Little Spokane Groundwater Elevation & Stream Flow Monitoring Project

June 30, 2010

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WRIA 55/57 Watershed Implementation Team

Prepared by:
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Water Resources

Funding provided by:
Washington Department of Ecology
Grant G0700149
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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

<table>
<thead>
<tr>
<th>Well Name</th>
<th>Well Description</th>
<th>Elevation (ft ms¹)</th>
<th>Well Depth (ft)</th>
<th>Screened Interval (ft bgs²)</th>
<th>Aquifer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spokane County Colbert Landfill – North Glen</td>
<td>Monitoring well</td>
<td>1671</td>
<td>45</td>
<td>35-45</td>
<td>Upper Sand &amp; Gravel</td>
</tr>
<tr>
<td>Whitworth Water Rivilla</td>
<td>Production well no longer in use</td>
<td>1585</td>
<td>30</td>
<td>21-29</td>
<td>Upper Sand &amp; Gravel</td>
</tr>
<tr>
<td>Whitworth Water – Shady Slope</td>
<td>Emergency Standby well that is rarely used</td>
<td>1635</td>
<td>130</td>
<td>90-120</td>
<td>Upper Sand &amp; Gravel</td>
</tr>
<tr>
<td>Whitworth Water – North Mt. View</td>
<td>Production well no longer in use</td>
<td>1955</td>
<td>90</td>
<td>60-68</td>
<td>Upper Sand &amp; Gravel</td>
</tr>
<tr>
<td>Spokane County Water District 3 – River Estates</td>
<td>Monitoring well near a production well</td>
<td>1715</td>
<td>122</td>
<td>54-100</td>
<td>Upper Sand &amp; Gravel</td>
</tr>
<tr>
<td>Spokane County Water District 3 – Pine River</td>
<td>Monitoring well near a production well</td>
<td>1610</td>
<td>208</td>
<td>203-208</td>
<td>Lower Sand &amp; Gravel</td>
</tr>
<tr>
<td>Ecology – Deer Park</td>
<td>Monitoring Well</td>
<td>2180</td>
<td>350</td>
<td>87-350</td>
<td>Basalt</td>
</tr>
</tbody>
</table>

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 – Chatteroy 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

<table>
<thead>
<tr>
<th>Date &amp; Measurement</th>
<th>Colbert Landfill North Glen</th>
<th>Whitworth Water Rivilla</th>
<th>Whitworth Water North Mt. View</th>
<th>Spokane County WD 3 River Estates</th>
<th>Spokane County WD 3 Pine River</th>
<th>Ecology Deer Park</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 28, 2009</td>
<td>Manual Measurement</td>
<td>8.27</td>
<td>42.46</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Logger Measurement</td>
<td>8.28</td>
<td>42.82</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>0.01</td>
<td>-0.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November 3, 2009</td>
<td>Manual Measurement</td>
<td>9.84</td>
<td>43.31</td>
<td>20.63</td>
<td>22.74</td>
<td>40.54</td>
</tr>
<tr>
<td></td>
<td>Data Logger Measurement</td>
<td>9.82</td>
<td>43.31</td>
<td>20.54</td>
<td>22.65</td>
<td>40.64</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-0.02</td>
<td>0.0</td>
<td>-0.09</td>
<td>-0.09</td>
<td>0.10</td>
</tr>
<tr>
<td>December 17, 2009</td>
<td>Manual Measurement</td>
<td>8.05</td>
<td>21.92</td>
<td>19.18</td>
<td>39.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Logger Measurement</td>
<td>8.14</td>
<td>21.85</td>
<td>19.20</td>
<td>39.70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-0.09</td>
<td>-0.07</td>
<td>0.02</td>
<td>-0.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data Logger Measurement</td>
<td>9.64</td>
<td>7.85</td>
<td>42.52</td>
<td>20.06</td>
<td>15.92</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-0.03</td>
<td>0.03</td>
<td>-0.08</td>
<td>-0.35</td>
<td>0.02</td>
</tr>
<tr>
<td>June 11, 2010</td>
<td>Manual Measurement</td>
<td>9.56</td>
<td>7.62</td>
<td>42.56</td>
<td>20.47</td>
<td>18.77</td>
</tr>
<tr>
<td></td>
<td>Data Logger Measurement</td>
<td>10.27</td>
<td>7.60</td>
<td>42.52</td>
<td>20.56</td>
<td>18.89</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-0.71</td>
<td>-0.02</td>
<td>-0.04</td>
<td>0.09</td>
<td>0.12</td>
</tr>
</tbody>
</table>

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

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.
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

<table>
<thead>
<tr>
<th>Study Well ID</th>
<th>Elev</th>
<th>Date (Deer)</th>
<th>DTW</th>
<th>Date (Current)</th>
<th>DTW</th>
<th>Date (Change)</th>
<th>DTW</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2100</td>
<td>6/20/91</td>
<td>42.46</td>
<td>11/1/91</td>
<td>56</td>
<td>1/30/92</td>
<td>43.9</td>
<td>35.9</td>
</tr>
<tr>
<td>4</td>
<td>2147</td>
<td>6/25/91</td>
<td>44.1</td>
<td>10/29/91</td>
<td>44</td>
<td>1/29/92</td>
<td>44.2</td>
<td>44.3</td>
</tr>
<tr>
<td>6</td>
<td>2071</td>
<td>10/10/91</td>
<td>32.2</td>
<td>11/4/91</td>
<td>32.4</td>
<td>1/30/92</td>
<td>32.8</td>
<td>32.1</td>
</tr>
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<td>8</td>
<td>2090</td>
<td>6/18/91</td>
<td>63.95</td>
<td>11/1/91</td>
<td>53.7</td>
<td>1/29/92</td>
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<td>2135</td>
<td>10/3/91</td>
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<td>1/30/92</td>
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<td>149.4</td>
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<td>106.8</td>
<td>107.6</td>
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<td>76.9</td>
<td>10/28/91</td>
<td>76.7</td>
<td>1/27/92</td>
<td>76.7</td>
<td>76.1</td>
</tr>
<tr>
<td>25</td>
<td>2180</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

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

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.

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

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

**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**

![Graph showing Little Spokane River discharge and elevation at select river miles.](image-url)
Table 4-3: Change in Little Spokane River Flow due to Ground Water/Surface Water Interactions

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

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
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.

