

# FLOW ENHANCEMENT STUDY

Siwash Creek

Okanogan County, Washington

Prepared for: Colville Confederated Tribes

Project No. 110014 • September 21, 2012



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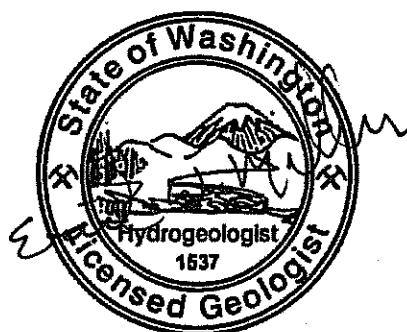
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## Executive Summary

Siwash Creek is a snowmelt dominated stream flowing over 15 miles to the Okanogan River. Fish habitat in the lower 1.4 miles of the Creek is currently limited by stream flows that dry up in summer months. Fish passage from the Okanogan River is likely impeded in all but the highest of flows by a diffuse channel at the mouth of the Creek (Arterburn et al., 2007). Above this, fish passage is thought to be limited to the lower 1.4 miles of the Creek, above which a series of natural falls likely restricts passage (Arterburn et al., 2007). Anecdotal accounts from local residents indicate that in previous decades, the stream flowed year-round below the falls. The objective of this study is to identify alternatives to restore/augment flows in the lower 1.4 miles of Siwash Creek to maximize survival of juvenile steelhead.

Seven stream gaging stations (Staffs A through G) were established on Siwash Creek to evaluate flow losses to groundwater seepage and irrigation diversions and establish flow augmentation targets. Gauging was performed between March and November 2011. Three gauging stations monitored flow in the lower watershed below Antoine Valley. Staff C is located at the top of the 1.4 mile fish bearing reach just below the falls, Staff B is near the middle of the reach, and Staff A is near the mouth of the Creek. Discharge from Antoine valley was monitored at Staff D, while the upper watershed was monitored by Staffs E, F, and G. Aquifers in the project area were evaluated to further understanding of groundwater/surface water interactions and to support development of flow augmentation alternatives.

Staff C was the most downstream gaging station with perennial flow for the 2011 gauging period. Stream flow dried up beginning in early July at Staffs A and B. An irrigation diversion (Schaller Right) occurs between Staffs C and D that diminishes flow between these stations during the irrigation season. Within Antoine Valley, significant losses in stream flow occur as a result of irrigation diversions and seepage to groundwater. Anecdotal information indicates continuous flow through the valley only occurred for about a 1-week period during the 2011 freshet.

Target augmentation flows were established for the mouth of Antoine Valley (Staff D) and at the falls (Staff C) based on measured seepage losses and habitat flow objectives of 0.3 and 1 cubic feet per second (cfs) at the mouth of the Creek. To meet the habitat flow of 0.3 cfs in 2011, estimated flow augmentation of 1.1 and 1.8 cfs would have been required for the non-irrigation and irrigation seasons, respectively, at Staff D. Because flow augmentation targets are based on a relatively short gaging period (8 months) during a relatively wet year (2011), an assumed safety factor of 50% was applied to the estimated augmentation flows as an allowance for uncertainty and annual climate variation. With the 50% safety factor, flow augmentation of 1.7 and 2.6 cfs are estimated to meet the 0.3 cfs habitat objective during non-irrigation and irrigation seasons, respectively (Table ES-1). On an annual basis, this quantity is equivalent to approximately 1,500 acre-feet. At the falls (Staff C), the annual augmentation quantity is reduced to about 1,400 acre-feet. These annual augmentation quantities equate to flows of 4.9 and 4.5 cfs over the 5-month irrigation season, for inputs at Staffs D and C,

respectively. Estimated augmentation flows to achieve a 1 cfs habitat flow are included in Table ES-1 below.

**Table ES-1 – Flow Augmentation Quantities at Staff D to Meet Habitat Flow Objectives**

<b>Habitat Flow Objective</b>	<b>0.3 cfs year-round at Creek mouth</b>	<b>1 cfs year round at Creek mouth</b>
Annual Augmentation Qty (acre ft)	1,491	2,251
Non-Irrigation Season Augmentation (cfs)	1.7	2.7
Irrigation Season Augmentation (cfs)	2.6	3.7

Note: Augmentation quantities computed from seepage losses and habitat flow objectives with a 50% safety factor. See Tables 2 and 3 for complete table notes.

Several alternatives were examined for enhancing stream flows to the fish passable reach below the falls at RM 1.4 including:

- retiring water rights;
- converting surface water diversion to groundwater withdrawals;
- groundwater pumping from a well; and,
- new surface water storage in the upper watershed.

Of these, the most feasible augmentation alternative was judged to be retiring irrigation rights in Antoine Valley equal to about 4.9 cfs or about 1,500 acre-feet annually. Lesser quantities would provide some habitat benefit by extending flow further downstream and/or meeting project objective during wetter years, depending on the quantity of retired water rights.

Retiring of Antoine Valley groundwater and surface water rights has uncertainty with regard to the timing of instream flow benefit to Siwash Creek. Retired surface water rights, when placed in-stream, will infiltrate within Antoine Valley except for the short period of continuous flow through the valley. The infiltrated water will accrete onto the water table and move with groundwater to a discharge point at the mouth of Antoine Valley (near Staff D). At this location, a bedrock constriction forces groundwater to the surface through a number of springs. The timing of this discharge should be evaluated using a groundwater model to confirm that discharge occurs at a time and in sufficient quantity to meet project objectives. In addition, the potential exchange of groundwater between Antoine and Siwash Creeks has not been fully characterized. The relationship of groundwater flow between these creeks should be further investigated through shallow piezometers and water level measurements to ensure that the infiltrated, flow augmentation water does not migrate to Antoine Creek.

Piping of water from the point of diversion(s) to the mouth of Antoine Valley offers the advantage of controlling the timing and quantity of discharge to the Creek. Piping would require a change in time of use of the water right from irrigation season to year round and a change in place of use.

Retiring the Schaller Right would provide some benefit to stream flows below the falls, but would not provide sufficient water to meet the habitat flow objectives. The effect of this option on habitat flows could be investigated by temporarily fallowing fields irrigated by this right.

The next most feasible alternatives rely on groundwater sources. Converting a surface water diversion (Schaller Right) to groundwater in the reach between the falls and Antoine Valley could extend 0.3 cfs habitat flow an estimated 1,400 feet further downstream with flow drying up about 2,800 feet downstream. The Schaller Right may be difficult to protect in-stream and hydrogeologic/impairment uncertainty are drawbacks for this option. Groundwater pumping from a well in the fish passable reach below the falls could extend flow an estimated 2,100 feet from a 200-gallon per minute (gpm) well with a discharge point in the lower reach. This option would require a new water right and also has hydrogeologic/impairment uncertainty.

Developing a new surface water storage facility was not determined to be feasible because the basin does not produce sufficient water to meet habitat flow objectives after downstream losses to seepage and irrigation withdrawals.

Moving forward, we recommend:

- pursuing water rights in Antoine Valley;
- characterizing the groundwater exchange between Antoine and Siwash Creek through installation of shallow monitoring wells;
- evaluating the timing and quantity of instream flow benefit from a retired water right through a groundwater model;
- Investigate fallowing fields irrigated by Schaller Right on a trial basis; and,
- adaptively managing water right acquisition and retirement through continued monitoring.

# 1 Introduction

The Colville Confederated Tribes Anadromous Fish Division (CCT AFD) is seeking to increase stream flows in Siwash Creek, near Tonasket in Okanogan County to enhance spawning and rearing habitat for Okanogan River steelhead. A fish passage barrier assessment of Okanogan River tributaries (Arterburn, et al., 2007) identified anadromous fish habitat in Siwash Creek below River Mile (RM) 1.4; however, low to no-flow conditions exist in the lower reach for most of the year. These flow conditions present an impediment to fish passage and significantly increase juvenile steelhead mortality. Steep stream gradients at RM 1.4 likely present a natural fish passage barrier above the lower reach (Arterburn, et al., 2007).

## 1.1 Purpose and Scope

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The objective of this study is to identify alternatives to increase flows in the lower reach from mid- to late-summer through spring in the lower 1.4 miles of Siwash Creek to maximize survival of juvenile steelhead. To accomplish this, Aspect Consulting, LLC (Aspect) characterized hydrologic and groundwater conditions in the basin and identified and evaluated alternatives to augment stream flows in the lower reach.

## 1.2 Flow and Water Quality Objectives

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The Tribes' primary objective is to provide rearing habitat in the fish-passable lower 1.4 miles of the Creek by enhancing flows following spring freshet when this reach typically dries up. Specific objectives include:

- Establish perennial rearing habitat in some or all of the lower 1.4 miles of the Creek. The minimum flow necessary to sustain juvenile steelhead in the lower reach is assumed to be 0.3 cubic feet per second (cfs) with higher flow being desirable based on discussions with CCT AFB biologists; therefore, habitat flow objectives of 0.3 and 1 cfs were considered in the analysis. This flow should extend as far downstream as possible to maximize rearing habitat, but need not reach the river to provide rearing habitat benefit.
- Meet water quality parameters optimal for juvenile steelhead rearing, including water temperatures between 45 degrees F and 63 degrees F, dissolved oxygen between 5 milligrams per liter (mg/L) and 15 mg/L, and pH between 6.7 and 8.3 (Bell, 1991). Evaluation of copper and zinc were outside the scope of this study. Because the Creek does not appear on the State's 303(d) listing of impaired water bodies, these metals are not expected to be present in concentrations affecting targeted species at Siwash Creek.



## 2 Hydrology

This section presents an overview of the Siwash Creek basin, describes stream the gauging network established as part of the study, characterizes surface water flows and geologic conditions, and the basin hydrogeology, and presents flow augmentation targets.

### 2.1 Basin Description

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The Siwash Creek watershed occupies 48-square miles east of Tonasket, Washington (Figure 1). The Creek flows west and southwest for 15 miles from the southwest slope of Mount Bonaparte to the Okanogan River in Tonasket. The South and Middle Forks of the Creek join to form the mainstem at RM 11.9. The North Fork enters the mainstem at RM 10.5. The Creek has no other major tributaries.

The Creek enters a steep, narrow canyon at about RM 8.9 and exits the canyon flowing into Antoine Valley at the apex of a broad alluvial fan at RM 5.4. The stream has been channelized on the eastern portion of the valley floor and diverted to the north downstream of Havillah Road. Except for high flows, the Creek infiltrates into the subsurface in Antoine Valley, disappearing about  $\frac{3}{4}$  miles after emerging into the valley from the canyon mouth. The Creek reemerges at the surface in springs located about  $\frac{1}{2}$ -mile north of Fancher Road at RM 3.0. Antoine Creek, located to the north, runs roughly parallel to Siwash Creek passing within 2 miles of Siwash Creek at the north end of Antoine Valley.

Downstream of Fancher Road, the Creek passes through a short, narrow canyon that opens to an upper glacial terrace. The Creek incised this terrace creating a canyon that becomes deeper with distance downstream. A series of small waterfalls formed as the stream removed glacial sediments exposing underlying bedrock at RM 1.4. The Creek has incised into a lower glacial terrace at about RM 1.7, exits this canyon at about RM 0.3, and flows across the surface of the Okanogan River terrace, through the City of Tonasket (City), under US Route 97 and a rail trestle before entering the Okanogan River. The stream channel across the lower  $\frac{1}{2}$ -mile of the glacial terrace has been channelized where it flows through the City (Entrix and Golder Associates, 2004). For the purposes of this report, the region lying upstream of Antoine Valley is referred to as the upper watershed and the region downstream from this valley is referred to as the lower watershed. The stream reach below the falls at RM 1.4 is referred to as the fish-passable reach.

The upper portion of the watershed is bounded to the north by Bonaparte Mountain and to the south by Barker Mountain. The upper portion is characterized by exposed bedrock ridges and thin glacial sediments that occupy regions between the ridges. Vegetation in the upper watershed above the confluence with North Fork is dominantly coniferous forest and land use is forestry. Land ownership is primarily United States Forest Service. The upper portion of the watershed above Antoine Valley, up to the confluence of the North Fork, is primarily grassland and shrub-steppe and land use is range with limited irrigated lands. Nearly all land downstream of the Okanogan Forest boundary is privately owned.

The lower watershed from Antoine Valley downstream to the Okanogan River is characterized by shallow soils and exposed bedrock in the uplands and thick, relatively flat, unconsolidated sediments in the lowlands. Antoine Valley and the upper glacial terrace between the falls (RM 1.4) and Fancher Road (RM 3.0) is agricultural with both regions irrigated using surface and groundwater from the Siwash Creek system. The northern portion of Antoine Valley is irrigated using surface water from Antoine Creek. Land use in the lower reach below the falls at RM 1.4 is mixed agricultural and large-parcel residential except in City limits, where land use is predominantly residential/commercial. Irrigation is limited below the falls and uses sources other than the Creek.

Average annual precipitation ranges from 12 inches in the lower watershed to 25 inches in the upper watershed on the southwest face of Mount Bonaparte. Most precipitation falls in winter months as snow. Precipitation is rare during summer months.

Surface water storage is limited predominantly to two small lakes occupying bedrock depressions on the southwest slope of Mount Bonaparte (Razor Lake and Harbor Lake). These lakes drain relatively small areas, and are located over a mile from Siwash Creek.

#### ***Irrigation and Water Rights***

Much of the low lying areas of lower Siwash Creek basin are irrigated.

Relevant water rights were identified, compiled, and evaluated by Washington Water Trust in the Siwash Basin Water Rights Review (WWT, 2011). The document was prepared in support of the Tribes' efforts to develop flow restoration strategies. The WWT (2011) report includes numbers of irrigated acres, places of use, and instantaneous rates of withdrawal for relevant water rights in the basin. However, locations for points of diversion and withdrawal were limited in the report to data available in Ecology's Water Rights Application Tracking System (WRATS) database. Because data from Ecology's source does not contain specific locations, locations of relevant surface water diversions and groundwater points of withdrawal upstream of the falls were field verified in winter 2012 as part of this study and are shown in Figure 10. Additional information regarding the WWT report is summarized in Section 3.1.1.

Antoine Valley is irrigated using water from the Siwash Creek system. This includes surface water from the Creek and groundwater in glacial sediments recharged primarily from Siwash Creek. Examination of air photo data, conversations with locals having knowledge of the site, and information in the WWT report indicate approximately 440 acres in Antoine Valley are irrigated by wheel line sprinkler and flood irrigation methods using water from the Siwash Creek system. In the north half of Antoine Valley, center pivot sprinklers operated by Antoine Valley Ranch use water diverted from Antoine Creek. Water rights in the WWT (2011) report include the Holmdahl (surface and groundwater), Antoine Valley Ranch (AVR) (surface and groundwater), IGO Ranch (surface and groundwater) and Laurie (groundwater) rights (Figure 10).

The other area where significant irrigation occurs lies in the reach between Antoine Valley and the falls at RM 1.4. Air photo data examined by WWT (2011) indicate approximately 83 acres in this reach are irrigated using wheel lines and hand lines with water sourced from surface water diversions on Siwash Creek. These lands are irrigated by various landowners using water from the Schaller Right (surface water). Further

downstream, other water rights use groundwater to irrigate smaller areas including the Gardiner and Culver Rights.

## 2.2 Stream Flow

### 2.2.1 Gauging

Data collected in the Siwash Creek basin from spring 2011 through December 2011 were used to characterize stream flow patterns. Prior to this study, there were no active stream flow gauges on Siwash Creek, no record of continuous flow measurements, and only scant point measurements available. Periodic point measurements collected by the Okanogan Conservation District between May 2000 and April 2003 indicate mean flows of 0.2 cfs and 1.2 cfs for the lower and upper portions of the Creek, respectively (Entrix and Golder Associates, 2004). Average annual flow is reported by others as 5 cfs (Walters, 1974). Approximately 20 measurements collected by the USGS (Station 12444400) on lower Siwash Creek between 1957 and 1977 indicate peak flows as high as 52 cfs occurring on January 9, 1959<sup>1</sup>. Available information indicates the Creek flows perennially to the falls at RM 1.4. Flows reported by Okanogan Conservation District and Walters (1974) and anecdotal accounts by CCT AFD staff and local residents confirm stream flow dries up in the lower reach below the falls during mid-late summer and early fall.

Seven stream gaging stations were established in the Creek from near the mouth to just above the confluence of the North Fork in the upper watershed. Five gauges were installed as part of the initial scope of work and two more were added 2 months later to expand the stream gauging effort. Stream gauge locations are shown in Figure 2. A staff gauge was installed at each gauging station and transducers were installed at Staffs D and E. Descriptions and rationale for each gauge are described below:

**Staff A** – Located at the railroad trestle near the mouth of the Creek at RM 0.1. This gauge was installed on May 19, 2011 to characterize flows in the lowermost section of the Creek. Flows at this location dry up seasonally following the spring freshet, and this station permits measurement of losses to groundwater as the stream traverses the lower glacial terrace. Data are limited for this gauge since it was installed later than the others and was vandalized and had to be reinstalled. One manual flow measurement was collected at the Highway 97 bridge on April 7, 2011 prior to installing Staff gauge A. Flows at Staff A dried up in the first week of July 2011.

**Staff B** – Located on the upstream end of a corrugated metal culvert where the Creek passes beneath a private road on the Nau property at RM 0.8. This gauge was installed on May 19, 2011 to characterize flows in the lower reach of the Creek. Flows at this location also dry up seasonally following the spring freshet. The station permits measurement of stream flow losses as the Creek traverses the lower glacial terrace. Data are limited for this gauge because it was installed later than the others. Flows at this location dried up the first week of July 2011.

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<sup>1</sup> There is some uncertainty regarding the location of this station. Station 12444400 is listed as “Siwash Cr Trib nr Tonasket Wash.”; however, USGS water resources web site show the drainage area is listed as 0.66 square miles and the listed station coordinates plot far south of Tonasket.

**Staff C** – Located immediately downstream of the falls on the Castelda property at RM 1.4. This gauge was installed on March 24, 2011 to measure flows downstream of the irrigated region between RM 1.4 and RM 3.0 and to establish an upstream control point to measure groundwater losses across the lower terrace. Because bedrock crops out at the surface, flows at Staff C are assumed to capture nearly all water flowing through the Siwash Creek system at this location (i.e., little or no subsurface flow). Data are limited for this gauge to times when the landowner could be contacted for access to the site.

**Staff D** – Located immediately upstream of the County bridge at the Fancher Road crossing. This gauge was installed on April 7, 2011 to measure flows draining Antoine Valley. Station D provides an upstream control point for computing flow differences between the falls and Fancher Road. The gauge was outfitted with a continuous recording datalogger to record changes in stage height and water temperature.

**Staff E** – Located on the south side of Siwash Creek Road on property owned by the Tribe, at the mouth of the canyon at RM 5.4. This gauge was installed on March 24, 2011 to characterize flows entering Antoine Valley from the upper watershed above irrigation diversions. The gauge was outfitted with a continuous recording datalogger to record changes in stage height and water temperature.

**Staff F** – Located on the upstream side of a corrugated metal culvert where the Creek passes beneath a private road on the Holmdahl property at RM 10.5. Staff F is located about 200 feet downstream of the confluence with North Fork Siwash Creek. This gauge was installed on April 7, 2011 to characterize flows to define water available for potential surface water storage in the upper watershed.

**Staff G** – Located on the main channel about 200 feet upstream of the confluence with the North Fork on the Holmdahl property. This gauge was installed on April 7, 2011 to monitor flows from the South and Middle Forks and allow computation of the flow contribution from the North Fork.

Manual flow measurements were regularly taken at staff gauges during the study to characterize flows and establish rating curves. When stage heights were observed to be the same as a previous site visit, stage was recorded and flow measurements were not collected. The number of manual flow measurements at a given station varied between 9 and 20, depending on the installation date of the station and the time flow ended (at Stations A and B).

Stage height and flow data were used to develop rating curves for each staff gauge (Appendix A). Flows were measured using a Swoffer flow velocity meter. Results of stream flow monitoring are shown in Table 1. Figure 3 shows hydrographs for Staff Gauges D and E for the period April 7, 2011 through November 2011. Missing data on the Staff Gauges D and E hydrographs represent times when the datalogger malfunctioned.

### **2.2.2 Stream Flow Hydrographs**

Seasonal stream flow patterns in Siwash Creek are indicative of a snowpack dominated watershed with limited groundwater storage to sustain baseflows. Stream flow measurements (Table 1) indicate flows generally decrease with distance downstream.

The hydrograph at Staff E (Figure 3) shows peak flows during the spring freshet which occurs from approximately May 1 through the first week of July. The magnitude and duration of the 2011 freshet appear to be much greater than normal. Examination of stream flow hydrographs since 2003 for nearby Bonaparte and Tunk Creeks indicate the unusually cool spring and high snow pack of 2011 delayed the freshet by about 4 weeks, with peak flows that were two to three times higher than normal in those basins. Peak measured flow at Staff Gauges E through G occurred on May 26 with the highest flow at Staff F (21.4 cfs). Peak measured flow at Staff Gauges A through D occurred on June 9 with the highest flow at Staff D (7.96 cfs).

Beginning in about mid-July following snow melt runoff from the upper watershed, the available groundwater storage sustains flows until the first fall precipitation events. Average baseflow at Staff D is about 0.5 cfs which is about 0.5 cfs less than the average baseflow at upstream Staff E, although the difference between these stations varies (Figure 3). Baseflows are sufficient to extend flow downstream to near the falls at RM 1.4 (Staff C) where very low -flow conditions were observed in late summer. The presence of trout near Staff D (Entrix and Golder Associates, 2004) and anecdotal information provided by CCT AFD staff indicate that flow is always perennial at Staff D.

Flow in the lower reach of the Creek extended to the Okanogan River only when sufficiently high to overcome losses to groundwater and irrigation, typically during the spring freshet. Beginning in early July, flow ceased below the falls (Table 1, Stations A and B). During the fall, precipitation events generated a flashy runoff pattern attributed to shallow soils and exposed bedrock in the upper watershed. Flow extended downstream of the falls to Staff B beginning in late October, but did not reach Staff A. Anecdotal accounts from local residents indicate the stream used to flow perennially across much of the lower reach below the falls, but perhaps not all the way to the Okanogan River.

Differences in flows between gauging stations are discussed further in the groundwater-surface water section below (see Section 2.5.1).

### **Correlation with Long-term Hydrograph**

Stream flow data observed through the monitoring period at Siwash Creek were correlated with Bonaparte Creek, which is the neighboring basin to the south to synthesize a long-term hydrograph for Siwash Creek. The Bonaparte Creek station is a continuous stream flow monitoring station operated by Washington State Department of Ecology with a period of record that spans from the beginning of water-year 2003 (beginning in October 2002) to the present time.

Available instantaneous flow rates at Siwash Creek obtained from the datalogger at Staff E were plotted against simultaneous, instantaneous rates at Bonaparte Creek on 15-minute increments to develop a linear correlation. The results of that analysis indicate that Siwash Creek flows at Staff E are approximately 33 percent of Bonaparte Creek with a linear regression coefficient ( $R^2$ ) of 0.83 which is within reasonable tolerance.

The correlation was then applied to the 10-year period of record data at Bonaparte Creek to synthesize a yearly hydrograph for Siwash Creek over the same time span. Hydrographs for the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile probability of exceedance were formulated and plotted. These results are shown in Figure 11.

Potential sources of error are inherent in the hydrograph synthesis given the relatively short monitoring period for Siwash Creek. Much of the uncertainty related to this correlation could be resolved through continued monitoring of the Siwash Creek stream flows.

Additional sources of error may exist with this methodology, including potential variance in basin characteristics based upon basin drainage area and timing of peak runoff. Bonaparte Creek is a substantially larger and higher drainage basin with significant surface water storage that is absent in the Siwash basin. The larger drainage area associated with Bonaparte Creek and presence of surface water storage may affect timing of peak flows associated with rainfall events that may lag those observed in the Siwash Creek basin.

### **Water Quality**

Water quality measured in the Creek during this study was limited to temperature recorded by dataloggers at Staff gauges D and E. These data are shown in Figure 4. These data are incomplete for the period covered by this study due to the dataloggers malfunctioning from about mid-May through the end of July for Staff D and late September for Staff E. The record at Staff D captured the most critical period during the summer when freshet flows had receded and air temperatures were warmest. Maximum temperature for the available data was 66 degrees F at Staff D on May 10, 2011. Temperatures during the lowest measured flows in late August and early September at Staff D were less than 60 degrees F.

Water quality parameters measured by the Okanogan Conservation District (OCD) in 2000, as summarized in a report on limiting factors (Entrix and Golder Associates, 2004), are determined to be suitable for salmonid habitat with water temperature reported to be below 64 degrees F. The limiting factors report noted that some water quality parameters above Antoine Valley do not meet requirements for salmonid species but indicated this is likely not a concern for the fish-passable reach below Antoine Valley. When sufficient flows for fish habitat were present, the limiting factors report found the water quality in the fish passable reach to be good.

## **2.3 Geologic Conditions**

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The geologic setting of the Siwash Creek vicinity is characterized by glacially overridden bedrock uplands overlain by unconsolidated sediments in low lying areas, including the Antoine and Okanogan River Valleys. The principal geologic units from a 1:100,000 scale map compilation from Washington Department of Natural Resources are presented in Figure 5. The Okanogan River Valley bottom has an elevation of approximately 900 feet and is comprised primarily of alluvium. Continental glacial deposits form gently sloping terraces on the valley margins to elevations of approximately 1,400 feet. These terraces have been deeply incised by drainages including Siwash Creek. The glacial terraces terminate on the eastern margin of the valley where they abut bedrock uplands including Duffys Mountain to the east. Bedrock outcrops on nearly all of the ridges in the basin, including the 7,200-foot summit of Mount Bonaparte. Continental glacial sediments mantle bedrock depressions between ridges and cover much of the southwest slope of Mount Bonaparte, including the headwater drainages of Siwash Creek.

Alluvium consisting of layered silt, clay, sand, gravel and cobbles was deposited across the Okanogan River floodplain in the period following retreat of the glacial ice sheet, as the river incised underlying glacial deposits. Alluvium in the Siwash Creek bottom is primarily confined to the narrow creek floodplain near the mouth of the Creek (Figure 5). Much of the surface of Antoine Valley is covered by a broad alluvial fan extending from the mouth of the canyon at RM 5.4. Examination of air photos and topography indicate the stream channel has historically migrated across the surface of the alluvial fan depositing over 80 feet of alluvium onto the underlying glacial drift. In the upper watershed above Antoine Valley, the stream channel alternates between incised narrow canyon cut into glacial drift and wider floodplains having braided channels.

Glacial deposits consisting primarily of fine sand, silt, and layers of clay and coarse sand and gravel were deposited by the Okanogan lobe of the Cordilleran continental glacial ice sheet, approximately 10,000 to 12,000 years ago. Following glacial ice retreat, the Okanogan River incised glacial sediments occupying the entire valley, leaving behind remnant glacial terraces along the valley margins and filling a bedrock depression at Antoine Valley. Siwash Creek has incised a straight, steep-walled canyon into the glacial terrace beginning at about RM 1.7. This canyon narrows and deepens with distance downstream to a depth of approximately 150 feet. The Creek emerges from this canyon at about RM 0.3 where it traverses a lower terrace through the City of Tonasket to the confluence with the Okanogan River.

Well log data indicate the depth to the bedrock surface varies in the lower watershed. Glacial drift generally becomes thicker to the west toward the Okanogan River Valley axis. Glacial drift thickness ranges from less than 100 feet near the valley margin to greater than 360 feet toward the valley axis, although variability in this trend is indicated by Well 15D01, where bedrock was identified at a 60-foot depth. Bedrock crops out at the falls where the Creek has deeply incised glacial sediments.

In the upper watershed, bedrock forming the glacially-overridden Mount Bonaparte is primarily mapped as crystalline banded gneiss. In the lower watershed, bedrock forming Duffys Mountain to the north of the Creek is mapped as metamorphosed sedimentary and volcanic rocks and tuffs. These rocks have little or no intrinsic permeability and yield water from secondary fractures. Bedrock is mantled in places by thin glacial deposits primarily concentrated in drainage bottoms and depressions on the bedrock surface. As stated above, depth to bedrock in the lower watershed increases toward the Okanogan River valley bottom.

## 2.4 Hydrostratigraphic Units and Aquifers

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A hydrostratigraphic unit is a geologic unit or collection of geologic units that exhibit similar hydraulic characteristics. Examination of well data obtained from Ecology's well database indicate two principal hydrostratigraphic units in the Siwash Creek vicinity:

- Glacial Drift Aquifer
- Bedrock Aquifer

Well logs in the vicinity of the Creek are contained in Appendix B. Well locations are presented on Figures 6 and 8 with the locational accuracy provided. Cross sections showing groundwater levels and hydrostratigraphic units from well log data are shown for the lower watershed downstream of Staff D at RM 3.0 and for Antoine Valley.

### **Glacial Drift Aquifer**

The glacial drift aquifer represents the most important groundwater resource in the Creek vicinity. This aquifer generally consists of glacial outwash deposits comprised of sand and gravels. Locally, layers of silt and clay form aquitards at varying depths within the glacial drift aquifer. The glacial drift aquifer occurs in three distinct locations: the glacial terrace from about the falls at RM 1.4 (near Staff C) downstream to the Okanogan River, the upper portion of the glacial terrace from about the falls upstream to a point about ½-mile below Antoine Valley (Staff D), and Antoine Valley.

Glacial terrace from the falls downstream to the Okanogan River. Available well log data indicate the aquifer is relatively thick and laterally extensive. Aquifer thickness exceeds 360 feet and water-bearing units are comprised of fine- to coarse-grained sand. Well completion depths range from 64 feet at 16A04 to 358 feet at 15M01. Generally, the glacial aquifer tends to be more productive in closer proximity to the Okanogan River. Well yields are moderate to good ranging from 21 gallons per minute (gpm) at 16A04 to 200 gpm in a 12-inch well at 15A01<sup>2</sup> (Figure 6). One well, 15D01 located about 300 feet north of the Creek, is completed in bedrock present within 60 feet of the surface, suggesting the bedrock surface undulates significantly beneath the glacial terrace.

Upper glacial terrace from the falls upstream to ½-mile below Antoine Valley (approximately RM 1.4 to RM 2.2). Available well log data in this agricultural and large-parcel residential area indicate the aquifer is thin and laterally discontinuous. Few wells are actually completed in the glacial drift and most wells in this area are completed in bedrock with very low to no yield. Where present, aquifer thickness is less than 100 feet and water-bearing units are comprised of sand and gravel. Wells completed in glacial sediments are completed at depths from 60 feet at 14F01 to 94 feet at 14B03 (Figure 6). Yields for these wells are generally low to moderate ranging from 0.5 gpm to 10 gpm. One well (14D02), assumed to be completed in glacial drift at a depth of 58 feet is reported to yield 100 gpm. The glacial drift in this area is recharged by infiltration from Siwash Creek, mountain front recharge, and direct precipitation to the surrounding tributary area.

Antoine Valley. Available well log data in this irrigated agricultural area indicate the aquifer is relatively thick and laterally extensive throughout the valley. Subsurface conditions in Antoine Valley are depicted in the cross section shown on Figure 9. Aquifer thickness exceeds 160 feet based on Well 12A02. Water-bearing units are comprised of sand and gravel occurring between fine-grained layers comprised primarily of clay. The aquifer tends to be thinnest at the valley margins and thickens toward the center of the valley. Well completion depths range from 10 feet at 01P01 to 142 feet at 06P01 with

<sup>2</sup> The well yield on the log for this well is difficult to read (see Appendix B for copy of well log). The 200 gpm should be confirmed through contacting the current owner and testing, if necessary. The location of this well was adjusted from the ¼ , ¼ section location based on hydrogeologic information on the well log and owners name. The well location should be field verified.



most wells completed at depths less than 50 feet. Well yields are typically good, but range from 1.5 gpm at 06P01 to 350 gpm at 01J01. Most well yields are greater than 50 gpm and the higher yielding wells are used for irrigation. Well yields tend to be greater in the middle of the valley. Two wells (12C01 and 12F01) and one dry well (01L01) encountered bedrock near the valley margin (Figure 8). The glacial drift in this area is recharged by Siwash Creek, mountain front recharge, direct precipitation to the surrounding tributary area, and potentially by losses from Antoine Creek (see Section 2.5.2).

Few wells are completed in the glacial drift or alluvium in the upper watershed above Antoine Valley.

### **Bedrock Aquifer**

Crystalline bedrock forms aquifers having limited recharge and groundwater storage throughout the Siwash Creek basin. Most wells above the falls and below Antoine Valley are completed in bedrock at depths from 63 feet to 605 feet and have very limited to no yields (Figure 6). Closer to the river, Well 15D01 is completed in bedrock at a depth of 400 feet and yields 10 gpm; the highest yield for any well in bedrock below Antoine Valley.

Within Antoine Valley, one well completed in bedrock (12F01) yields 30 gpm and another well appears to have encountered bedrock (12C01). Both wells are located in the southern portion of the valley near the valley margin (Figure 8). Depth to bedrock in both wells is less than 50 feet.

Most wells in the upper watershed above Antoine Valley are located in upland areas away from the creek and are completed in bedrock with small yields typically less than 10 gpm.

## **2.5 Groundwater Flow**

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This section presents an evaluation of groundwater surface water interactions, groundwater recharge and discharge, and flow.

### **2.5.1 Surface Water/Groundwater Interactions**

Groundwater and surface water interactions were evaluated to quantify flow losses and gains along the Creek and to determine the quantity of project water required to overcome seepage losses and reconnect the Creek to the Okanogan River.

Stream reaches are generally described as gaining, losing, or neutral. Gaining reaches develop where surface water or groundwater input to the stream increases flows and the groundwater level is higher than the surface water level (positive hydraulic gradient). Losing reaches develop where surface water in the stream infiltrates through the streambed to recharge groundwater. In losing reaches, the surface water level is higher than groundwater level (negative hydraulic gradient). A losing condition may be naturally occurring or induced by pumping. An unsaturated zone may exist between the groundwater and surface water indicating a stream that is disconnected from the groundwater system (Winter et al., 1998). Under a detached condition, a stream loses to groundwater, however, seepage from the streambed is not controlled by depth to

groundwater. Thus, pumping from a well adjacent to a detached stream would not increase seepage losses.

