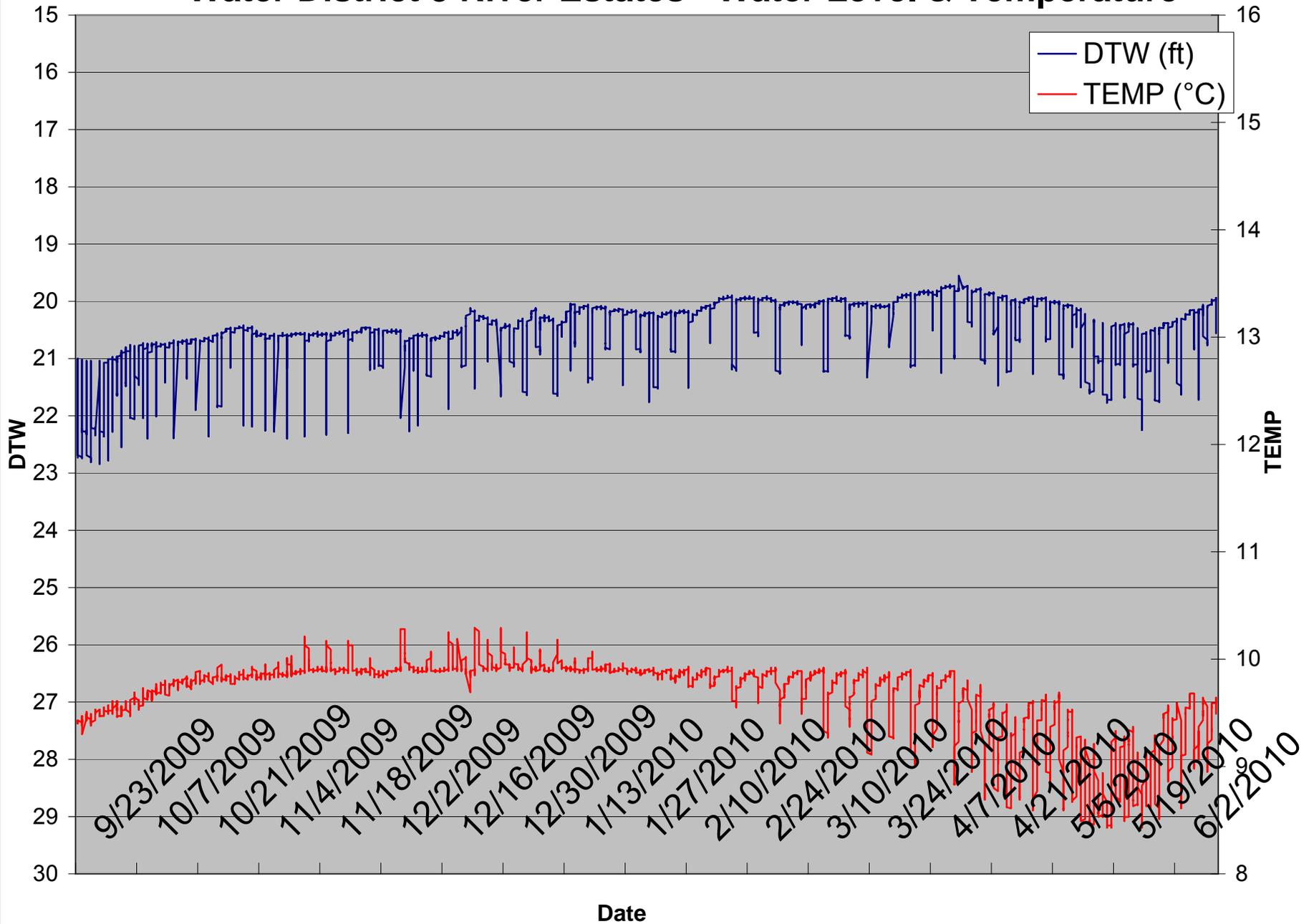
# Whitworth Shady Slope - Water Level & Temperature