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.
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.
Appendix A
Well Logs – Continuous Water Level Monitoring Locations
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name Whitworth Water District Address 10820 N. Waikiki Road, Spokane, WA.
(2) LOCATION OF WELL: County Spokane
(3) STREET ADDRESS OF WELL (or nearest address): N. 15212 Shady Slope Road, Spokane, WA.
(4) TYPE OF WORK: Owner's number of well (if more than one) 2
Abandoned ☐ New well ☒ Method Dug ☐ Bored ☒
Depleted ☒ Reconditioned ☒ Office ☐ Other ☐
Drilled ☒ Rotated ☒ Jettied ☒
(5) DIMENSIONS: Diameter of well 12 plus 2'-88" feet
Drilled 130 feet. Depth of completed well 130 feet
(6) CONSTRUCTION DETAILS:
Casing installed Yes ☒ No ☐
Diam from 12 to 2'-88" feet
Perforations Yes ☒ No ☐
Size of perforations in by
Gravel placed from 12 to 130 feet
Screen size Yes ☒ No ☐
Type of screen 10" pipe size
Manufacturer's Name Houston
Model No 304 St
Diam 1-3/4 size 40 from 90-115 feet
Dry 1-3/4 size 25 from 115-120 feet
Gravel packed Yes ☒ No ☐ Size of gravel
Gravel placed from 12 to 130 feet
Surface seal Yes ☒ No ☐
Material used in seal to what depth
Did any strata contain unsuitable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off
(7) PUMP: Manufacturer's Name
Type HP
(8) WATER LEVELS:
Static level 30 feet 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:
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 to water level)
Time Water Level Time Water Level Time Water Level
Recovered to static level in 28 seconds
Date of test
Bail or test gal/min with ft drawdown after
Art test gal/min with steem set at
Artesian flow Date
(10) WELL LOG OR ABANDONMENT PROCEDURE DESCRIPTION:
Formation: Describe by color, character, size of material and structure and show thickness of sand and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top Soil</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Clay</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Sand &amp; gravel 1&quot; minus, brown</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Sand &amp; gravel 1&quot; minus, some brown clay</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Gravel 1&quot; minus, some med. to 12-20 coarse sand, cemented with clay &amp; boulders</td>
<td>12</td>
<td>20</td>
</tr>
<tr>
<td>Gravel 1&quot; minus 10&quot;, sand 20</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Coarse 40&quot;, sand fine &amp; silt 40&quot;; brown clay 10&quot;</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Boulders 6&quot; minus with brown 35</td>
<td>40</td>
<td>50</td>
</tr>
<tr>
<td>Clay &amp; med. to fine sand</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Brown clay with very fine silt</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>3/8 minus gravel 40&quot;, fine 55</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>Gravel 30&quot;, coarse sand</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Some silt</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>3/8 coarse gravel 30&quot;, coarse sand 50%, med. sand 20%, clay balls</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Coarse sand 40&quot;, med. sand 92</td>
<td>60</td>
<td>70</td>
</tr>
<tr>
<td>40&quot;, fine sand 20%, some clay balls</td>
<td>70</td>
<td>80</td>
</tr>
<tr>
<td>Brown clay, some very fine</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Sand</td>
<td>90</td>
<td>100</td>
</tr>
<tr>
<td>Coarse sand 20%, med. sand 98</td>
<td>100</td>
<td>110</td>
</tr>
</tbody>
</table>

Work started Nov. 1, 19 Complete Jan. 11

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

NAME: CJ JARR T & SON DRILLING
ADDRESS: 3055 West Road, Merda, WA.
(Signed) (WELL DRILLER) License No. 051-5
Contractor's Registration No.
CJ JARR T 111JA Date Jan. 29

(USE ADDITIONAL SHEETS IF NECESSARY)

28087 is an Equal Opportunity and Affirmative Action Employer. For accommodation needs, contact the Water Resources Program at 407-6600. The TDD number is 206-407-6600

The Department of Ecology does NOT warrant the Data and/or the Information on this Well Report.
Owner: John Fleming

Location of Well: County - Spokane

Proposed Use: Domestic [X] Industrial [ ] Municipal [ ]

Irrigation [ ] Test Well [ ] Other [ ]

Type of Work: Owner's number of well (if more than one)

New well [X] Method: Dug [ ] Bored [ ] Recauned [ ]

Cable [ ] Driven [ ] Rotary [ ] Jetted [ ]

Dimensions: Diameter of well 8 inches

Drilled 90 ft. Depth of completed well 50 ft.

Construction Details:

Casing installed: 8" Diam. from 0 ft. to 30 ft.

Threaded [ ] Diameter from ft. to ft.

Welded [ ] Diameter from ft. to ft.

Perforations: Yes [X] No [ ]

Type of perforator used:

Size of perforations: in. by in.

perforations from ft. to ft.

Screens: Yes [X] No [ ]

Manufacturer's Name:

Type: Diam.: Slot size: from ft. to ft.

Gravel packed: Yes [X] No [ ] Size of gravel:

Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? ft.

Material used in seal:

Did any strata contain unusable water? Yes [X] No [ ]

Type of water:

Depth of strata:

Method of sealing strata off:

Pump: Manufacturer's Name:

Type: H.P.

Water Levels:

Land-surface elevation above mean sea level...

ft. below top of well Date...

Test pressure lbs. per square inch Date...

Arisian water is controlled by...

(Cap, valve, etc.)

Well Tests:

Drawdown is amount water level is lowered below static level...

as a pump test made? Yes [X] No [ ] If yes, by whom?

id: gal/min. with ft. drawdown after hrs.

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. F. Bartholomew (Type or Print)

Address: Nine Mile Falls, Wash.

License No. Date: Jan 1964

Signature: D. F. Bartholomew (Well Driller)
**WATER WELL REPORT**

Date Printed: 15 Aug 2002  
State of Washington

(1) **OWNER**  
Spokane Water Dist No 3

(2) **LOCATION OF WELL**  
County: Spokane

(2a) **Street Address of well**  
River Estates Rd

(3) **PROPOSED USE**  
Domestic

(4) **TYPE OF WORK**  
New Well

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

(6) **CONSTRUCTION DETAILS**  
Casing Installed: Welded

<table>
<thead>
<tr>
<th>liner</th>
<th>Dia from</th>
<th>Dia to</th>
<th>Dia from</th>
<th>Dia to</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>14 ft</td>
<td>54 ft</td>
<td>14 ft</td>
<td>67 ft</td>
</tr>
<tr>
<td>none</td>
<td>16 ft</td>
<td>121 ft</td>
<td>16 ft</td>
<td>121 ft</td>
</tr>
</tbody>
</table>

Perforations used: No, Used in

Size of perforations: in by in

Screens: Yes, K Pac Location

Manufacturer'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

(7) **PUMP**  
Manufacturer's Name:  
Type: None

(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 feet: 38.77 gpm  
4 hours

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

Bailer test: gal/min  
ft drawdown after hours

Air test: gal/min w/ stem set at ft for hours

Artesian flow: gpm  
Date

Temperature of water:  
Was a chemical analysis made: No

(10) **Well Log**  
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.

<table>
<thead>
<tr>
<th>Material</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Sand Gravel Boulders</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Smaller Boulders Sand/Gravel</td>
<td>14</td>
<td>17</td>
</tr>
<tr>
<td>Hard Gravel Boulders</td>
<td>17</td>
<td>23</td>
</tr>
<tr>
<td>Satuated Gravel Boulders</td>
<td>23</td>
<td>26</td>
</tr>
<tr>
<td>Gray Silt Boulders</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Brown Satuated Sand/Gravel</td>
<td>28</td>
<td>37</td>
</tr>
<tr>
<td>Gray Sand Fine Satuated</td>
<td>37</td>
<td>45</td>
</tr>
<tr>
<td>Gray Sand Coarse WiWater</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>Gray Clay</td>
<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Gray Satuated Sand</td>
<td>53</td>
<td>58</td>
</tr>
<tr>
<td>Brown Sand Coarse Satuated</td>
<td>58</td>
<td>63</td>
</tr>
<tr>
<td>Brown Clay Silt</td>
<td>63</td>
<td>66</td>
</tr>
<tr>
<td>Coarser Brown Sand</td>
<td>66</td>
<td>80</td>
</tr>
<tr>
<td>Clayey Brown Sand Satuated</td>
<td>80</td>
<td>98</td>
</tr>
<tr>
<td>Brown Sand Coarse Satuated</td>
<td>98</td>
<td>106</td>
</tr>
<tr>
<td>Gray Sand Fine</td>
<td>105</td>
<td>112</td>
</tr>
<tr>
<td>Coarser Sand WiWater</td>
<td>112</td>
<td>117</td>
</tr>
<tr>
<td>Clayey Sand Less Water</td>
<td>117</td>
<td>122</td>
</tr>
</tbody>
</table>

**Notes**

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

**WELL CONSTRUCTION CERTIFICATION**

I, JAMES F. NOONAN, Driller/Licensed Engineer, accept responsibility for the construction of this well and the data and information reported herein is the best knowledge and belief.