The interaction of surface water and groundwater was investigated through the use of seepage runs (measuring stream flow in the upstream and downstream reach of the Creek and computing the relative difference in flow). Typical measurement error associated with a manual flow measurement using a velocity meter has been estimated at 5% (Rantz, et al., 1982); therefore, differences in flow between two stations are within the measurement error, if the difference is less than 10% of the two flow measurements. Differences between flow at upstream and downstream stations results not only from gains/losses to groundwater, but also may include surface water withdrawals and return flows.

Losses from the Creek to groundwater in the lower reach below the falls contribute to the Creek going dry for most of the year. The losing characteristic of the lower Creek reach is similar to many tributaries to the Okanogan River. These creeks experience their greatest losses to groundwater in the lower most reaches where they traverse glacial and alluvial deposits that coarsen toward the river (Sumioka and Dinicola, 2009). Such stream flow losses have been observed at Antoine and Tonasket Creeks, where low or no flow conditions occur near their confluence with the Okanogan River. Siwash Creek presents characteristics similar to these tributaries, including an upper watershed dominated by exposed bedrock and shallow soils having limited groundwater storage capacity and a lower reach that traverses coarse deposits where losses to groundwater are accelerated.

### 2.5.1.1 Seepage Runs

Results of the surface water/groundwater characterization from seepage runs are summarized in Table 1 and discussed below.

Seepage rates were estimated between gauging stations using data from seepage runs. The difference in discharge between two adjacent stations was compared and divided by the distance between the stations to compute a seepage rate. When estimating seepage rates, efforts were made to account for the effects of irrigation withdrawals by evaluating seepage losses during irrigation and non-irrigation seasons and by estimating irrigation withdrawals within each reach.

#### **Staff B to Staff A – Lower Reach from the Nau Property to the railroad trestle**

**Summary: Flow is intermittent along this reach with flow drying up at the end of freshet. The reach is losing when flowing and losses are attributed to seepage to groundwater. Average seepage losses of 1.03 cfs were estimated for this reach.**

Seepage runs indicate this reach displays strongly losing characteristics with stream flows at both gauges rapidly diminishing to a no-flow condition at the end of the freshet (early July). Flow resumed to Staff B in the fall, after irrigation season stopped, but did not extend downstream to Staff A. Losses generally tend to increase with increased stream flow, although the greatest loss did not coincide with the peak of the freshet, but rather occurred during the early part of the freshet (peak loss of 2.20 cfs occurred on May 24 compared to loss of 0.91 during peak measured flow on June 9) (Table 1). No known surface water irrigation diversions are present in the Creek along this reach and losses are attributed to seepage to groundwater.

Several groundwater points of withdrawal are mapped in Ecology's WRATS database near the mouth of the creek in close proximity to the Okanogan River, minimizing the potential for groundwater withdrawals to impact Siwash Creek flows. The Culver right is mapped further upstream and the point of withdrawal for this right should be located to evaluate potential effects on stream flow (see Section 3.1.1).

The seepage rate between Staff B and Staff A was estimated from the average loss of 0.74 cfs along 0.72 miles between the gauges at 1.03 cfs per mile of stream length.

#### **Staff C to Staff B – Lower Reach from the falls at RM 1.4 to the Nau property**

**Summary – This reach is predominantly losing. The lower portion of the reach is intermittent and dries up at end of freshet. Losses are attributed to seepage to groundwater. Average seepage loss of 1.17 cfs per mile is estimated for this reach.**

Seepage runs indicate this reach displays predominantly losing characteristics. Four seepage runs were made, two during the freshet and two in the fall after the irrigation season. Three of four seepage runs indicated a losing condition. Peak loss of 1.85 cfs occurred during high flows on June 9, 2011, and is attributed to seepage to groundwater and bank storage. Groundwater seepage is the likely mechanism of loss during the lower fall flows. The fourth seepage run, during the freshet, was within measurement error and indicated a near neutral condition, potentially related to releases from bank storage.

No surface water irrigation diversions are present in the Creek between Staffs C and B. One groundwater point of withdrawal appears to be mapped in Ecology's WRATS database in this reach and may be associated with Well 15A01, which appears to be an irrigation well. This and several domestic wells are located within 200-300 feet of the Creek. The location of these wells in close proximity to the Creek suggest the potential for hydraulic continuity, and this potential should be evaluated for any irrigation wells.

The seepage rate between Staff C and Staff B was estimated from the average loss of 0.77 cfs along 0.66 miles between the gauges to be 1.17 cfs per mile of stream length.

#### **Staff D to Staff C – Irrigated Area between Antoine Valley and the falls at RM 1.4**

**Summary – This reach loses during irrigation season and is slightly gaining during non-irrigation season. Losses are attributed to irrigation diversions.**

Seepage runs indicate this reach displays losing characteristics during irrigation season. A total of 15 seepage runs were made between these stations. Of the 10 measurements made during irrigation season, 7 measurements indicate losses and 3 lie within measurement error. Measurements taken during non-irrigation season indicate a neutral to gaining reach, with 2 seepage runs showing a gain, one showing a loss, and 2 that lie within measurement error. The one measurement showing a measureable loss was taken on April 27 when some irrigation may have already begun. Otherwise, the contrast in losing conditions during irrigation season and gaining conditions during non-irrigation season is consistent and suggests losses are predominantly related to irrigation withdrawals. This region is irrigated using surface water diverted from Siwash Creek.

During irrigation season, including the April 27 measurement, seepage runs show an average loss of 0.48 cfs. Gains during non-irrigation season average 0.10 cfs and are

attributed to direct precipitation to the tributary area along the 1.67 miles of this reach, mountain front recharge, and groundwater inflow from Antoine Valley occurring immediately downstream of Staff D. In the absence of irrigation diversions, this reach is likely neutral to slightly gaining.

#### **Staff E to Staff D – Antoine Valley**

**Summary – This reach is predominantly losing. Continuous flow through Antoine Valley occurred for about 1 week during the 2011 freshet. Losses are attributed to irrigation diversions and seepage to groundwater depleted during irrigation season.**

Seepage runs indicate this reach is predominantly losing. This reach traverses Antoine Valley and surface water flows diminish as water infiltrates to the subsurface. Flows re-emerge to the surface in a series of large springs upstream of Staff D. The valley floor is irrigated using water from the Siwash Creek system. Locations of surface water points of diversion and groundwater points of withdrawal are shown in Figure 10.

A total of 19 seepage runs were made along this reach. Few measurements were made prior to the onset of irrigation season, but the two available measurements indicate a neutral condition suggesting the aquifer was near fully recharged when these measurements were taken in April. Peak loss of 7.09 cfs occurred on May 26 during high freshet flows. This loss is primarily attributed to recharge of groundwater storage and irrigation withdrawals. A water balance performed along this reach presented in Section 2.5.2 indicates non-irrigation season seepage losses recharge groundwater storage which is important for meeting the irrigation demand.

Stream flow losses during the irrigation season averaged 1.69 cfs and during the non-irrigation season averaged 0.60 cfs (Table 1). The losses are attributed to a combination of seepage to groundwater and irrigation diversions. Seasonal aquifer depletion induced by groundwater withdrawals likely induces seepage loss to groundwater.

#### **Staff F to Staff E – Upper watershed above Antoine Valley**

**Summary – This reach is predominantly neutral to slightly gaining. Gains are attributed predominantly to surface inflows. Minor losses are attributed to phreatophyte uptake occurring in late summer-fall.**

A total of 21 seepage runs along this reach indicate the following conditions:

- During the freshet, conditions were predominantly neutral, but a large loss was noted during the peak flow, presumably the result of localized flooding increasing bank storage and/or potentially a significant flood crest that was measured at Staff F but had not yet reached Staff E.
- From summer through early fall, conditions are also near neutral, but a small, consistent loss was computed likely in response to water uptake by phreatophytes. Rates of loss to groundwater and/or uptake by vegetation along the 5.11 miles between Staff F and Staff E were estimated to be 0.03 cfs per mile of stream length from measurements taken August 19 through October 2).
- Late October to November, the reach is gaining, with gains attributed to inflows from ephemeral surface drainages and potentially groundwater inflow.

### **Staff G to Staff F – Upper watershed above to the confluence with North Fork Siwash Creek**

#### **Summary – North Fork Siwash Creek inflow averaged 0.89 cfs.**

Differences in flows between Staff G and Staff F are indicative of the surface water contributions from the North Fork. Because these gauges are located within several hundred feet of each other, surface water/groundwater interactions are likely very small compared to the volume of water input from the North Fork. Flow from the North Fork averaged 0.89 cfs and peak contribution from this tributary was 7.36 cfs on May 26, 2011.

## **2.5.2 Recharge and Discharge**

### ***Water Balance for Irrigation and Non-Irrigation Seasons***

#### **Antoine Valley**

Irrigation withdrawals in Antoine Valley were estimated through an irrigation demand analysis on the irrigated land in Antoine Valley (excluding land irrigated from non-Siwash creek sources). Seepage runs between Staff E and Staff D were analyzed and compared to irrigation withdrawals to evaluate the basin water balance and potential sources of error.

The irrigation demand analysis was performed using Washington Irrigation Guide (WIG) methodology (NRCS, 1997). A representative location (Omak) and crop type (pasture/turf) were selected from Appendix A of the WIG to perform the analysis. Data from air photos, discussions with local farmers and review of WWT 2011 were used to determine the applicable areas (440 acres) which are irrigated mostly by wheel-line methods (some flood irrigation also occurs). Using this approach, irrigation demand (assumed to be equal to irrigation withdrawal) averaged 3.41 cfs through the irrigation season with peak demand of 5.76 cfs occurring in July.

A component of the irrigation withdrawals returns to the aquifer due to irrigation inefficiencies. A return flow factor of 15-percent for wheel line methods was utilized in the WIG analysis to estimate system losses through consumptive use based on Washington Department of Ecology's Guidance for Determining Irrigation Efficiency and Consumptive Use (Ecology, 2005). Applying the return flow factor indicates an average consumptive irrigation demand of 2.90 cfs.

A water balance along this reach using stream flow loss data from Table 1 was developed for comparison to irrigation withdrawals. Irrigation withdrawals between Staffs D and E occur through a combination of wells and surface diversions (Figure 10). The estimated consumptive irrigation withdrawals of 2.9 cfs is significantly greater than the average 1.7 cfs irrigation season loss measured between Staffs E and D. Non-irrigation season seepage losses averaged 0.6 cfs and partially offset the irrigation season seepage deficit, but are insufficient to account for the full irrigation withdrawal. Consumptive 2011 annual irrigation withdrawals totaled an estimated 877 acre-feet, while annual seepage losses were estimated at about 770 acre-feet. The similarity of these estimates (recharge is 87% of withdrawals) suggests irrigation demand is largely met by annual seepage losses from Siwash Creek. Additional sources of recharge including direct precipitation

and mountain front recharge likely contribute to Antoine Valley aquifers. Potential uncertainties in water use estimates and irrigation efficiency could contribute to the discrepancy.

#### Below Antoine Valley

A similar approach was used to estimate irrigation withdrawals in the irrigated area between Antoine Valley and the falls at RM 1.4. The Schaller water right (a surface water right) is the primary water right in this reach (Figure 10) and irrigates an estimated 83 acres (WWT, 2011) with an estimated irrigation season withdrawal of 0.68 cfs (206 acre-feet) with peak demand of 1.17 cfs occurring in July. Allowing for a 15% irrigation return flow for wheel line methods (Ecology, 2005), the average consumptive irrigation use is estimated at 0.58 cfs (175 acre-feet).

In comparison, losses from seepage run data for the irrigation season in the irrigated area between Antoine Valley and the falls at RM 1.4 average 0.48 cfs (143 acre-feet) (Table 1) is within 20% of the estimated consumptive irrigation use. The similarity of these estimates indicates that the estimated irrigation demand is largely met by direct surface water diversions. The difference is attributed to the 0.1 cfs gain along this reach (measured during the non-irrigation season).

### **Recharge, Discharge and Groundwater Flow Directions**

Recharge to the glacial drift aquifer occurs via stream flow losses and direct precipitation/mountain front recharge. In the lowermost portion of the watershed near the Okanogan River (i.e., near Staff A), the glacial drift aquifer is in hydraulic continuity with the greater Okanogan Valley aquifer. Groundwater flow directions in the aquifer near the river are likely subparallel to the south flowing river. Groundwater elevation data suggest the glacial drift aquifer discharges into the Okanogan River which likely comprises a natural, regional discharge zone. Water levels in wells near the mouth of Siwash Creek including wells 09R01, 16A01 and 16A04 indicate groundwater elevations are up to 20 feet above the Creek, however, no evidence of groundwater seeps into the Creek were observed. This could be explained by error in estimating wellhead elevations from USGS mapping, water level measurement error, and/ or by the presence of a confining layer.

Further to the east, the glacial drift aquifer is recharged primarily from the east by surface water running off the western slopes, including Duffys Mountain. Other sources of recharge to the glacial drift aquifer include direct precipitation recharge on the glacial terrace, losing reaches of the Creek and potentially upwelling from the bedrock aquifer.

Groundwater elevations from wells completed in glacial drift aquifer indicate the general direction of groundwater flow is to the west, toward the Okanogan River (Figure 7). Hydraulic head in the glacial drift aquifer below the falls (Staff C to the Okanogan River) declines from well 15A01 toward the river. In the reach below the falls, two wells (15M01 and 15L01) located about a half-mile south of Staff B have groundwater levels 20 feet to 40 feet below the Creek. This suggests a gradient away from the Creek consistent with the large seepage losses in this reach.

In the glacial aquifer upstream between Staffs C and D, groundwater in glacial drift overlies and is perched on bedrock and, therefore, water level elevations are substantially higher than in wells completed in glacial drift below the falls (Figure 7).

A groundwater elevation contour map within Antoine Valley (Figure 8) was developed using a combination of existing and field measured data. In developing the map, many of the wells in Antoine Valley were field located using GPS and water levels were collected where access was available. For others, water levels from well logs were used. Wellhead elevations were estimated from USGS digital elevation model (DEM).

In addition, to the groundwater elevation data, interpretation of groundwater flow relied on measured gains/losses on Siwash Creek and anecdotal accounts of stream flow in Antoine Creek. Discussions with the landowner at Antoine Valley Ranch indicate Antoine Creek stream flows diminish with distance as the creek flows across the valley. During summer, flows typically dry up in the reach where Antoine Creek flows across the valley. Flows resume at the western (downstream) end of the valley where a series of large springs feeds water from both sides of the channel.

Flows measured by USGS (Sumioka and Dinicola, 2009) just above where Antoine Creek enters Antoine Valley display losing conditions compared to flows measured at another gauging station located less than 1 mile upstream. Although much of the decrease in flow in Antoine Creek can be attributed to the irrigation diversion for Antoine Valley Ranch (water that is applied to irrigated lands within Antoine Valley), it is likely some water infiltrates into the glacial sediments, consistent with the anecdotal accounts of the Antoine Creek drying up as it flows across Antoine Valley. The water lost from Antoine Creek appears to mostly return to the Creek in springs at the downstream valley end. Flow measurements collected by USGS in Antoine Creek near the confluence with the Okanogan River indicated a net gain of 0.1 and 0.2 cfs during June and September 2008, respectively indicating most Antoine Creek losses return to the creek and additional inputs occur that offset the irrigation losses.

Groundwater elevation contours (Figure 8), Siwash Creek gaging (Table 1), anecdotal information and USGS gauging data on Antoine Creek suggest the following groundwater flow patterns in Antoine Valley:

- Groundwater in the southern half of the valley generally moves in a southwesterly direction converging on Staff D.
- Glacial drift in Antoine Valley is recharged primarily from Siwash Creek as surface water from the creek infiltrates to the subsurface. Other important sources of recharge likely include direct precipitation to the valley floor and runoff from tributary regions surrounding the valley. Substantial irrigation withdrawals in the valley (see discussion above) likely temporarily deplete groundwater storage during the irrigation season that is recharged throughout the year from seepage losses.
- Stream flow losses from Siwash Creek occur in the upper mile and a quarter where it crosses the valley. Groundwater outflow from the valley is restricted by a narrow bedrock outlet just downstream of Staff D. Shallow groundwater in the glacial drift aquifer in Antoine Valley discharges to Siwash Creek through a series of springs upstream of Staff D. The bedrock restriction also results in groundwater flow converging on Siwash Creek in the approximately lower mile of Antoine Valley.

- The relationship of groundwater flow between Antoine Creek and Siwash Creek is uncertain. Losses from the upper portion of Antoine Creek within the valley could potentially flow southwesterly toward Siwash Creek. Antoine Creek is reportedly losing within the valley and elevation at the discharge point of the Creek into the valley is about 50 feet higher elevation than Siwash Creek. However, USGS gauging data indicates that most Antoine Creek losses return to Antoine Creek. Numerous springs were observed where Antoine Creek exits Antoine Valley. A groundwater divide must be present in the westerly part of the valley that separates the Antoine and Siwash Creek springs. The location of this divide is uncertain due to sparse well data in this area. The location of the groundwater divide and its seasonal variation is important in defining groundwater exchange between these adjacent creeks.

Bedrock underlies glacial drift at a depth of more than 360 feet in the lower watershed. Within Antoine Valley at least 160 feet of glacial drift overlies bedrock (Wells 12A02 and 12A03). Bedrock rises to ground surface on the adjoining uplands east and west of the valley and downstream of Staff D. Recharge to the bedrock aquifer is likely dominated by spring snow melt concentrated along fractures where bedrock outcrops. Lesser amounts of recharge occur from fall precipitation. Groundwater flow direction in the bedrock is likely generally toward the Okanogan River in the lower watershed where it discharges into the Okanogan River and toward local drainage bottoms in the upper watershed. Hydraulic head in the bedrock appears higher than in the glacial drift in the lower watershed, for example, Well 15D01 shows groundwater levels 70 feet higher than nearby wells completed in glacial drift. In Antoine Valley, hydraulic head in a well completed in bedrock (12F01) is the same as adjacent wells completed in glacial drift.

### **Groundwater Exchange with Antoine Creek**

As stated above, the potential for groundwater exchanges between Siwash and Antoine Creeks is unknown. Both Creeks exhibit losing conditions along their upper reaches in Antoine Valley and gaining conditions near the downstream valley constriction where springs upwell. The existing groundwater level data is insufficient to define the potential for exchange between these basins. The nature of the groundwater level changes is likely dynamic and transient in response to irrigation withdrawals. Further definition of groundwater elevations is recommended to define the exchange including monitoring of water levels during irrigation and non-irrigation season. Definition of the relationship between Siwash and Antoine Creeks is important to understand the benefit of any flow augmentation alternative to Siwash Creek.

## **2.6 Flow Augmentation Targets**

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Enhancing stream flow in the fish passable reach below the falls at RM 1.4 requires identifying a source of water capable of sustaining post-freshet flows and having water quality suitable for salmonid rearing. Flows in this reach ceased with the end of the freshet in early July and resumed partway below the falls to Staff B after the end of irrigation season in 2011. The 2011 spring freshet was later and larger than normal. Flow data from other water years are not available for the fish passable reach. Therefore, the stream flow augmentation targets are presented below for 2011 conditions, and with a safety factor provided as a buffer for periods of lower flow.



Flow augmentation targets were developed for Staffs C and D (Table 2). Although flow augmentation could occur at points between these stations, they provide convenient reference for discussing target flows. Target flows are based on losses (seepage and diversions) between Staff C or D and Staff A, habitat flow requirements, and a safety factor, as discussed below.

### **Seepage and Irrigation Diversion Losses**

For the non-irrigation season, losses between Staffs D and A were estimated at 1.3 cfs based on the April 7, 2011 seepage run (Table 1). During the irrigation season, losses to seepage and stream flow were estimated at 2.0 cfs based on mean and median values. The difference between the irrigation (2 cfs) and non-irrigation (1.3 cfs) season target flows largely results from the 0.58 cfs consumptive use of the Schaller Right, located downstream of Staff D.

Measured losses from Staff C to A were biased by measurements taken during the freshet and these losses were not considered representative of average conditions. For this reason, Staff C to A losses were estimated by adjusting Staff D flows as follows:

- During irrigation season: Staff D flow was decreased by 0.5 cfs to account for Schaller irrigation withdrawals between Staffs D and C. The estimated irrigation season seepage loss from Staff C to A is, therefore, 1.5 cfs (Table 2).
- During non-irrigation season: Staff D flow was increased to account for average gains of 0.1 cfs between Staffs D and C. The non-irrigation seasons estimated loss from Staff C to A is, therefore, 1.2 cfs (Table 2).

### **Habitat Flows**

- The minimum flow to sustain rearing for targeted species is 0.3 cfs according to CCT AFD biologist opinion. The 0.3 cfs flow is not considered optimal and a higher flow of 1 cfs was also used as a target habitat flow. The target habitat flows were applied at the mouth of the Creek.

### **Safety Factor**

- A 50% safety factor was added to the 2011 flow augmentation to allow for reduced instream flow during drier years and to provide a buffer for uncertainty associated with the relatively short monitoring period of this study. Monitoring could be continued to determine augmentation needs based on measured values, rather than using an assumed safety factor to estimate flow augmentation requirements during drier years.

To achieve a habitat flow of 0.3 cfs at the creek mouth in 2011 would have required Staff D flow augmentation of 1.1 cfs and 1.8 cfs for the non-irrigation and irrigation seasons, respectively (Table 2). During drier years, this flow augmentation requirement is expected to increase to 1.7 (non-irrigation season) and 2.6 cfs (irrigation season), based on an assumed safety factor of 50%. Because of the uncertainty in the safety factor, planning should allow for adaptive management to the flow augmentation alternative. The synthesized hydrograph at Staff E (Figure 11) indicates dry year flows (90<sup>th</sup> percentile exceedance) will be substantially diminished from those observed in 2011. The higher demand for flow augmentation water during dry years may be partially offset by

reduced seepage losses if mounding develops beneath the streambed in response to year round flow along reaches which are currently dry. Total annual flow augmentation at Staff D to meet the 0.3 cfs habitat objective is about 1,500 acre-feet (Table 2).

At Staff C, flow augmentation targets inclusive of the safety factor are 1.3 and 2.6 cfs for the non-irrigation and irrigation seasons, respectively (Table 2). Total annual flow augmentation at Staff C to meet the 1 cfs habitat objective is about 1,400 acre-feet (Table 2).

Estimated flow augmentation quantities to achieve a habitat flow of 1 cfs at the creek mouth is presented in Table 3. The augmentation quantity at Staff D is estimated at 3.7 cfs for the irrigation season and 2.7 cfs for the non-irrigation season to achieve a 1 cfs habitat flow at Staff A. Total annual augmentation quantity at Staff D is estimated at about 2,300 acre-feet.

### 3 Stream Flow Augmentation Alternatives

Several alternatives were examined for enhancing flows in the fish passable reach below the falls at RM 1.4. These alternatives are discussed below and summarized in Table 4.

#### 3.1 Alternative 1 - Conversion of Water Rights for Instream Flow Purposes

One or more alternatives involving conversion of an existing water right for instream flow benefit could be implemented to meet flow targets in the fish passable reach.

##### 3.1.1 Water Rights Summary (from WWT report)

The Siwash Creek water rights summary report (WWT, 2011) evaluated potential water right acquisitions by prioritizing rights primarily on the basis of their validity. A summary of these water rights is shown in Table 3. While the WWT report examined the “paper” validity of these rights, it did not address potential flow benefits beyond reporting authorized instantaneous or annual quantities where this information was available. The WWT report prioritized water rights into 5 Tiers and reported instantaneous quantities for most water rights. Rights in Tiers 1 and 2 are considered to be high priority for potential acquisition based on their validity and size. Tier 1 includes the Holmdahl, Antoine Valley Ranch and IGO Ranch Rights. Tier 2 includes the Culver and Laurie Rights. Tier 3 and higher are considered to have potential issues with acquisition feasibility based validity, location or other obstacles.

**Table 4 - Summary of Water Rights Evaluated in the Siwash Basin Water Rights Review (WWT, 2011)**

Water Right	Type	Qi (cfs)	Qa (AF)
Holmdahl - Tier 1	Surface Water	Not Reported	Not Reported
	Groundwater	3.89	720
Antoine Valley Ranch - Tier 1	Surface Water	Not Reported	Not Reported
	Groundwater	1.34	240
IGO Ranch - Tier 1	Surface Water	Not Reported	Not Reported
	Groundwater	0.79	200
Culver - Tier 2	Groundwater	1.11	320
Laurie - Tier 2	Groundwater	0.22	33
Gardinier - Tier 3	Groundwater	0.67	78
Schaller- Tier 3	Surface Water	Not Reported	Not Reported

### 3.1.2 ***Benefit from Conversion of Water Rights to Instream Flows***

Using an existing water right could benefit instream flows by either retiring the water right by placing it in trust, for example, or by converting a surface water point of diversion to a groundwater point of withdrawal. The location in the basin of a given water right will influence its effect on stream flows.

#### **1A. Retire Water Right(s) in Antoine Valley**

Retiring an irrigation surface or groundwater right in Antoine Valley would benefit flows; however, the benefit would likely be diffused over the year and would not necessarily occur during the right's former irrigation season period of use. Except during the highest freshet flows, Creek flows entering Antoine Valley infiltrate to groundwater and flow to a discharge point near Staff D. The AVR, Homdahl, and IGO surface diversions are all located at the upstream end of the valley. Flow returned to the stream by retiring a water right would infiltrate and flow with groundwater before discharging into Siwash Creek near Staff D. Essentially, the full quantity of the water right would eventually daylight as stream flow, assuming no flow is lost to Antoine Creek. The surface water diversion points are about a mile from Staff D and the timing of the discharge at Staff D would likely be spread out over several months. This may have a beneficial effect by discharging the conserved water over a longer time period than the irrigation season. In addition it may lead to warmer winter flows that minimize anchor ice.

Retiring a groundwater right in Antoine Valley would be similar to retiring a surface water right because most surface water infiltrates the valley floor and experiences short travel time through the permeable aquifer media to the shallow groundwater table. Shallow monitoring well(s) would be required to further evaluate the interaction between Siwash and Antoine Creeks to confirm water would not be lost to Antoine Creek.

An annual quantity of about 1,500 acre-feet would be required for flow augmentation at Staff D and about 1,400 acre-feet would be required at Staff C (Table 2). By comparison, water rights listed in Table 3 total about 1,160 acre-feet for Antoine Valley and 1,600 acre-feet for all rights listed. It is important to note that the annual quantities shown in Table 3 and summarized in the WWT (2011) report do not include surface water rights.

There is uncertainty in the timing of discharge at Staff D from the retirement of an Antoine Valley water right as discussed above. In addition, there is uncertainty regarding flow augmentation requirements over water years varying from the 2011 monitoring period. A groundwater model could be used to evaluate the timing of flow benefits near Staff D resulting from retirement of a water right and to identify changes in magnitude of flow augmentation through multi-year climate cycles.

#### **Actions required to implement Alternative 1A include:**

- Install one or more shallow monitoring wells to evaluate the potential for groundwater flow between Antoine and Siwash Creeks.
- Engage water right holders in discussion regarding acquisition of right.
- Construct a transient groundwater model to evaluate the timing and magnitude of the retired right on stream flow augmentation.

- Additional data needs to support the model include estimating stream flow losses and irrigation diversions along Antoine Creek within Antoine Valley.

### **1B. Retire Water Right in Antoine Valley and Pipe Water to Staff D**

As an alternative to allowing a retired surface water right to infiltrate, the water could be piped from the diversion point to the approximate location of Staff D. Piping would mitigate infiltration losses and allow control over the timing of discharge. Flows would likely be increased on a one-to-one basis. To provide flow on a year round basis, this alternative would have to be coupled with a change in period of use and purpose/place of use for an existing water right. A change to the period of use, instantaneous quantity and purpose/place of use for an existing water right will require a demonstration that downstream water rights will not be impaired.

#### **Actions required to implement Alternative 1B include:**

- Engage water right holders in discussion regarding acquisition of right.
- Evaluate potential for easements and piping costs.

### **1C. Retire Schaller Right**

The Schaller Right is a surface water right shared among three landowners in the reach between Staff D and Staff C. This right has been identified as Tier 3 by WWT and therefore considered less feasible for acquisition. However, placing water from the Schaller Right to instream flow would have a direct, one-to-one impact on stream flows at Staff C. The WWT report does not identify a Qi for the Schaller Right, but does indicate an estimated 83 acres are irrigated using the right. An analysis assuming 83 acres are irrigated under the Schaller Right indicates average irrigation withdrawal is 0.68 cfs (0.58 cfs estimated consumptive use, see Section 2.5.2). This flow falls well short of the 2.6 cfs of supplemental water required at Staff C to create 0.3 cfs habitat flow at the creek mouth during the irrigation season. Retirement of the entire Schaller Right would have extended flow of 0.3 cfs to an estimated 1,400 feet below the falls for 2011 conditions and drying up about 2,800 feet below the falls.

#### **Actions required to implement Alternative 1C include:**

- Examine validity and quantity of right.
- Engage water right holders in discussions regarding acquisition of right.
- Consider temporary fallowing of fields irrigated by this right to observe flow benefits.

### **1D. Retire Rights Downstream of Falls**

Two groundwater rights were identified downstream of the falls by WWT (2011). The Culver and Gardinier Rights have Qi of 1.11 and 0.67 cfs, respectively. Specific locations of the points of withdrawal for these rights are unknown. Information available from Ecology's Water Resources Explorer website indicates the Culver Right may be located too far from the Creek to have significant continuity (in the southwest corner of Section 15). The Gardinier Right may have a point of withdrawal near the Creek, but is classified by WWT (2011) as Tier 3 and therefore, may have potential issues impeding its acquisition. Additional information is needed to verify whether these rights are in

hydraulic continuity with the Creek and whether acquisition and retirement of these right(s) could provide significant flow augmentation benefit.

**Actions required to implement Alternative 1D include:**

- Identify points of withdrawal for these rights.
- Assess hydraulic continuity.
- Assess feasibility of acquiring these rights.

## 3.2 Alternative 2 - Convert Surface Water Diversion to Groundwater

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An alternative to acquiring a water right for retirement is to convert a surface water point of diversion to a groundwater point of withdrawal taking advantage of lag time and groundwater storage to lessen the impact on stream flows. Because surface and groundwater are in close continuity in Antoine Valley, this approach is not anticipated to benefit flows if implemented in Antoine Valley.

### ***2A – Convert Schaller Diversion to Groundwater***

The reach between Staff D and Staff C presents a more feasible location for conversion from surface water to groundwater because water that is not withdrawn from the Creek provides a direct benefit to stream flow. This alternative would involve converting the point of diversion for one or more landowners using the Schaller Right. Because it is a surface water right and because of its location in the watershed (below Antoine Valley), the Schaller Right is the only water right in the Siwash Creek basin that could be converted to groundwater with a potential instream flow benefit. A well would need to be constructed that is capable of meeting the irrigation demand currently met by the surface water diversion (estimated at 0.68 cfs or about 300 gpm). Well log data used to develop a cross section of the aquifer along this reach indicate the glacial drift aquifer is thin and laterally discontinuous. Most wells are completed in bedrock and the few completed in glacial drift yield only up to 10 gpm. One well (14D02) is apparently owned by one of the Schaller Right holders (Olson) yields 100 gpm. Additional hydrogeologic study is required to better understand the groundwater conditions along this reach to examine whether a surface water diversion could be economically converted to groundwater.

As stated above, flow augmentation equal to the entire Schaller Right would have extended flow of 0.3 cfs up to 1,400 feet below the falls for 2011 conditions. Flows increasing after irrigation season and the onset of fall precipitation would extend habitat flow farther downstream.

Advantages of this approach include eliminating the need to take agricultural land out of production. Disadvantages include uncertainty whether the aquifer in the reach between Staff D and Staff C is capable of yielding water in sufficient quantities to meet irrigation demands, uncertainty with respect to the validity of the Schaller Right that is classified as Tier 3 by WWT, and the relatively small instantaneous quantity associated with the Schaller Right that will provide a limited benefit to flow downstream of the falls. Coordination likely involving more than one water right holder is also a disadvantage.

**Actions required to implement this alternative include:**

- *Perform hydrogeological feasibility study.* Resolving uncertainty regarding the groundwater resources in the reach between Staff D and Staff C will require additional hydrogeological study including field verification and survey of existing wells, water level measurements, revised cross sections based on new data and hydraulic testing of one or more existing wells to quantify aquifer properties. If results were favorable, a test well would be drilled that could be converted to a production well.
- *Submit water right change application.* A water right change application for a new point of withdrawal would need to be submitted to Department of Ecology and processed through its cost reimbursement program or through the Okanogan Conservancy Board. The change application process will require verification of the validity of the water right, a hydrogeological study establishing resource availability, and continuity with the creek and an impairment analysis. Much of this would be accomplished while performing the hydrogeological feasibility study.
- *Construct Production Well.* Perform well, screen and pump design. Contract with a driller to drill and develop a production well. Costs can be reduced by converting a successful test well.

### 3.3 Alternative 3 - Groundwater Sourced Flow Augmentation

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Using groundwater to augment stream flow involves pumping cool groundwater to the Creek from an existing or new well. Groundwater pumped from a well would ideally be discharged into the creek below the falls at RM 1.4. Alternatives involving groundwater pumped from wells require a water right permit that is assumed to be attainable under the Hillis Rule. Under Hillis Rule, Washington Administrative Code (WAC) 173-152-050(3b), if the water right application is for a proposed water use that is nonconsumptive or with mitigation would be water budget neutral and, if approved would substantially enhance or protect the quality of the natural environment, then it qualifies for expedited processing.