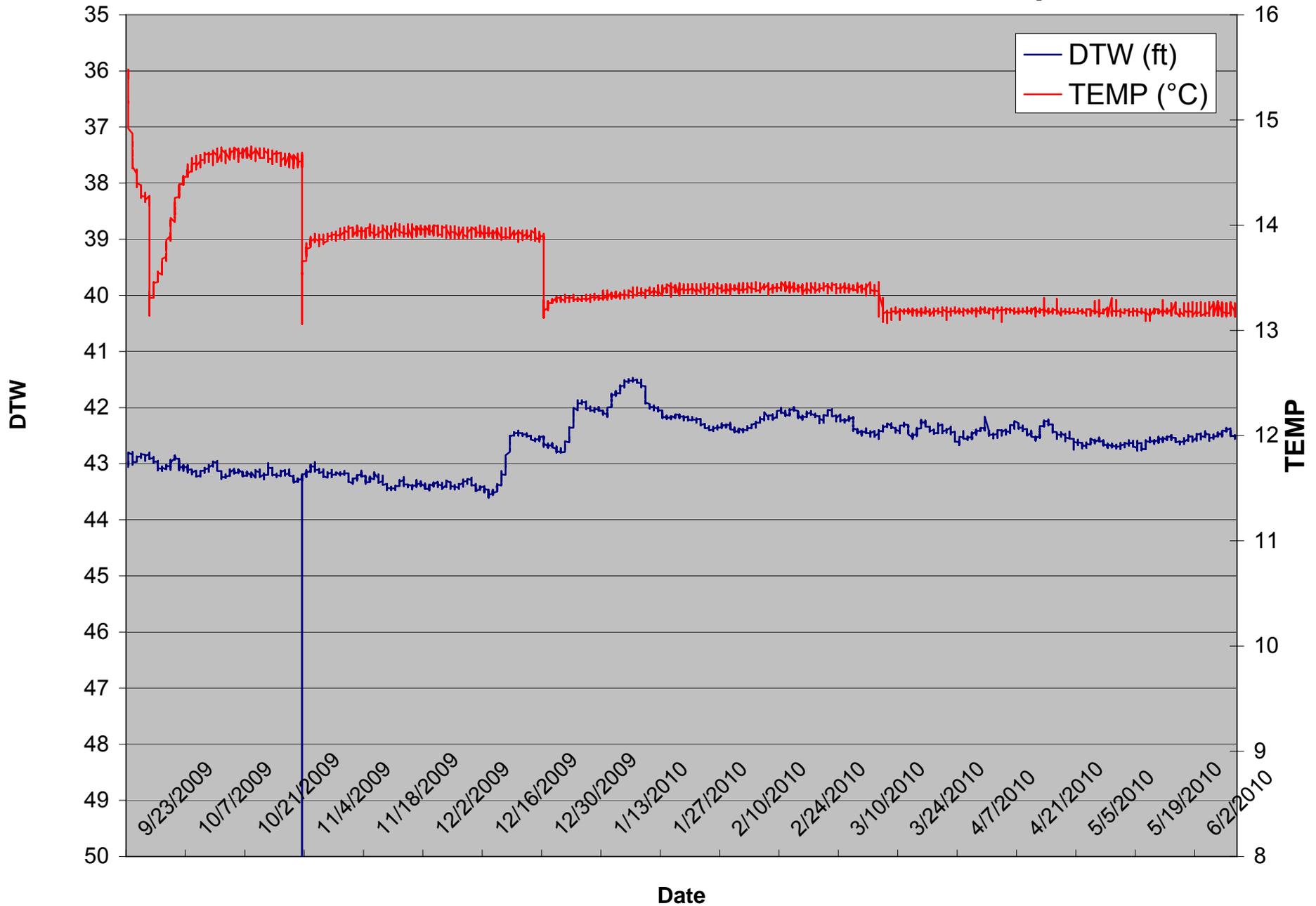
# Colbert Landfill North Glen - Water Level & Temperature



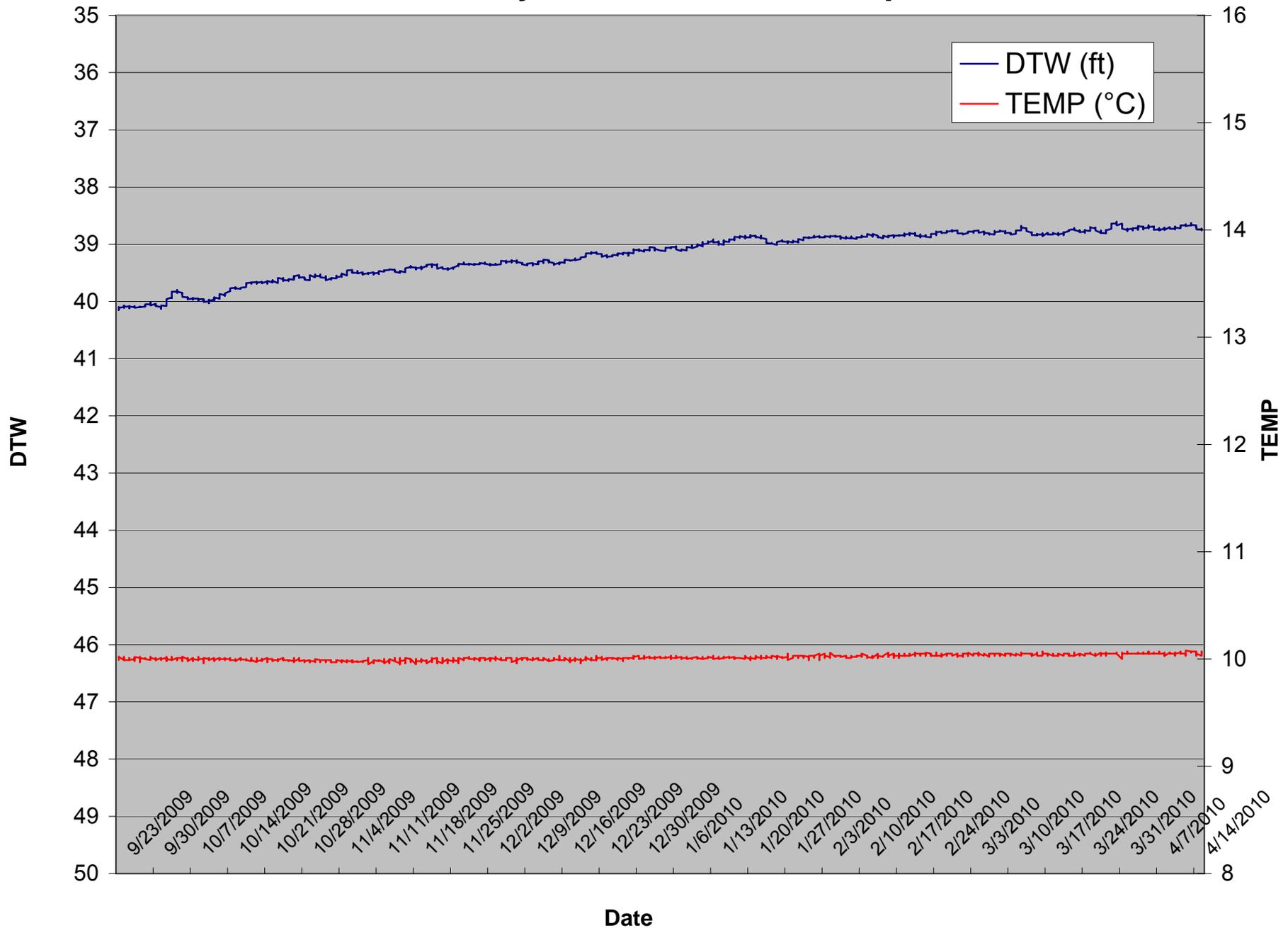
# Water District 3 River Estates - Water Level & Temperature