JAMES F. NOONAN  
License No: 03/2

Trainee Name:  
Name: Fogle Pump & Supply Inc  
Shop: Airway Hei

ADDRESS: PO Box 1450  
Airway Heights, WA 99001  
Phone: 509-244-9346  
Fax: 509-244-9346  
E-mail: 8834393555

**Fogle Pump & Supply Inc**  
**Airway Heights, WA 99001**  
**Phone: 509-244-9346**  
**Fax: 509-244-9345**  
**E-mail: 8834393555**

**SIGNED** (Driller/Licensed Engineer)

[Signature]

**Contractor Registration No:**  
Date Log Created: 04/15/2002
STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
DIVISION OF WATER RESOURCES

Appl. #6502  
Permit #6145  
Cert. #6017  
WELL LOG

Record by: Driller  
Source: Driller's Record

Location: State of Washington  
County: Spokane  
Area: Diagram of Section

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

Drilling Co.: Clyde Reeder - Well Driller

Address: Water Power Co.  
Date: May 5, 1961

Owner: Washington Water Power Co.  
Address: P.O. Drawer 1465, Spokane, Wash.

Land surface, datum 1600' above

SWL: 15.3'  
Date: May 5, 1961  
Dims: 6" x 208"  

<table>
<thead>
<tr>
<th>Material</th>
<th>From (feet)</th>
<th>To (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic supply and municipal</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Fill material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top soil</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Sand</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Sand &amp; gravel</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Clay, sand, silt</td>
<td>19</td>
<td>56</td>
</tr>
<tr>
<td>Clay, blue, &amp; silt</td>
<td>56</td>
<td>116</td>
</tr>
<tr>
<td>Sand, coarse, &amp; silt</td>
<td>116</td>
<td>187</td>
</tr>
<tr>
<td>Sand, coarse, &amp; gravel in clay</td>
<td>187</td>
<td>202</td>
</tr>
<tr>
<td>Gravite, broken</td>
<td>202</td>
<td>208</td>
</tr>
<tr>
<td>Granite</td>
<td>208</td>
<td></td>
</tr>
<tr>
<td>Casing: 6&quot; from 0' to 203'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sealed with concrete to 1'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yield: 330 gpm with 43' DD after 24 hrs.</td>
<td></td>
<td>immediate recovery</td>
</tr>
<tr>
<td>Date of test: May 5, 1961</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Turn up Sheet of sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name: D.C.F. (Observation) Address: 103 E. Indiana
Location of Well: County: Spokane

(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 ☐
Deepered ☐ Method: Cable ☐ Driven ☐ Reconditioned ☐ Method: Rotary ☐ Jetted ☐

(5) Dimensions:
Drilled: 42 ft. Depth of completed well: 242 ft.
Diameter of well: 6" inches.

(6) Construction Details:
Casing installed: " 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.: ft. Slot size: ft. to ft.
Diam.: ft. Slot size: 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: Ordovician
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:
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:
Bailer test: gal/min. with ft. drawdown after hrs.
Artesian flow: g.p.m.
Temperature of water: Was a chemical test made? Yes ☐ No ☑

(10) Well Log:
Formation: Describe by color, character, size of material and structure, and show thickness of strata 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
SAND, GREY 0 3
SAND, GRAY, COARSE TO MEDIUM 3 17
SAND, GRAY, MEDIUM TO COARSE 17 37
SAND, GRAY, FINE TO MEDIUM 37 46
SAND, GRAY, FINE TO MEDIUM 46 57
SAND, GRAY, FINE TO MEDIUM 57 67
CLAY, GREY 67 88
CLAY, GREY TO LIGHT GREY 88 106
CLAY, GREY TO DARK GREY 106 124
CLAY, GREY TO RED 124 142
CLAY, GREY TO RED 142 160
CLAY, GREY TO RED 160 178
CLAY, GREY TO RED 178 196
CLAY, GREY TO RED 196 214
CLAY, GREY TO RED 214 232


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: R.B. WELL DRILLING
(Person, firm, or corporation) (Type or print)
Address: Rt. 7, Starbuck, Yakima, Wash. 98945
(Signed) C. O.

ECY 050-1-20
(USE ADDITIONAL SPACE NECESSARY)
2/17/78

Study ID - DOE Chattoary
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name: (Observation) Address: 103 E Wall Ave., Spokane.

LOCATION OF WELL: County: Spokane. Section: 27, T 29 N., R 165 E. M. W. M. Grid and distance from section or subdivision corner: W 3700 N. and 1750 W. from the SE corner Sec. 33.

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

(4) TYPE OF WORK: Owner's number of well: 1 (more than one):
New well ☐ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS:

(6) CONSTRUCTION DETAILS:
Casing installed: 6" diam. from 0 ft. to 87 ft.
Threaded ☐ Welded ☐
Perforations: Yes ☐ No ☐ Type of perforator used: Size of perforations:
Perforations from to ft. ft. ft. ft. ft. ft. ft.

Screens: Yes ☐ No ☐ Manufacturer's Name: 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 to ft. ft.

Surface seal: Yes ☐ No ☐ To what depth? 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: 2170 ft.
Static level: 67 ft. below top of well Date: 3/4/78
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: 3/1/78
Bore test: 200 gal/min. with ALL ft. drawdown after hrs.
Artesian flow: s.p.m. Date:
Temperature of water: Was a chemical test 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,

<table>
<thead>
<tr>
<th>Material</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand, silt, sand</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Clay, silt, sandy</td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>Clay, silt</td>
<td>37</td>
<td>56</td>
</tr>
<tr>
<td>Sand, gravel, sand</td>
<td>56</td>
<td>61</td>
</tr>
<tr>
<td>Clay, silt, dense</td>
<td>61</td>
<td>67</td>
</tr>
<tr>
<td>Sand, silt, clay, dense</td>
<td>67</td>
<td>73</td>
</tr>
<tr>
<td>Clay, silt, dense</td>
<td>73</td>
<td>93</td>
</tr>
<tr>
<td>Sand, silt, dense</td>
<td>93</td>
<td>94</td>
</tr>
</tbody>
</table>

YIELD WAS ESTIMATED

DEER PARK 7-4
Clayton 7-4
475-805-11730-30

Work started: 2/3/78. Completed: 2/25/78. 15 days.

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. B. WELL DRILLING
(Person, firm, or corporation) (Type or print)
Address: Rt. 7, Bux, 6000, Yakima, Wash. 9893
(Signed) C. C. C. (Well Driller)
License No. 0700 Date: 3/5/78

ECY 056-1-20

USE ADDITIONAL SHEETS IF NECESSARY
Appendix B
Water Level, Temperature & Conductivity Graphs
Water District 3 Pine River - Water Level & Temperature

Date

DTW

TEMP

9/23/2009
10/7/2009
10/21/2009
11/4/2009
11/18/2009
12/2/2009
12/16/2009
12/30/2009
1/13/2010
1/27/2010
2/10/2010
2/24/2010
3/10/2010
3/24/2010
4/7/2010
4/21/2010
5/5/2010
5/19/2010
6/2/2010
Appendix C
Well Logs – Snap Shot Water Level Measurement Locations
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name: MR. OTTO HYTEIN
Address: N584 OAKST, SPOKANE, WA

(2) LOCATION OF WELL: County: SPOKANE
Township Section: 18, R. 42, 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):
New well [ ] Method: Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [ ] Jetted [ ]

(5) DIMENSIONS:
Drilled: 102 ft. Diameter of well: 6 inches
Depth of completed well: 102 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: Yes [ ] No [ ]
Threaded [ ] Diam. from 1 ft. to 19 ft.
Welded [ ] Diam. from 1 ft. to 19 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.