#### ***Alternative 3A – Groundwater Sourced Flow Augmentation in Lower Watershed***

An alternative using groundwater pumped from a well to augment stream flows could be used as a stand-alone means or as a supplement to another flow augmentation alternative. This alternative could be implemented in the lower reach of the Creek below the falls where there is greater opportunity to be in hydraulic continuity with the mainstem. A new or existing well located adjacent to the creek downstream of the falls could be pumped as a stop-gap to sustain flows from the time when flows dry up until they resume to Staff B a period of approximately 120 days (early July through late October). This alternative is limited to the reach below the falls because groundwater upstream in Antoine Valley is in close hydraulic continuity with the Creek and groundwater resources are likely limited in the reach between Staff D and Staff C.

### 3.3.1 Aquifer Yield

A pumping well should be located approximately 2,000 downstream of the falls to minimize the potential for encountering shallow bedrock. This location is near existing Well 15A01 that well log data indicates is a 12-inch well yielding 200 gpm. The well location and yield should be confirmed (see footnote 2). The well log lacks descriptions of lithology except that the material is coarse. The well is relatively shallow at 82 feet with a static water level depth reported on the log of 27 feet. As with nearly every well in the lower reach of the creek, well test information recorded at time of drilling does not include the amount of drawdown observed. Therefore, values for specific capacity cannot be determined from wells nearest the Creek. In the absence of more information, the assumed yield for a new or existing well located about 2,000 feet downstream of the falls is up to 200 gpm. Several other wells may be present near the creek and in the creek bottom.

### 3.3.2 Benefit from Groundwater Source Flow Augmentation

To use groundwater pumping as a standalone means of augmenting stream flows, a well located 2,000 feet downstream of the falls would need to yield about 2.2 cfs (990 gpm) during irrigation season and 1.1 cfs (490 gpm) during non-irrigation season to extend flow to the Okanogan River. These rates were determined by reducing Staff C flow augmentation target for seepage along the 2,000 feet reach below Staff C (1.1 cfs/mile seepage over 2,000 feet). Using the same assumptions, a well yielding 0.45 cfs (200 gpm) would extend flow about 2,100 feet downstream, nearly to Staff B during the irrigation season. Stream flow could be extended farther downstream if groundwater pumping were used in conjunction with another alternative, for example retiring a water right above the falls.

A key advantage to the groundwater pumping alternative is providing a water source in the fish passable reach. The proximity of source water to the intended discharge reach reduces losses to groundwater and the potential that flow augmentation will be consumed by irrigation demands and phreatic riparian vegetation. Other alternatives that source water from upstream locations are subject to these demands. Another advantage is that groundwater pumping could be used to supplement another flow augmentation alternative. Disadvantages include limited available hydrogeologic information for the region nearest the Creek and potential interference with existing wells. It is not clear whether the aquifer would support a pumping well with yields capable of overcoming seepage losses to provide substantial habitat benefit.

#### **Actions required to implement this Alternative include:**

- *Perform hydrogeological feasibility study.* Resolving uncertainty regarding the aquifer productivity below the falls will require additional hydrogeological study including:
  - ◆ Field verification and survey of existing wells,
  - ◆ Water level measurements, and



- ♦ Revised cross sections based on new data and hydraulic testing of one or more existing wells to quantify aquifer properties, predict well yields and determine whether one or more properly spaced wells would be required to meet project flow objectives.
- If results were favorable, a test well would be drilled that could be converted to a production well.
- *Submit application for a new water right under Hillis Rule.* This action would include a hydrogeological study establishing resource availability and evaluating continuity with the Creek/Okanogan River and an impairment analysis. Much of this would be accomplished while performing the hydrogeological feasibility study. This alternative is not expected to create a bypass reach that would require mitigation for a new water right, but a demonstration would likely have to be made to Ecology, as part of the water right permitting process.
- *Construct Production Well.* Perform well, screen and pump design. Contract with a driller to drill and develop a production well. Costs can be reduced by converting a successful test well.

### 3.4 Alternative 4 - Water Storage

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A major objective of this study is to evaluate surface water storage as a potential flow enhancement alternative. Water storage facilities can provide benefit to the system by retaining excess stream flow volumes during times of relative abundance and subsequently release it during times of relative scarcity.

#### 3.4.1 Water Available for Storage

A stream flow hydrograph was synthesized for the 10<sup>th</sup>, 50<sup>th</sup> and 90<sup>th</sup> percentile exceedances, based on correlation of Staff E with nearby gauge at Bonaparte Creek (Figure 11 - see Section 2). The graph also presents demands on flows for habitat (from CCT AFD), seepage loss, and seepage loss considering a 50 percent safety factor. Demands are shown in a “stacked”, cumulative manner on the graph. Based upon the synthesized hydrographs for Siwash Creek, water produced from the basin that is in excess of demands generally coincides with the non-irrigation season (November through April). This water is available for storage. On years where flow quantities are at the 50th percent probability of exceedance, there is less than 20acre-feet of water available for storage during the non-irrigation months in excess of seepage demand with safety factor. Ignoring the safety factor increases water available for storage to 140 acre-feet. This volume is insufficient to provide flows in excess of seepage losses. In contrast, approximately 1,500 acre-feet of stored water would be required to meet the seepage losses and habitat flow. Due to the substantial shortfall in water available for storage relative to demands, it is believed that the water storage alternative is infeasible.

## 4 Evaluation of Alternatives

Alternatives were evaluated based on the probability of success, flow benefit to targeted species in the fish passable reach and relative cost. Results are summarized in Table 4.

In our opinion, the most effective alternative to meet the minimum flow objective of 0.3 cfs at the Okanogan confluence is retiring water rights in Antoine Valley equal to an irrigation season flow of about 4.9 cfs, or an annual total of approximately 1,500 acre-feet annually. This annual quantity is estimated to provide an average annual discharge of 0.3 cfs at Staff A. Existing information on water rights in Antoine Valley (WWT, 2011) indicate rights on the order of about 6.2 cfs exist but the annual quantity totals about 1,160 acre-feet (not including surface water), which is about 340 acre-feet short of the estimated flow augmentation requirement. A major advantage of this alternative is the infrastructure simplicity. Implementation of this alternative would require verifying targeted water rights, confirming the timing of discharge using a groundwater model, confirming flow will discharge to Siwash Creek and not Antoine Creek, and confirming downstream irrigation demands. This alternative requires taking irrigated land out of production.

A more costly approach is piping water right discharge to Staff D. This has the advantage of providing certainty with regard to timing and quantity of flow. The time of use for the water right would have to be converted from irrigation season to year round with an accompanying impairment analysis.

Another option for conversion of water rights to instream flow purposes is retirement of the Schaller water right. This alternative offers the advantage of direct benefit to stream flows at Staff C, but provides a limited flow quantity and the right may have issues with acquisition feasibility. Temporary fallowing of the fields irrigated by this right could be pursued on a trial basis to evaluate habitat benefits from this alternative.

The second most effective alternative is pumping from groundwater to enhance stream flows using a new or existing well located below the falls (Staff C). There is uncertainty whether the aquifer is capable of yielding sufficient water to overcome seepage losses and meet flow objectives.

A less effective but feasible alternative is converting a surface water point of diversion to a groundwater point of withdrawal in the irrigated area downstream of Antoine Valley between Staff D and Staff C. An advantage of this alternative is that it leaves irrigated lands in production. There are, however, uncertainties with respect to aquifer yield in this reach that cannot be resolved without additional hydrogeologic study of the area.

The least feasible alternative evaluated is creating new surface water storage in the upper watershed. Hydrologic analysis of the creek indicates that in most years, the creek is not capable of producing enough water for storage to meet habitat flow objectives in the fish passable reach.

Moving forward, we recommend the following:

1. Pursue acquisition of one or more water rights in Antoine Valley equal to 4.9 cfs. Lesser quantities including acquisition of portions of the Schaller Right will provide flow augmentation, but are not likely to provide habitat along the full 1.4 mile fish passable reach. Monitoring should continue to document timing and magnitude of flow benefit from retirement of rights.
2. Install shallow monitoring wells in the north half of Antoine Valley to ensure flow benefits from retired water rights will be realized in Siwash Creek and not lost to Antoine Creek.
3. Develop a groundwater model to evaluate how retiring a water right will impact timing and quantity of flows.
4. Adaptively manage water right acquisition and retirement through continued monitoring.
5. Depending on results of the 2 and 3 above, consider conversion of the right to year round use, capped at the same annual quantity and piping of the water to a discharge point near Staff D.

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## Limitations

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# Table 1- Stream Flow Measurements and Seepage Losses

Siwash Creek Flow Enhancement Study  
Okanogan County, WA

Staff Gauge	Flow Measurements (cfs)							Difference Between Stations (gains/losses) (cfs)								
	A	B	C	D	E	F	G	F-G	E-F	D-E	C-D	B-C	A-B	C-A	D-A	
3/24/2011			2.04		1.96											Non-Irrigation Season
4/7/2011	0.42		1.90	1.75		1.38	0.74	0.65			0.15			-1.48	-1.33	
4/15/2011				1.96		1.33	0.56	0.76								
4/20/2011			1.62	1.72	1.86	1.28	0.56	0.72	0.58	-0.14	-0.10					
4/27/2011			1.44	1.77	1.69	1.68	0.78	0.91	0.01	0.08	-0.34					
5/12/2011			3.60	3.69	4.60	4.39	2.86	1.53	0.21	-0.90	-0.09					Irrigation Season
5/19/2011	1.39	2.01			5.46	5.32	4.96	0.36	0.14				-0.62			
5/24/2011	1.67	3.87	3.80	3.62	6.83	5.95	6.50	-0.55	0.88	-3.20	0.18	0.07	-2.20	-2.13	-1.95	
5/26/2011			5.54	6.23	13.32	21.39	14.03	7.36	-8.06	-7.09	-0.69					
5/27/2011	2.22				11.29	11.24	10.49	0.75	0.05							
6/9/2011	4.60	5.51	7.36	7.96	8.72	7.08	6.68	0.40	1.64	-0.76	-0.60	-1.85	-0.91	-2.76	-3.36	
6/17/2011			4.15	4.69							-0.54					
6/18/2011	2.89	3.72											-0.83			
6/21/2011	2.53	2.82											-0.29			
6/23/2011	1.44	1.97											-0.53			
6/28/2011	1.30	1.79											-0.49			
7/2/2011	0.97	1.57		2.10	2.76	2.98	2.50	0.48	-0.22	-0.66			-0.60		-1.13	
7/5/2011	0.00	0.15											-0.15			
7/6/2011	0.00	0.00														
7/8/2011	0.00	0.00	0.16	0.91	2.48	2.38	1.77	0.61	0.10	-1.57	-0.75					
7/15/2011	0.00	0.00	0.07	0.62	1.98	2.04	1.27	0.77	-0.06	-1.36	-0.55					
7/22/2011	0.00	0.00	0.06	<u>0.62</u>	<u>2.05</u>	<u>2.00</u>	<u>1.30</u>	0.70	0.05	-1.43	-0.56					
7/29/2011	0.00	0.00														
8/2/2011	0.00	0.00														
8/3/2011	0.00	0.00														
8/19/2011	0.00	0.00	0.05	0.46	0.77	0.87	0.39	0.48	-0.10	-0.31	-0.41					
8/27/2011	0.00	0.00	0.02	<u>0.91</u>	0.54	0.72	0.66	0.06	-0.18	0.37	-0.89					
10/2/2011	0.00	0.00		0.47	0.88	1.01	0.46	0.55	-0.13	-0.41						Non-Irrigation Season
10/8/2011	0.00	0.00		0.53	1.25	1.21	0.45	0.76	0.04	-0.72						
10/16/2011	0.00	0.00		0.68	1.27	1.16	0.27	0.89	0.11	-0.59						
10/21/2011	0.00	0.00														
10/28/2011	0.00	0.24	0.91	0.80	1.15	0.92	0.34	0.58	0.23	-0.35	0.11	-0.67				
11/3/2011	0.00	0.30	0.93	0.68	<u>1.86</u>	1.04	0.36	0.68	0.82	-1.18	0.25	-0.63				
11/11/2011	0.00	0.41		<u>0.91</u>	<u>1.96</u>	<u>0.87</u>	<u>0.40</u>	0.47	1.09	-1.05						
11/27/2011	0.00	0.46		<u>1.00</u>	<u>2.00</u>	<u>0.92</u>	<u>0.45</u>	0.47	1.08	-1.00						
Averages							All data	0.89	-0.08	-1.17	-0.32	-0.77	-0.74			
							Irrigation Season	1.08	-0.46	-1.69	-0.48	-0.89	-0.74			
							Non-Irrigation	0.68	0.43	-0.60	0.10	-0.65	-			

## Notes

- Underlined values are derived from stage height readings and rating curves.
- Bolded values lie within measurement error of 5% per station (10% total). Measurement error between Staff Gauges F and G not shown.
- Average losses/gains were computed using values within and outside error range to minimize bias associated with using only values greater than measurement error.
- Irrigation season is defined as May 1 through September 30; except for the reach from Staff C to Staff D that likely began in late April.
- Gaining characteristics are positive, losing are negative.

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9/21/2012

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Table 1

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**Table 2 - Estimated Flow Augmentation to Achieve 0.3 cfs Habitat Flow**

Siwash Creek Flow Enhancement Study  
Okanogan County, WA

**Staff D to A**

Season	Staff D to A loss <sup>1</sup>	Habitat Flow <sup>2</sup>	Staff D Target Flow 2011 <sup>3</sup>	2011 Minimum Measured Flow at Staff D <sup>4</sup>	2011 Staff D Flow Augmentation (no safety factor) <sup>5</sup>	Staff D Flow Augmentation with Safety Factor <sup>6</sup>	Average Annual Augmentation Qty (acre ft) <sup>7</sup>	Average Annual Augmentation Qty (cfs) <sup>8</sup>	Irrigation Season Qi to meet Annual Qty (cfs) <sup>9</sup>
Non-Irrigation	1.3	0.3	1.6	0.5	1.1	<b>1.7</b>	1491	2.1	4.9
Irrigation	2.0	0.3	2.3	0.5	1.8	<b>2.6</b>			

**Staff C to A**

Season	Staff C to A loss <sup>10</sup>	Habitat Flow <sup>2</sup>	Staff C Target Flow 2011 <sup>3</sup>	2011 Minimum Measured Flow at Staff C <sup>11</sup>	2011 Staff C Flow Augmentation (no safety factor) <sup>5</sup>	Staff C Flow Augmentation with Safety Factor <sup>6</sup>	Average Annual Augmentation Qty (acre ft) <sup>7</sup>	Average Annual Augmentation Qty (cfs) <sup>8</sup>	Irrigation Season Qi to meet Annual Qty (cfs) <sup>9</sup>
Non-Irrigation	1.2	0.3	1.5	0.6	0.9	<b>1.3</b>	1361	1.9	4.5
Irrigation	1.5	0.3	1.8	0.02	1.8	<b>2.6</b>			

Notes:

1. Non-irrigation season loss for D to A based on seepage run on 4/7/11. Irrigation season value based on median of three measurements. Median is near average.
2. From CCT AFD.
3. Target is estimated flow at Staff required to create habitat at Creek mouth. Sum of losses and habitat flow.
4. Minimum measured value (Table 1).
5. Estimated flow supplement required in 2011 to meet habitat requirement.
6. Applies a 50% safety factor to allow for dry years and uncertainty.
7. Annual augmentation quantity including safety factor.
8. Annual augmentation quantity with safety factor presented as an average annual flow rate.
9. Annual augmentation quantity with safety factor presented as irrigation season flow rate for the purpose of comparing irrigation rights with annual flow augmentation target.
10. Non-irrigation season flow based on Staff D non-irrigation flow increased by average gain of 0.1 cfs between Staff D and C. Irrigation season flow based on Staff D irrigation flow decreased by average 0.5 cfs loss between Staff C and D.
11. Minimum non-irrigation flow taken from lowest Staff D measurement and increased by average non-irrigation season gain 0.1 cfs between staff D and C. Irrigation season is minimum measured value.

# Table 3 - Estimated Flow Augmentation to Achieve 1 cfs Habitat Flow

Siwash Creek Flow Enhancement Study  
Okanogan County, WA

## Staff D to A

Season	Staff D to A loss <sup>1</sup>	Habitat Flow <sup>2</sup>	Staff D Target Flow 2011 <sup>3</sup>	2011 Minimum Measured Flow at Staff D <sup>4</sup>	2011 Staff D Flow Augmentation (no safety factor) <sup>5</sup>	Staff D Flow Augmentation with Safety Factor <sup>6</sup>	Average Annual Augmentation Qty (acre ft) <sup>7</sup>	Average Annual Augmentation Qty (cfs) <sup>8</sup>	Irrigation Season Qi to meet Annual Qty (cfs) <sup>9</sup>
Non-Irrigation	1.3	1.0	2.3	0.5	1.8	2.7	2251	3.1	7.5
Irrigation	2.0	1.0	3.0	0.5	2.5	3.7			

## Staff C to A

Season	Staff C to A loss <sup>10</sup>	Habitat Flow <sup>2</sup>	Staff C Target Flow 2011 <sup>3</sup>	2011 Minimum Measured Flow at Staff C <sup>11</sup>	2011 Staff C Flow Augmentation (no safety factor) <sup>5</sup>	Staff C Flow Augmentation with Safety Factor <sup>6</sup>	Average Annual Augmentation Qty (acre ft) <sup>7</sup>	Average Annual Augmentation Qty (cfs) <sup>8</sup>	Irrigation Season Qi to meet Annual Qty (cfs) <sup>9</sup>
Non-Irrigation	1.2	1.0	2.2	0.6	1.6	2.4	2122	2.9	7.0
Irrigation	1.5	1.0	2.5	0.02	2.5	3.7			

Notes:

1. Non-irrigation season loss for D to A based on seepage run on 4/7/11. Irrigation season value based on median of three measurements. Median is near average.
2. From CCT AFD.
3. Target is estimated flow at Staff required to create habitat at Creek mouth. Sum of losses and habitat flow.
4. Minimum measured value (Table 1).
5. Estimated flow supplement required in 2011 to meet habitat requirement.
6. Applies a 50% safety factor to allow for dry years and uncertainty.
7. Annual augmentation quantity including safety factor.
8. Annual augmentation quantity with safety factor presented as an average annual flow rate.
9. Annual augmentation quantity with safety factor presented as irrigation season flow rate for the purpose of comparing irrigation rights with annual flow augmentation target.
10. Non-irrigation season flow based on Staff D non-irrigation flow increased by average gain of 0.1 cfs between Staff D and C. Irrigation season flow based on Staff D irrigation flow decreased by average 0.5 cfs loss between Staff C and D.
11. Minimum non-irrigation flow taken from lowest Staff D measurement and increased by average non-irrigation season gain 0.1 cfs between staff D and C. Irrigation season is minimum measured value.

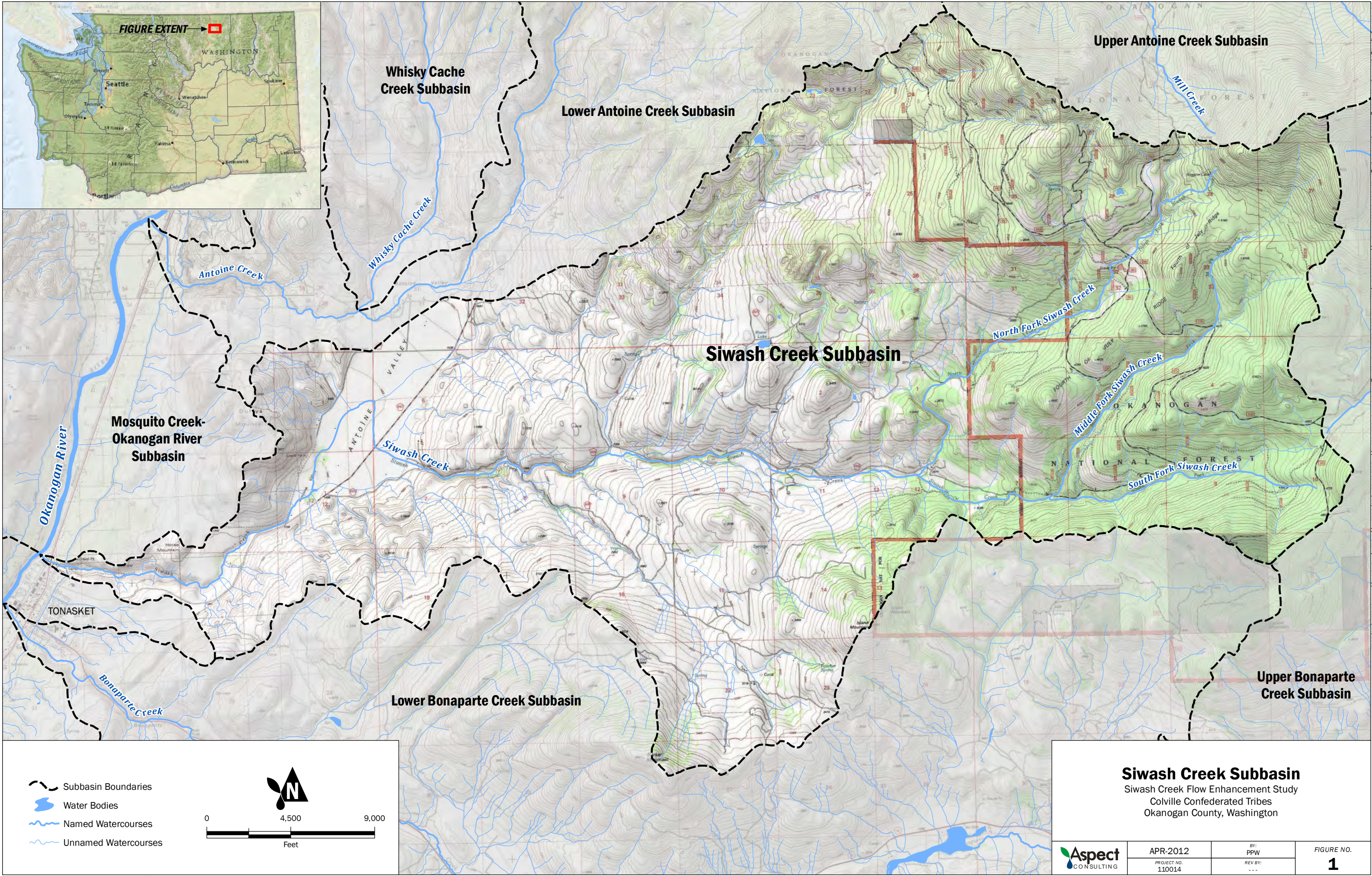


## Table 5 - Summary of Flow Augmentation Alternatives

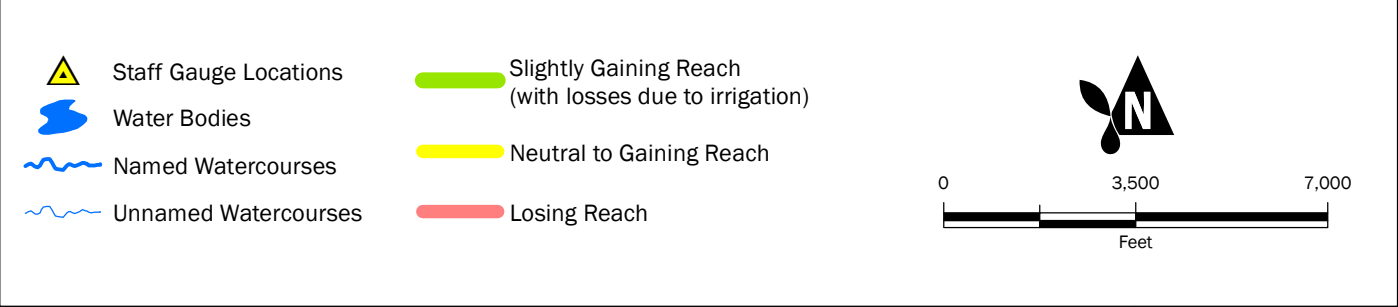
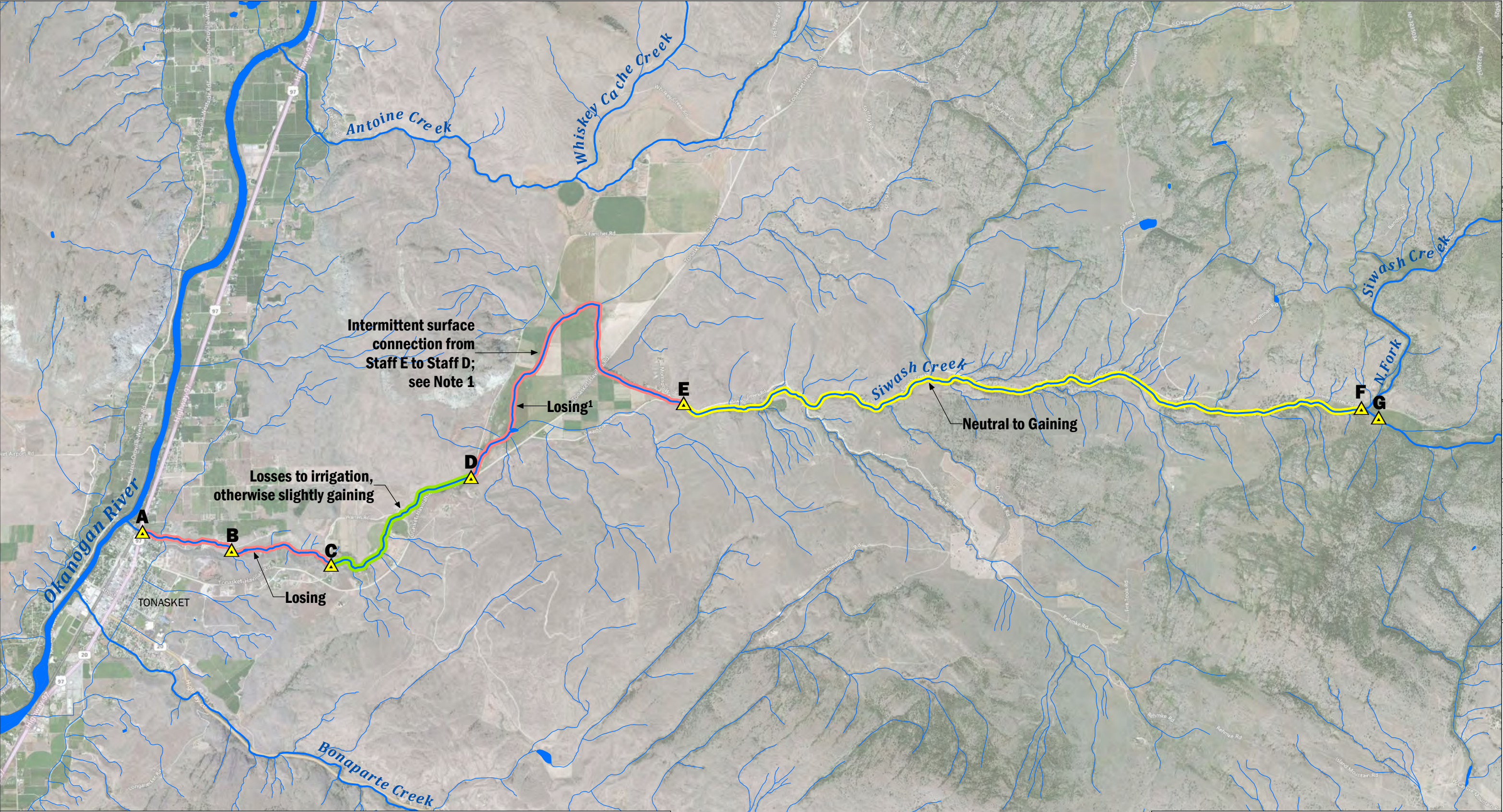
Siwash Creek Flow Enhancement Study  
Okanogan County, WA

Alternative		Predicted Flow Augmentation	Advantage	Disadvantage	Uncertainty
1A	Retire Water Rights in Antoine Valley	Extend habitat flow of 0.3 cfs to the Okanogan River during wetter years and increase wetted length during drier years. AV groundwater rights total 1,160 acre-feet annually compared to Staff D target augmentation of 1,500 acre-feet.	Greatest flow potential; No construction costs; Minimal permitting costs	Requires land owner cooperation, taking land out of irrigated production	Availability of water rights to meet augmentation target; Flow requirements during drier years; Timing of groundwater discharge into Siwash Creek; Groundwater exchange between Siwash and Antoine Creeks
1B	Pipe surface water diversion or groundwater withdrawal to Staff D	Same as above	Increase flows on one-to-one basis by eliminating infiltration losses; Provide control over timing of discharge	Pipeline construction cost; Requires change to existing right in time of use (from seasonal to year-round) and place of use; Requires landowner cooperation, taking land out of irrigated production	Availability of water rights to meet augmentation target. Impairment of rights along seasonal bypass reach; Groundwater exchange between Siwash and Antoine Creeks; Flow requirements during drier years; Availability of easements for pipeline construction
1C	Retire Schaller Right	Extend habitat flow of 0.3 cfs up to 1,400 feet downstream of falls (RM 1.4) if full right converted to groundwater	Eliminate uncertainty regarding timing of flow benefit	Limited flow benefit; Requires coordination among multiple landowners, taking land out of irrigated production; Right potentially difficult protect to instream	Availability of rights
1D	Retire Culver/Gardinier Rights	Unknown	Unknown	Requires land owner cooperation, taking land out of irrigated production. Potential problem for change of use for Gardinier Right	Location of point of withdrawal; Hydraulic continuity with Siwash Creek; Availability of rights for transfer
2A	Convert Surface Water Diversion to Groundwater between RM 1.4 and RM 3.0 (Schaller Right)	Extend habitat flow of 0.3 cfs an estimated 1,400 feet downstream of falls (RM 1.4) if full right converted to groundwater	Keep land in irrigated production	Limited flow benefit; Requires coordination among multiple landowners; Transfer of right potentially difficult; Long term pumping costs	Groundwater availability limited; Hydraulic continuity of selected well site and Siwash Creek; Impairment potential; Availability of right for transfer
3A	Groundwater Pumping below the Falls at RM 1.4	Extend habitat flow of 0.3 cfs an estimated 700 feet from discharge for well yielding 200 gpm (0.45 cfs)	Relatively lower cost ; Water sourced near discharge location	Pumping/Operation and Maintenance Costs; Requires new water right	Groundwater availability in volumes required to meet flow objectives; Hydraulic continuity of selected well site and Siwash Creek; Impairment potential









NOTE:  
1) Land owner reports surface flow connection from Staff E to Staff D occurred only for about a one week during 2011 spring freshet.