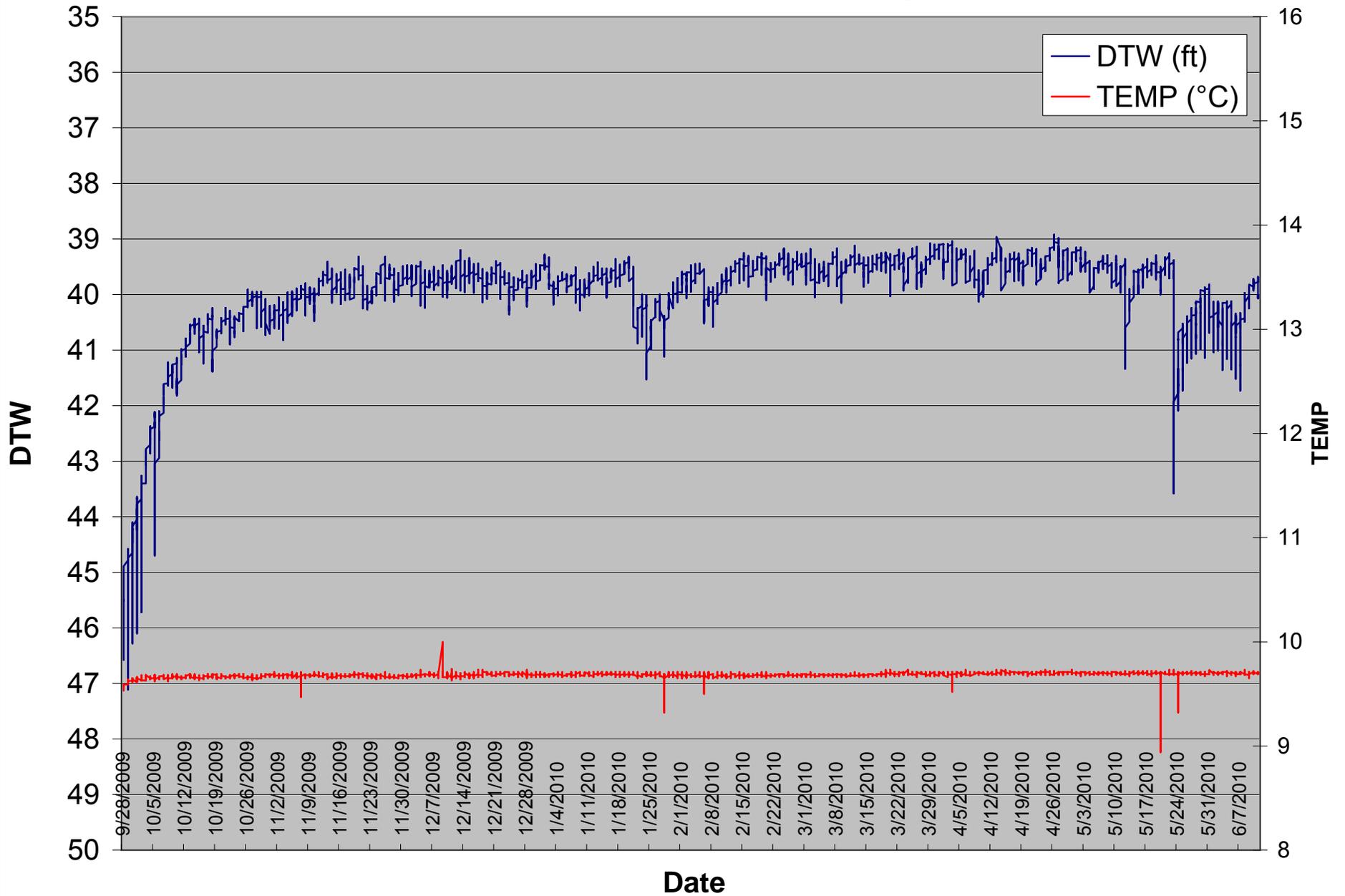
# Whitworth Water North Mt. View - Water Level & Temperature