Screen: 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:
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:
15 ft. below top of well
Artesian pressure:
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.
Air test: approx. 45-30

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.
Artesian flow: g.p.m. Date
Temperature of water
Was a chemical analysis taken: Yes [ ] No [ ]

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:
Address:
Type of well:
[ ] W. T. [ ] D. T.

License No. 0188 Date: 3-17-71

S. P. No. 1736-OS-(Rev. 4-71)

Study ID - 2
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name: Bill Love
Address: Cedar Rd - Deer Park WA 99006

(2) LOCATION OF WELL: County: Spokane

(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 [ ]
- Drilled [ ]
- Rotary [ ]
- Jetted [ ]
- Deepened [ ]
- Reconditioned [ ]

(5) DIMENSIONS:
- Drilled: 160 ft.
- Diameter of well: 6 inches.
- Depth of completed well: 160 ft.

(6) CONSTRUCTION DETAILS:
- Casing installed: 6 " Diam. from 1 ft. to 140 ft.
  Threaded [ ]
  Welded [ ]
- Perforations: Yes [ ]
  Type of perforator used: skill saw
  Size of perforations: 5 in. by 5 in.
  Perforations from 30 ft. to 50 ft.
  Perforations from 130 ft. to 160 ft.
- Screens: Yes [ ]
  Manufacturer's Name:
  Type: 
  Model No.:
  Diam. Slot size from ft. to ft.
  Diam. Slot size from ft. to ft.
- Gravel packed: Yes [ ]
  Size of gravel:
  Gravel placed from ft. to ft.
- Surface seal: Yes [ ]
  Material used in seal: Bentonite
  To what depth? 40 ft.
  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: 2150 ft.
- Static level: 70 ft. below top of well
- Artesian pressure:
- Artesian water is controlled by:
  (Cap, valve, etc.)

(9) WELL TESTS:
- Drawdown is amount water level is lowered below static level
- Water test:
  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
  " " " 

- AIR TEST 15-20 GPM
  Date of test:
  Boiler test:
  gal./min. with ft. drawdown after hrs.
  Artesian flow: g.p.m.
  Date:
  Temperature of water: Was a chemical analysis made? Yes [ ] No [ ]

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: MINDEN WELL DRILLING, INC.
(Person, firm, or corporation) (Type or print)
Address: Rt 3 Box 100 Deer Park WA 99006

(Signed) Ken Minden
(Well Driller)

License No.: 971
Date: 4-20-81

Received Oct 1 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

10/1/81

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Harlon Helm
Address: N 5327 Elm Spokane WA 99208

LOCATION OF WELL: Spokane
Bearing and distance from section or subdivision corner:

PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

TYPE OF WORK: New well ☐ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Other ☐ Reconditioned ☐ Rotary ☐ Jetted ☐

DIMENSIONS:
Diameter of well 160 ft
Depth of completed well 160 ft

CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 0 ft to 1.1 ft to 39.6 ft
Threaded ☐
Welded ☐

Perforations: Yes ☐ No ☐ PVC liner ☐
Size of perforations: 1/8 in. by 2 in.
Number of perforations: 50

Screens: Yes ☐ No ☐
Manufacturer's Name
Diam. Slot size from ft to ft

Gravel packed: Yes ☐ No ☐
Size of gravel:

Surface seal: Yes ☐ No ☐
Material used in seal: bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water:
Method of sealing strata off:

PUMP:
Manufacturer's Name
Type:

WATER LEVELS:
Static level: 80 ft below top of well
Artesian pressure: 120 lbs per square inch
Artesian water is controlled by (Cap, valve, etc.):

WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐
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)

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: MINDEN WELL DRILLING
Address: Rt 3 Box 100 Deer Park WA 99006
License No. 971

[Signature] [Date]
STATE OF WASHINGTON

(1) OWNER: Jim Neff
Address 8303 Howard Ave., Spokane, WA

(2) LOCATION OF WELL: County: Spokane

PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well
New well ☑ Method: Dug ☑ Bored ☑
Depend on ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 60 inches.
Drilled 260 ft. Depth of completed well 260 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 60 ft. Diam. from 1 ft. to 75 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☑ " Diam. from ft. to ft.

Perforations: Yes ☑ No ☐
Type of perforation used:
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screws: 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:
Did any strata contain unusable water? Yes ☑ No ☐
Type of water:
Method of sealing strata off:

(7) PUMP: Manufacturer's Name:
Type:

(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 Data:
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)

<table>
<thead>
<tr>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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: Jim Neff
(Person, firm, or corporation) (Type or print)
Address: 8303 Howard Ave., Spokane, WA

[Signed] [2/2/76] (Well Driller)

License No. Date...

S.F. No. 7236-05 (Rev. 4-71)
ECY 370-28

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Glenn Well & Helen Well
Address: Rt. 2 Box 82, Elk Park, Wash. 99006
LOCATION OF WELL: County: Spokane
 Township: 1
 Range: 42
 Section: 23

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

(4) TYPE OF WORK: New Well [ ] Method: Dug [ ] Bored [ ] Reconditioned [ ]
Reconditioned [ ] Rotary [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well: 6 inches

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diameter from 0 ft. to 20 ft.
Threaded [ ] " Diameter from 20 ft. to 80 ft.
Welded [ ] " Diameter from 80 ft. to 260 ft.

Perforations: Yes [ ] No [ ]
Type of perforator used:
SIZE of perforations: 1 in. by 1 in.

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: cement and bentonite
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water:
Depth of strata:
Method of sealing strata:

(7) PUMP: Manufacturer's Name:
Type:

(8) WATER LEVELS:
Static level: 2.22 ft. below top of well
Artesian pressure:
Artesian water is controlled by:

(9) WELL TESTS:
Yield: gal./min. with ft. drawdown after weeks.

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

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: SAM'S DRILLING
Address: Rt. 2 Box 82 Elk, Washington 99009
(Signed) [Signature]
(Well Driller)
License No.: 6/9/82
Date: 11/1/82
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name: Eldon E. Decker
Address: Rt. 3 Box 192, Deer Park, Wash. 99006

(2) LOCATION OF WELL: County: Spokane
Section: 14
Lot: 4
T. 86 N., R. 43 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)
New well ☐ Method: Dug ☐ Bored ☐ Drilled ☐
Deepened ☐ Cable ☐ Rotary ☐ Jetted ☐
Reconditioned ☐

(5) DIMENSIONS:
Diameter of well: 6 inches
Drilled: 100 ft. Depth of completed well: 100 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: ☑ Diam. from: 6 ft. to 96 ft.
Threaded ☐ Diam. from: ft. to ft.
Welded ☑ Diam. from: 6 ft. to 96 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: Diameter: Slot size: from: ft. to ft.
Diam.: Slot size: from: ft. to ft.
Gravel packed: Yes ☑ No ☐ Size of gravel: ft.
Gravel placed from: ft. to ft.