Gauging Station Locations

Siwash Creek Flow Enhancement Study

Colville Confederated Tribes

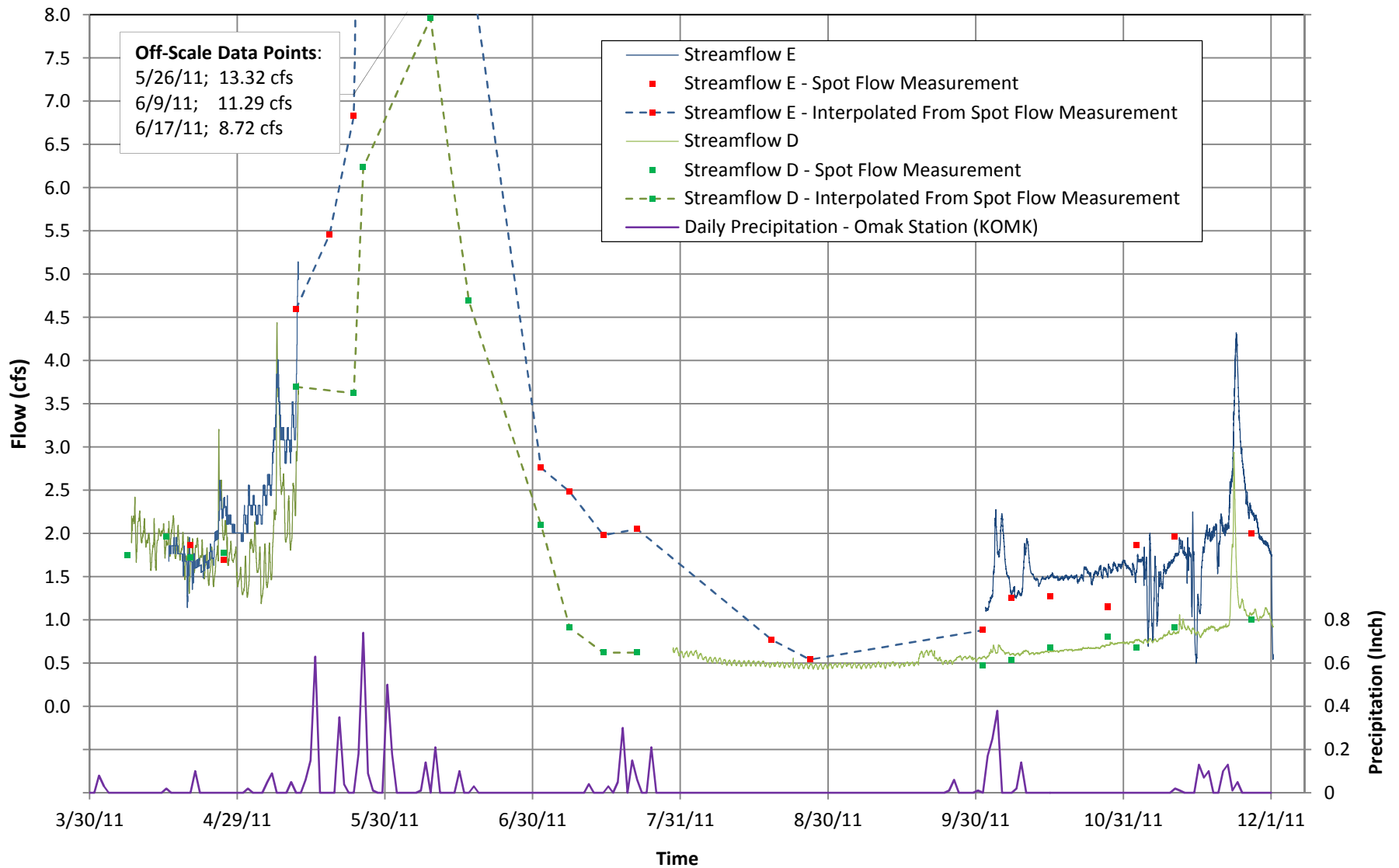
Okanogan County, Washington

APR-2012	BY: PPW	FIGURE NO. <b>2</b>
PROJECT NO. 110014	REV BY: ---	

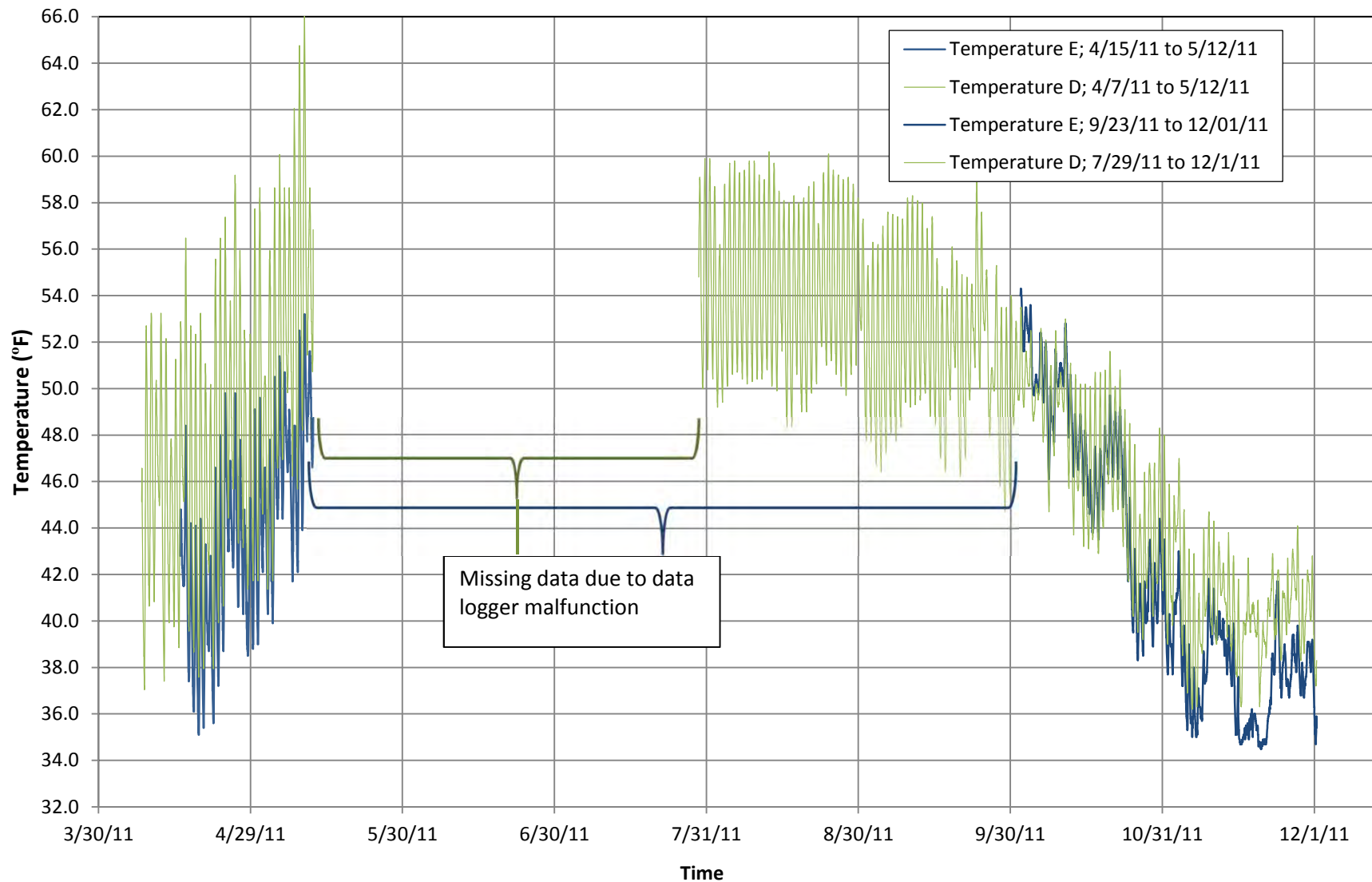
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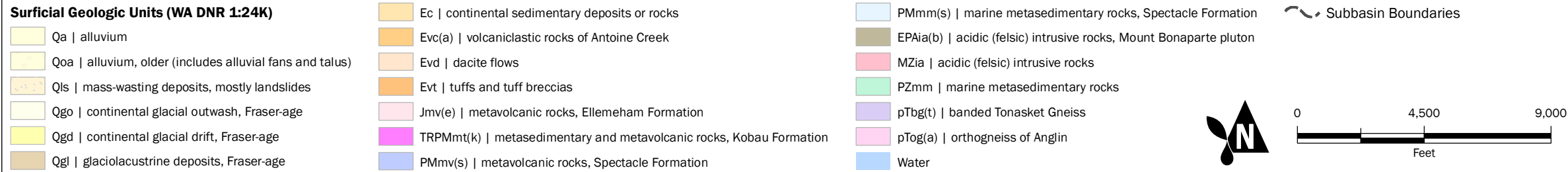
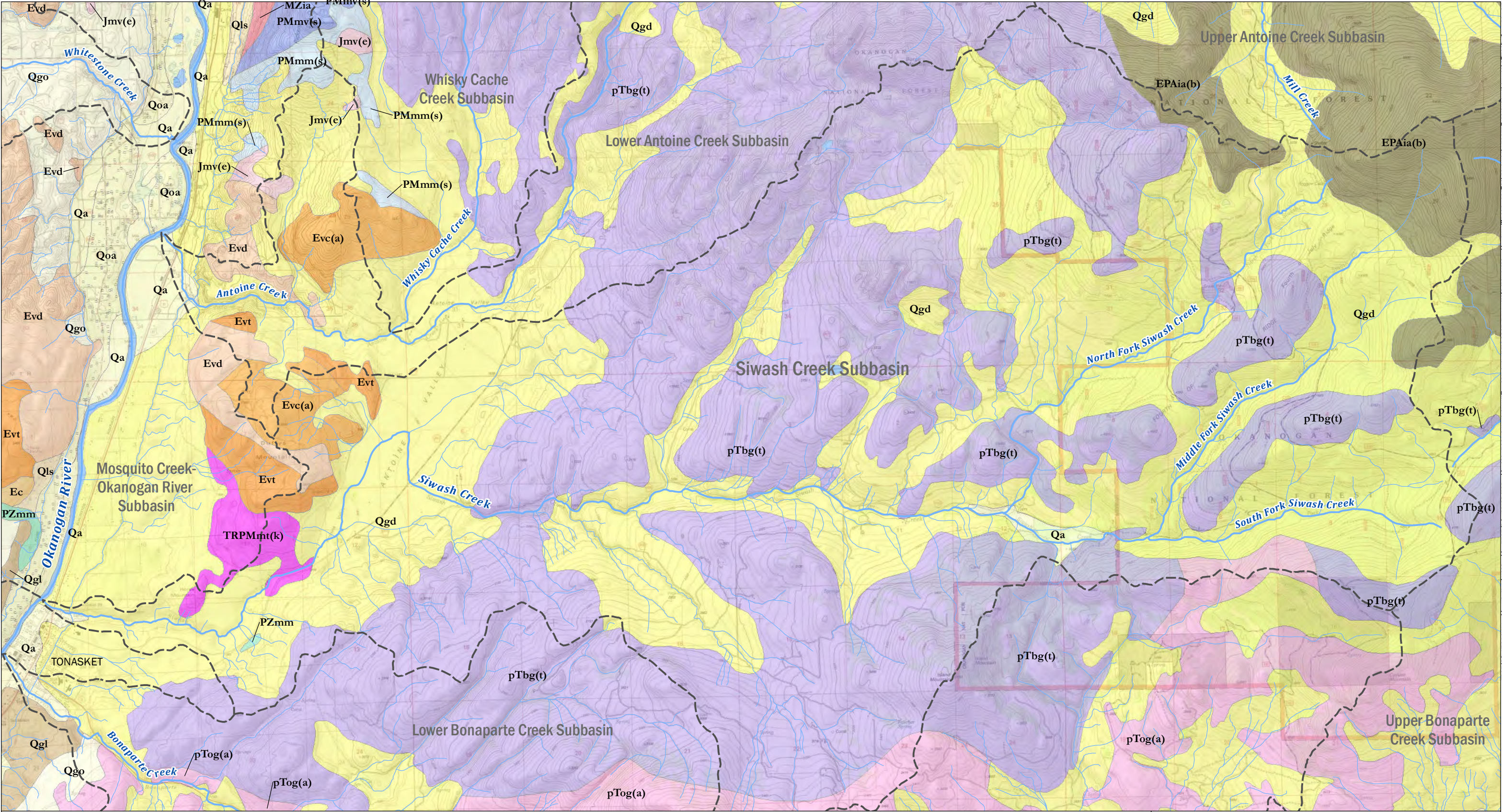
## Stream Flow Hydrograph Siwash Creek - Staff D and E



## Stream Flow Temperature Siwash Creek - Staff D and E







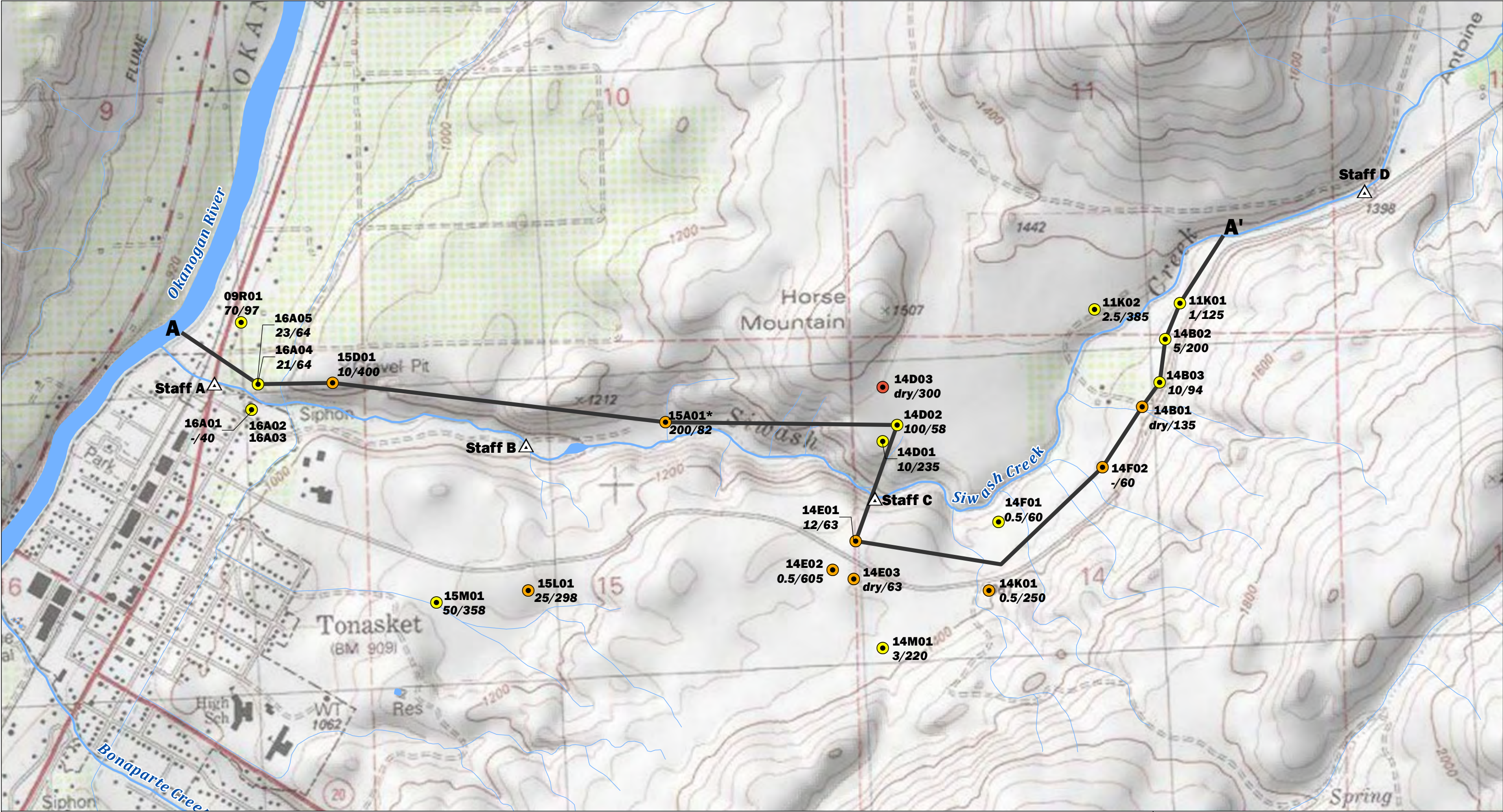
### Siwash Creek Basin Surficial Geology

Siwash Creek Flow Enhancement Study  
Colville Confederated Tribes  
Okanogan County, Washington

	APR-2012	BY: PPW	FIGURE NO. <b>5</b>
	PROJECT NO. 110014	REV BY: ---	

GIS Path: I:\Projects\_8\Colville-SiwashCreek\_110014\Delivered\05\_SurficialGeology.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 4/3/2012 | User: paulthman | Print Date: 4/3/2012





**Wells**

by location source:

- Parcel
- Quarter-Quarter Section
- Quarter Section

**09R01** ← WELL ID

**10/63** ← YIELD (GPM)/ TOTAL DEPTH (FEET)

\*Well 15A01 location adjusted from ¼, ¼ section location based on hydrogeologic information on well log. Yield shown on log is difficult to read and should be confirmed.

Cross Section A-A'

Named Watercourses

Unnamed Watercourses

Water Bodies

Staff Gauge Locations

0 1,000 2,000

Feet

**Well Location Map**

**Lower Siwash Creek**

Siwash Creek Flow Enhancement Study

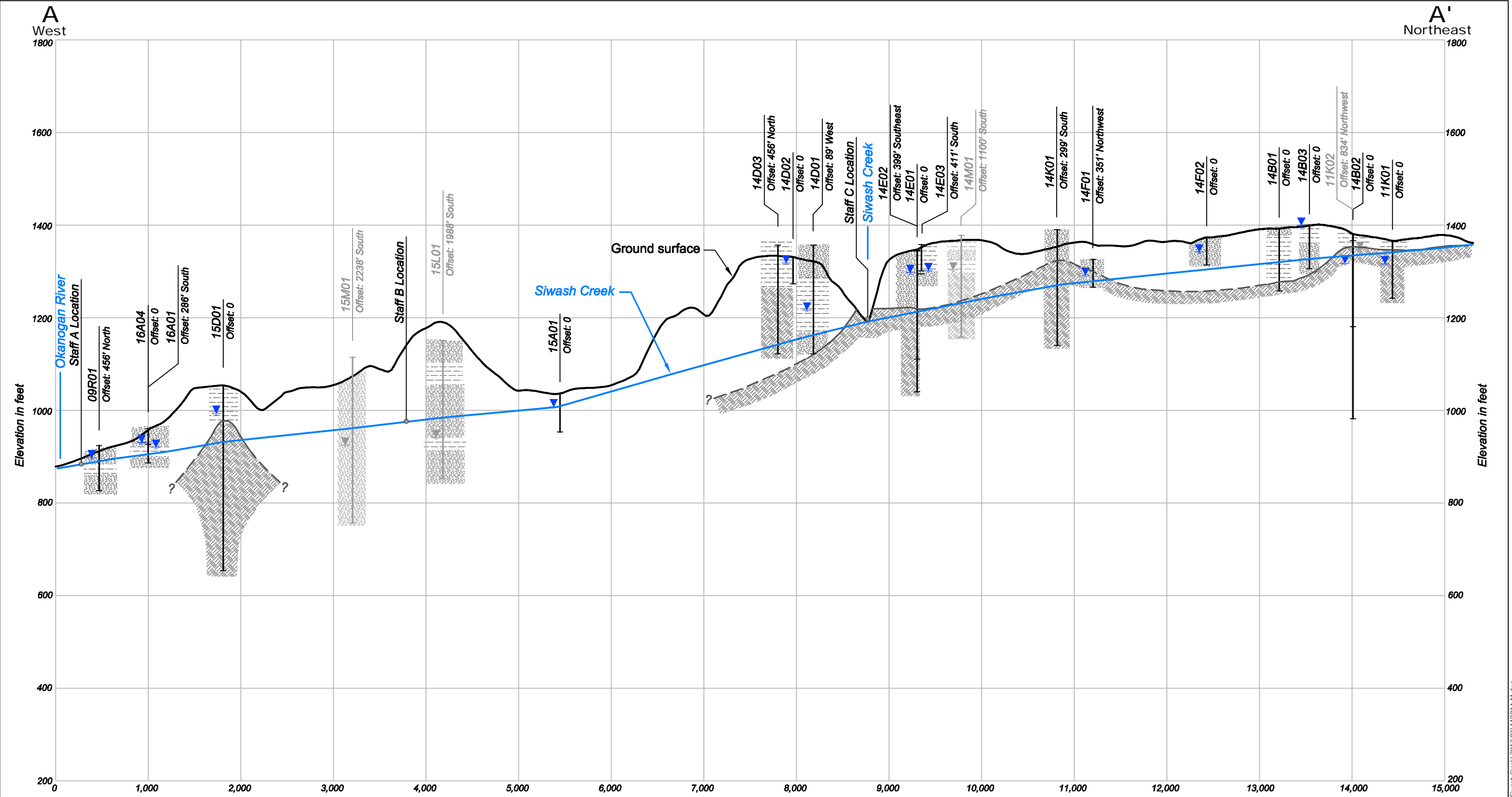
Colville Confederated Tribes

Okanogan County, Washington

SEP-2012	BY: PPW	FIGURE NO. <b>6</b>
PROJECT NO. 110014	REV BY: PPW	



GIS Path: I:\Projects\_8\ColvilleSiwashCreek\_110014\Drawings\06\_Wells\_LowerSiwash.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 9/19/2012 | User: jwhitman | Print Date: 9/19/2012



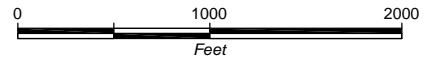


**Legend**

-  Coarse grained
-  Fine grained
-  Bedrock
-  Siwash Creek elevation profile (as projected on to cross section B-B')
-  Geologic contact line (Dashed where unknown)


-  Well with label and offset
-  Static water level

SCALE:  
1" = 200' (Vertical)  
1" = 1000' (Horizontal)  
Vertical exaggeration = 5X

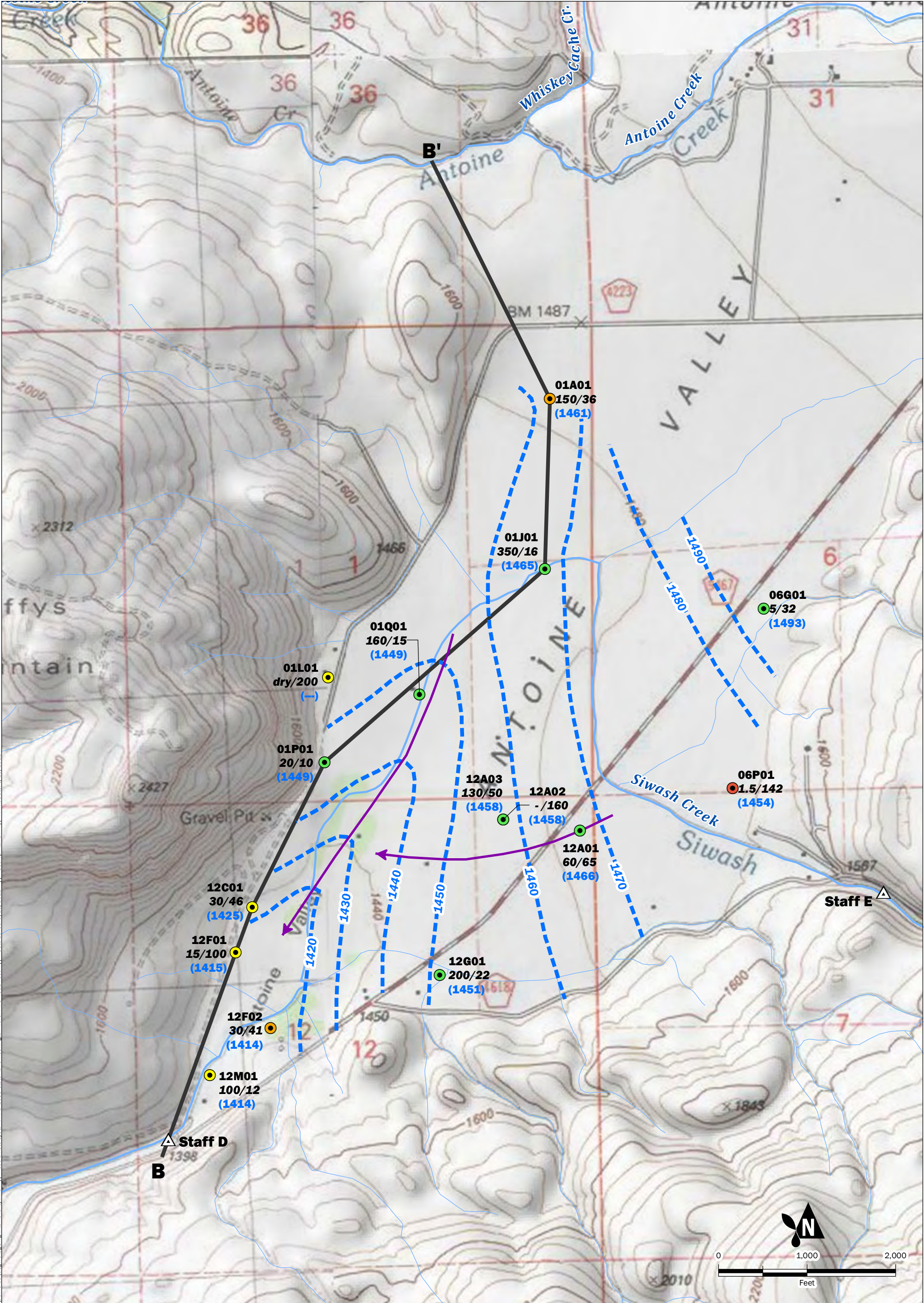


Cross Section A-A'

Siwash Creek Flow Enhancement Study  
Colville Confederated Tribes  
Okanagan County, Washington

	FEB-2012	BY: BMS/PMB	FIGURE NO. <b>7</b>
	PROJECT NO. 110014	REV BY: BMS (SEPT 2012)	





GIS Path: T:\Projects\_8\ColvilleSiwashCreek\_110014\Delivered\08\_Wells\_GW\_AntoineValley.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 9/19/2012 | User: pwillman | Print Date: 9/19/2012

Wells

by location source:

- GPS
  - Parcel
  - Quarter-Quarter Section
  - Quarter Section
- 12A01** ← WELL ID  
**60/65** ← YIELD (GPM)/ TOTAL DEPTH (FEET)  
**(1466)** ← STATIC WATER LEVEL ELEVATION (FEET)

- Named Watercourses
- Unnamed Watercourses
- Water Bodies
- Staff Gauge Locations
- Cross Section B-B'
- Inferred Groundwater Flow Direction
- Water Level Contours (feet above sea level)

Well Location Map and Groundwater Elevations - Antoine Valley

Siwash Creek Flow Enhancement Study  
Colville Confederated Tribes  
Okanogan County, Washington



SEP-2012

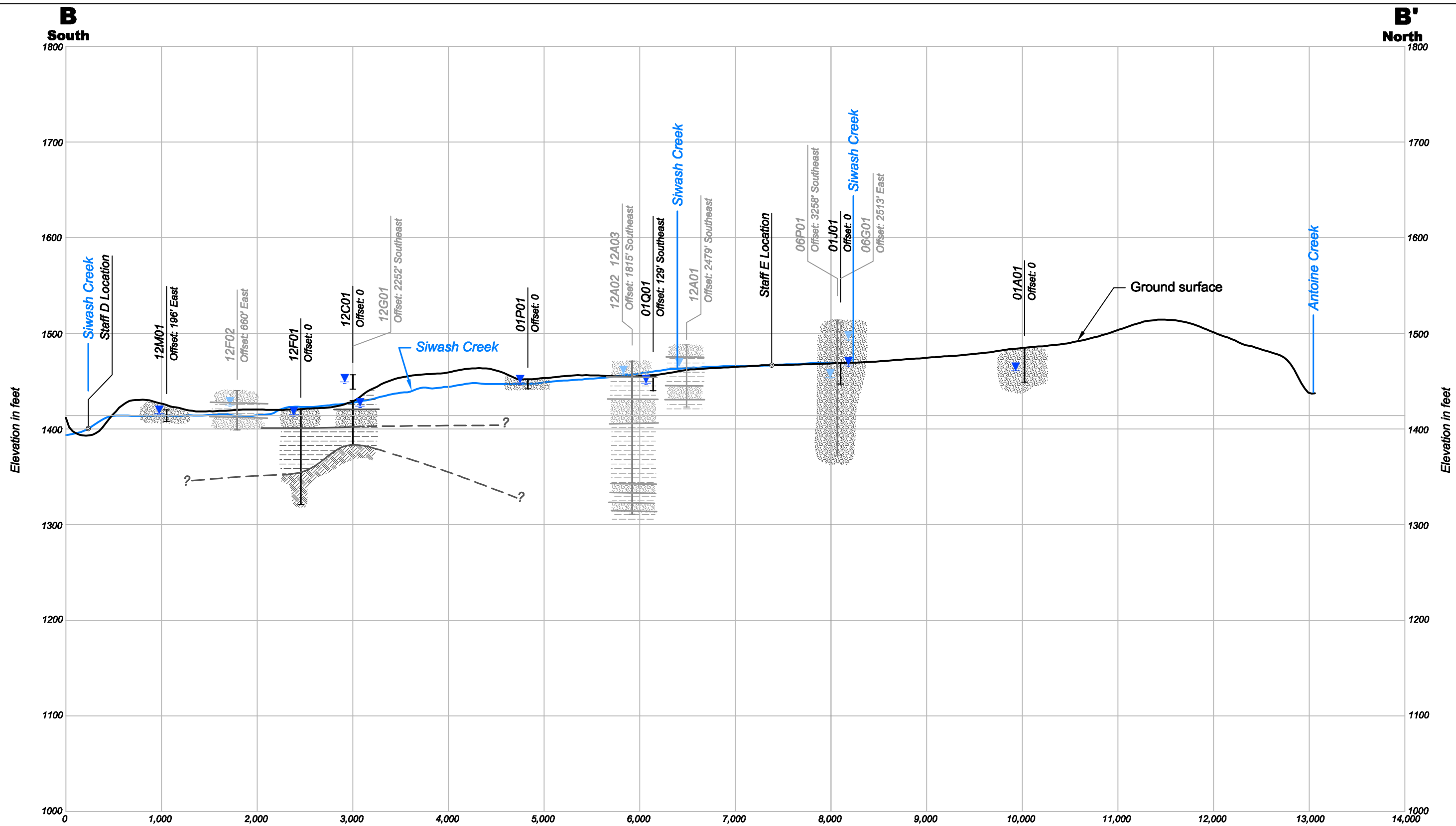
PROJECT NO.  
110014

BY:  
PPW

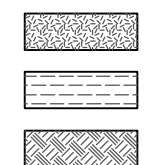
REV BY:  
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FIGURE NO.  
**8**





**Legend**



Coarse grained  
Fine grained  
Bedrock

Siwash Creek elevation profile  
(as projected on to cross section B-B')

Geologic contact line  
(Dashed where unknown)

Well with label and offset

Static water level

SCALE:  
1" = 100' (Vertical)  
1" = 1000' (Horizontal)  
Vertical exaggeration = 10X



**Cross Section B-B'**

Siwash Creek Flow Enhancement Study  
Colville Confederated Tribes  
Okanagan County, Washington

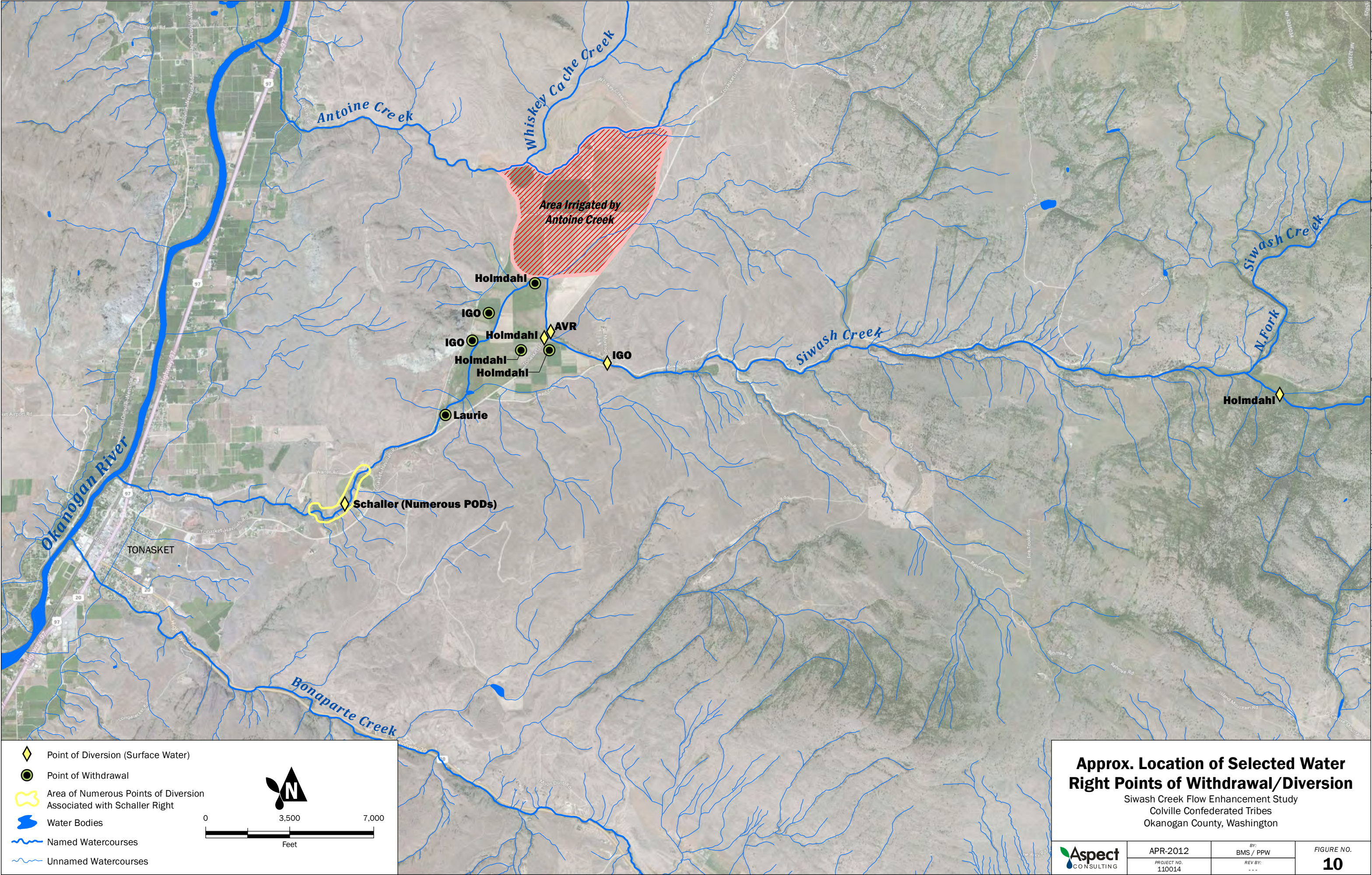


FEB-2012  
PROJECT NO.  
110014

BY:  
BMS/PMB  
REV BY:  
BMS (SEPT 2012)