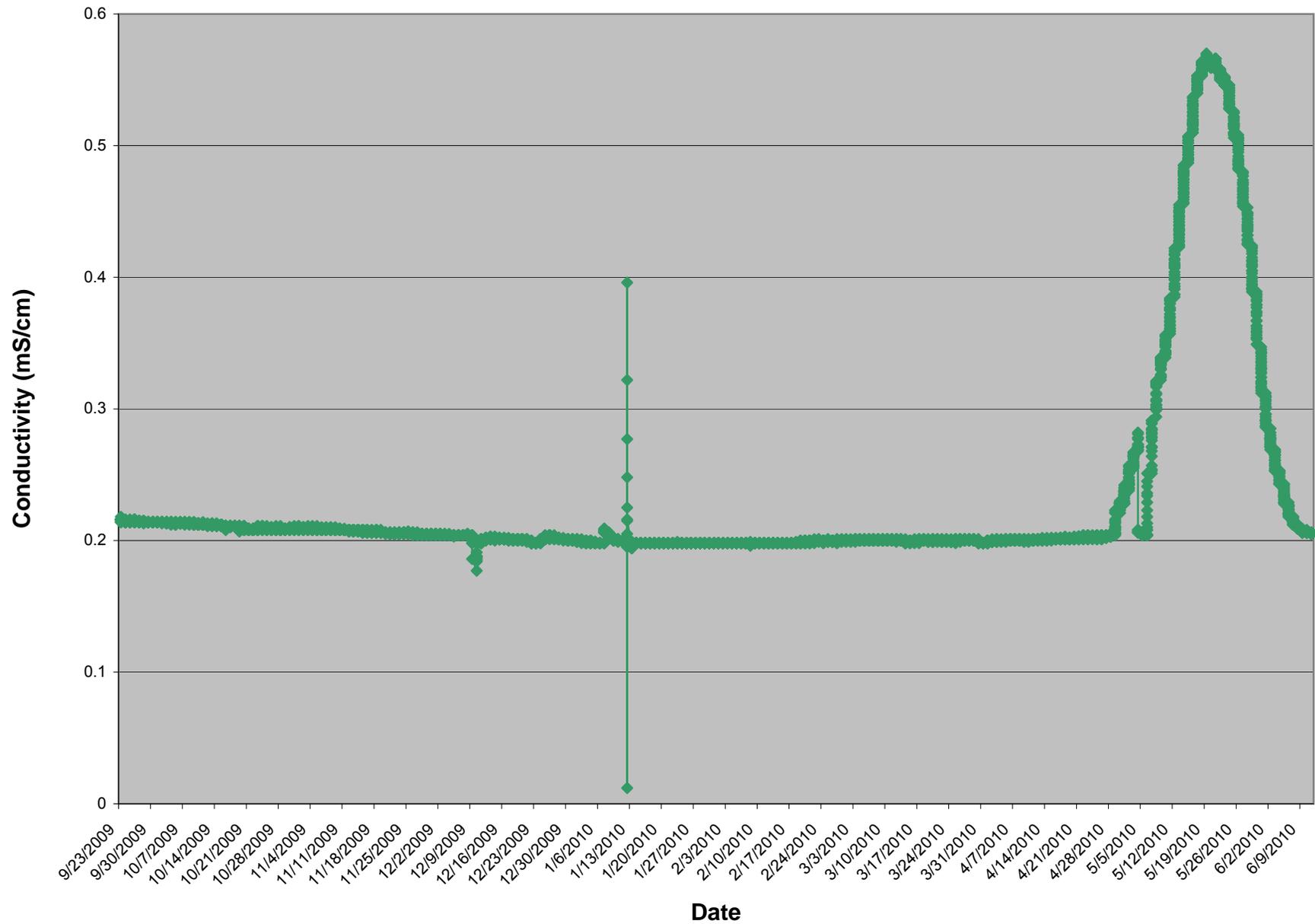
# DOE Chattaroy - Water Level & Temperature