Surface seal: Yes ☑ No ☐ To what depth: 96 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.: N.P.

(8) WATER LEVELS:
Land-surface elevation: 1215
above mean sea level:
Static level: 39 ft. below top of well
Date:
Artesian pressure: lbs. per square inch
Date:
Artesian water is controlled by:
(Cap, valve, etc.)

(9) WELL TESTS:
Drill down amount water level is lowered below static level
Was a test made? Yes ☑ No ☐ If yes, by whom:
Yield: 50 gal./min with 48 ft. drawdown after 1 hr.

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

<table>
<thead>
<tr>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
</tr>
</thead>
</table>

Date of test: Date of test:
Date of test:
Artesian flow: g.p.m. Date:
Temperature of water: Was a chemical analysis made?

(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.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top soil, dark, sandy</td>
<td>0'</td>
<td>4'</td>
</tr>
<tr>
<td>Clay, sandy, hard, tan</td>
<td>4'</td>
<td>7'</td>
</tr>
<tr>
<td>Sand, silty, fine</td>
<td>7'</td>
<td>12'</td>
</tr>
<tr>
<td>Sand &amp; Basalt rocks, tan silt</td>
<td>12'</td>
<td>16'</td>
</tr>
<tr>
<td>Clay, moist, brown, firm</td>
<td>16'</td>
<td>24'</td>
</tr>
<tr>
<td>Clay, moist, rusty-brown, soft</td>
<td>24'</td>
<td>40'</td>
</tr>
<tr>
<td>Clay, moist, tan, soft</td>
<td>40'</td>
<td>67'</td>
</tr>
<tr>
<td>Clay, moist, rusty-brown, firm, water</td>
<td>67'</td>
<td>71'</td>
</tr>
<tr>
<td>Clay, moist, tan, firm</td>
<td>71'</td>
<td>78'</td>
</tr>
<tr>
<td>Clay, moist, dark brown, firm</td>
<td>78'</td>
<td>86'</td>
</tr>
<tr>
<td>Clay, moist, black, hard</td>
<td>86'</td>
<td>91'</td>
</tr>
<tr>
<td>Basalt, fractured, black, and hard</td>
<td>91'</td>
<td>94'</td>
</tr>
<tr>
<td>Basalt, black, hard</td>
<td>94'</td>
<td>100'</td>
</tr>
</tbody>
</table>

RECEIVED
DEC 18 1974

DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started: Nov. 25, 1974, Completed Dec. 8, 1974

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: ZIMMERMAN WELL DRILLING CONC.
(Person, firm, or corporation) (Type or print)

Address: Box 1406, Spokane, Wash. 99202

[Signature] James J. Zimmerman
(Well Driller)
License No. 05444
Date: Dec. 15, 1974

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Robert J. McCann
Address: Route 1 Box 348 B15 - Chattaroy, WA 99003

LOCATION OF WELL: County: Spokane
Section: 8 T. 28 N. R. 43 W.

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

(4) TYPE OF WORK: New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jettied ☐

(5) DIMENSIONS: Diameter of well... Inches:
Drilled... 280 ft. Depth of completed well... 280 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 in. Diam. from... ft. to 174 ft.
Threaded ☐ Diam. from... ft. to... ft.
Weired ☒ Diam. from... ft. to... ft.

Perforations: Yes ☑ No ☐
Type of perforator used: in. by:
SIZE of perforations: 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: Sand & Gravel
Did any strata contain unusable water? Yes ☑ No ☒
Type of water: Fresh water
Depth of strata... ft.
Method of sealing strata off:

(7) PUMP: Manufacturer's Name:
Type:

(8) WATER LEVELS: Land/surface elevation:
above mean sea level... 20 ft.
Static level... 145 ft. below top of well Date: 3/6/80
Artesian pressure... 0 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: 4 gal/min with ft. drawdown after hrs.

"Est. Aft. Lift"

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.
Artesian flow... g.p.m. Date:
Temperature of water:

Was a chemical analysis made? Yes ☐ No ☑

3/12/80

(USE ADDITIONAL SHEETS IF NECESSARY)

RECEIVED
MAR 12 1980

DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

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: Ponderosa Drilling & Development, Inc.
Address: 6010 Broadway - Spokane, WA 99206

[Signed] Paul Hawkins (Well Driller)
License No: 1007 Date: March 10, 1980
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name: Jerry Ramsey
LOCATION OF WELL: County: Spokane
Lot: 1
Sec 17 T29 N R43 W
Short plat 79-70 Rec in Short plat Blk F P 22

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

(4) TYPE OF WORK: Owner's number of well
New well □ Method: Dug □ Bored □ Deepened □ Cable □ Driven □
Reconditioned □ Rotary □ Jetted □

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 197 ft. Depth of completed well 197 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 in. diam. from 0 ft. to 180 ft.
Threaded □ Diam. from ft. to ft.
Welded X 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
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 X No □ To what depth 18 ft.
Material used in seal Cement & bentonite
Did any strata contain unusable water? Yes □ No □
Type of water: Depth of strata
Method of sealing strata:

(7) PUMP: Manufacturer's Name
Type: HP

(8) WATER LEVELS:
Land-surface elevation above mean sea level 2240 ft.
Static level 108 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
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)
Water Level Time Water Level Time Water Level

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

10/27/83

(USE ADDITIONAL SHEETS IF NECESSARY)

(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.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonsil</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Coarse Br. sand</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Coarse sand &amp; gravel</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Coarse Br. sand</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Coarse sand &amp; gravel</td>
<td>11</td>
<td>57</td>
</tr>
<tr>
<td>Pine Br. sand</td>
<td>57</td>
<td>68</td>
</tr>
<tr>
<td>Coarse sand &amp; gravel</td>
<td>68</td>
<td>121</td>
</tr>
<tr>
<td>Hard grey clay</td>
<td>121</td>
<td>123</td>
</tr>
<tr>
<td>Soft Br. clay</td>
<td>123</td>
<td>144</td>
</tr>
<tr>
<td>Soft, dec, granite, Br. clay mix</td>
<td>144</td>
<td>181</td>
</tr>
<tr>
<td>Soft Br. dec, granite</td>
<td>181</td>
<td>187</td>
</tr>
<tr>
<td>Very soft Br. dec, granite</td>
<td>187</td>
<td>188</td>
</tr>
<tr>
<td>Soft Br. granite</td>
<td>188</td>
<td>194</td>
</tr>
<tr>
<td>Med. soft Br. granite</td>
<td>194</td>
<td>197</td>
</tr>
</tbody>
</table>

RECEIVED
OCT 27 1983
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

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: S. D. DRILLING
(Person, firm, or corporation) Type or print
Address: Rt. 2 Box 82 Elk, Washington 99009

[Signature]
(Well Driller) 9/21/ 83

License No. 04796 Date: 19...
WATER WELL REPORT

STATE OF WASHINGTON

(1) OWNER: Name: Al Veillette  Address: 810 3rd Ave, Deer Park

LOCATION OF WELL: County: Spokane  SW1/4 NE 1/4, Sec. 32, T29 N., R.43 W.M.