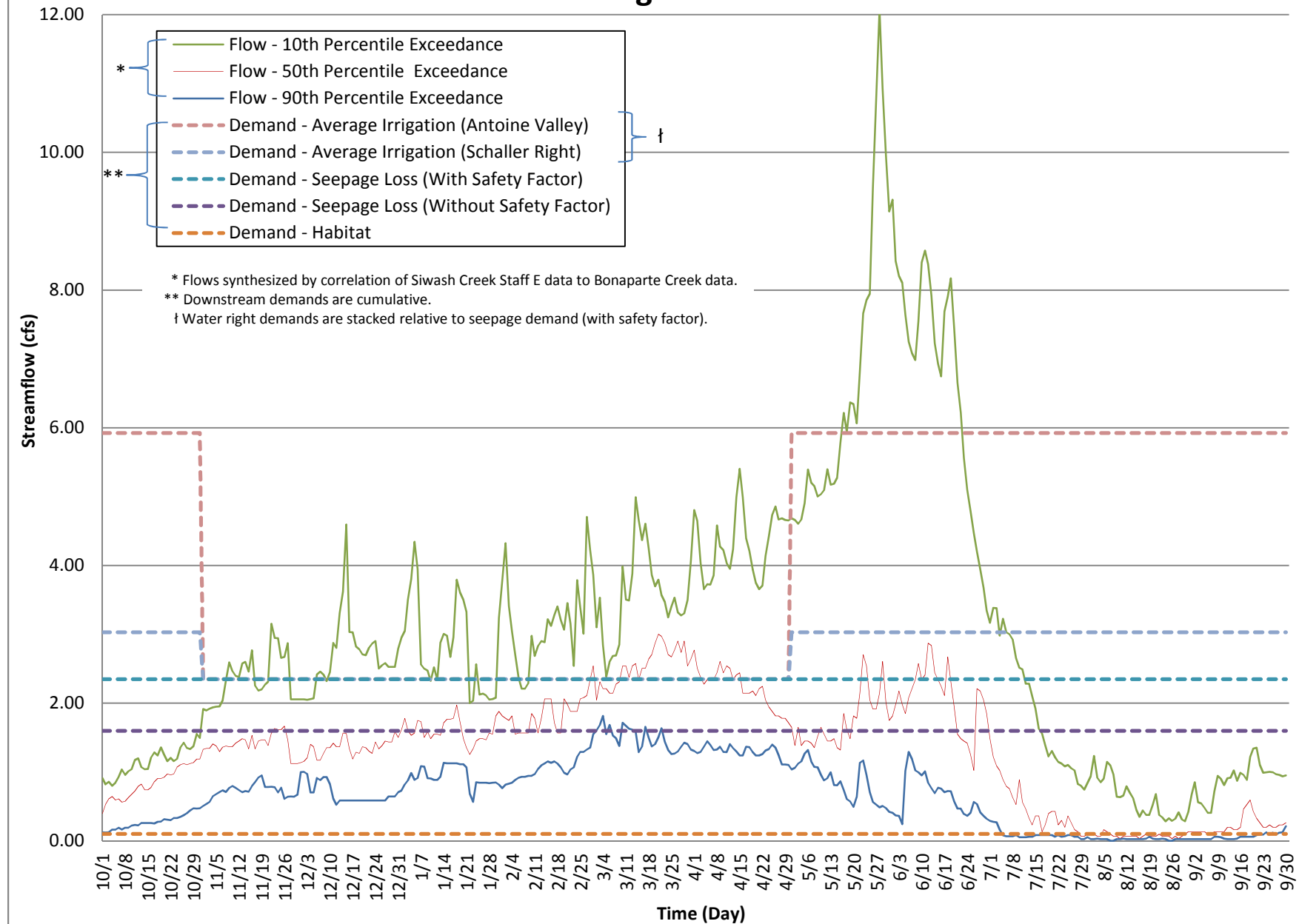
FIGURE NO.  
**9**





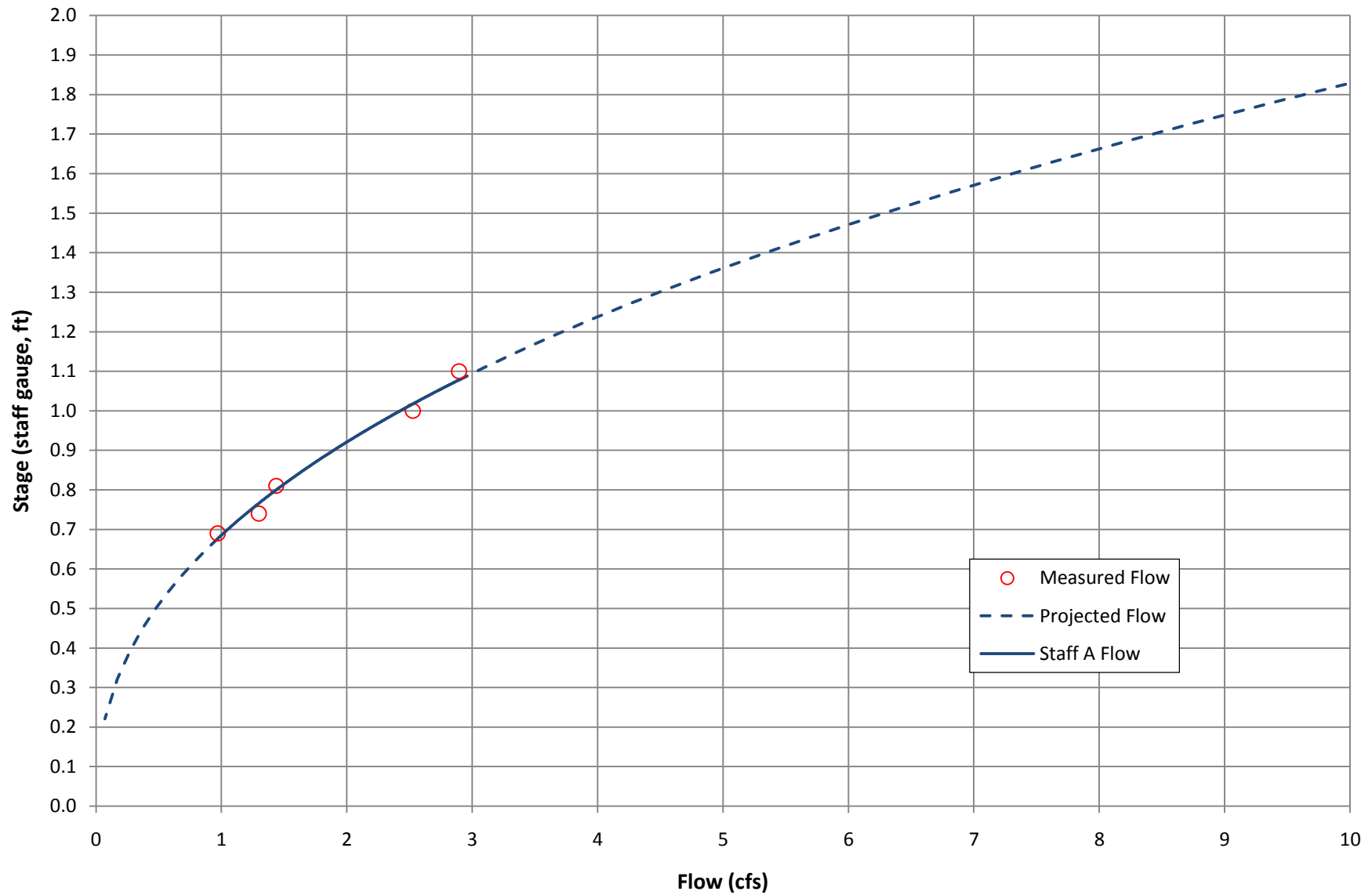


## Synthesized Stream Flow Hydrograph (Staff E) and Storage Release Scenarios



## **APPENDIX A**

### **Rating Curves**



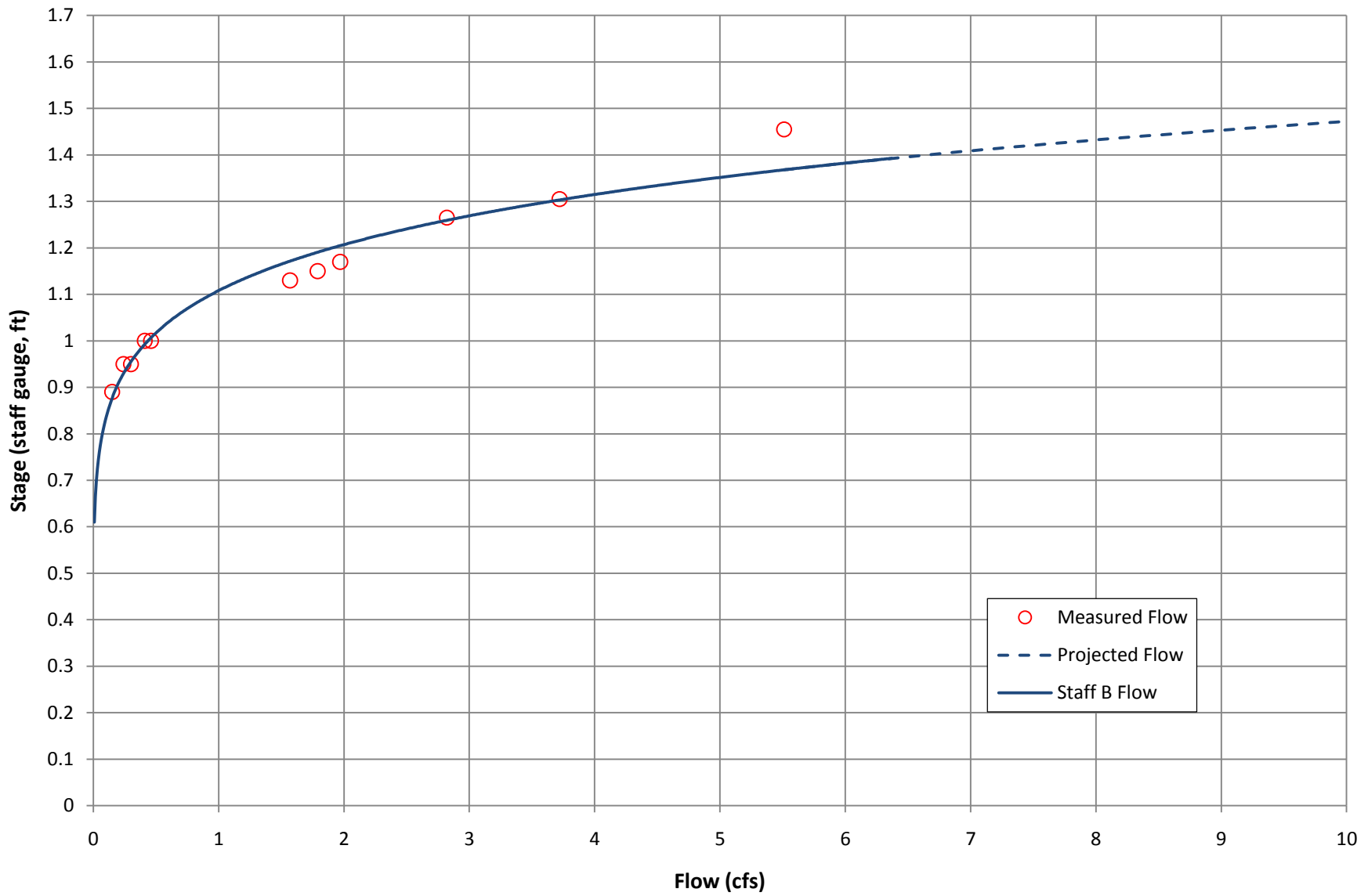
**Aspect Consulting**

9/21/2012

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## Staff A Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA



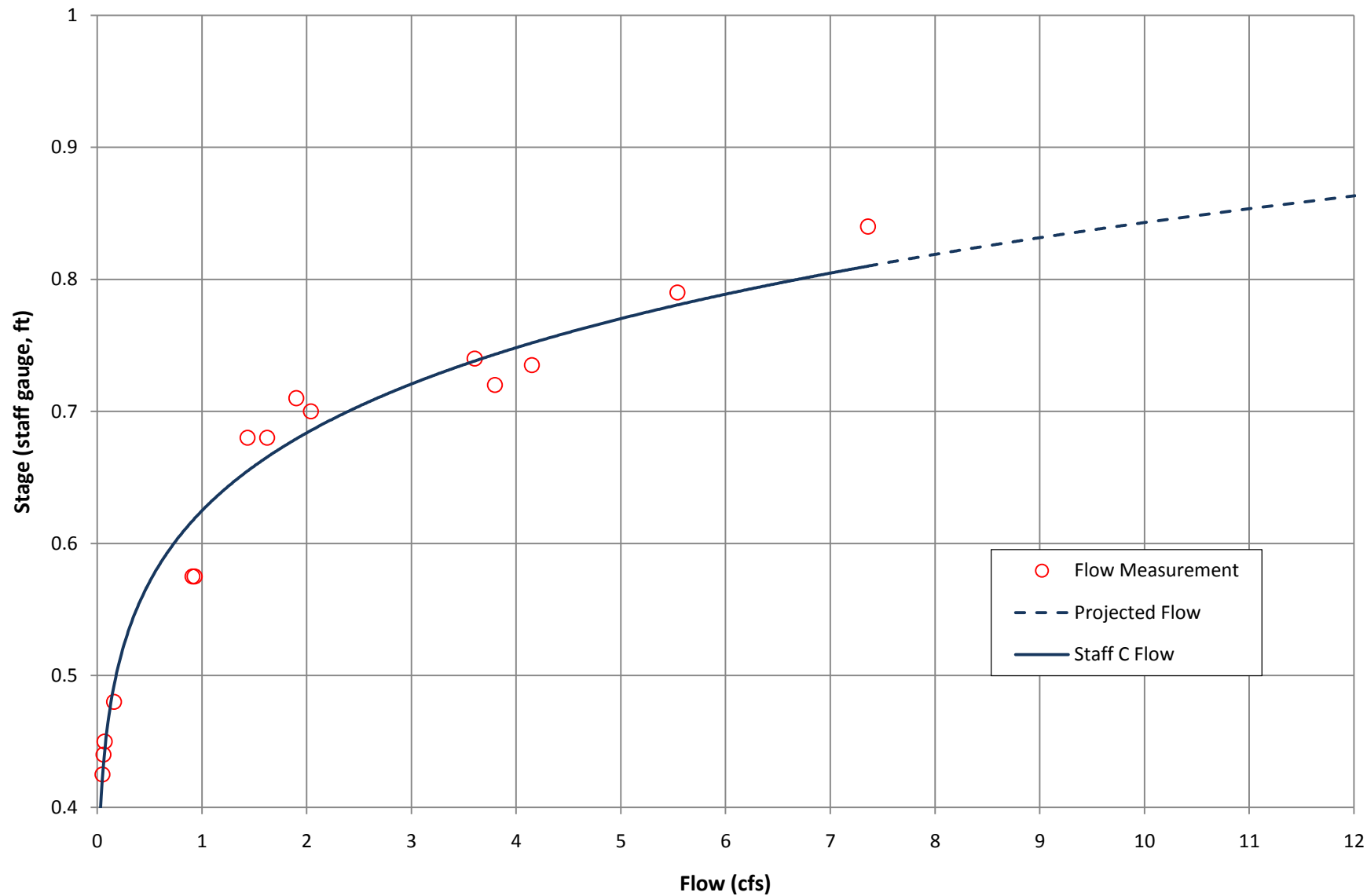
**Aspect Consulting**

9/21/2012

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## Staff B Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA



**Aspect Consulting**

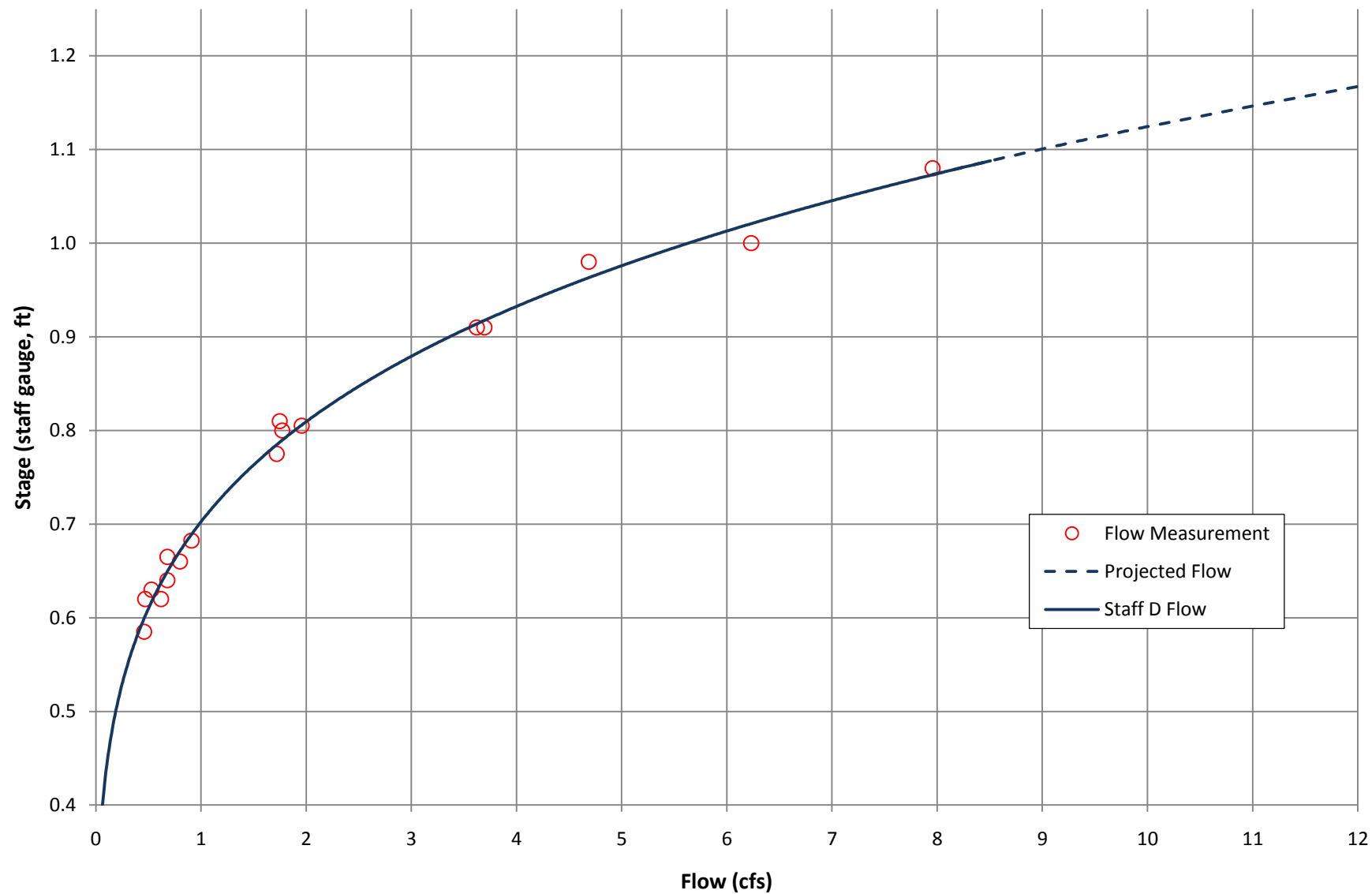
9/21/2012

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## Staff C Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA





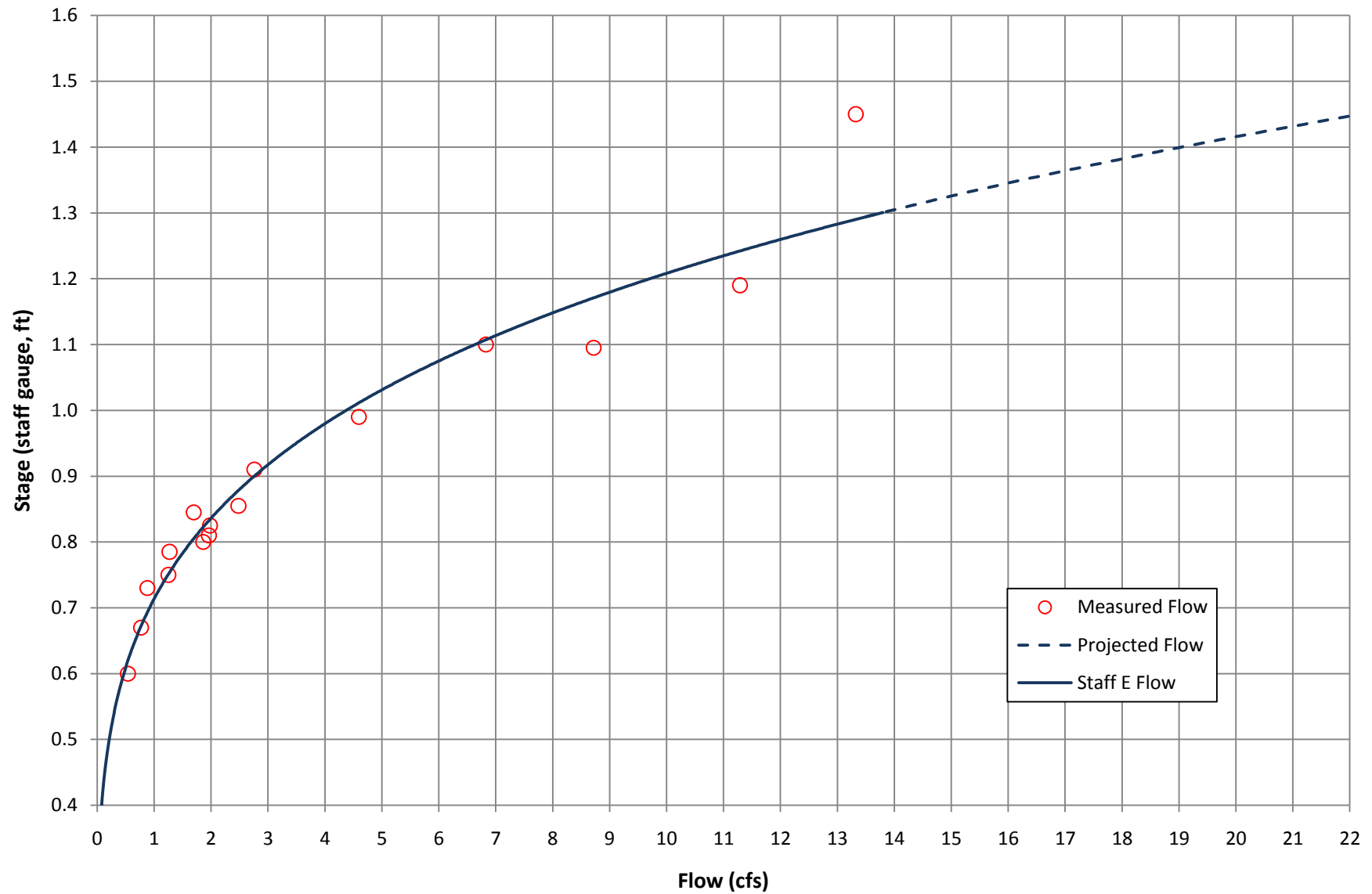
**Aspect Consulting**

9/21/2012

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## Staff D Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA



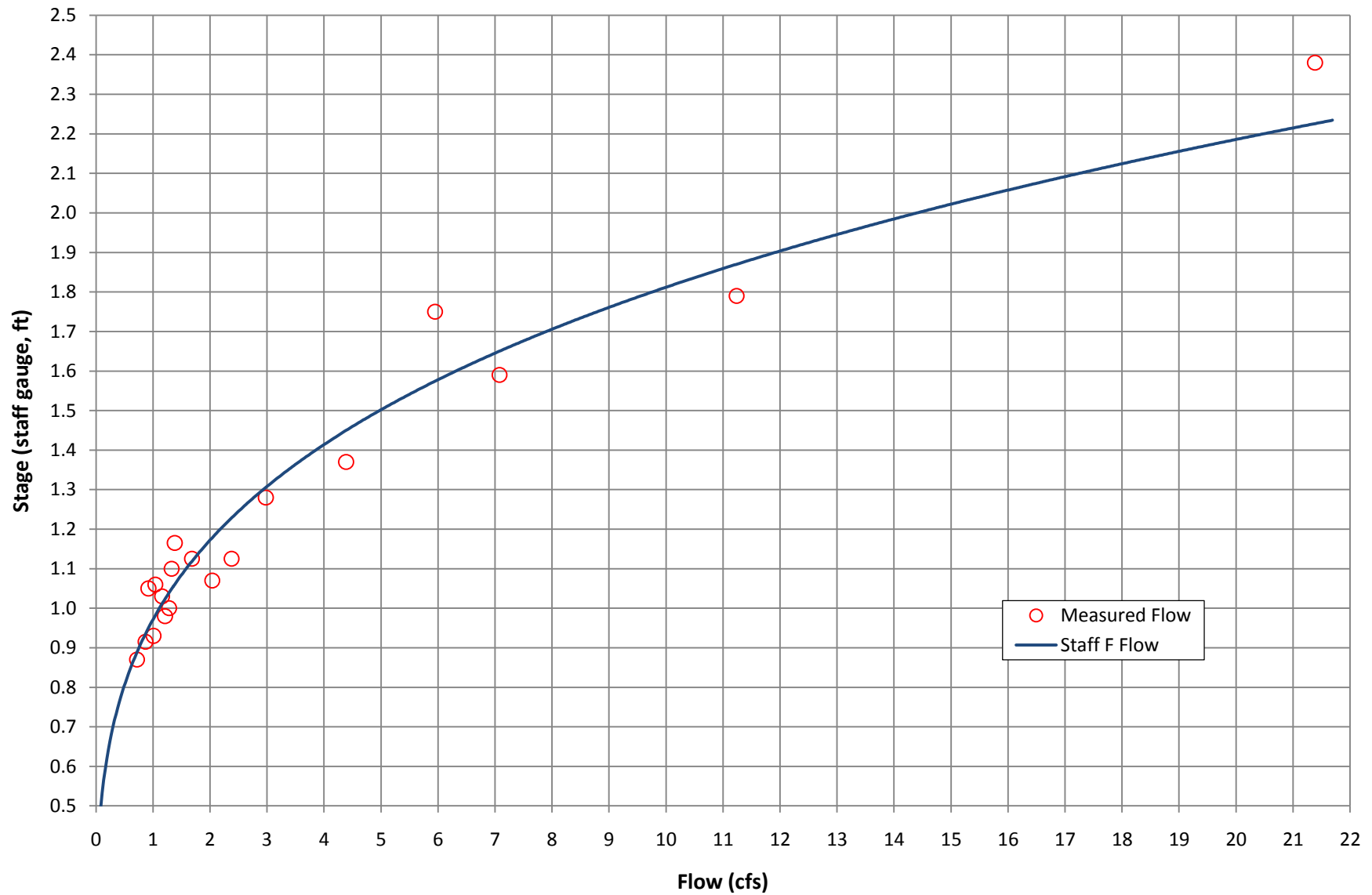
**Aspect Consulting**

9/21/2012

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## Staff E Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA



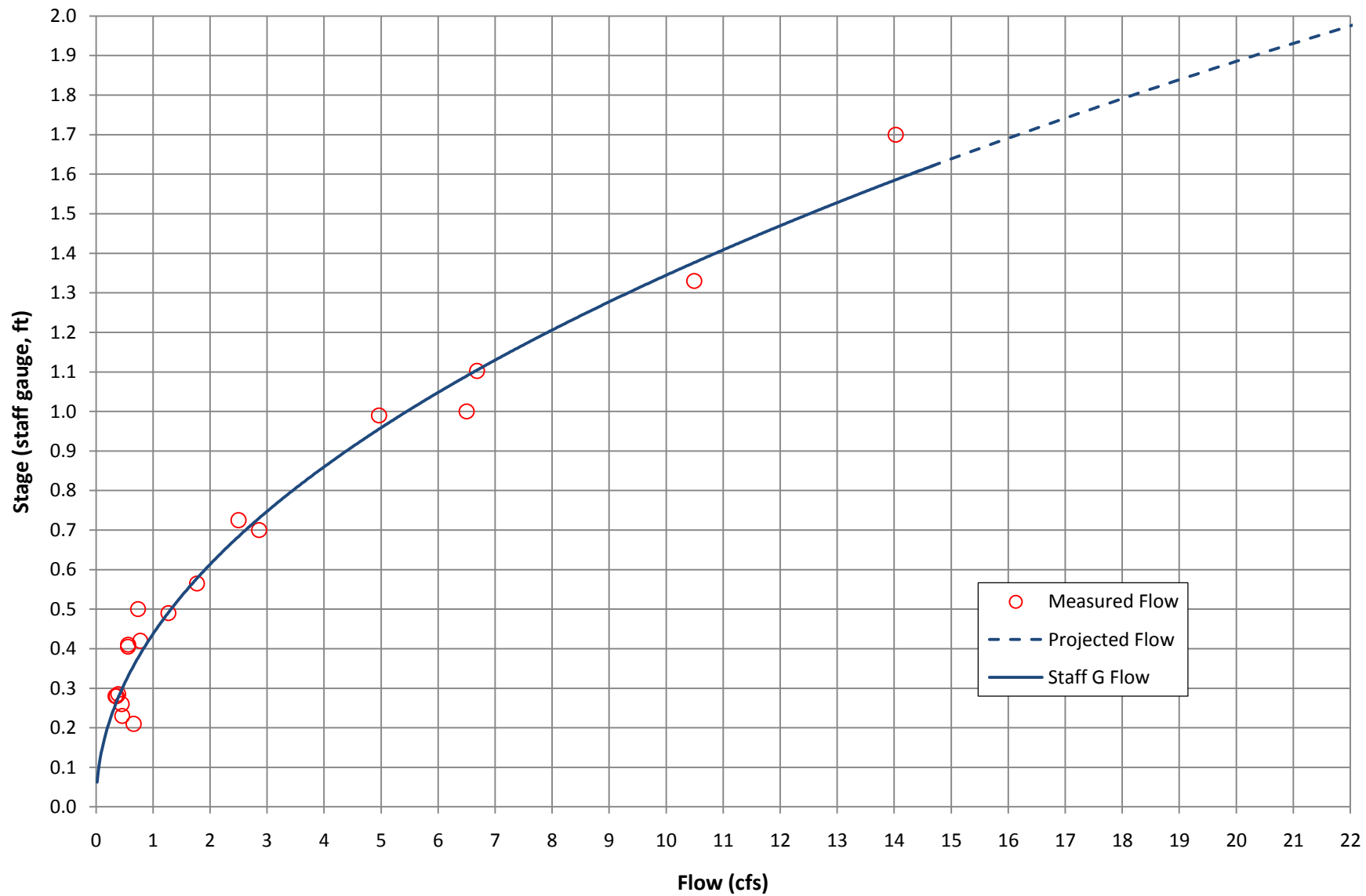
**Aspect Consulting**

9/21/2012

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## Staff F Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA



Aspect Consulting

9/21/2012

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## Staff G Rating Curve

Siwash Creek Flow Enhancement Study  
Okanogan County, WA

## **APPENDIX B**

### **Well Logs**

## Summary of Wells in Antoine Valley

Well ID	Owner	Ecology Well ID	Total Depth (ft)	Yield (gpm)	Water Level (ft)	Water Level Source	Locational Accuracy
01A01	Fancher	-	36	150	24	well log	Qtr Qtr
01J01	Fruit	-	16	350	8.3	measured	GPS
01L01	Oberg	-	200	dry	-	well log	Parcel
01P01	Vernier	-	10	20	2.6	measured	GPS
01Q01	Vernier	-	15	160	6.15	measured	GPS
06G01	Morrison	-	32	5	17.75	measured	GPS
06P01	Morrison	-	142	1.5	60	well log	Qtr
12A01	Holmdahl	-	65	60	22	well log	GPS
12A02	Holmdahl	-	160	-	13	well log	GPS
12A03	Holmdahl	-	50	130	13	well log	GPS
12C01	Walter	-	46	30	4	well log	Parcel
12F01	Michels	ACM907	100	15	6	well log	Parcel
12F02	Schaller	ABY740	41	30	15	well log	Qtr Qtr
12G01	Fruit	-	22	200	4	well log	GPS
12M01	Nixon	-	12	100	3	well log	Parcel

# Summary of Wells in Lower Siwash Creek below Antoine Valley

Well ID	Owner	Ecology Well ID	Total Depth (ft)	Yield (gpm)	Water Level (ft)	Water Level Source	Locational Accuracy
09R01	Alois/Home Helpers	ALC479	97	70	26	well log	Parcel
11K01	Zachman	-	125	1	50	well log	Parcel
11K02	Olson	BCF102	385	2.5	63	well log	Parcel
14B01	Combs	-	135	dry	-	well log	Qtr Qtr
14B02	helm	BAB573	200	5	20	well log	Parcel
14B03	Hernandez	AHT586	94	10	0	well log	Parcel
14D01	Olson	APT620	235	10	140	well log	Parcel
14D02	Olson	BAT836	58	100	12	well log	Parcel
14D03	Kessler	-	300	dry	-	well log	Qtr Section
14E01	Gardinier	ACX473	62.5	12	48	well log	Qtr Qtr
14E02	Gardinier	AEQ516	605	0.5	304	well log	Qtr Qtr
14E03	Gardinior	AEQ517	63	dry	56	well log	Qtr Qtr
14F01	Combs	AGE252	60	0.5	34	well log	Parcel
14F02	Combs	ACX301	60	-	32	well log	Qtr Qtr
14K01	Eberle	-	250	0.5	-	well log	Qtr Qtr
14M01	Gardinier	ACR844	220	3	76	well log	Parcel
15A01	Schuller	-	82	20	27	well log	Qtr Qtr
15D01	Eberle	-	400	0.25	60	well log	Qtr Qtr
15L01	Bretz	AKJ688	298	25	210	well log	Qtr Qtr
15M01	Free Methodist	ALF563	358	50	190	well log	Parcel
16A01	USFS	-	40	-	31	well log	Parcel
16A02	USFS	-	40	-	30	well log	Parcel
16A03	USFS	-	40	-	29	well log	Parcel
16A04	Culver	AKO019	64	21	40	well log	Parcel
16A05	Culver	AKO018	64	23	40	well log	Parcel

Application No. G4-23855  
Permit No. G4-23855P

— 3 —



First and First Copy with  
Second Copy — Owner's Copy  
Third Copy — Driller's Copy

# WATER WELL REPORT

STATE OF WASHINGTON

Application No. **64-23855**

Permit No. **64-238551**

(1) OWNER: Name **T. Holmdahl** Address **46 Siwash Crk Tonasket, WA, 98851**

(2) LOCATION OF WELL: County **OKANOGAN** NE  $\frac{1}{4}$  NE  $\frac{1}{4}$  Sec 12 T. 37 N. R. 27 E W.M.  
ing and distance from section or subdivision corner **200 Ft south & 1100 Ft west from NE corner of Sec 12**

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

(4) TYPE OF WORK: Owner's number of well (if more than one) **3**  
New well ☒ Method: Dug ☐ Bored ☐  
Deepened ☐ Cable ☐ Driven ☐  
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well **12** inches.  
Drilled **1100** ft. Depth of completed well **160** ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: **12** " Diam. from **0** ft. to **160** ft.  
Threaded ☐ " Diam. from ft. to ft.  
Welded ☒ " Diam. from ft. to ft.

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

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

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

Surface seal: Yes ☒ No ☐ To what depth? **18** ft.  
Material used in seal **CLAY**  
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 **1500** ft.  
Static level **13** ft. below top of well Date \_\_\_\_\_  
Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

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

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

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

## (10) WELL LOG:

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

MATERIAL	FROM	TO
TOP SOIL	0	14
SAND & DIRT	14	15
CLAY	15	16
CLAY & DIRT (W/WATER)	16	17
SOOPY CLAY	17	29
HARDER	29	34
SAND & GRAVEL (NOT GOOD)	34	46
RED SAND (W/WATER)	46	57
BROWN FINE SAND	57	84
GRAY SILT	84	95
SOME SAND MOSTLY SILT	95	99
HARDER CLAY	99	129
SOFT CLAY	129	131
WATER CLAY	131	134
SOME ROCKS & GRAVEL	134	135
ROCKS & CLAY	135	138
WATER IN CLAY SOUP	138	141
HARD PAN	141	148
FREE GRAVEL W/WATER	148	149
HARD CLAY	149	150
SAND & GRAVEL	150	152
SOOPY GRAVELY WATER	152	155
HARD PAN	155	160

DEPARTMENT OF ECOLOGY  
WELL LOG

Work started **AUG 1975** Completed **AUG 1975**

## WELL DRILLER'S STATEMENT:

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

**HUBBARD'S WELL DRILLING**  
NAME **Harry H. Hubbard**  
(Person, firm, or corporation) (Type or print)

Address **Box 207 Riverside, Wash.**

[Signed] \_\_\_\_\_ (Well Driller)

License No. **227-02-6093** Date **AUG 1975**

# WATER WELL REPORT

STATE OF WASHINGTON

Application No. 64-23855  
Permit No. 64-23855P

(1) OWNER: Name T. HOLMDAL Address 46 Siwash Crk, Tonasket, WA 98855

(2) LOCATION OF WELL: County Okanogan NE NE Sec. 12 T. 37 N. R. 27 E W.M.