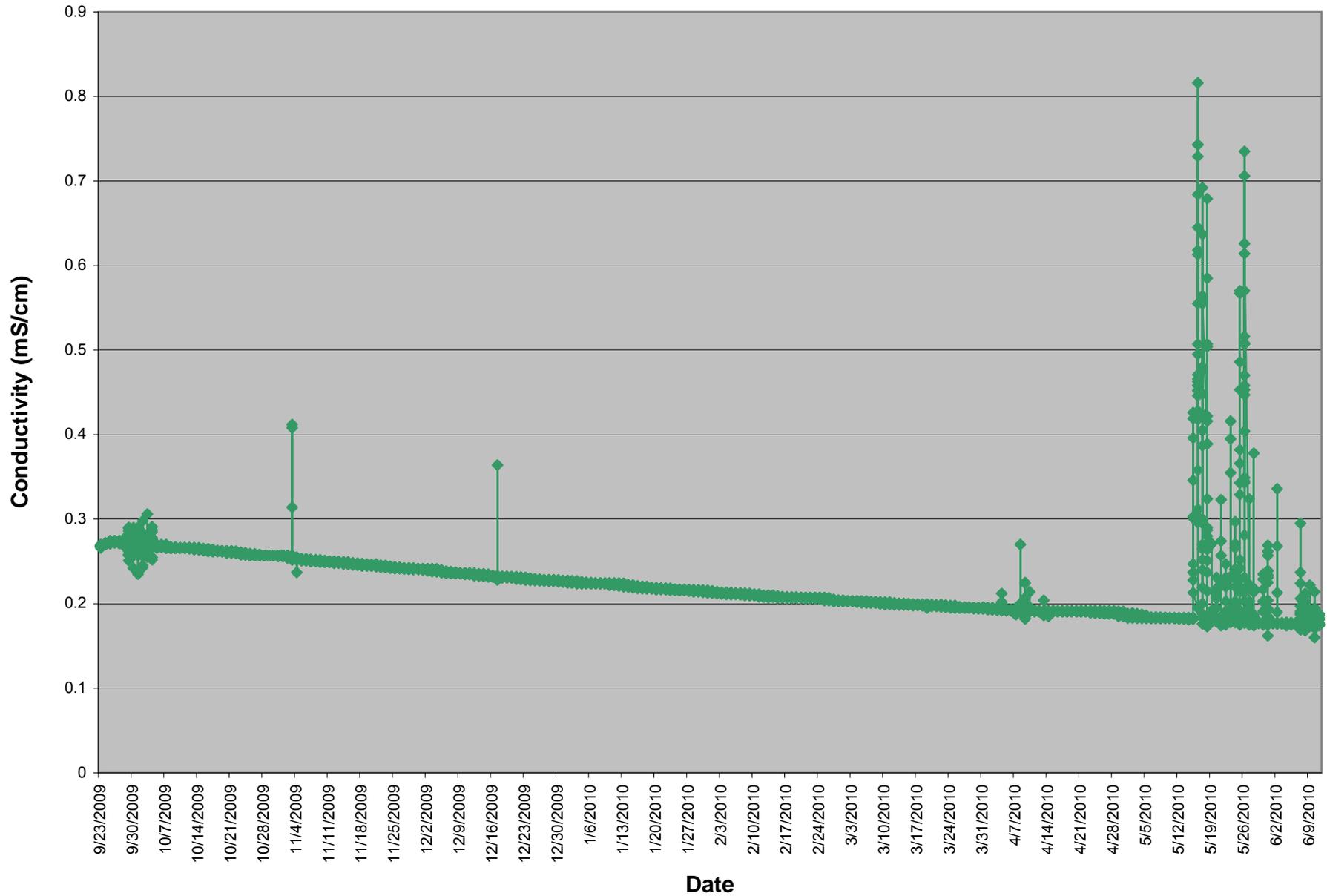
# DOE Deer Park - Water Level & Temperature



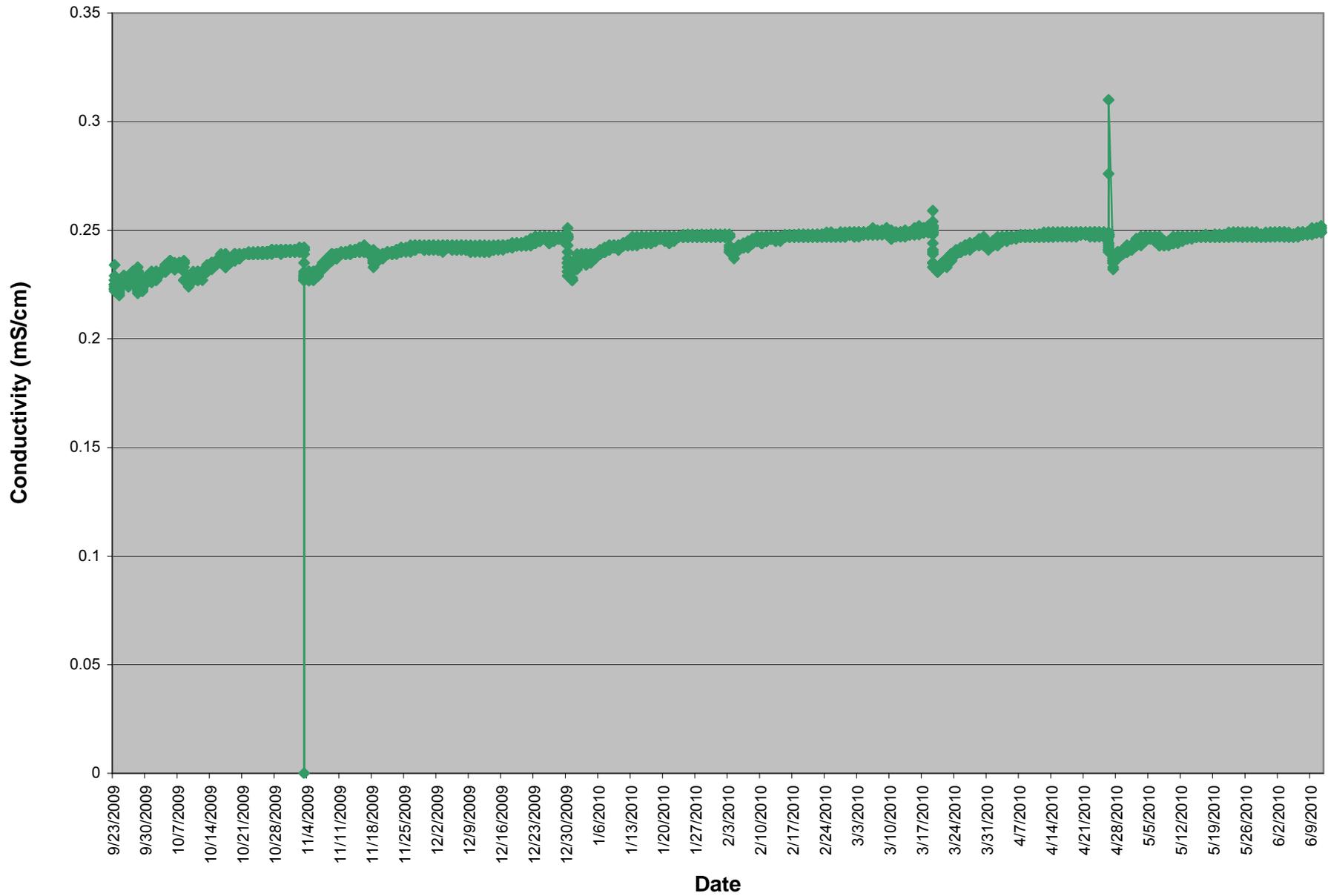
# Whitworth Water Rivilla - Conductivity