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


(5) DIMENSIONS: Diameter of well: 60 inches  Drilled: 140 ft  Depth of completed well: 140 ft

(6) CONSTRUCTION DETAILS:
Casing installed: 60 ft. Diam. from 0 to 140 ft.
Threaded [X]  Diameter: 9
Welded [ ]  Diameter: 9
Perforations: Yes [X]  No [ ]
Type of perforator used: In, by

SIZE of perforations: ft. to ft.

perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes [X]  No [ ]
Manufacturer's Name:  Model No: 

Type:  Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

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

Surface seal: Yes [X]  No [ ]
Material used in seal: bentonite
Did any strata contain unusable water? Yes [X]  No [ ]

Type of water:  Depth of strata:
Method of sealing strata off:

(7) PUMP: Manufacturer's Name:  M.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level: 213 ft.
Static level: 100 ft. below top of well  Date: 5-2-70
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 [X]  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
Bailer test: 8 gal./min. with ft. drawdown after hrs.
Artesian flow: g.p.m. Date:
Temperature of water: 50° F. Was a chemical analysis made? Yes [X]  No [ ]

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  Spokane Drilling Co.
Person, firm or corporation:  Type or print)
Address: F. D. 110 Garland
(Signed)  (Well Driller)
License No. 0408  Date: 7-24-70

RECEIVED
MAR 30, 1978
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started: 7/1/70  Completed: 7/1/70

ECY 050-1-20 (USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name: D. C. N.

LOCATION OF WELL: County: Spokane

PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐

TYPE OF WORK: New well ☐ Dug ☐ Bored ☐ Reconditioned ☐

DIMENSIONS: Diameter of well 6 in.

CONSTRUCTION DETAILS:
- Casing installed: 6 in. Diam. from 0 ft. to 87 ft.
- Perforations: Yes ☐ No ☐
- Screens: Yes ☐ No ☐
- Gravel packed: Yes ☐ No ☐
- Surface seal: Yes ☐ No ☐

PUMP:
- Manufacturer's Name:
- Type:
- H.P.

WATER LEVELS:
- Land-surface elevation 67 ft.
- Static level 67 ft. below top of well
- Artesian pressure 0 lbs. per square inch
- Artesian water controlled by:

WELL TESTS:
- Drawdown is amount water level is lowered below static level
- Was a pump test made? Yes ☐ No ☐
- Yield:

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. B. WELL DRILLING

Address: Rt. 7, Box 6200, Yakima, Wa.

License No. 0700

Date: 3/5 Jan. 1979
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name: Jerry Little, Address: 13910 Downer St. 99021

LOCATION OF WELL: County: Spokane

(2a) STREET ADDRESS OF WELL (or nearest address): Westgar Rd.

(3) PROPOSED USE: Domestic X, Industrial, Municipal, Water Test Well, Other

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

(5) DIMENSIONS:
- Diameter of well: 6 inches
- Depth of completed well: 60 ft

(6) CONSTRUCTION DETAILS:
- Casing Installed: Yes X, No [ ]
- Diam. from ft. to ft.
- Perforations: Yes X, No [ ]
- Size of perforations in. by in.
- Material: 0 from ft. to ft.
- Screen: Yes X, No [ ]
- Diam. from ft. to ft.
- Gravel packed: Yes X, No [ ]
- Diam. from ft. to ft.
- Gravel placed from ft. to ft.
- Surface seal: Yes X, No [ ]
- To what depth: 20 ft.
- Material used in seal: [ ]
- Depth of strata X:
- Method of sealing strata off:

(7) PUMP: Manufacturer's Name: [ ]

(8) WATER LEVELS:
- Land-surface elevation above mean sea level: 15 ft.
- Static level: 0 ft. below top of well: 524.53
- Artesian pressure: 100 lbs. per square inch: [ ]
- Artesian water is controlled by:

(9) WELL TESTS:
- Drawdown is largest water level is lowered below static level
- Was a pump test made? Yes X, No [ ]
- Drawdown after:
- Yield:
- Recovery data (time taken as zero when pump turned on) (water level measured from well top to water level)
- Date of test:
- Booster fill:
- Airtest:
- Temperature of water:
- Was a chemical analysis made? Yes X, No [ ]

WELL CONSTRUCTOR CERTIFICATION:
I hereby certify 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: Tip Top Water Well Drilling
Address: 1311 Sullivan Rd. Elk 99009
(Signed) (WELL DRILLER)
Contractor's Registration No.

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT

STATE OF WASHINGTON

OWNER: Arnold Sholl
Address: 10823 E. Krugquist Ave, 99021

LOCATION OF WELL:
County: Spokane
SW 1/4, SW 1/4 Sec 4, T. 26 N., R. 44 W.

STREET ADDRESS OF WELL (or nearest address): 10823 E. Krugquist Ave, 99021

PROPOSED USE:
- Domestic
- Irrigation
- Municipal
- Industrial
- Other

TYPE OF WORK:
- New well
- Modified well
- Deepened well
- Reconditioned well
- Retapaged well
- Drilled well
- Jetted well

DIMENSIONS:
- Diameter of well: 16 inches
- Drilled: 125 feet
- Depth of completed well: 135 ft.

CONSTRUCTION DETAILS:
- Casing installed: 6
- Dam. from 6 to 88 ft.
- Welded
- Liner installed
- Dam. from 88 to 125 ft.
- Threaded
- Dam. from 125 to ft.

Perforations: Yes
- Type of perforator used
- SIZE of perforations: in
- perforations from ft. to ft.
- perforations from ft. to ft.
- perforations from ft. to ft.

Screens: Yes
- Manufacturer's Name
- Type
- Yarn.
- Slot size
- From
- To
- Ename.
- Slot size
- From
- To
- Gravel packer: Yes
- No
- Size of gravel
- Gravel placed from ft. to ft.
- Surface seal: Yes
- No
- Depth of strata
- Method of sealing strata off

PUMP: Manufacturer's Name
- Type
- H.P.

WATER LEVELS:
- Land surface level: ft.
- Top of well: 125 ft.
- Artesian pressure: lbs. per square inch.
- Artesian water is controlled by:

WELL TESTS:
- Drawdown is amount water level is lowered below static level:
- Was a pump test made? Yes
- Yield: gal./min.
- 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
- Bailer test: gal./min.
- ft. drawdown after hrs.
- Airtest:
- Temperature of water
- Was a chemical analysis made? Yes

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
Terry Waters Milling
Address
License No.
Contractor's Registration No.

Date: 11-30-93

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name K.C. Doggett
Address E.6403 Woolard Rd., Colbert, WA 99005.

LOCATION OF WELL: County Spokane
Section 12 T. 27 N. R. 43 W.M.

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

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

DIMENSIONS: Diameter of well 6 inches Drilled 319 feet
Depth of completed well 316 feet

CONSTRUCTION DETAILS:
Casing installed: 6" Diam. from 1 ft. to 311 ft.
Threaded [ ] Diam. from 1 ft. to 311 ft.
Welded[ ] Diam. from 1 ft. to 311 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. Slot size from ft. to 316 ft.
Diam. Slot size from ft. to 316 ft.

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

Surface seal: Yes [ ] No [ ]
Did any strata contain usable water? Yes [ ] No [ ]
Material used in seal bentonite
Type of water: muddy silt Depth of strata: 117'
Method of sealing strata off drove casing past

PUMP: Manufacturer's Name
Type
H.P.