Distance and direction from section or subdivision corner 220ft south 1040ft west from NE corner of sec. 12

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

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

(5) DIMENSIONS: Diameter of well 12" inches.  
Drilled 50 ft. Depth of completed well 41 ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: " Diam. from ft. to ft.  
Threaded ☐ " Diam. from ft. to ft.  
Welded ☒ 12 " Diam. from 0 ft. to 41 ft.

Perforations: Yes ☒ No ☐  
Type of perforator used 1/2  
SIZE of perforations 1/2 in. by 1 in.  
63 perforations from 36 ft. to 40 ft.  
perforations from ft. to ft.  
perforations from ft. to ft.

Screens: Yes ☐ No ☒  
Manufacturer's Name BERKLEY  
Type SUBMERSIBLE Model No. HP 10  
Diam. Slot size from ft. to ft.  
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: 1/4  
Gravel placed from ft. to ft.

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

(7) PUMP: Manufacturer's Name BERKLEY  
Type: SUBMERSIBLE HP 10

(8) WATER LEVELS: Land-surface elevation above mean sea level... ft.  
Static level 13 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: 130 gal./min. with 27 ft. drawdown after 4 hrs.  
" " " " " "

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

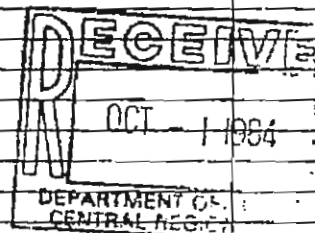
Time	Water Level	Time	Water Level	Time	Water Level

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

## (10) WELL LOG:

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

MATERIAL	FROM	TO
TOP SOIL	0	6
CLAY	6	17
SAND & CLAY (W/WATER)	17	21
CLAY & ROCKS	21	35
GOOD SAND & GRAVEL	35	41
MUCK	41	50



Work started JUNE 19 75 Completed JUNE 19 75

## 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 HUBBARD'S WELL DRILLING  
(Person, firm, or corporation) (Type or print)

Address RIVERSIDE, WASH

[Signed] Harry H. Hubbard  
(Well Driller)

License No. 1-22-643 Date JUNE 19 75

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

## STATE OF WASHINGTON

Permit No. G4-23855

(1) OWNER: Name T. HOLMDALE Address 46 SILWASH CRK TONAWKET, WA 9805

(2) LOCATION OF WELL: County OKMORGAN - NE<sup>1</sup>/<sub>4</sub> NE<sup>1</sup>/<sub>4</sub> Sec. 12 T. 37N. R. 27E W.M.  
 Bearing and distance from section or subdivision corner 450 ft South & 175 ft West from NE corner of Sec. 12

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

(4) TYPE OF WORK: Owner's number of well (if more than one).....2

New well	<input checked="" type="checkbox"/>	Method: Dug	<input type="checkbox"/>	Bored	<input type="checkbox"/>
Deepened	<input type="checkbox"/>	Cable	<input type="checkbox"/>	Driven	<input type="checkbox"/>
Reconditioned	<input type="checkbox"/>	Rotary	<input type="checkbox"/>	Jetted	<input type="checkbox"/>

(5) DIMENSIONS: Diameter of well 6 inches.  
 Drilled 65 ft. Depth of completed well 65 ft.

**(6) CONSTRUCTION DETAILS:**

Casing installed: 6 " Diam. from 0 ft. to 65 ft.  
 Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Welded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes ☒ No ☐  
Type of perforator used SAW  
SIZE of perforations 1/8 in. by 2 in.  
50 perforations from 48 ft. to 62 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? 10 ft.  
Material used in seal: CLAY  
Did any strata contain unusable water? Yes ☐ No ☒  
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name BERKLEY  
Type: SUBMERSIBLE HP 5

(8) **WATER LEVELS:** Land-surface elevation above mean sea level.....ft.  
 Static level 22.....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: 60 gal./min. with 43 ft. drawdown after 2 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
00:00	0.00	00:00	0.00	00:00	0.00
00:01	0.01	00:01	0.01	00:01	0.01
00:02	0.02	00:02	0.02	00:02	0.02
00:03	0.03	00:03	0.03	00:03	0.03
00:04	0.04	00:04	0.04	00:04	0.04
00:05	0.05	00:05	0.05	00:05	0.05
00:06	0.06	00:06	0.06	00:06	0.06
00:07	0.07	00:07	0.07	00:07	0.07
00:08	0.08	00:08	0.08	00:08	0.08
00:09	0.09	00:09	0.09	00:09	0.09
00:10	0.10	00:10	0.10	00:10	0.10
00:11	0.11	00:11	0.11	00:11	0.11
00:12	0.12	00:12	0.12	00:12	0.12
00:13	0.13	00:13	0.13	00:13	0.13
00:14	0.14	00:14	0.14	00:14	0.14
00:15	0.15	00:15	0.15	00:15	0.15
00:16	0.16	00:16	0.16	00:16	0.16
00:17	0.17	00:17	0.17	00:17	0.17
00:18	0.18	00:18	0.18	00:18	0.18
00:19	0.19	00:19	0.19	00:19	0.19
00:20	0.20	00:20	0.20	00:20	0.20
00:21	0.21	00:21	0.21	00:21	0.21
00:22	0.22	00:22	0.22	00:22	0.22
00:23	0.23	00:23	0.23	00:23	0.23
00:24	0.24	00:24	0.24	00:24	0.24
00:25	0.25	00:25	0.25	00:25	0.25
00:26	0.26	00:26	0.26	00:26	0.26
00:27	0.27	00:27	0.27	00:27	0.27
00:28	0.28	00:28	0.28	00:28	0.28
00:29	0.29	00:29	0.29	00:29	0.29
00:30	0.30	00:30	0.30	00:30	0.30
00:31	0.31	00:31	0.31	00:31	0.31
00:32	0.32	00:32	0.32	00:32	0.32
00:33	0.33	00:33	0.33	00:33	0.33
00:34	0.34	00:34	0.34	00:34	0.34
00:35	0.35	00:35	0.35	00:35	0.35
00:36	0.36	00:36	0.36	00:36	0.36
00:37	0.37	00:37	0.37	00:37	0.37
00:38	0.38	00:38	0.38	00:38	0.38
00:39	0.39	00:39	0.39	00:39	0.39
00:40	0.40	00:40	0.40	00:40	0.40
00:41	0.41	00:41	0.41	00:41	0.41
00:42	0.42	00:42	0.42	00:42	0.42
00:43	0.43	00:43	0.43	00:43	0.43
00:44	0.44	00:44	0.44	00:44	0.44
00:45	0.45	00:45	0.45	00:45	0.45
00:46	0.46	00:46	0.46	00:46	0.46
00:47	0.47	00:47	0.47	00:47	0.47
00:48	0.48	00:48	0.48	00:48	0.48
00:49	0.49	00:49	0.49	00:49	0.49
00:50	0.50	00:50	0.50	00:50	0.50
00:51	0.51	00:51	0.51	00:51	0.51
00:52	0.52	00:52	0.52	00:52	0.52
00:53	0.53	00:53	0.53	00:53	0.53
00:54	0.54	00:54	0.54	00:54	0.54
00:55	0.55	00:55	0.55	00:55	0.55
00:56	0.56	00:56	0.56	00:56	0.56
00:57	0.57	00:57	0		

galler test gal/min, with ft. drawdown after hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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

MATERIAL	FROM	TO
TOP SOIL	0	10
DIRT & GRAVEL	10	13
HARD PAN	13	20
CLAY SOME GRAVEL	20	40
WOOD / GRAVEL	40	46
SAND / GRAVEL / WATER	46	59
BINDER	59	61
FREE	61	62
CLAY	62	65

RECEIVED  
OCT - 1 1984  
DEPARTMENT OF  
CENTRAL INTELLIGENCE

Work started JULY 1975. Completed JULY 1975.

**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 HUBBARD'S WELL DRILLING  
(Person, firm, or corporation) (Type or print)

Address RIVERSIDE

(Signed) Harry A. Huford.  
(Well Driller)

License No. 229-62 - 6043 Date JULY 1975

PRINTED No. ... 100-100000-0000

bearing and distance from section or subdivision corner

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

MATERIAL	FROM	TO
Sand Gravel, Boulders Clay	0	142

License No. 0382 Date 3-19 1979

FSY 040.1-20

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

Application No. \_\_\_\_\_  
Permit No. \_\_\_\_\_



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

43891

## WATER WELL REPORT

Inv &gt;

STATE OF WASHINGTON

Start Card No. W054987UNIQUE WELL I.D. # ACC-938

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

(1) OWNER: Name Ivan Oberg Address 107 Rancher Rd. Tonasket, WA 98855(2) LOCATION OF WELL: County Okanogan NE SW 1 37 27 N. R. W. M.(2a) STREET ADDRESS OF WELL (or nearest address) Address Above(3) PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐  
☐ Irrigation ☐ Test Well ☐ Other ☐  
☐ DeWater

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

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐  
Deepened ☐ Cable ☐ Driven ☐  
Reconditioned ☐ Rotary ☒ Jetted ☐(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 200 feet. Depth of completed well 200 ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Welded ☒ \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ \_\_\_\_\_ ft. to \_\_\_\_\_ ft.Perforations: Yes ☐ No ☒

Type of perforator used \_\_\_\_\_

SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.Screens: Yes ☐ No ☒

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel \_\_\_\_\_

Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.Material used in seal BentoniteDid any strata contain unusable water? Yes ☐ No ☒

Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.

Static level \_\_\_\_\_ 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

Time Water Level Time Water Level Time Water Level

Time Water Level Time Water Level Time Water Level

Time Water Level Time Water Level Time Water Level

Time Water Level Time Water Level Time Water Level

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## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
Sand, gravel-broken	0	15
Rock-shale	15	19
Black shale	19	200
Black shale w/white quartz stringers		
No Water.		

SEP 27 1995

Work started 8/23/95 19 Completed 8/24/95 19

## WELL CONSTRUCTOR CERTIFICATION:

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

NAME Fogle Pump & Drilling West

P.O. Box 436 Republic WA 99166 OR PRINT

Address \_\_\_\_\_

(Signed) Torrey D. Carlick License No. 1895

(WELL DRILLER)

Contractor's Registration # PS 095 L4 Date 8/24/95

No. \_\_\_\_\_ Date \_\_\_\_\_ 18

(USE ADDITIONAL SHEETS IF NECESSARY)



STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

WELL LOG

No. Appli. #4431

Date June 2 19 56

Record by well driller

Source driller's record

Location State of WASHINGTON

County Okanogan

Area

Map

SW 1/4 NE 1/4 sec 12 T37 N, R. 27 E

Diagram of Section

Drilling Co Marvin Henneman

Address Oroville, Wash.

Method of Drilling dug Date 19 56

Owner James Fruit

Address Tonasket, Wash.

Land surface, datum ft above  
below

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

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

Clay	20	20
Gravel (water bearing)	2	22
Pump test:		
Dim. 22"x4'		
SWL: 4 ft.		
DD: 16 ft.		
Yield: 200 g.p.m.		
Type & size of pump: 2" centrifugal		
" " " " motor: 5 h.p. single		
phase		
CASING: 48" diam. concrete tile		
from top to 22 ft.		

Turn up

Sheet    of    sheets

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

# WELL LOG

No. App'd. 5316

Date 1-27 1960

Record by well driller

Source driller's record

Location State of WASHINGTON

County. . . Okanogan . . .

Arca . . . . .

Map . . . . .

E<sub>2</sub> ~~NE~~ 1/4 sec 1 T. 37N., R. 27. E

### Diagram of Section

Drilling Co. Marvin Henneman

Address Oroville, Wash.

Method of Drilling... dug ... Date 8-27 - - , 1959

John T. Fancher

Address. Tomasket, Wash.

Land surface, datum . . . . . ft above  
below

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

Top soil	4	4
Gravel & boulders	20	24
Gravel water bearing	12	36
PUMP TEST:		
Dim. 36'x4'		
SWL: 24 ft.		
DD: 10 ft.		
Measured discharge: 150	g.p.m.	
CASING:		
48" diam. concrete tile	from top	
	to 36 ft.	

Turn up

Sheet - of - sheets



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

No. Appli. #4062

### Diagram of Section

— — — — —

11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 10

[illegible]

Mon 12

May . . . , 19-

10 11 12 13 14 15

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



Sheet.      of      sheets

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

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W088416

UNIQUE WELL I.D. #

Water Right Permit No.

(1) OWNER: Name JAYME/JOHN WALTER Address PO Box 1065 TONASKET WA 98855

(2) LOCATION OF WELL: County Okanogan NE 1/4 NW 1/4 Sec. 12 T. 37 N. R. 27 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) 60 FANCHER RD TONASKET WA 98855

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

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

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 96 feet. Depth of completed well 96 ft.

(6) CONSTRUCTION DETAILS:  
Casing installed: 6 - Diam. from 0 ft. to 46 ft.  
Welded ☒ - Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ - Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ - Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

Screens: Yes ☐ No ☒  
Manufacturer's Name \_\_\_\_\_  
Type \_\_\_\_\_ 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 above mean sea level \_\_\_\_\_ ft.  
Static level 4 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.

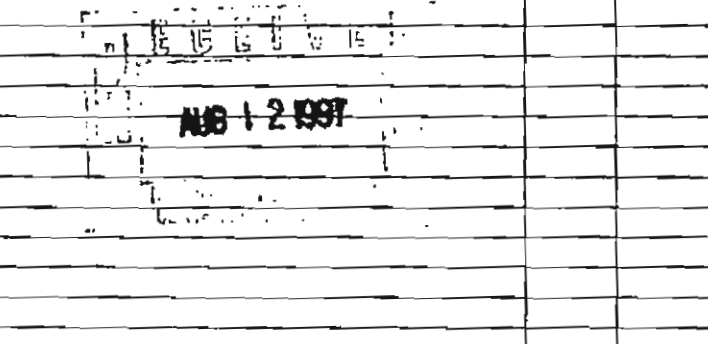
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)  
Time Water Level Time Water Level Time Water Level

Date of test 7/19/97  
Ball test 30 gal./min. with 0 ft. drawdown after 4 hrs.  
Air test \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes ☐ No ☐

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
top soil	0	1
clay	0	3
hard clay	3	14
sand & rocks	14	25
mud	25	35
mud & gravel	35	46
rocks	46	



Work Started 7/13 19. Completed 7/20 1997

## 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 Hubbard Well Drilling (PERSONAL OR CORPORATION) (TYPE OR PRINT)

Address P.O. Box 112

(Signed) Joe Hubbard License No. 0882

Contractor's Registration No. Hubbard 1208A Date 7/20 1997

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6800. The TDD number is (206) 407-6006.

Appli. No. 9161  
Permit No. 8485

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
DIVISION OF WATER RESOURCES

WELL LOG

Record by Drillers Record  
Source Drillers Record

Location State of WASHINGTON  
County Okangon  
Area  
Map

NW 1/4 SW 1/4 sec 12 T 37N, R27. E

Drilling Co. Tonasket Ready-Mix, Inc.

Address Tonasket, Washington

Method of Drilling Dug Date June 1, 19 68

Owner Robert M. Nixon

Address Tonasket, Washington

Land surface, datum . . . ft above

SWL 3' Date June 18, 19 68 Dims 48" x 12"

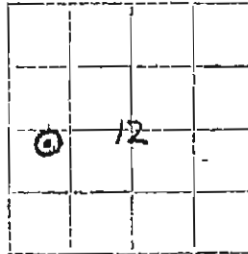


Diagram of Section

CORRELATION	MATERIAL	From (feet)	To (feet)
-------------	----------	-------------	-----------

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

Irrigation		
Dirt & Clay	0	4
Gravel	4	10
Clay	10	10'6"
Gravel	10'6"	12'
Gravel packed from 6 to 12'		
Yield: 100 gpm with 6' DD after 12 hrs		
Slow final recovery		
June 18, 1968		

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

## WELL LOG

No Applic 4064

Cert. 2394

Date . . . . ., 1920.

Record by N. M. Vernier -----

Source Driller's Record...

Location State of WASHINGTON

County.. Okanogan .. . . . .

Area . . . . .

Map . . . . .

NW 1/4 SE 1/4 sec 1 ...T 37 N, R 27. E

### Diagram of Section

Drilling Co. N. M. Vernier . . . . .

Address . Tonasket, Washington .. . . .

Method of Drilling Dug. . . . . Date . . . . ., 19 . .

Owner... N. M. Vernier . . . . .

Address Tonasket, Washington . . . . .

Land surface, datum ----- ft above  
below -----

CON- DATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
----------------	----------	---------------------	-----------------

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

[illegible]

**Turn up**

Sheet 1 of 1 sheets

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

WELL LOG No Appli. 4063  
Date April 17, 1952 Cert. 2393  
Record by N. M. Vernier  
Source Driller's Record  
Location State of WASHINGTON  
County Okanogan  
Area  
Map  
SE 1/4 SW 1/4 sec 1 T 37 N, R 27 E  
Drilling Co. N. M. Vernier  
Address  
Method of Drilling Dug Date April 17, 1952  
Owner N. M. Vernier  
Address Tonasket, Washington  
Land surface, datum ft above  
below

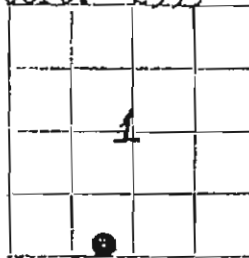


Diagram of Section

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Coarse Gravel	10	10
	Pump Test:		
	Dia: 10' X 48"		
	SWL: 1'		
	DD: 6'		
	Yield: 20 g.p.m.		
	Casing 48" dia Well curbing concret		
	from 0 to 10'		
	Perforations: Regular well curbing		
	Bottom from 0 to 10'		
	Ring irain forced with steel band		
	5'		

Turn up

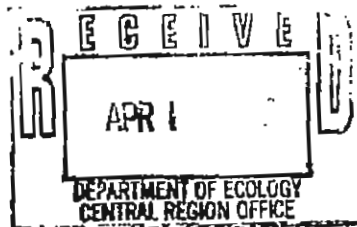
Sheet of sheets

## WATER WELL REPORT

Start Card No. M074339  
 Unique Well I.D. # ACM907  
 Water Right Permit No.

## STATE OF WASHINGTON

OWNER: Name MICHELS, KENNETH		Address PO BOX 45 TONASKET, WA 98855-	
(2) LOCATION OF WELL: County OKANOGAN		NE 1/4 NW 1/4 Sec 12 T 37 N., R 27E WM	
(2a) STREET ADDRESS OF WELL (or nearest address) FANCHER RD.,			
(3) PROPOSED USE: DOMESTIC		(10) WELL LOG	
(4) TYPE OF WORK: Owner's Number of well [If more than one] 1 NEW WELL Method: ROTARY		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 in formation.	
(5) DIMENSIONS: Diameter of well 5 inches Drilled 100 ft. Depth of completed well 100 ft.		MATERIAL	
(6) CONSTRUCTION DETAILS:		OVERBURDEN 0 2	
Casing installed: 6 " Dia. from +1 ft. to 58 ft.		SAND GRAVEL 2 15	
WELDED 4 " Dia. from 40 ft. to 100 ft.		CLAY GRAVEL 15 53	
" Dia. from ft. to ft.		LIMESTONE GREEN MEDIUM 53 68	
		LIMESTONE GRAY W/WATER 68 70	
		LIMESTONE GRAY MEDIUM 70 100	
Perforations: 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: NO			
Manufacturer's Name			
Type Model No.			
Diam. slot size from ft. to ft.			
Diam. slot size from ft. to ft.			
Gravel packed: NO			
Gravel placed from ft. to ft.			
Surface seal: YES To what depth? 19 ft.			
Material used in seal BENTONITE			
Did any strata contain unusable water? YES			
Type of water? SURFACE WATER Depth of strata 10-15 ft.			
Method of sealing strata off CASING			
(7) PUMP: Manufacturer's Name			
Type NONE H.P.			
(8) WATER LEVELS: Land-surface elevation			
above mean sea level ... ft.			
Static level 6 ft. below top of well Date 02/21/97			
Artesian Pressure lbs. per square inch Date			
Artesian water controlled by CAP			
(9) WELL TESTS: Drawdown is amount water level is lowered below static level.		WELL CONSTRUCTOR CERTIFICATION:	
Was a pump test made? NO If yes, by whom?		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.	
Yield: gal./min with ft. drawdown after hrs.			
Recovery data		NAME FOGLE PUMP & SUPPLY, INC.	
Time Water Level Time Water Level Time Water Level		(Person, firm, or corporation) (Type or print)	
Date of test / /		ADDRESS 316 W 5TH	
Bailer test gal./min. ft. drawdown after hrs.		(SIGNED) Mike Dean License No. 1451	
Air test 15 gal./min. w/ stem set at 98 ft. for .5 hrs.		Contractor's	
Artesian flow g.p.m. Date		Registration No. FOGLEP095L4 Date 03/13/97	
Temperature of water Was a chemical analysis made? NO			



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

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W 050235

UNIQUE WELL I.D. # ABY 740

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

(1) OWNER: Name Todd Schaller Address Rt 1 Box 214, Oroville, Wa 98844

(2) LOCATION OF WELL: County Okanogan SE 1/4 NW 1/4 Sec 12 T 37 N. R. 27 WM.

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

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

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

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

(5) DIMENSIONS: Diameter of well 6 inches  
Drilled 40 feet. Depth of completed well 40 ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +1 ft. to 36 ft.  
Welded ☒ Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

Screens: Yes ☒ No ☐  
Manufacturer's Name \_\_\_\_\_  
Type Telescoping Model No. \_\_\_\_\_  
Diam 5 Slot size 30 from 35 ft. to 40 ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

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

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

(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.  
Static level 15 ft. below top of well Date \_\_\_\_\_  
Artesian pressure \_\_\_\_\_ lbs. per square inch Date \_\_\_\_\_  
Artesian water is controlled by \_\_\_\_\_ (Cap, valve, etc.)

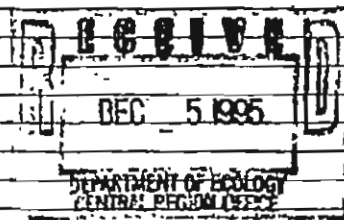
(9) WELL TESTS: Drawdown is amount water level is lowered below static level  
Was a pump test made? Yes ☐ No ☐ If yes, by whom? \_\_\_\_\_  
Yield, 30 gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

" " " "

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

MATERIAL	FROM	TO
Top Soil	0	3
Sand, Gravel	3	16
Wet Brown Clay, Some Gravel	16	29
Sand, Gravel, Water	29	41



Work Started 11-28-95 at \_\_\_\_\_ Completed 11-30-95 at \_\_\_\_\_

## 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 Okanogan Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Rt 2 Box 395, Okanogan, Wa 98840

(Signed) Steve Schaller License No. 1448  
(WELL DRILLER)

Contractor's Registration No. OKANODD119LT Date 12-1-95 19\_\_\_\_

(USE ADDITIONAL SHEETS IF NECESSARY)

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

Please print, sign and return to the Department of Ecology



# Water Well Report

Original - Ecology, 1<sup>st</sup> copy - owner, 2<sup>nd</sup> copy - driller

## Construction/Decommission

☒ Construction 258590☐ Decommission ORIGINAL INSTALLATION Notice of Intent Number \_\_\_\_\_

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal  
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other \_\_\_\_\_

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

☒ New well ☐ Reconditioned Method: ☐ Dug ☐ Bored ☐ Driven  
☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 97 ft.

Depth of completed well 97 ft.

### CONSTRUCTION DETAILS

Casing ☒ Welded 6" Diam. from 12 ft. to 92 ft.  
 Installed: ☐ Liner installed " Diam. from " ft. to " ft.  
☐ Threaded " Diam. from " ft. to " ft.

Perforations: ☐ Yes ☒ No

Type of perforator used \_\_\_\_\_  
 SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: ☒ Yes ☐ No ☒ K-Pac Location 91

Manufacturer's Name Johnson

Type T&S COP Model No. \_\_\_\_\_  
 Diam. 5 Slot size 30 from 92 ft. to 97 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_  
 Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentright CS

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 26' ft. below top of well Date 3-16-07

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: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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 3-16-07

Bailer test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Airstest 70 gal./min. with stem set at 95 ft. for 4 hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☒ No

## Current

Notice of Intent No. W 232614

Unique Ecology Well ID Tag No. ALC 479

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

Property Owner Name Pete Alois Home 1761 Acers

Well Street Address Hwy 97

City Tonasket County Okanogan

Location 55/4-1/4 55/4 Sec 9 Twn 3727 EWM or WWM ☒ circle one

Lat/Long (s, t, r) Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

still REQUIRED ) Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 3727090029

## CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TOP Soil	0	6
Silty Sand	6	24
Sand Gravel	24	41
Clay	41	45
Clay Gravel Water	45	48
Fine Sand	48	72
Gravel	72	75
Fine Sand	75	83
Coarse Sand	83	88
Gravel	88	97



Start Date 3-13-07 Completed Date 3-16-07

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

Driller/Engineer/Trainee Name (Print) Bill Morrison

Driller/Engineer/Trainee Signature [Signature]

Driller or trainee License No. 1573

Drilling Company Morrison Drilling

Address PO Box 3652

City, State, Zip Omak WA 98841

Contractor's Registration No. [Signature] Date 3-16-07

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)

### IF TRAINEE.

Driller's Licensed No. \_\_\_\_\_

Driller's Signature \_\_\_\_\_





# WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle) 346137

☒ Construction

☐ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number \_\_\_\_\_

PROPOSED USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Municipal <input type="checkbox"/> DeWater <input type="checkbox"/> Irrigation <input type="checkbox"/> Test Well <input type="checkbox"/> Other	
TYPE OF WORK: Owner's number of well (if more than one) _____ <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Reconditioned Method: <input type="checkbox"/> Dug <input type="checkbox"/> Bored <input type="checkbox"/> Driven <input type="checkbox"/> Deepened <input type="checkbox"/> Cable <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Jetted	
DIMENSIONS: Diameter of well <u>6</u> inches, drilled <u>98</u> ft. Depth of completed well <u>98</u> ft.	
CONSTRUCTION DETAILS Casing <input checked="" type="checkbox"/> Welded <u>6</u> " Diam. from <u>+2</u> ft. to <u>93 1/2</u> ft. Installed: <input type="checkbox"/> Liner installed " Diam. from " ft. to " ft. <input type="checkbox"/> Threaded " Diam. from " ft. to " ft.	
Perforations: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type of perforator used _____ SIZE of perfs. in. by in. and no. of perfs. from ft. to ft.	
Screens: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> K-Pac Location <u>93</u> Manufacturer's Name <u>MIDNIFLEX</u> Type <u>STAINLESS</u> Model No. _____ Diam. <u>6</u> Slot Size <u>1/2</u> from <u>93</u> ft. to <u>98</u> ft. Diam. Slot Size from ft. to ft.	
Gravel/Filter packed: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Size of gravel/sand _____ Materials placed from ft. to ft.	
Surface Seal: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No To what depth? <u>18</u> ft. Materials used in seal <u>BENTONITE AND 6" CASING</u> Did any strata contain unusable water? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> 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 <u>34</u> ft. below top of well Date <u>7-7-09</u> 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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, by whom? _____ Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. 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. Airstest <u>12</u> gal./min. with stem set at <u>97</u> ft. for <u>1 1/2</u> hrs. Artesian flow _____ g.p.m. Date _____ Temperature of water _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

CURRENT

Notice of Intent No. W260663

Unique Ecology Well ID Tag No. BAR 405

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

Property Owner Name AMANDEEP MALHA

Well Street Address 3 TEMBY ROAD

City TONASKET County: OKANOGAN

Location SE 1/4- 1/4 SE 1/4 Sec 09 Twn 37 R22E WWM circle or one

Lat/Long: Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

(s, t, r still REQUIRED) Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 3727090079

CONSTRUCTION OR DECOMMISSION PROCEDURE  
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.  
(USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
SAND, BRN, FINE	0	26
SAND, BRN, FINE, DAMP	26	38
CLAY, SILT, GRAY, WET	38	58
SILT, SAND, GRAVELS	58	
WATER		98

RECEIVED

JUL 20 2009

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Start Date 7-6-09 Completed Date 7-7-09

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JON RICARD

Driller/Engineer/Trainee Signature J Ricard

Driller or Trainee License No. 2341

If trainee, licensed driller's \_\_\_\_\_

Signature and License no. \_\_\_\_\_

Ricard Drilling Inc.  
9 Pleasant View Dr.  
Republic, WA 99166  
Contractor # RICARDI920CD  
Date 7-7-2009

(1) OWNER: Name Arnold Kessler Address HAVILAH BL. Tonasket, WA  
(2) LOCATION OF WELL: County Okanogan N. 1/4, N. 1/4 Sec. 14 T. 37 N., R. 27E W. M.  
Bearing and distance from section or subdivision corner

(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 <input checked="" type="checkbox"/>	Method: Dug <input type="checkbox"/>	Bored <input type="checkbox"/>
Deepened <input type="checkbox"/>	Cable <input type="checkbox"/>	Driven <input type="checkbox"/>
Reconditioned <input type="checkbox"/>	Rotary <input checked="" type="checkbox"/>	Jetted <input type="checkbox"/>

(5) **DIMENSIONS:** Diameter of well ..... 8" inches.  
 Drilled 300 ft. Depth of completed well ..... 300 ft.

**(6) CONSTRUCTION DETAILS:**

**Casing installed:** 8" Diam. from +1 ft. to 89 ft.  
 Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Welded ☒ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes ☒ No ☐ *Torch*  
Type of perforator used \_\_\_\_\_  
SIZE of perforations *.00* in. by *12* in.  
*2* perforations from *25* ft. to *87* ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Screens:** Yes ☐ No ☒

**Manufacturer's Name**.....

**Type**..... **Model No**.....

**Diam.**..... **Slot size**..... **from**..... **ft. to**..... **ft.**

**Diam.**..... **Slot size**..... **from**..... **ft. to**..... **ft.**

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

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

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

(8) **WATER LEVELS:** Land-surface elevation above mean sea level.....ft.  
 Static level NONE 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.

00	01	02	03
04	05	06	07

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

**(10) WELL LOG:**

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

MATERIAL	FROM	TO
Brn. clay	0	5
Blue clay, gravel	3	89
Granite	89	300'

Dry

RECEIVED

NOV 15 1971

DEPARTMENT OF THE ARMY  
OFFICE OF THE ADJUTANT GENERAL  
WASHINGTON, D. C.

~~RECEIVED~~

~~NOV 14 1977~~

DEPARTMENT OF ECOLOGY  
SPOKANE REGIONAL OFFICE

Work started 11-2, 1977 Completed 11-2, 1977

**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 Aqua Drilling and Dev. Inc.  
(Person, firm, or corporation) (Type or print)

Address Box 1499 CDA, Ida.

[Signed] Thom D. Lewis  
(Well Driller)

License No. 718 Date 11-4, 1977

# WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name Letha Zachman Address Box 183 Tonasket Wn. 98855

(2) LOCATION OF WELL: County Okanagon SW 1/4 SE 1/4 Sec 11 T 37 N R 27 E W.M.

ing and distance from section or subdivision corner

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

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

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

## (6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +1 ft. to 20 ft.  
Threaded ☐ " Diam. from ..... ft. to ..... ft.  
Welded ☒ " Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒

Type of perforator used .....  
SIZE of perforations ..... in. by ..... in.  
..... perforations from ..... ft. to ..... ft.  
..... perforations from ..... ft. to ..... ft.  
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☒

Manufacturer's Name .....  
Type ..... Model No .....  
Diam. .... Slot size ..... from ..... ft. to ..... ft.  
Diam. .... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....  
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 19 ft.  
Material used in seal Bentonite  
Did any strata contain unusable water? Yes ☐ No ☒  
Type of water? ..... Depth of strata .....  
Method of sealing strata off .....

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

(8) WATER LEVELS: Land-surface elevation above mean sea level .....  
Static level 50 ft. below top of well Date 6-8-78  
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: 1 gal./min. with ..... ft. drawdown after ..... hrs.  
" Blown Air " " " " " " " " " " " "

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 .....

Flow test: ..... gal./min. with ..... ft. drawdown after ..... hrs.

Artesian flow: ..... g.p.m. Date .....

Temperature of water Cold Was a chemical analysis made? Yes ☐ No ☒

## (10) WELL LOG:

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

MATERIAL	FROM	TO
Sand	0	10
Decomposed Granite	10	18
Broken Gray Granite	18	50
Soft Gray Granite	50	125

RECEIVED

AUG-24 1978

DEPARTMENT OF ECOLOGY  
CENTRAL REGIONAL OFFICE

RECEIVED  
JUL 17 1978  
Department of Water Resources  
Northern District Office

Work started 6-6 19 78 Completed 6-6 19 78

## 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 Agua Drilling Inc.  
(Person, firm, or corporation) (Type or print)

Address PO Box 659 Hayden Lake Idaho

[Signed] Jay Buchanan  
(Well Driller)

License No. 999 Date 6-6 19 78

(1) OWNER: Name \_\_\_\_\_ Address \_\_\_\_\_

LOCATION OF WELL: County OK SW NE 1 4 Sec 1 T 1 N R 1 W M

Bearing and distance from section or subdivision corner: 30 feet north and 30 feet west of the corner of the section.