# Water District 3 Pine River - Conductivity



# Whitworth Water North Mt. View - Conductivity



Appendix C  
Well Logs – Snap Shot Water Level Measurement Locations







STATE OF WASHINGTON

Permit 63-24782

(1) OWNER: Name: Jim Neff Address: 18303 Howard Spok. WA  
(2) LOCATION OF WELL: County: Spokane NE 1/4 NE 1/4 Sec 15 T23N. R42W.M.

PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]  
Irrigation [ ] Test Well [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one).....  
New well [X] Method: Dug [ ] Bored [ ]  
Deepened [ ] Cable [ ] Driven [ ]  
Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches  
Drilled 260 ft. Depth of completed well 260 ft.

(6) CONSTRUCTION DETAILS:  
Casing installed: 6" Diam. from 1 ft. to 23 ft.  
Threaded [ ] " Diam. from " ft. to " ft.  
Welded [X] " Diam. from " ft. to " ft.

Perforations: Yes [ ] No [X]  
Type of perforator used.....  
SIZE of perforations in. by in.  
perforations from ft. to ft.  
perforations from ft. to ft.  
perforations from ft. to ft.

Screens: Yes [ ] No [X]  
Manufacturer's Name.....  
Type..... Model No.....  
Diam. Slot size from ft. to ft.  
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel:.....  
Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.  
Material used in seal Bentonite & Sand  
Did any strata contain unusable water? Yes [ ] No [X]  
Type of water?..... Depth of strata.....  
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name.....  
Type:..... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level 2150 ft.  
Static level 30 ft. below top of well Date.....  
Artesian pressure lbs. per square inch Date.....  
Artesian water is controlled by (Cap. valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes [ ] No [ ] If yes, by whom?.....  
Yield: gal./min. with ft. drawdown after hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

of test 1-30-76  
B.P. at gal./min. with ft. drawdown after hrs.  
Flow g.p.m. Date.....  
Temperature of water..... Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Dirt	0	2
SAND	2	55
CLAY	55	63
Broken BASALT	63	68
Hard BASALT	68	260

Work started 1-22-1976 Completed 1-30-1976

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME: J. J. Drilling (Person, firm, or corporation) (Type or print)

Address: 13621 E 7th Sykes, WA

[Signed] J. J. Drilling (Well Driller)

License No. 2015 Date: 1/30/76

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.















File Original and First Copy with Department of Ecology  
 Second Copy - Owner's Copy  
 Third Copy - Driller's Copy

# 1222 13 WATER WELL REPORT

Start Card No. W21566

UNIQUE WELL I.D. # ABE134

STATE OF WASHINGTON

Water Right Permit No. \_\_\_\_\_

OWNER: Name Arnold Scholl Address 10823 E. Kronquist Mead 99021

(a) LOCATION OF WELL: County Spoканe SW 1/4 SW 1/4 Sec 4 T 26 N. R 44 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 10823 E. Kronquist Mead 99021

(3) PROPOSED USE:  Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other   
 DeWater

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Clay White	0	30
Clay Gray	30	48
Clay Light Brn.	48	77
Sand coarse	77	86
Backed Clay	86	107
Basalt Fractured w/w	107	125

(4) TYPE OF WORK: Owner's number of well (if more than one) \_\_\_\_\_  
 Abandoned  New well  Method Dug  Bored   
 Deepened  Cable  Driven   
 Reconditioned  Rotary  Jetted

(5) DIMENSIONS: Diameter of well 6 inches.  
 Drilled 125 feet. Depth of completed well 125 ft.