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

WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes by whom?
Yield cal./min. with II 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

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 Bartholomew Drilling, Inc.
(Person, firm, or corporation) (Type or print)
Address N. 11525 Nine Mile Rd., Nine Mile Falls WA 99026
(Signed) Date 10/29, 86
(Well Driller)
License No. 0051 Date 10/29, 86

(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**

**STATE OF WASHINGTON**

**OWNER:** Name: Delbert Linton  
Address: 5636 Ingle Rd., In Fer, WA 9805

**LOCATION OF WELL:** County: Pierce  
Section: 35  
Tob. 27 N.  
Range: 13 W.M.

**STREET ADDRESS OF WELL** (or nearest address):

**PROPOSED USE:**  
- Domestic  
- Irrigation  
- DeWater  
- Industrial  
- Municipal  
- Test Well  
- Other

**TYPE OF WORK:**  
- Abandoned  
- New well  
- Drilled  
- Bored  
- Reconditioned  
- Cable  
- Rotary  
- Other

**DIMENSIONS:**  
- Diameter of well: 7 inches  
- Depth of completed well: 24 feet

**CONSTRUCTION DETAILS:**  
- Casing installed:  
  - Dia. from: 6 in. to 239 ft.
- Liner diameter:  
  - Dia. from: 6 in. to 24 ft.
- Perforations:  
  - Yes  
  - No
- Screens:  
  - Johnson
- Gravel packed:  
  - Yes  
  - No
- Surface seal:  
  - Yes  
  - No
- Material used in seal:  
- Did any strata contain unusable water?  
  - Yes  
  - No
- Type of water:  
- Depth of strata:  
  - Method of sealing strata off:

**PUMP:**  
- Manufacturer's Name:  
- Type:  
- H.P.:  

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

**WELL TESTS:**  
- Drawdown: amount water level is lowered below static level:
  - Was a pump test made?
    - Yes  
    - No
- Yield:
  - gal./min.
  - 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:

**WELL CONSTRUCTOR CERTIFICATION:**

I, [Full Name], (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address:  

(Signed)  

(WELL DRILLER)  

License No:

Contractor's Registration No.:

Date:  

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

(1) OWNER: Name George Sullivan Address N. 19009 Little Spokane Dr., Spokane, WA

(2) LOCATION OF WELL: County Spokane N 1/2 of NE 1/4 NW 1/4 Sec.21 T.27 N R.43 W.M. except E 20 ft.

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

(4) TYPE OF WORK: New well [x] Method: Dug [] Bored [] Deepened [] Cable [] Driven [] Reconditioned [] Rotary [] Jetted []

(5) DIMENSIONS: Diameter of well 6.00 inches Drilled 100 ft Depth of completed well 34 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6.00 Diam. from +1 ft. to 79 ft.
Threaded [] Diam. from ft. to ft.
Welded [] 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 [x] No [] Johnson
Type: Stainless steel Manufacturer's Name
Model No
Diam. 5.00 Slot size .025 ft. to 84 ft.
Diam. Slot size from ft. to ft.

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

Surface seal: Yes [x] No [] To what depth? 20 ft.
Material used in seal bentonite
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:

(8) WATER LEVELS:
Land-surface elevation above mean sea level...
Static level 12 ft. below top of well Date 6/23/86
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 [x] No [] If yes by whom?
Yield: sal/min. with... ft. drawdown after...

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 6/11/86 g.p.m. Date
Artesian flow
Temperature of water

(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.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown clay</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Gray clay</td>
<td>18</td>
<td>38</td>
</tr>
<tr>
<td>Blue gray clay</td>
<td>38</td>
<td>45</td>
</tr>
<tr>
<td>Tan clay</td>
<td>45</td>
<td>51</td>
</tr>
<tr>
<td>White clay</td>
<td>51</td>
<td>63</td>
</tr>
<tr>
<td>Gray clay with sand</td>
<td>63</td>
<td>72</td>
</tr>
<tr>
<td>Sand with red clay</td>
<td>72</td>
<td>79</td>
</tr>
<tr>
<td>Granite sand</td>
<td>79</td>
<td>85</td>
</tr>
<tr>
<td>Lenses</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Gray clay</td>
<td>85</td>
<td>100</td>
</tr>
</tbody>
</table>

WELL DRILLER'S STATEMENT:

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

NAME Bartholomew Drilling, Inc.
(Please name of corporation)

Address N. 11525 Nine Mile Rd., Nine Mile Falls WA 99026
(City, State and Zip Code)

License No. 0051 Date 8-6-86

USE ADDITIONAL SHEETS IF NECESSARY
WATER WELL REPORT

STATE OF WASHINGTON

OWNER: Name: George Sullivan (Mike) Address: 19009 Little Spokane Dr., Spoka

(2) LOCATION OF WELL: County: Spoka

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

(3) PROPOSED USE: Domestic [] Industrial [] Municipal []

(4) TYPE OF WORK: Owner's number of well (if more than one)

Abandoned [ ] New well [X] Method: Dug [ ] Bored [ ]

Reconditioned [ ] Driven [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well: 6 inches

Drilled: 195 ft Depth of completed well: 185 ft

(6) CONSTRUCTION DETAILS:

Casing installed: 6 ft. Diam from 1 1/2 ft to 173 ft

Cemented: [ ] Liner installed: [ ]

Perforations: Yes [X] No [ ]

Type of perforator used

SIZE of perforations in by in

Recorded 0.20 in and 0.25 in

Gravel packed: Yes [X] No [ ]

Gravel size:

Surface seal: Yes [X] No [ ]

Type of water: clay brown-dec granite

Material used in seal: bentonite

Did any strata contain unsuitable water? Yes [X] No [ ]

Depth of strata:

Method of sealing strata off

(7) PUMP: Manufacturer's Name

Type

(8) WATER LEVELS:

Land surface elevation above mean sea level ft

Statellite level at bottom of well: 66 ft

Artesian pressure: lbs per square inch: Date

Intake water controlled by:

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

Water level then recorded at

High water test time taken minus zero when pump turned on: Water level measured from minus pump level (in ft)

Low water test time Water level

Date of test

Radiator test

(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

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>top soil</td>
<td>0 2</td>
</tr>
<tr>
<td>clay white</td>
<td>2 12</td>
</tr>
<tr>
<td>clay brown-dec granite</td>
<td>12 18</td>
</tr>
<tr>
<td>clay white-dec granite</td>
<td>18 44</td>
</tr>
<tr>
<td>clay dark brown</td>
<td>60 70</td>
</tr>
<tr>
<td>silty sand &amp; clay-some water</td>
<td>70 80</td>
</tr>
<tr>
<td>could only develop 1gpm-pulled screens</td>
<td>80 110</td>
</tr>
<tr>
<td>clay brown</td>
<td>110 120</td>
</tr>
<tr>
<td>clay gray</td>
<td>120 135</td>
</tr>
<tr>
<td>clay white</td>
<td>135 175</td>
</tr>
<tr>
<td>coarse granite sand &amp; water</td>
<td>175 185</td>
</tr>
<tr>
<td>hard clay white with some granite sand</td>
<td>185 195</td>
</tr>
</tbody>
</table>

WELL CONSTRUCTOR CERTIFICATION:

I declare that the information is true and correct. I have reviewed the plans and specifications and have verified that the work was done in accordance with the plans and specifications.

Name: Bartholomew Drilling, Inc.