(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	<input type="checkbox"/>	Method, dug	<input type="checkbox"/>	Bored	<input type="checkbox"/>
Deepened	<input type="checkbox"/>	Hand-dug/cable	<input type="checkbox"/>	Driven	<input type="checkbox"/>
Reconditioned	<input type="checkbox"/>	Rotary	<input type="checkbox"/>	Jetted	<input type="checkbox"/>

(5) **DIMENSIONS:** Diameter of well 12 inches.  
 Drilled 90 ft. Depth of completed well 90 ft.

**(6) CONSTRUCTION DETAILS:**

**Casing installed:** 1 1/2" Diam. from 504.4 ft to 505.0 ft.  
 Threaded ☐ 1 1/2" Diam. from \_\_\_\_\_ ft to \_\_\_\_\_ ft.  
 Welded ☐ 1 1/2" Diam. from 505.0 ft to 505.0 ft.

**Perforations:** Yes ☐ No ☐

Type of perforator used .....

SIZE of perforations ..... in. by ..... in.

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

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

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

Screens: Yes ☐ No ☐

Manufacturer's Name.....

Type..... Model No.....

Diam..... Slot size..... from..... ft to..... ft.

Diam..... Slot size..... from..... ft to..... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel, .....  
Gravel placed from ..... ft. to ..... ft.

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

(7) PUMP: Manufacturer's Name Johnston  
Type JFD-100 H.P. 20

**(8) 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.)

**(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.

14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100													
101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200

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
11:00	10.0	11:00	10.0	11:00	10.0
11:15	10.0	11:15	10.0	11:15	10.0
11:30	10.0	11:30	10.0	11:30	10.0
11:45	10.0	11:45	10.0	11:45	10.0
12:00	10.0	12:00	10.0	12:00	10.0
12:15	10.0	12:15	10.0	12:15	10.0
12:30	10.0	12:30	10.0	12:30	10.0
12:45	10.0	12:45	10.0	12:45	10.0
13:00	10.0	13:00	10.0	13:00	10.0
13:15	10.0	13:15	10.0	13:15	10.0
13:30	10.0	13:30	10.0	13:30	10.0
13:45	10.0	13:45	10.0	13:45	10.0
14:00	10.0	14:00	10.0	14:00	10.0
14:15	10.0	14:15	10.0	14:15	10.0
14:30	10.0	14:30	10.0	14:30	10.0
14:45	10.0	14:45	10.0	14:45	10.0
15:00	10.0	15:00	10.0	15:00	10.0
15:15	10.0	15:15	10.0	15:15	10.0
15:30	10.0	15:30	10.0	15:30	10.0
15:45	10.0	15:45	10.0	15:45	10.0
16:00	10.0	16:00	10.0	16:00	10.0
16:15	10.0	16:15	10.0	16:15	10.0
16:30	10.0	16:30	10.0	16:30	10.0
16:45	10.0	16:45	10.0	16:45	10.0
17:00	10.0	17:00	10.0	17:00	10.0
17:15	10.0	17:15	10.0	17:15	10.0
17:30	10.0	17:30	10.0	17:30	10.0
17:45	10.0	17:45	10.0	17:45	10.0
18:00	10.0	18:00	10.0	18:00	10.0
18:15	10.0	18:15	10.0	18:15	10.0
18:30	10.0	18:30	10.0	18:30	10.0
18:45	10.0	18:45	10.0	18:45	10.0
19:00	10.0	19:00	10.0	19:00	10.0
19:15	10.0	19:15	10.0	19:15	10.0
19:30	10.0	19:30	10.0	19:30	10.0
19:45	10.0	19:45	10.0	19:45	10.0
20:00	10.0	20:00	10.0	20:00	10.0
20:15	10.0	20:15	10.0	20:15	10.0
20:30	10.0	20:30	10.0	20:30	10.0
20:45	10.0	20:45	10.0	20:45	10.0
21:00	10.0	21:00	10.0	21:00	10.0
21:15	10.0	21:15	10.0	21:15	10.0
21:30	10.0	21:30	10.0	21:30	10.0
21:45	10.0	21:45	10.0	21:45	10.0
22:00	10.0	22:00	10.0	22:00	10.0
22:15	10.0	22:15	10.0	22:15	10.0
22:30	10.0	22:30	10.0	22:30	10.0
22:45	10.0	22:45	10.0	22:45	10.0
23:00	10.0	23:00	10.0	23:00	10.0
23:15	10.0	23:15	10.0	23:15	10.0
23:30	10.0	23:30	10.0	23:30	10.0
23:45	10.0	23:45	10.0	23:45	10.0
24:00	10.0	24:00	10.0	24:00	10.0

Date of test \_\_\_\_\_

Geller test ..... gal./min. with ..... ft. drawdown after ..... hrs.  
 Artesian flow ..... g.p.m. Date .....

Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

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

[illegible]

**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 (Person, firm, or corporation) (Type or print)

Address .....

[Signed] \_\_\_\_\_ (Well Driller)

License No. \_\_\_\_\_ Date \_\_\_\_\_, 19\_\_\_\_

(1) OWNER: Name DAN DAIGLE Address 30E Winesap, TONASKET, WI  
 (2) LOCATION OF WELL: County Okanogan - NW, NW, Sec. 14 T. 37 N., R. 2E W.M.  
 Spring and distance from section or subdivision corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one) 2

New well	<input checked="" type="checkbox"/>	Method: Dug	<input type="checkbox"/>	Bored	<input type="checkbox"/>
Deepened	<input type="checkbox"/>	Cable	<input type="checkbox"/>	Driven	<input type="checkbox"/>
Reconditioned	<input type="checkbox"/>	Rotary	<input checked="" type="checkbox"/>	Jetted	<input type="checkbox"/>

(5) **DIMENSIONS:** Diameter of well ..... 8 inches.  
 Drilled 289 ft. Depth of completed well 289 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from +1 ft. to 198 ft.

Threaded ☐ " Diam. from " ft. to " ft.

Welded ☒ " Diam. from " ft. to " ft.

**Perforations:** Yes ☒ No ☐ *TPB ch*  
 Type of perforator used .....  
 SIZE of perforations ..... *14* in. by ..... *12* in.  
 ... *32* perforations from ..... *794* ft. to ..... *198* 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? 20 ft.  
Material used in seal: Bentonite  
Did any strata contain unusable water? Yes ☐ No ☒  
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

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

(8) **WATER LEVELS:** Land-surface elevation above mean sea level.....ft.  
 Static level ..... 70 .....ft. below top of well Date. 2/14/88  
 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 .....  
 Water test..... gal./min. with ..... ft. drawdown after ..... hrs.  
 Artesian flow ..... g.p.m., Date .....  
 Temperature of water Cold ..... Was a chemical analysis made? Yes ☐ No ☒

**(10) WELL LOG:**

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

MATERIAL	FROM	TO
Topsoil	0	2
Gravel, Sand, Coarse to fine	2	14
Granite Boulder	14	18
Sand, Coarse to fine	18	26
Sand, fine, Silt, Clay	26	154
Shale, Gravel, Clay, Gray	154	193
Sand, fine	193	199
Shale, Gray, fine water	199	256
Shale, Gray, firm	256	279
Shale, Green, HARD	279	289
Shale, Gray, firm, Seep		

RECEIVED

10.55 - 8)

Work started 2-11- 1980 Completed 2-14- 1980

**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 Allied Drilling & Development, Inc.  
(Person, firm, or corporation) (Type or print)

Address P.O. Box 607, Onak, Wisc 54884

[Signed] Salad. Wright  
(Well Driller)

License No. 0993 Date 2-16 1980

ECY 050 1 20 (9/93) f



ECY 050-1-20 (9/93) \* \* \*

## WATER WELL REPORT

Start Card No W081904  
 Unique Well I.D. # ACR844  
 Water Right Permit No.

STATE OF WASHINGTON

(1) OWNER: Name **GARDINIER, DAVID & JENNY** Address **PO BOX 643 TONASKET, WA 98855-**

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

- NW 1/4 SW 1/4 Sec 14 T 37 N., R 27 WM

(2a) STREET ADDRESS OF WELL (or nearest address) **HAVILLAN HWY,**

(3) PROPOSED USE: **DOMESTIC**

(10) WELL LOG

(4) TYPE OF WORK: Owner's Number of well  
 (If more than one) **1**  
**NEW WELL** Method: **ROTARY**

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 in formation

(5) DIMENSIONS: Diameter of well **6** inches  
 Drilled **220** ft. Depth of completed well **90.5** ft.

(6) CONSTRUCTION DETAILS:

Casing installed: **6** " Dia. from **+2** ft. to **90.5** ft.  
**WELDED** " Dia. from ft. to ft.  
 " Dia. from ft. to ft.

MATERIAL	FROM	TO
CLAY BROWN GRAVEL	0	21
HARDPAN CLAY BROWN	21	35
CLAY SAND FINE	35	37
SAND GRAVEL BOULDERS	37	42
CEMENTED GRAVEL HARD	42	50
CEMENTED GRAVEL CLAY	50	80
SHALE MEDIUM HARD	80	84
CEMENTED GRAVEL CLAY	84	97
SHALE DECOMPOSED SOFT	97	107
SHALE GRAY SOFT	107	165
SHALE MEDIUM SOFT	165	220

Perforations: **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: **NO**

Manufacturer's Name

Type

Diam. slot size from ft. to ft.  
 Diam. slot size from ft. to ft.

Gravel packed: **NO**

Size of gravel

Gravel placed from ft. to ft.

Surface seal: **YES**

To what depth? **19** ft.

Material used in seal **BENTONITE**

Did any strata contain unusable water? **NO**

Type of water? Depth of strata ft.

Method of sealing strata off **CASING**

Note - There is approx 3 GPM  
 between 84' + 107'  
 Cannot drill deeper due to  
 casing reached refusal  
 Hole is caving in under  
 casing due to soft  
 formation

(7) PUMP: Manufacturer's Name

Type **NONE**

H.P.

(8) WATER LEVELS:

Land-surface elevation

above mean sea level ... ft.

Static level **76** ft. below top of well Date **03/19/98**

Artesian Pressure lbs. per square inch Date

Artesian water controlled by **CAP**

Work started 03/11/98

Completed 03/19/98

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

Was a pump test made? **NO** If yes, by whom?

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

Recovery data

Time Water Level Time Water Level Time Water Level

Date of test / /

Bailer test gal/min. ft. drawdown after hrs.

Air test 3 gal/min. w/ stem set at 95 ft. for .5 hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? **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 **FOGLE PUMP & SUPPLY, INC.**

(Person, firm, or corporation) (Type or print)

ADDRESS **316 W. 5TH COLVILLE, WA**

(SIGNED *Jon Richard* License No. **2341**

Contractor's

Registration No. **FOGLEPS095L4**

Date **04/02/98**



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

# WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent

UNIQUE WELL I.D. #

Water Right Permit No.

W109810

AEQ 516

(1) OWNER: Name David Gardner Address Box 643 Tonasket WA 98855

(2) LOCATION OF WELL: County Okanogan SW 1/4 NW 1/4 Sec 14 T 37 N.R. 27 WM

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

TAX PARCEL NO.: \_\_\_\_\_

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

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

(5) DIMENSIONS: Diameter of well 8 inches  
Drilled 605 feet. Depth of completed well 605 ft.

(6) CONSTRUCTION DETAILS  
Casing Installed: 8 " Diam. from 42 ft. to 115 ft.  
☒ Welded  
☐ Liner installed  
☐ Threaded

Perforations: ☐ Yes ☐ No

Type of perforator used \_\_\_\_\_

SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: ☐ Yes ☐ No ☐ K-Pac Location \_\_\_\_\_

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☐ No ☐ Size of gravel/sand \_\_\_\_\_

Material placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal benzene

Did any strata contain unusable water? ☐ Yes ☐ No

Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_

Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land surface elevation above mean sea level \_\_\_\_\_ ft.

Static level 3041 ft. below top of well Date 7-30-99

Artesian pressure 24 lbs. per sq. inch

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.

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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 \_\_\_\_\_

\_\_\_\_\_ 720 gallons per day at 1 ft

\_\_\_\_\_ estimated

Date of test \_\_\_\_\_

Bailer test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Airtest .5 gal./min. with total ft. drawdown after 3 hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION  
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

MATERIAL	FROM	TO
sandy loam top soil	0	4
sandy silt	4	16
cheap sand	16	40
stony clay	40	45
silt sand & gravel	45	51
sand & gravel	51	55
silt sand & gravel	55	61
silt sand & gravel	61	66
clay deep with random gravel	66	115
med soft granite	115	307
broken granite (w)	307	309
med granite	309	418
broken granite (w)	418	420
med to hard granite with numerous fractures	420	605

Well needs to be lined to supply install a pump

Work Started 7-23 99 Completed 7-28 99

## WELL CONSTRUCTION CERTIFICATION:

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

Type or Print Name Marshall Miller License No. 1437  
(Licensed Driller/Engineer)

Trainee Name \_\_\_\_\_ License No. \_\_\_\_\_

Drilling Company MM Quality Drilling, LLC

(Signed) MM Miller License No. 1437  
(Licensed Driller/Engineer)

Address 22905 Riverview Rd., Chelan, WA 98816

Contractor's Registration No. MVMQUDLO33MM Date 8-2 99

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

# WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent

UNIQUE WELL I.D. #

Water Right Permit No.

W089643  
AEQ 517

(1) OWNER: Name David Gaudinore Address P.O. Box 643 Tonasket WA 98858

(2) LOCATION OF WELL: County Chelan SW 1/4 NW 1/4 Sec 14 T 32 N.R. 27 WM

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

TAX PARCEL NO.: \_\_\_\_\_

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

(4) TYPE OF WORK: Owner's number of well (if more than one) 2  
☒ New Well Method: ☐ Dug ☐ Bored  
☐ Deepened ☐ Cable ☐ Driven  
☐ Reconditioned ☒ Rotary ☐ Jetted  
☐ Decommission

(5) DIMENSIONS: Diameter of well 8 inches  
Drilled 63 feet. Depth of completed well 61 ft.

(6) CONSTRUCTION DETAILS  
Casing Installed: 8 " Diam. from 72 ft. to 61 ft.  
☒ Welded ☐ Liner installed ☐ Threaded  
Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: ☒ Yes ☐ No for ch  
Type of perforator used 44 x 4"  
SIZE of perforations 4 in. by \_\_\_\_\_ in.  
4 perforations from 61 ft. to 60 ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location \_\_\_\_\_  
Manufacturer's Name \_\_\_\_\_  
Type \_\_\_\_\_ Model No. \_\_\_\_\_  
Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_  
Material placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: ☒ Yes ☐ No  Bentonite 18'   
Material used in seal \_\_\_\_\_  
Did any strata contain unusable water? ☐ Yes ☒ No  
Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
Method of sealing strata off \_\_\_\_\_

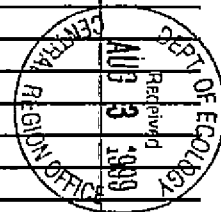
(7) PUMP: Manufacturer's Name \_\_\_\_\_  
Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.  
Static level 36 ft. below top of well Date 7-22-99  
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.  
Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
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  
no measurable water with  
are left due to low static level  
Date of test \_\_\_\_\_  
Ballot test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Airtest \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION  
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

MATERIAL	FROM	TO
Top Soil	0	3
sandy silt	3	16
clean sand	16	41
sandy clay	41	45
silt sand & gravel	45	57
clay & wet gravel	57	61
clay	61	63



Work Started 7-22 Completed 7-22-99

## WELL CONSTRUCTION CERTIFICATION:

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

Type or Print Name Marshall Miller License No. 1437  
(Licensed Driller/Engineer)

Trainee Name \_\_\_\_\_ License No. \_\_\_\_\_  
Drilling Company MVM Quality Drilling, LLC

(Signed) MV Miller License No. 1437  
(Licensed Driller/Engineer)

Address 22905 Riverview Rd., Chelan, WA 98816

Contractor's Registration No. MVMQUDLO33MM Date 8-2-99

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

Per telecomm - Two dealers Moriarty + Silverthorn  
(USE ADDITIONAL SHEETS IF NECESSARY) (begun) (completed)

3

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

# WATER WELL REPORT

STATE OF WASHINGTON

Notice of Intent W-036207

UNIQUE WELL I.D. # ALX 301

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

(1) OWNER: Name Elijah Combs Address Tanaket Wash 98555

(2) LOCATION OF WELL: County OKANOGAN NW 1/4 SW 1/4 Sec 14 T 37 N.R. 27 WM

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

TAX PARCEL NO.: \_\_\_\_\_

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

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

(5) DIMENSIONS: Diameter of well 8 inches  
Drilled 60 feet. Depth of completed well 60 ft.

## (6) CONSTRUCTION DETAILS

Casing installed:

☒ Welded 8 " Diam. from +1 ft. to 59 ft.  
☐ Liner installed " Diam. from " ft. to " ft.  
☐ Threaded " Diam. from " ft. to " ft.

Perforations:

☐ Yes ☒ No

Type of perforator used \_\_\_\_\_

SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens:

☒ Yes ☐ No ☒ K-Pac Location Top

Manufacturer's Name JOHNSON

Type STAINLESS Model No. \_\_\_\_\_

Diam. 7" Slot Size 200 from 55 ft. to 60 ft.

Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_

Material placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: ☒ Yes ☐ No To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_

Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.

Static level 32 ft. below top of well Date 2-10-96

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.

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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.

Airtest \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☐ No

(10) WELL LOG or DECOMMISSIONING PROCEDURE DESCRIPTION  
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

MATERIAL	FROM	TO
<u>SAND BROWN SOFT</u>	<u>0</u>	<u>13'</u>

<u>SAND &amp; GRAVEL HARD</u>	<u>13'</u>	<u>52'</u>
-------------------------------	------------	------------

<u>SAND &amp; GRAVEL (LATER BR.)</u>	<u>52'</u>	<u>60'</u>
--------------------------------------	------------	------------

Work Started 12-30-95 Completed 2-9-96

## WELL CONSTRUCTION CERTIFICATION:

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

Type or Print Name Tom Myapine License No. 2231  
(Licensed Driller/Engineer)

Trainee Name \_\_\_\_\_ License No. \_\_\_\_\_

Drilling Company MEM Drilling

(Signed) Tom Myapine License No. 2231  
(Licensed Driller/Engineer)

Address 6 Airport Rd. Othello WA 99444

Contractor's Registration No. MCAL PMP 04K8 Date 2-9-96

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (360) 407-6600. The TDD number is (360) 407-6006.

## WATER WELL REPORT

Start Card No. W081889  
 Unique Well I.D. # ACR828  
 Water Right Permit No.

STATE OF WASHINGTON

(1) OWNER: Name **KERHARD, ERVEN** Address **PO BOX 1287 TONASKET, WA 98855-**

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

- SE 1/4 NW 1/4 Sec 14 T 37 N., R 27E WM

(2a) STREET ADDRESS OF WELL (or nearest address) **157 HAVILLA RD, TONASKET**

(3) PROPOSED USE: **DOMESTIC**

(10) WELL LOG

(4) TYPE OF WORK: Owner's Number of well  
 (If more than one) **1**  
**NEW WELL** Method: **ROTARY**

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 in formation.

(5) DIMENSIONS: Diameter of well **6** inches  
 Drilled **78** ft. Depth of completed well **78** ft.

MATERIAL	FROM	TO
CLAY GRAVEL	0	2
SAND GRAVEL	2	25
CEMENTED GRAVEL	25	35
SAND GRAVEL MOIST	35	47
BROWN HARDPAN CLAY	47	58
BROWN SAND W/WATER	58	78

(6) CONSTRUCTION DETAILS:

Casing installed: **6** " Dia. from **+2** ft. to **73** ft.  
**WELDED** " Dia. from ft. to ft.  
 " Dia. from ft. to ft.

Perforations: **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**

Manufacturer's Name

**JOHNSON**

Type **SLOTTED**

Model No. **STAINLESS**

Diam. **5** slot size **.016** from **73** ft. to **78** ft.

Diam. slot size from ft. to ft.

Gravel packed: **NO**

Size of gravel

Gravel placed from ft. to ft.

Surface seal: **YES**

To what depth? **19** ft.

Material used in seal **BENTONITE**

Did any strata contain unusable water? **NO**

Type of water? Depth of strata ft.

Method of sealing strata off **CASING**

(7) PUMP: Manufacturer's Name

Type **NONE**

H.P.

(8) WATER LEVELS:

Land-surface elevation

above mean sea level ... ft.

Static level **42** ft. below top of well Date **10/17/97**

Artesian Pressure lbs. per square inch Date

Artesian water controlled by **CAP**

Work started **10/15/97**

Completed **10/17/97**

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

Was a pump test made? **NO** If yes, by whom?

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

Recovery data

Time	Water Level	Time	Water Level	Time	Water Level
------	-------------	------	-------------	------	-------------

Date of test / /

Bailer test gal/min. ft. drawdown after hrs.

Air test **20** gal/min. w/ stem set at **75** ft. for **1.5** hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? **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 **FOGLE PUMP & SUPPLY, INC.**

(Person, firm, or corporation) (Type or print)

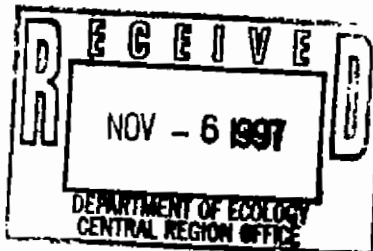
ADDRESS **316 W. 5TH COLVILLE, WA**

[SIGNED] *Jim Richard* License No. **2341**

Contractor's

Registration No. **FOGLEPS095L4**

Date **10/28/97**



✓ DK 11.21.80

# WATER WELL REPORT

State of Washington Date Printed: 14-Mar-2007 Log No.  
Construction / Decommission: Original 258560 0  
Construction Construction Notice

## CURRENT

Notice of Intent No.: W250523  
Unique Ecology Well I.D. No APB232  
Water Right Permit Number:  
OWNER: HUBER, GLENN

OWNER ADD PO BOX 147  
TONASKET, WA 98855

Well Add 31578 HWY 97 NORTH

City: Tonasket, WA 98855 County: Okanogan

Location: SE 1/4 SE 1/4 Sec 9 T 37 R 27E EW R

Lat/Long: Lat Deg Lat Min/Sec

(s, t, r still Long Deg Long Min/Sec

REQUIRED)

Tax Parcel No.: 2737090136

## CONSTRUCTION OR DECOMMISSION PROCEDURE

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

Material	From	To
LOAM BLACK	0	3
GRAVEL	3	4
SAND BROWN	4	25
CLAY BROWN	25	28
GRAVEL W/WATER	28	60

Notes:



Work starte 03/12/2007

Complete 03/12/2007

## WELL CONSTRUCTION CERTIFICATION:

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

✓ Driller Engineer Trainee

Name: AUDIE MCCURDY License No.: 2690

Signature: *Audie McCurdy*

If trainee, Licensed driller is: License No.:

Licensed Driller Signature

## Drilling Company:

NAME: FOGLE PUMP & SUPPLY, INC. Shop: REPUBLIC

ADDRESS: PO Box 456

Republic, WA 99166

Phone: Toll Free: 8008453500

E-Mail: foglewest@rcabletv.com

FAX: 5097750498 WEB Site: www.foglepump.com

Contractor's

Registration No.: FOGLEPS095L4 Date Log Created: 03/14/200

PROPOSED USE: DOMESTIC

TYPE OF WORK: Owners's Well Number: (If more than one well) 1

NEW WELL

Method: ROTARY

DIMENSIONS Diameter of well: 6 inches  
Drilled 60 ft. Depth of completed well 57 ft.

CONSTRUCTION DETAILS: Casing installed WELDED  
Liner installed: 6" Dia from +2 ft. to 57 ft.  
" Dia from ft. to ft. " Dia from ft. to ft.  
" Dia from ft. to ft.

Perforations: No Used In:

Type of perforator used

SIZE of perforations in. b in.  
Perforation from ft. to ft.  
Perforation from ft. to ft.  
Perforation from ft. to ft.

Screens: No K-Pac Location

Manufacture's Name

Type: Model No  
Diam. slot size from ft. to ft.  
Diam. slot size from ft. to ft.

Gravel/Filter packed: No Size of Gravel

Material placed fro ft. to ft.

Surface seal: Yes To what depth 57 ft.

Seal method: Material used in seal BENTONITE

Did any strata contain unusable water No

Type of water Depth of strata

Method of sealing strata off

PUMP: Manufacture's name

Type: H.P. 0

WATER LEVELS Land-surface elevation above mean sea level: 0 ft.

Static level 25 ft. below top of well Date 03/12/2007

Artesian Pressure lbs per square inch Date

Artesian water controlled by

WELL TESTS: Drawdown is amount water level is lowered below static level.

Was a pump test made No If yes, by whom

Yield gal/min with ft drawdown after

Yield gal/min with ft drawdown after

Yield gal/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:

Bailer test gal/min ft drawdown after hrs.

Air test 30 gal/min w/ stem set at 56 ft. for 1 hours

Artesian flow gpm Date

Temperature of water Was a chemical analysis made No



STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

## WELL LOG

Date 1-16, 1961

No. Appl. 5577  
Cert. 3797-ARecord by well driller  
Source driller's record

Location State of WASHINGTON

County Okanogan

Area

Lot 49, G.N.Ry. Ind.

Map

Lot- Town of Tongasket

1/4 sec 16 T 37 N, R 27 xx

Drilling Co Gus Thomas

Address Box 1416, Omak, Wash.

Method of Drilling Date, 1960

Owner Great Northern Railway Co.

Address St. Paul, Minn.

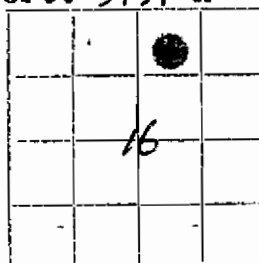
Land surface, datum ft above  
below

Diagram of Section

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

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

Top soil & boulders	14	14
Sand - water	18	32
Silt & clay	8	40
Silt & water	5	45
Silt & some gravel	2	47
Clay, fine silt & water	45	92
Gravel	6	98
PUMP TEST:		
Dim. 98'x8"		
SWL: 25 ft.		
DD: 53 ft.		
Yield: 130 g.p.m.		
Water Temp. 54°		
Type & size of pump: Submersible		
Type & size of engine: 5 h.p. elec.		
CASING:		
8" diam. from 0 to 98 ft.		
(over)		

Turn up

Sheet. of sheets



# WATER WELL REPORT

State of Washington Date Printed: 08-Aug-2008 Log No. 0  
 Construction / Decommission: Original  
 Construction Construction Notice 317267

## CURRENT

Notice of Intent No.: W237463  
 Unique Ecology Well I.D. No. BAB573  
 Water Right Permit Number:  
 OWNER: HELM, GREG & CHARLENE

OWNER ADD 46C GAYES POINT ROAD  
 OROVILLE, WA 98844

Well Add 241A HAVILLAH ROAD

City: Tonasket, WA 98855

County: Okanogan

Location: NW 1/4 NE 1/4 Sec 14 T 37 R 27E EW

Lat/Long: Lat Deg Lat Min/Sec  
 (s, t, r still) Long Deg Long Min/Sec

REQUIRED)  
 Tax Parcel No.: 8869500020

## CONSTRUCTION OR DECOMMISSION PROCEDURE

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.

Material	From	To
LOAM BROWN	0	2
BOULDERS COBBLES	2	7
COBBLES SAND	7	12
CLAY GREY	12	14
GRANITE GREY HARD	14	92
SHALE BLACK SOFT	92	93
SHALE BLACK MED	93	97
SHALE BLACK SOFT WET	97	134
GRANITE GREY MED	134	141
SHALE BLACK SOFT WET	141	183
GRANITE GREY MED	186	200

**RECEIVED**

Notes:

OCT 13 2008

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Work start 07/24/2008

Complete 07/28/2008

## WELL CONSTRUCTION CERTIFICATION:

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

☒ Driller ☐ Engineer ☐ Trainee

Name: AUDIE MCCURDY License No.: 2690

Signature: *Audie McCurdy*

If trainee, Licensed driller is: License No.:

Licensed Driller Signature

## Drilling Company:

NAME: FOGLE PUMP & SUPPLY, INC.

Shop: REPUBLIC

ADDRESS: PO Box 456

Republic, WA 99166

Phone: 5097752878

Toll Free: 8008453500

E-Mail: leslie@foglepump.com

FAX: 5097750498

WEB Site: www.foglepump.com

Contractor's

Registration No.: FOGLEPS095L4 Date Log Created: 08/04/200

PROPOSED USE: DOMESTIC

TYPE OF WORK: Owners's Well Number: (If more than one well)

NEW WELL

Method: ROTARY

DIMENSIONS Diameter of well: 6 inches  
 Drilled 200 ft. Depth of completed well 200 ft.

## CONSTRUCTION DETAILS:

Casing installed WELDED

Liner installed: PVC

4 " Dia from 10 ft. to 200 ft.

6 " Dia from +2 ft. to 18 ft.

" Dia from ft. to ft.

" Dia from ft. to ft.

Perforations: Yes Used In: LINER

Type of perforator used SKILL SAW

SIZE of perforations 1/8 in. b 7 in.

110 Perforation from 160 ft. to 200 ft.

Perforation from ft. to ft.

Perforation from ft. to ft.

Screens: No K-Pac Location

Manufacture's Name

Type: Model No

Diam. slot size from ft. to ft.

Diam. slot size from ft. to ft.

Gravel/Filter packed: No Size of Gravel

Material placed fro ft. to ft.

Surface seal: Yes To what depth 18 ft.

Seal method: Material used in seal BENTONITE

Did any strata contain unusable water No

Type of water Depth of strata

Method of sealing strata off

PUMP: Manufacture's name

Type: H.P. 0

WATER LEVELS Land-surface elevation above mean sea level: 0 ft.

Static level 20 ft. below top of well Date 07/28/2008

Artesian Pressure lbs per square inch Date

Artesian water controlled by

WELL TESTS: Drawdown is amount water level is lowered below static level.

Was a pump test made No If yes, by whom

Yield gal/min with ft drawdown after

Yield gal/min with ft drawdown after

Yield gal/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:

Bailer test gal/min ft drawdown after hrs.

Air test 5 gal/min w/ stem set at 199 ft. for 1 hours

Artesian flow gpm Date

Temperature of water Was a chemical analysis made No

ECY 050-1-20

# WATER WELL REPORT

ECOLGY

Construction/Decommission (x in circle)

☒ Construction 150498☐ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number \_\_\_\_\_CURRENT  
Notice of Intent No

W177043

Unique Ecology Well ID Tag No

AKJ688

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

Property Owner Name

Jim Bretz K

Well Street Address

12 Stanton loop

City

Tomaslet

County

Okanogan

Location

NW 1/4 1/4 SE 1/4 Sec 15 Twn 37 R 27 EWM circle or one WWM

Lat/Long

Lat Deg \_\_\_\_\_

Lat Min/Sec \_\_\_\_\_

(s r still

REQUIRED)

Long Deg \_\_\_\_\_

Long Min/Sec \_\_\_\_\_

Tax Parcel No \_\_\_\_\_

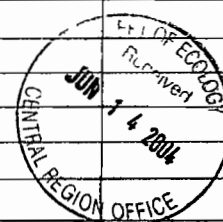
## CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation Describe by color character size of material and structure and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information. Indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
SAND, FINE, BRN	0	48
CLAY, SILT, BRN	48	92
SAND, FINE, BRN	92	210
CLAY, GRAY	210	225
SAND, SILT, GRAY, WATER	225	290
SAND, FINE, GRAY, GRAVEL	290	
W/WATER		298

RECEIVED

JUN 09 2004

DEPARTMENT OF ECOLOGY  
WELL DRILLING UNIT

Start Date 5-27-04

Completed Date 5-28-04

**PROPOSED USE** ☒ Domestic ☐ Industrial ☐ Municipal  
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other

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

**DIMENSIONS** Diameter of well 6 inches drilled 298 ft  
 Depth of completed well 298 ft

**CONSTRUCTION DETAILS**  
 Casing ☒ Welded 6 Diam from +2 ft to 295 ft  
 Installed ☐ Liner installed \_\_\_\_\_ Diam from \_\_\_\_\_ ft to \_\_\_\_\_ ft  
☐ Threaded \_\_\_\_\_ Diam from \_\_\_\_\_ ft to \_\_\_\_\_ ft

**Perforations** ☐ Yes ☒ No  
 Type of perforator used \_\_\_\_\_  
 SIZE of perfs \_\_\_\_\_ in by \_\_\_\_\_ in and no of perfs \_\_\_\_\_ from \_\_\_\_\_ ft to \_\_\_\_\_ ft

**Screens** ☒ Yes ☐ No ☐ K Pac Location 293  
 Manufacturer's Name Cook  
 Type STAINLESS Model No \_\_\_\_\_  
 Diam 6 Slot Size #18 from 293 ft to 298 ft  
 Diam \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft to \_\_\_\_\_ ft

**Gravel/Filter packed** ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_  
 Materials placed from \_\_\_\_\_ ft to \_\_\_\_\_ ft

**Surface Seal** ☒ Yes ☐ No To what depth? 19 ft  
 Materials used in seal BENTONITE  
 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 210 ft below top of well Date 5-28-04  
 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 \_\_\_\_\_ gal/min with \_\_\_\_\_ ft drawdown after \_\_\_\_\_ hrs  
 Yield \_\_\_\_\_ gal/min with \_\_\_\_\_ ft drawdown after \_\_\_\_\_ hrs  
 Yield \_\_\_\_\_ gal/min with \_\_\_\_\_ ft drawdown after \_\_\_\_\_ hrs  
 Recovery data (time taken as level when pump turned off) (water level measured from well top to water level)  

Time	Water Level	Time	Water Level	Time	Water Level
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

 Date of test \_\_\_\_\_  
 Bailor test \_\_\_\_\_ gal/min with \_\_\_\_\_ ft drawdown after \_\_\_\_\_ hrs  
 Airtest 25 gal/min with str set a 297 ft for 1 hrs  
 Artesian To \_\_\_\_\_ gpm Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☒ No

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JON RICARD

Driller/Engineer/Trainee Signature J. Ricard

Driller or Trainee License No 2341

Drilling Company

Clear Water Drilling

P.O. Box 155

Address

Malo Washington 99150

(509) 779-4022

City State Zip

Contractor's

Registration No CLEARWD974OC Date 5-28-04

Ecology is an Equal Opportunity Employer ECY 050 1 20 (Rev 4/01)

If trainee licensed driller's

Signature and License no \_\_\_\_\_



### Construction/Decommission

 Construction 258588

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

## Current

Notice of Intent No. W232612

Unique Ecology Well ID Tag No. ALC 478

Water Right Permit No.