(6) CONSTRUCTION DETAILS:  
 Casing installed: 6 Diam. from +2 ft. to 88 ft.  
 Welded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Liner installed  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Threaded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes  No   
 Type of perforator used \_\_\_\_\_  
 SIZE of perforations \_\_\_\_\_ in by \_\_\_\_\_ in.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
 Manufacturer's name \_\_\_\_\_  
 Type P.V.C. Model No. \_\_\_\_\_  
 diam. 4 Slot size 10 from 105 ft. to 125 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
 Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18 ft.  
 Material used in seal Bentonite  
 Did any strata contain unusable water? Yes  No   
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_ H.P. \_\_\_\_\_

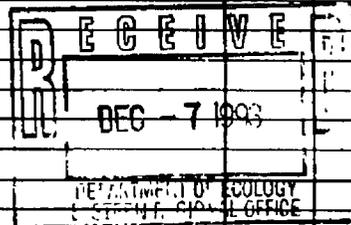
(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_  
 Static level 70 ft. above mean sea level  
 Artesian pressure \_\_\_\_\_ lb. per square inch Date 11-27-93  
 Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
 Was a pump test made? Yes  No  If yes, by whom? \_\_\_\_\_  
 Yield \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test \_\_\_\_\_  
 Bailor test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Arrest 40+ gal./min. with stem set at 125 ft. for 1 hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No



6" Drive Shoe Utilized

Work Started 11-24-93 19. Completed 11-28-93 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Top Top Well and Drilling  
 (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)  
 Address 15911 Blawie Rd Elk 99009  
 (Signed) Gregory Klatt License No 2037  
 (TYPE SIGNATURE)

Contractor's Registration No. 71PTAWW101B Date 11-30-93

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.







# WATER WELL REPORT

Start Card No. 033091

STATE OF WASHINGTON

Study ID - 47

Water Right Permit No. \_\_\_\_\_

OWNER: Name George Sullivan (Mike) Address N19009 LITTLE SPOKANE DR., SPOKA

(2) LOCATION OF WELL: County Spa. NE 4 NW 1 Sec 21 T. 27 N. R 43 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) \_\_\_\_\_

(3) PROPOSED USE:  Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other   
 DeWater

**(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

(4) TYPE OF WORK: Owner's number of well (if more than one) \_\_\_\_\_  
 Abandoned  New well  Method: Dug  Bored   
 Deepened  Cable  Driven   
 Reconditioned  Rotary  Jetted

MATERIAL	FROM	TO
top soil	0	2
clay white	2	12
clay brown-dec granite	12	18
clay white-dec granite	18	44
clay <del>dark</del> brown	44	60
clay dark brown	60	70
silty sand & clay-some water	70	80
set 10ft of 6 slot screen		
could only develop 1gpm-pulled screens		
clay brown	80	110
clay gray	110	120
clay white	120	135
clay lite brown	135	175
coarse granite sand & water	175	185
hard clay white with some granite sand	185	195

(5) DIMENSIONS: Diameter of well 6 inches.  
 Drilled 195 feet. Depth of completed well 185 ft.

(6) CONSTRUCTION DETAILS:  
 Casing installed: 6 Diam. from +1 1/2 ft. to 173 ft.  
 Welded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Liner installed  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Threaded  Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes  No   
 Type of perforator used \_\_\_\_\_  
 SIZE of perforations \_\_\_\_\_ in by \_\_\_\_\_ in.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 \_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
 Manufacturer's Name Johnson  
 Type stainless steel Model No. \_\_\_\_\_  
 Diam. 6 Slot size 35 from 175 ft. to 185 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
 Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 20 ft.  
 Material used in seal bentonite  
 Did any strata contain unusable water? Yes  No   
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land surface elevation \_\_\_\_\_ ft.  
 above mean sea level \_\_\_\_\_ ft.  
 Static level 66 ft. below top of well Date \_\_\_\_\_  
 Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
 Artesian water is controlled by \_\_\_\_\_ (Cap valve etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
 was a \_\_\_\_\_ test made? Yes \_\_\_\_\_ No \_\_\_\_\_ Done by whom? \_\_\_\_\_  
 Yield \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well to top of water level)  
 Time Water Level Time Water Level Time Water Level

Date of test \_\_\_\_\_  
 Bailor test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Arrest 60 gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

Work started 3/19/90 Completed 3/29/90

**WELL CONSTRUCTOR CERTIFICATION:**  
 I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME BARTHOLOMEW DRILLING, INC.  
PERSON FIRM OR CORPORATION (TYPE OR PRINT)  
N. 11525 NINE MILE RD.  
 Address NINE MILE FALLS, WA 99026

(Signed) Ken Menden License No. 971  
(WELL DRILLER)  
 Contractor's Registration No. BARTHI 24903 Date 04/24/90

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.





File Original and First Copy with Department of Ecology  
Second Copy — Owner's Copy  
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Water Right Permit No.

(1) OWNER: Name Dick Lawless Address W 4920 Staley Deer Park, WA 99006

LOCATION OF WELL: County Spokane 14 SE 1-4 Sec. 22 T 28 N R 42 WM.