Address: N 11525 Nine Mile Rd

City: Nine Mile Falls, WA

License No: 771

Registration No: BARTI 24903

Date: 04/24/90

(USE ADDITIONAL SHEETS IF NECESSARY)
**WATER WELL REPORT**

**STATE OF WASHINGTON**

---

**1. OWNER:** John Baker  
**Address:** E205 Woodland Rd

**2. LOCATION OF WELL:** Spokane  
**County:** SE 1/4 Sec 7 T 27 R 34 M

**3. PROPOSED USE:** Domestic

**4. TYPE OF WORK:** Drilled  
**Method:** Dug

**5. DIMENSIONS:** Diameter of well: 60 inches.  
**Depth of completed well:** 50 ft.

**6. CONSTRUCTION DETAILS:**

- **Casing installed:** 60 ft.  
- **Diam. from:** 10 ft. to 50 ft.

- **Welded:** 60 ft.

- **Threaded:** 60 ft.

- **Perforations:** Yes  
  - **No. of perforations:** 10  
  - **Size of perforations:** 10 ft. to 50 ft.

- **Gravel packed:** Yes  
  - **Size of gravel:** 10-20

- **Surface seal:** Yes  
  - **To what depth:** 10 ft.

**7. PUMP:**

- **Manufacturer's Name:** T-H-Lock

**8. WATER LEVELS:**

- **Static level:** ft. below top of well

- **Artesian water is controlled by:** Cap valve, etc.

**9. WELL TESTS:**

- **Drawdown is amount water level is lowered below static level:**

**RECOVERY DATA (time taken as zero when pump turned on): (water level measured from well top to water level)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
<th>Time</th>
<th>Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**RECOVERY DATA**

- **Date of test:**

- **Basin test:** 0.00 ft., drawdown after 0.00 hrs.
- **Artesian test:** 0.00 ft., drawdown after 0.00 hrs.

**10. WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

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

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>FROM</th>
<th>TO</th>
</tr>
</thead>
</table>
| Top soil | 0.00 | 1.00
| Sand & silt | 1.00 | 6.40
| Clay & silt | 6.40 | 6.80
| Bk sand & clay | 6.80 | 6.90
| Clay & silt | 6.90 | 7.40
| Sand & silt, clay | 7.40 | 7.50
| Clay TD | 7.50 |

**WELL CONSTRUCTOR CERTIFICATION:**

I, the undersigned, have 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 the best of our knowledge and belief.

**NAME:** Tip Top Water Well Drilling  
**ADDRESS:** 15511 Blane, Rd. Elk WA 99006

**License No.:** 1901  
**Contractor's Registration No.:** 1901  
**Date:** 10-28-1970

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

OWNER: Name: CHRIS CURRIE
Address: 11203 Hegler Rd, WA 99021

LOCATION OF WELL:
County: SPOKANE

(2a) STREET ADDRESS OF WELL (or nearest address): 11203 E. Hegler

(3) PROPOSED USE: 
- Domestic Irrigation
- DeWater Test Well

(4) TYPE OF WORK: 
- Owner’s number of well
- Abandoned
- New well
- Deepened
- Reconditioned
- Method: Dug
- Bored
- Driven
- Rotary
- Jetted
- Other

(5) DIMENSIONS:
- Diameter of well: 6 inches
- Drilled: 160 feet
- Depth of completed well: 159 ft

(6) CONSTRUCTION DETAILS:
- Casing installed: 6 ft
- Liner installed: Threaded
- Perforations: Yes
- Type of perforator used: in by in
- Size of perforations:
  - from ft to ft
  - from ft to ft
  - from ft to ft

- Screens: Yes
- Manufacturer’s Name: Stainless
- Model No.
- Diam: 6
- Slot size: 20
- Gravel packed: Yes
- Gravel placed from ft to ft
- Surface seal: Yes
- To what depth?: ft

(7) PUMP: 
- Manufacturer’s Name
- Type

(8) WATER LEVELS:
- Land surface elevation above mean sea level: ft
- Static level: 35 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
- Yield: gal/min
- With: ft.
-ドrawn down after: hrs.
- Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level):
- Time: Water Level

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: Vermillion Well Drilling, Inc
ADDRESS: North 6403 Perry, Spokane, WA 99207

(Signed) Dwayne McCullough
(WELL DRILLER) License No.: 92
Registration:
Date: September 29, 1992

(USE ADDITIONAL SHEETS IF NECESSARY)
WATER WELL REPORT
STATE OF WASHINGTON

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

2) LOCATION OF WELL: County Spokane
   Location 14 SE 14 Sec 22 T 28 N R 42 WM.

3) PROPOSED USE: Domestic ☑️ Irrigation ☐ Industrial ☐ Municipal ☐
   Domestic ✔️ Irrigation ☐ Industrial ☐ Municipal ☐

4) TYPE OF WORK: Owner’s number of well (if more than one)
   Drilled ☑️ Reconditioned ☐ Bored ☐ New well ☑️ Abandoned ☐
   Reconditioned ☐ Other ☐ Drilled ☑️ Cased ☐ rotary ☐ Jetted ☐

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

6) CONSTRUCTION DETAILS:
   Casing installed: 6 Diam. from 14 ft. to 36 ft.
   Drilled: 4 Diam. from 25 ft. to 285 ft.
   Gravel packed: Yes ☑️ No ☐ Size of gravel
   screens: Yes ☑️ No ☐ Manufacturer’s Name

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
   Water level: 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
   Initial test: gal./min. with ft. drawdown after hrs.
   Artesian: 11 gal./min. with static set at 284 ft. for 2 hrs.
   Artesian flow: g.p.m. Date
   Temperature of water Was a chemical analysis made? Yes ☑️ No ☐

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.
Address N 31621 Cedar Deer Park, WA 99006
(Signed) MINDEN DRILLING INC.
License No. 2208

Contractor’s Registration
No. MINDEN009079 Date 11-28-94

Ecology is an Equal Opportunity and Affirmative Action employer. For special
accommodation needs, contact the Water Resources Program at (206) 407-6000. The TDD number is (206) 407-6006.
**WATER WELL REPORT**

**STATE OF WASHINGTON**

**OWNER:** DONALD E. DINGMAN

**Address:** 26703 N. DENNISON ROAD DEER PARK WA

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### Location of Well

- **County:** Spokane
- **Parcel #:** 28252 - 9049

### Proposed Use

- Domestic, Irrigation, DeWater, Test Well

### Type of Well

- Abandoned
- New Well

### Method

- X Dug
- Deepened
- Cabled
- Driven
- Reconditioned
- Rotary
- Jacked

### Dimensions

- **Diameter of well:** 6" inches
- **Depth of completed well:** 290 ft.

### Construction Details

- **Casing installed:** 5 ft from to 36 ft.
- **Welded X PVC:** 5 ft from to 290 ft.
- **Perforations:** Yes
- **Screens:** Yes X No

### Pump

- **Manufacturer's Name:** Wesley
- **Type:** 4" Diam.
- **Slot size:** 10 ft from to 290 ft.
- **Gravel packed:** Yes X No
- **Size of gravel:** 18 ft.

### Water Levels

- **Static level:** 20 ft below top of well
- **Artesian pressure:** lbs per square inch
- **Artesian water is controlled by:** (e.g., valve, etc.)

### Wells Test

- **Estimated Air Lift:** 22 GPM
- **Recovery data:** (time taken as zero when pump turned off) (water level measured from well top to water level)

### Well Constructor Certification

I, as the constructor, take responsibility for the design, construction, and operation of this well, and its compliance with all Washington well construction standards. Materials used and the information reported on this report are true to my best knowledge and belief.

**NAME:**

**Address:** EAST 6010 BROADWAY SPOKANE, WA 99212

**Contractor:** MARTY RUGO (Marty Rugo)

**License No.:** 2038

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(USE ADDITIONAL SHEETS IF NECESSARY)