(2a) STREET ADDRESS OF WELL (or nearest address)

(3) PROPOSED USE:  Domestic  Industrial  Municipal   
 Irrigation  Test Well  Other   
 DeWater  Rotary

(4) TYPE OF WORK: Owner's number of well (if more than one)  
Abandoned  New well  Method: Dug  Bored   
Deepened  Cable  Driven   
Reconditioned  Rotary  Jetted

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 285 feet. Depth of completed well 285 ft.

(6) CONSTRUCTION DETAILS:  
Casing installed 6 Diam. from +2 ft. to 36 ft.  
Welded 4 Diam. from 25 ft. to 285 ft.  
Liner installed  Threaded

Perforations: Yes  No   
Type of perforator used skill saw  
Size of perforations 1/8 in. by 7 in.  
90 perforations from 225 ft. to 285 ft.  
10 perforations from 25 ft. to 225 ft.

Screens: Yes  No   
Manufacturer's Name \_\_\_\_\_  
Type \_\_\_\_\_ Model No. \_\_\_\_\_  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18 ft.  
Material used in seal Bentonite  
Did any strata contain unusable water? Yes  No   
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_  
Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_  
Static level 70 ft. below top of well Date 11-23-94  
Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes  No  If yes, by whom? \_\_\_\_\_  
Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test \_\_\_\_\_  
Bailey test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Airtest 11 gal./min. with stem set at 284 ft. for 2 hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Top soil brn	0	1
Sand fine silted brn	1	25
Basalt broken fractured	25	36
Basalt blk med	36	117
Basalt blk hard	117	171
Basalt blk med	171	203
Basalt blk hard	203	267
Basalt broken hard	267	273
Clay brn med	273	285

JAN 5 1995

Work Started 11-19 19. Completed 11-23- 19 94

### WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME MINDEN DRILLING INC. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address N 31621 Cedar Deer Park, WA 99006

(Signed) Dasen Minden License No. 2208 (WELL DRILLER)

Contractor's Registration No. MINDEDT090J9 Date 11-28 19 94

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.



The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 

060895

Study ID - 57

Water Right Permit No. \_\_\_\_\_

OWNER: Name DONALD E. DINGMAN Address 26703 N. DENNISON ROAD DEER PARK WA

(1) LOCATION OF WELL: County SPOKANE NE 1/4 NW 1/4 Sec 25 T. 28 N. R. 42 W.M

(2a) STREET ADDRESS OF WELL (or nearest address) PARCEL # 28252 - 9049

(3) PROPOSED USE:  Domestic Irrigation  Industrial  Municipal   
 DeWater  Test Well  Other

(4) TYPE OF WORK: Owner's number of well (if more than one)  
Abandoned  New well  Method: Dug  Bored   
Deepened  Cable  Driven   
Reconditioned  Rotary  Jetted

(5) DIMENSIONS: Diameter of well 6" inches.  
Drilled 300 feet Depth of completed well 290 ft.

(6) CONSTRUCTION DETAILS:  
Casing installed: 5 Diam from +1.5 ft. to 36 ft.  
Welded  4 Diam from +1.5 ft. to 290 ft.  
Liner installed  PVC  
Threaded  Diam from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Perforations: Yes  No   
Type of perforator used \_\_\_\_\_  
SIZE of perforations \_\_\_\_\_ in by \_\_\_\_\_ in.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes  No   
Manufacturer's Name WESCO  
Type \_\_\_\_\_ Model No. \_\_\_\_\_  
Diam. 4" Slot size 10 from 280 ft. to 290 ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes  No  Size of gravel \_\_\_\_\_  
Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes  No  To what depth? 18 ft.  
Material used in seal BENTONITE  
Did any strata contain unusable water? Yes  No   
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_  
Type \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.  
Static level 20 ft below top of well Date 9-24-92  
Artesian pressure \_\_\_\_\_ lbs per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes  No  If yes, by whom? \_\_\_\_\_  
Yield 22 gal./min. with \_\_\_\_\_ ft. drawdown after 1 hrs.  
**ESTIMATED AIR LIFT 22 GPM**

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  
Time Water Level Time Water Level Time Water Level

Date of test \_\_\_\_\_  
Bailer test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Airtest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes  No

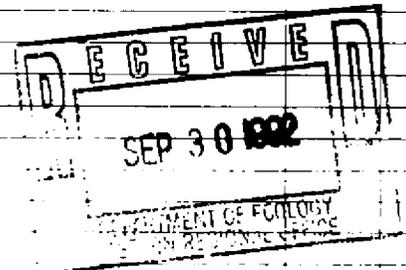
(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information

MATERIAL	FROM	TO
TOP SOIL GRAY	0	3
CLAY GRAY	3	7
SANDY CLAY BROWN	7	37
BASALT BLACK	37	230
CLAY BROWN	230	270
SAND WHITE	270	300

WATER IN SAND 270 to 300

6" DRIVE SHOE UTILIZED



Work started 9-21-92 19 \_\_\_\_\_ Completed 9-24-92 19 \_\_\_\_\_

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME PONDEROSA DRILLING (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address EAST 6010 BROADWAY SPOKANE, WA 99212

(Signed) Marty Rugo License No. 2038

Contractor's WELL DRILLER (Marty Rugo)

Registration No. PO-ND-EI \*248 JE Date Sept 25, 1992 19 \_\_\_\_\_

(USE ADDITIONAL SHEETS IF NECESSARY)



The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.