Property Owner Name John Denison

Well Street Address

City Tonasket County Okanagan

Location SE 1/4-1/4 SE 1/4 Sec 9 Twp 37 R 27 EWM or ☒ Circle

Lat/Long (s, t, r)      Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

still REQUIRED ) Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 3727090005

### CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TOP Soil	0	6
SAND Gravel	6	28
CLAY SAND	28	39
SAND coarse & Gravel	39	65

Start Date 3-12-67

Completed Date 3-13-07

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

Driller/Engineer/Trainee Name (Print) Bill MovinauDriller/Engineer/Trainee Signature [Signature]Driller or trainee License No. 1573

**IF TRAINEE.**

Driller's Licensed No.

Driller's Signature

Drilling Company Moorman Drilling

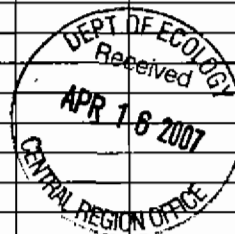
Address PO Box 3652 Ottawa

City, State, Zip OMARK WA 98841

Contractor's Registration No. MODMAD#070DP Date 3-13-07

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)





### Construction/Decommission

☒ Construction 295581

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number \_\_\_\_\_*

## Current

Notice of Intent No. W 220394

Unique Ecology Well ID Tag No. ALC 460

Water Right Permit No.

Property Owner Name John Dennison

Well Street Address Hwy 97 N

City Tonawanda County O'Keefe

Location SE 1/4-1/4 SF 1/4 Sec. 9 Twn 37 R 27 EWM or  circle

Lat/Long (s, t, r)      Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

still REQUIRED ) Long Deg \_\_\_\_\_ Long Min/Sec R

Tax Parcel No. 3727090006

### CONSTRUCTION OR DECOMMISSION PROCEDURE.

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TOP Soil	0	4
SAND - Gravel	4	28
CLAY	28	39
SAND	39	42
Gravel - SAND	42	59

DEPT OF EDUCATION  
Received  
APR 15 2008  
CENTRAL REGION OFFICE

Start Date 4-2-08 Completed Date 7-3-08

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

Driller/Engineer/Trainee Name (Print) B. I. Moomaw

Driller/Engineer/Trainee Signature Bill Medina

Driller or trainee License No. -1573

Drilling Company Mountain Drilling

Address PO Box 3652

City, State, Zip Omaha NE 68141

**IF TRAINEE,**

Driller's Licensed No.

Driller's Signature

Contractor's  
Registration No. 7001AD\*070DD

Date 4-3-08

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)

Please print, sign and return to the Department of Ecology



# Water Well Report

Original - Ecology, 1<sup>st</sup> copy - owner, 2<sup>nd</sup> copy - driller

### Construction/Decommission

☒ Construction. 295335

☐ Decommission *ORIGINAL INSTALLATION Notice of Intent Number*

PROPOSED USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Municipal <input type="checkbox"/> DeWater <input type="checkbox"/> Irrigation <input type="checkbox"/> Test Well <input type="checkbox"/> Other _____																									
<b>TYPE OF WORK:</b> Owner's number of well (if more than one) _____ <input checked="" type="checkbox"/> New well <input type="checkbox"/> Reconditioned <span style="margin-left: 50px;">Method: <input type="checkbox"/> Dug <input type="checkbox"/> Bored <input type="checkbox"/> Driven</span> <input type="checkbox"/> Deepened <span style="margin-left: 100px;"><input type="checkbox"/> Cable <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Jetted</span>																									
<b>DIMENSIONS:</b> Diameter of well <u>6</u> inches, drilled <u>58</u> ft. Depth of completed well <u>58</u> ft.																									
<b>CONSTRUCTION DETAILS</b> Casing <input checked="" type="checkbox"/> Welded: <u>6</u> " Diam. from <u>12</u> ft. to <u>53</u> ft. Installed: <input type="checkbox"/> Liner installed _____ " Diam. from _____ ft. to _____ ft. <input type="checkbox"/> Threaded _____ " Diam. from _____ ft. to _____ ft.																									
<b>Performances:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type of perforator used _____ SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.																									
<b>Screens:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> K-Pac Location <u>52</u> Manufacturer's Name <u>Johnson</u> Type <u>Telescop</u> Model No. _____ Diam. <u>6</u> Slot size <u>40</u> from <u>53</u> ft. to <u>58</u> ft. Diam. _____ Slot size _____ from _____ ft. to _____ ft.																									
<b>Gravel/Filter packed:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Size of gravel/sand _____ Materials placed from _____ ft. to _____ ft.																									
<b>Surface Seal:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No To what depth? <u>19'</u> ft. Material used in-seal <u>Benthaite SC</u> Did any strata contain unusable water? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type of water? _____ Depth of strata _____ Method of sealing strata off _____																									
<b>PUMP:</b> Manufacturer's Name <u>N/A</u> H.P. _____ Type: _____																									
<b>WATER LEVELS:</b> Land-surface elevation above mean sea level _____ ft. Static level <u>38</u> ft. below top of well Date <u>3-26-08</u> Artesian pressure _____ lbs. per square inch Date _____ Artesian water is controlled by _____ (cap. valve, etc.)																									
<b>WELL TESTS:</b> Drawdown is amount water level is lowered below static level Was a pump test made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, by whom? _____ Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. 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 border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Time	Water Level	Time	Water Level	Time	Water Level																		
Time	Water Level	Time	Water Level	Time	Water Level																				
Date of test <u>3-26-08</u> Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs. Airstest <u>35</u> gal/min with stem set at <u>56</u> ft. for <u>4</u> hrs. Artesian flow _____ g.p.m. Date _____ Temperature of water _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No																									

## Current

Notice of Intent No. W 220391

Unique Ecology Well ID Tag No. A/C 499

Water Right Permit No.

Property Owner Name John Dennison

Well Street Address Henry 97

City Tonasket County Okanogan

Location SE 1/4-1/4 SE 1/4 Sec 9 Twn 27 R 27 EWM ☒ or ☐ circle

Lat/Long (s, t, r)      Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_ R

still REQUIRED ) Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 37 27 09 0006

### CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

[illegible]

Start Date 3-26-08 Completed Date 3-26-08

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

Driller/Engineer/Trainee Name (Print) Bill Morgan

Driller/Engineer/Trainee Signature Byron Mowbray

Driller or trainee License No. 1573

Drilling Company Moon & Co. 11/195

Address P.O. Box 3652

City, State, Zip OMAK WA 98841

**IF TRAINEE,**

Driller's Licensed No.

Driller's Signature

Contractor's  
Registration No. 070DP Date 3-26-08

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)



Please print, sign and return to the Department of Ecology



# Water Well Report

Original - Ecology, 1<sup>st</sup> copy - owner, 2<sup>nd</sup> copy - driller

### Construction/Decommission

☒ Construction **295334**  
☐ Decommission *ORIGINAL INSTALLATION Notice  
of Intent Number*

PROPOSED USE: <input checked="" type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Municipal <input type="checkbox"/> DeWater <input type="checkbox"/> Irrigation <input type="checkbox"/> Test Well <input type="checkbox"/> Other _____																															
<b>TYPE OF WORK:</b> Owner's number of well (if more than one) _____ <input checked="" type="checkbox"/> New well <input type="checkbox"/> Reconditioned <span style="margin-left: 50px;">Method: <input type="checkbox"/> Dug <input type="checkbox"/> Bored <input type="checkbox"/> Driven</span> <input type="checkbox"/> Deepened <span style="margin-left: 100px;"><input type="checkbox"/> Cable <input checked="" type="checkbox"/> Rotary <input type="checkbox"/> Jetted</span>																															
<b>DIMENSIONS:</b> Diameter of well <u>6</u> inches, drilled <u>59</u> ft. Depth of completed well <u>59</u> ft.																															
<b>CONSTRUCTION DETAILS</b> Casing <input checked="" type="checkbox"/> Welded <u>6</u> " Diam. from <u>12</u> ft. to <u>54</u> ft. Installed: <input type="checkbox"/> Liner installed _____ " Diam. from _____ ft. to _____ ft. <input type="checkbox"/> Threaded _____ " Diam. from _____ ft. to _____ ft.																															
<b>Perforations:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type of perforator used _____ SIZE of perfs _____ in. by _____ in. and no. of perfs _____ from _____ ft. to _____ ft.																															
<b>Screens:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> K-Pac Location <u>53</u> Manufacturer's Name <u>Johnson</u> Type <u>TC/SCOPE</u> Model No. _____ Diam. <u>6</u> Slot-size <u>40</u> from <u>54</u> ft. to <u>59</u> ft. Diam. _____ Slot-size _____ from _____ ft. to _____ ft.																															
<b>Gravel/Filter packed:</b> <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Size of gravel/sand _____ Materials placed from _____ ft. to _____ ft.																															
<b>Surface Seal:</b> <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No To what depth? <u>20</u> ft. Material used in seal <u>Bentonite SC</u> Did any strata contain unusable water? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Type of water? _____ Depth of strata _____ Method of sealing strata off _____																															
<b>PUMP:</b> Manufacturer's Name <u>Un</u> Type: _____ H.P. _____																															
<b>WATER LEVELS:</b> Land-surface elevation above mean sea level _____ ft. Static level <u>37</u> ft. below top of well Date <u>3-28-08</u> Artesian pressure _____ lbs. per square inch Date _____ Artesian water is controlled by _____ (cap, valve, etc.)																															
<b>WELL TESTS:</b> Drawdown is amount water level is lowered below static level Was a pump test made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, by whom? _____ Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. Yield: _____ gal./min. with _____ ft. drawdown after _____ hrs. 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 border="1" style="width: 100%; border-collapse: collapse;"> <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> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table> Date of test <u>3-28-08</u> Bailor test _____ gal./min. with _____ ft. drawdown after _____ hrs. Airstest <u>33</u> gal./min. with stem set at <u>57</u> ft. for <u>4</u> hrs. Artesian flow _____ g.p.m. Date _____ Temperature of water _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		Time	Water Level	Time	Water Level	Time	Water Level																								
Time	Water Level	Time	Water Level	Time	Water Level																										

## Current

Notice of Intent No. 220392


Unique Ecology Well ID Tag No. ALC 500

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

Property Owner Name John Dennison

Well Street Address Hwy 97

City Tonawanda County Okemos

Location SE 1/4-1/4 Sec 9 Twn 37 R 27 EWM or  circle

Lat/Long (s, t, r)      Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

still REQUIRED )    Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 37 27 09 0006

### CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information indicate all water encountered (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TOP SOIL	0	5
SAND Gravel	5	27
CLAY	27	39
SAND Gravel	39	45
Gravel - SAND	45	59

DEPT OF WATER & POWER  
Received  
APR 07 2008  
CENTRAL REGION OFFICE

Start Date 3-28-08 Completed Date 3-28-08

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

Driller/Engineer/Trainee Name (Print) Bill Moore

Driller/Engineer/Trainee Signature Paul Morrison

Driller or trainee License No. 1513

Drilling Company MOORE DRILLING

Address PO Box 3652

City, State, Zip OMAHA NE 68184

If TRAINEE.  
Driller's Licensed No. \_\_\_\_\_  
Driller's Signature. \_\_\_\_\_

Contractor's MEEMAD x 70 DD Date 3-28-0  
Registration No.

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 2/03)



# WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle)

☒ Construction 184583  
☐ Decommission ORIGINAL CONSTRUCTION Notice  
 of Intent Number \_\_\_\_\_

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal  
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other \_\_\_\_\_

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

DIMENSIONS: Diameter of well 5 inches, drilled 58 ft.  
 Depth of completed well 60 ft.

CONSTRUCTION DETAILS  
 Casing ☒ Welded 5 " Diam. from +2 ft. to 55 ft.  
 Installed: ☐ Liner installed \_\_\_\_\_ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
☐ Threaded \_\_\_\_\_ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: ☐ Yes ☒ No  
 Type of perforator used \_\_\_\_\_  
 SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: ☒ Yes ☐ No ☒ K-Pac Location 54 ft.  
 Manufacturer's Name JOHNSON  
 Type STAINLESS Model No. \_\_\_\_\_  
 Diam. 4 Slot Size 20 from 60 ft. to 55 ft.  
 Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_  
 Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 18 ft.  
 Materials used in seal 2 1/2" hole plug  
 Did any strata contain unusable water? ☐ Yes ☒ No  
 Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_  
 Method of sealing strata off \_\_\_\_\_

PUMP: Manufacturer's Name Grundfos  
 Type: Sub. pump H.P. 1/2

WATER LEVELS: Land-surface elevation above mean sea level 1900 ft.  
 Static level 34 ft. below top of well Date 10/16/05  
 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: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 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 1/2 gal./min. with 25 ft. drawdown after 2 hrs.  
 Airtest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water 56 Was a chemical analysis made? ☐ Yes ☒ No

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JAMES TREPANIER  
 Driller/Engineer/Trainee Signature James Trepanier  
 Driller or Trainee License No. 2287

If trainee, licensed driller's \_\_\_\_\_  
 Signature and License no. \_\_\_\_\_

CURRENT

Notice of Intent No. W 176265

Unique Ecology Well ID Tag No. AGE 252

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

Property Owner Name Kenneth Combs

Well Street Address 181 HAVILA RD.

City Tonasket County: OKANOGAN

Location SE 1/4- 1/4 NW 1/4 Sec. 14 Twn. 32 R. 22 ☒ WWM circle or one WWM

Lat/Long: \_\_\_\_\_ Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_  
 (s, t, r still REQUIRED) Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. F

## CONSTRUCTION OR DECOMMISSION PROCEDURE

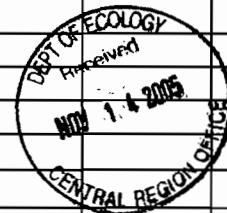
Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TOP SOIL	0	3
Large Gravel	3	30
holder	30	34
GRAVEL SAND W/B	34	60

RECEIVED

NOV 09 2005

Water Resources Program  
 Department of Ecology



Start Date 8/23/05 Completed Date 10/16/05

Drilling Company AQUAM WELLS SPECIALISTS

Address PO BOX 468

City, State, Zip TONASKET WA. 98855

Contractor's AQUAM W 5958KB  
 Registration No. \_\_\_\_\_ Date 8/16/02

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 4/01)

Inv > 924516

STATE OF WASHINGTON

Water Right Permit No.

[illegible]

(USE ADDITIONAL SHEETS IF NECESSARY)



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

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

# WATER WELL REPORT

STATE OF WASHINGTON

4983  
Start Card No. 080051

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

(1) OWNER: Name Pete Weitz Address 287 Hy. 20 East, Tonasket, Wa

(2) LOCATION OF WELL: County Okanogan SW 14 NW 14 Sec. 14 T. 37 N. R. 27 W.M.

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

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

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

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 23 feet. Depth of completed well 98 ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +2 ft. to 93 ft.  
Welded ☒ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes ☐ No ☒

Type of perforator used \_\_\_\_\_  
SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes ☒ No ☐

Manufacturer's Name Houstons  
Type Telescoping Model No. \_\_\_\_\_  
Diam. 5" Slot size 30 from 93 ft. to 98 ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

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

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

(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.  
above mean sea level  
Static level 50 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: 25+ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
" " " " " "  
" Est Air 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 \_\_\_\_\_

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

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
Existing Well	0	75
Sand, Gravel, Water	75	98

RECEIVED  
MAY 20 1991

Work started 5-21-91, 19. Completed 5-22, 1991

## 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 Okanogan Drilling  
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address RT 2, Box 395, Okanogan, Wa

(Signed) [Signature] License No. 1448  
(WELL-DRILLER)

Contractor's Registration No. OKANODD119LT Date May 24, 1991

(USE ADDITIONAL SHEETS IF NECESSARY)

# WATER WELL REPORT

Start Card No. 22458

STATE OF WASHINGTON

UNIQUE WELL I.D. # \_\_\_\_\_

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

(1) OWNER: Name Mr. Pete Weitz

Address 287 HWY. 20, E. Tonasket, WA. 98855

(2) LOCATION OF WELL: County Okanogan

SW 4 NW 4 Sec 14 T37 N. R27 W. M

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

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

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

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐  
Deepened ☐ Cable ☐ Driven ☐  
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.

Drilled 340 feet. Depth of completed well 340 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +2 ft. to 170 ft.  
Welded ☒ Liner installed ☒ 4 " Diam. from 5 ft. to 340 ft.  
Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes ☐ No ☒

Type of perforator used \_\_\_\_\_

SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.

\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes ☐ No ☒

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel \_\_\_\_\_

Gravel placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.

Material used in seal Bentonite

Did any strata contain unusable water? Yes ☐ No ☒

Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off \_\_\_\_\_

(7) PUMP: Manufacturer's Name \_\_\_\_\_

Type: \_\_\_\_\_ H.P. \_\_\_\_\_

(8) WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.

Static level 52 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: 5 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

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
Top Soil	0	3
Sand, Gravel	3	15
Sand, Gravel, Cobbles	15	23
Gray Sticky Clay	23	78
Silts, Sand, Gravel, Water	78	86
Silts, Sand, Water	86	94
Sand, Gravel, Water	94	124
Brown Clay	124	155
Sand, Water	155	164
Silts, Fine Sand, Water	164	168
Decomposed Shale, Trace of Water	168	170
Med. Hard Shale-Blue	170	174
Decomposed, Weathered Shale	174	179
Med. Hard Black Shale	179	241
Decomposed Black Shale, Trace of Water	241	246
Med. Hard Black Shale	246	305
Decomposed Black Shale, Water	305	311
Med. Hard Black Shale	311	340

Work started 4/26/94, 19. Completed 4/30/94, 19.

WELL CONSTRUCTOR CERTIFICATION:

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

NAME Okanogan Drilling

(PERSON, FIRM, OR CORPORATION)

(TYPE OR PRINT)

Address Rt. 2, Box 395 Okanogan, WA. 98840

(Signed) [Signature] License No. 1448

(WELL DRILLER)

Contractor's

Registration No. OKANODD119LT Date 5/1/94, 19

(USE ADDITIONAL SHEETS IF NECESSARY)



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



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

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. 080020

Water Right Permit No. R

OWNER: Name Philip Brown Address P.O. Box 493, Tonasket, Wa 98855

(2) LOCATION OF WELL: County Okanogan S E 4 SE 4

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

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

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

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐  
Deepened ☒ Cable ☐ Driven ☐  
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 120 feet. Depth of completed well 108 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +2 ft. to 108 ft.  
Welded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Perforations: Yes ☐ No ☒

Type of perforator used \_\_\_\_\_

SIZE of perforations \_\_\_\_\_ in. by \_\_\_\_\_ in.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
\_\_\_\_\_ perforations from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: Yes ☒ No ☐

Manufacturer's Name Johnson

Type Telescoping Model No. \_\_\_\_\_

Diam. 5 " Slot size 25 from 103 ft. to 108 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 above mean sea level \_\_\_\_\_ ft.

Static level 62 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: 50 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.

Artest \_\_\_\_\_ gal./min. with stem set at \_\_\_\_\_ ft. for \_\_\_\_\_ hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes ☐ No ☐

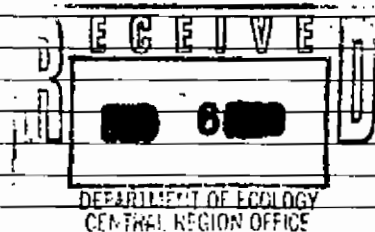
(10) WELL LOG or ABANDONMENT

Formation: Describe by color, character, & thickness of aquifers and the kind and nature with at least one entry for each change of information

MATERIAL

Top Soil

Sand, Gravel, Cabbles	3	62
Sand, Gravel, Water	62	113
Gray Clay, Silts, Water	113	120



Work started 11-29-90, 19. Completed 11-30, 1990

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 Okanogan Drilling

(PERSON, FIRM, OR CORPORATION)

(TYPE OR PRINT)

Address RT. 2 Box 395, Okanogan, Wash 98840

(Signed) James A. [Signature] License No. 1448

(WELL DRILLER)

Contractor's

Registration

No. OKANODD119LT Date Dec 4, 1990, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

STATE OF WASHINGTON  
DEPARTMENT OF CONSERVATION  
AND DEVELOPMENT

## WELL LOG

No. Appl. 5849 ....

Date. 3-6 . . . . , 1961.

Record by well driller . . . . .

Source **driller's record**

Location State of WASHINGTON

County Okanogan

Area . . . . .

## Map

SE  $\frac{1}{4}$  SE  $\frac{1}{4}$  sec 9 T 37 N, R 27 E

Drilling Co Thomas Drilling Co.

Address Box 1416 Omak, Wash.

Method of Drilling . . . . . Date . Feb. . , 19. 61

Owner Raymond E. Colbert

Address. Tonasket, Wash.

Land surface, datum. . . . . ft <sup>above</sup>  
below

CORRE- LATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
------------------	----------	---------------------	-----------------

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

[illegible]

**Turn up**

Sheet      of      sheets





# WATER WELL REPORT

Original & 1<sup>st</sup> copy - Ecology, 2<sup>nd</sup> copy - owner, 3<sup>rd</sup> copy - driller

Construction/Decommission ("x" in circle) 323991

☒ Construction

☐ Decommission ORIGINAL INSTALLATION Notice of Intent Number \_\_\_\_\_

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal  
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other \_\_\_\_\_

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

☒ New well ☐ Reconditioned Method: ☐ Dug ☐ Bored ☐ Driven  
☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 64 ft.  
 Depth of completed well 63 ft.

## CONSTRUCTION DETAILS

Casing ☒ Welded 6 " Diam. from 42 ft to 58 ft.  
 Installed: ☐ Liner installed " Diam. from " ft. to " ft.  
☐ Threaded " Diam. from " ft. to " ft.

Perforations: ☐ Yes ☒ No

Type of perforator used \_\_\_\_\_

SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: ☒ Yes ☐ No ☒ K-Pac Location 57

Manufacturer's Name Johnson

Type Telescop Model No. \_\_\_\_\_  
 Diam. 6 Slot size 35 from 58 ft. to 63 ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 20 ft.

Material used in seal Bent right

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? \_\_\_\_\_ Depth of strata \_\_\_\_\_

Method of sealing strata off \_\_\_\_\_

PUMP: Manufacturer's Name N/A  
 Type: \_\_\_\_\_ H.P. \_\_\_\_\_

WATER LEVELS: Land-surface elevation above mean sea level \_\_\_\_\_ ft.

Static level 40 ft. below top of well Date 12-2-08

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: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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 12-2-08

Bailer test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Airtest 21 gal./min. with stem set at 61 ft. for 4 hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_

Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☒ No

## CURRENT

Notice of Intent No. W 232630

Unique Ecology Well ID Tag No. AKO 019

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

Property Owner Name Ron-Janece Calver

Well Street Address  Hwy 97 Tonasket

City Tonasket County Okanogan

Location 1/4-1/4 NE 1/4 Sec 16 Twn 32 R27 ☒ WWM or circle one

Lat/Long (s, t, r) Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

Still **REQUIRED** Long Deg \_\_\_\_\_ Long Min/Sec A

Tax Parcel No. 3727160004

## CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
NO TOP SOIL		
SAND GRAVEL	0	9
BROWN SAND	9	16
SILTY SAND	16	29
GRAVEL & SAND	29	38
GRAY CLAY & GRAVEL	38	43
CLEAN GRAVEL	43	64
FINE SAND	64	+

RECEIVED

DEC 05 2008

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Start Date 11-28-08 Completed Date 12-2-08

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Bill Moorman

Driller/Engineer/Trainee Signature Bill Moorman

Driller or trainee License No. 1573

Drilling Company Moorman Drilling

Address PO Box 3652

City, State, Zip OMAK WA 98841

IF TRAINEE,

Driller's Licensed No. \_\_\_\_\_

Driller's Signature \_\_\_\_\_

Driller's Registration No. MOORMAN#0700D

Date 12-2-08

Ecology is an Equal Opportunity Employer.

# WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W-26278

UNIQUE WELL I.D. # \_\_\_\_\_

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

(1) OWNER: Name Stan McDaniel Address P.O. Box 922, Tonasket, WA. 98855

(2) LOCATION OF WELL: County Okanogan NW 15 SE 37 N. R. 27 W.M.

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

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

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

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 460 feet. Depth of completed well 430 ft.

## (6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +2 ft. to 455 ft.  
Welded ☒ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Liner installed ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

Screens: Yes ☒ No ☐  
Manufacturer's Name Cook  
Type Telescoping Model No. \_\_\_\_\_  
Diam. 5 Slot size 20 from 455 ft. to 460 ft.  
Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

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

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

(8) WATER LEVELS: Land-surface elevation \_\_\_\_\_ ft.  
Static level 240 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: 30 gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
" " " " " "  
" Est. Air 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

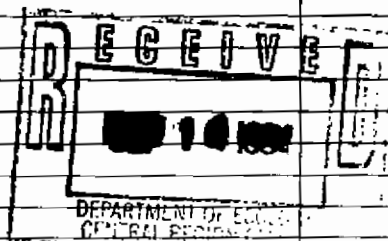
Date of test \_\_\_\_\_

Baller test \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
Airtest 30 gal./min. with stem set at 430 ft. for 3 hrs.  
Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
Temperature of water \_\_\_\_\_ Was a chemical analysis made? Yes ☐ No ☐

## (10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

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

MATERIAL	FROM	TO
Top Soil	0	3
Sand	3	28
Sand, Gravel	28	162
Sand	162	240
Blue Clay	240	315
Sand, Some Gravel, Silty Water	315	324
Silty Sand, Water	324	348
Wet Silty Clay	348	430
Sand, Gravel, Water	430	460



Work started 5/12/94, 19. Completed 5/28/94, 19.

## WELL CONSTRUCTOR CERTIFICATION:

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

NAME Okanogan Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address Rt. 2, Box 395 Okanogan, WA. 98840

(Signed) Lewis Adolph License No. 1448

Contractor's Registration No. OKANODD119LT Date 7/11/94, 19.

(USE ADDITIONAL SHEETS IF NECESSARY)





Permit No. ....

ECY 050-1-20

ing and distance from section or subdivision corner

**(10) WELL LOG:**

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

MATERIAL	FROM	TO
Topsoil	0	2
Bricks, Clay, Gravel	2	59
Shale, Hard, Gray	59	75
Shale, Soft, Gray	75	78
Shale, Hard, Gray	78	132
Quartz, hard, Seep	132	136
Shale, Gray, Hard	136	203
Shale, Green, Hard	203	240
Shale, Gray, Hard	240	370
Quartz, Soft, Seep	370	374
Shale, Gray, Hard	374	400

Casing installed: 6" Diam. from +1 ft. to 59 ft.  
Threaded ☐ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
Welded ☒ " Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Type of perforator used.....	SIZE of perforations .....	in. by .....	in. ....
perforations from .....	ft. to .....	ft. ....	ft. ....
perforations from .....	ft. to .....	ft. ....	ft. ....
perforations from .....	ft. to .....	ft. ....	ft. ....

Manufacturer's Name \_\_\_\_\_

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

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

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

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

(8) **WATER LEVELS:** Land-surface elevation  
above mean sea level.....ft.  
Static level ..... 60 .....ft. below top of well Date 9-23-80  
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
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

Rate of test ..... gal./min. with ..... ft. drawdown after ..... hrs.

Artesian flow ..... g.p.m. Date.....  
 Temperature of water..... Was a chemical analysis made? Yes ☐ No ☒

Work started 9-11 1980 Completed 9/22 1980

**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 Allied Drilling & Development Inc.  
(Person, firm, or corporation) (Type or print)

Address P.O. Box 611, Torrington, W.Va.

[Signed] Dale A. Wright  
(Well Driller)

License No. 0993 Date 7-25 1980



# RECORD BY WELL DRILLER OR OTHER CONSTRUCTOR OF WORKS FOR WITHDRAWAL OF GROUND WATER

Under Permit No. G. W. 5542

("The well driller or other constructor of works for the withdrawal of public ground waters shall be obligated to furnish the permittee a certified record of the factual information necessary to show compliance with the provisions of this section." Sec. 8, Chap. 283, Laws of 1945.)

1. Tonasket Wenoke Growers Tombert, Wash.  
(Name and address of owner of well or other works for withdrawal of water)
2. Type; name or number of works where water is taken  
(Well, tunnel or infiltration trench)
3. Date on which work on well or other structure was started 4/1/60
4. Date on which work was completed 4/8/60
5. If work on well or other structure was abandoned, give date  
and reason for abandonment

## 6. DESCRIPTION OF WORKS:

(a) WELL: Depth. 98 ft Diameter 6 in. or ft. Dug or drilled Drilled

Flowing or pump well pump Water Temp. 54

If PUMP WELL: Type and size of pump is Elec. submersible

Type and size of motor or engine is 5 h.p. electric

Depth from ground surface to water level before pumping 25 feet

After continuous operation for 8 hours, the measured discharge of the pump is  
(at least four)

130 g.p.m., and the drawdown of water level is 53 feet  
(Pumping level minus static water level)

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

Time	Water Level	Time	Water Level

Date of test

If FLOWING WELL: Measured discharge      g.p.m. on      (Date)

Shut-in pressure at ground surface      lbs. per sq. in. on      (Date)

Water is controlled by      (Cap, valve, etc.)

CASING: (Give diameter, commercial specifications and depth below ground surface of each casing size.)

6 in. diameter      from 0 to 98 ft.

     in. diameter      from      to      ft.

     in. diameter      from      to      ft.

     in. diameter      from      to      ft.

Describe and show depth of shoe, plug, adapter, liner or other details:

E960'  
255507  
T37/R27E-16  
SW, NE  
Okanoogen Co.  
G

OK  
JFM

Perforated casing or screens:

total of 30 perforations from 94 to 96 ft.  
 (Number per foot and size of perforations, or describe screen)  
 from to ft.  
 from to ft.  
 from to ft.  
 from to ft.

LOG OF WELL OR TUNNEL: (Describe each stratum or formation clearly, indicate if water bearing, and give thickness and depth as indicated.)

MATERIAL	Thickness (Feet)	Depth to bottom (Feet)
0 to 14 feet top soil and boulders	14	14
14' to 32' sand with water at 25'	18	32
32' to 40' silt and clay, no water	8	40
40' to 45' silt and water	5	45
45' to 47' silt and some gravel	2	47
47' to 92' clay, fine silt and water	45	92
92' to 98' gravel	6	98

(b) INFILTRATION TRENCH OR TUNNEL: Type

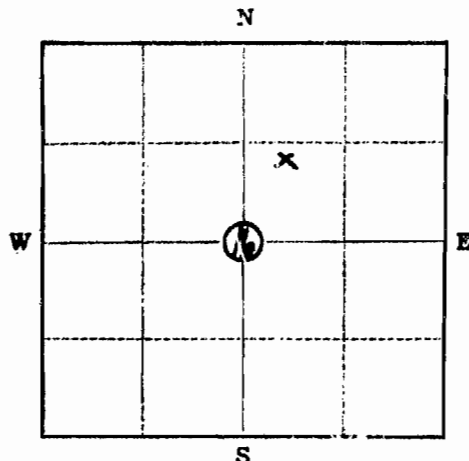
Dimensions:

(Tunnel—length, course, and cross-sectional size)

(Trench—minimum and maximum depths)

Bottom width ft. Discharge g.p.m. Date of test

Position of water bearing stratum with reference to portal of tunnel



Scale: 1" = 2000'

Sec. 16 Twp. 37 Rge. 27

Show approximate location of well or other works with (X) on section plat at left.

*Luis Thomas*  
 Signature of well driller or other constructor

*Box 1416 Omak Wash*  
 Address





# WATER WELL REPORT

Original & 1<sup>st</sup> copy - Ecology, 2<sup>nd</sup> copy - owner, 3<sup>rd</sup> copy - driller

## Construction/Decommission ("x" in circle)

☒ Construction **414531**  
☐ Decommission ORIGINAL INSTALLATION Notice  
 of Intent Number \_\_\_\_\_

## CURRENT

Notice of Intent No. WE12911

Unique Ecology Well ID Tag No. BCF102

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

Property Owner Name Ty & Kathleen Olson

Well Street Address \_\_\_\_\_

City TONASKET County OFANOGAN

Location SE 1/4-1/4 SW 1/4 Sec 11 Twn 37 R27 ☒ WWM or circle one

Lat/Long (s, t, r) Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

Still **REQUIRED** Long Deg \_\_\_\_\_ Long Min/Sec \_\_\_\_\_

Tax Parcel No. 3727110013

**PROPOSED USE:** ☒ Domestic ☐ Industrial ☐ Municipal  
☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other \_\_\_\_\_

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

**DIMENSIONS:** Diameter of well 6 inches, drilled 387 ft.  
 Depth of completed well 387 ft.

**CONSTRUCTION DETAILS**  
 Casing ☒ Welded 6" Diam. from +2 ft. to 29 ft.  
 Installed: ☐ Liner installed 4" Diam. from -10 ft. to 387 ft.  
☐ Threaded \_\_\_\_\_ Diam. from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Perforations:** ☐ Yes ☒ No  
 Type of perforator used \_\_\_\_\_  
 SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Screens:** ☐ Yes ☒ No ☐ K-Pac Location \_\_\_\_\_  
 Manufacturer's Name \_\_\_\_\_  
 Type \_\_\_\_\_ Model No. \_\_\_\_\_  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.  
 Diam. \_\_\_\_\_ Slot size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Gravel/Filter packed:** ☐ Yes ☒ No ☐ Size of gravel/sand \_\_\_\_\_ ft.  
 Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

**Surface Seal:** ☒ Yes ☐ No To what depth? 23 ft.  
 Material used in seal GRANULAR BENTONITE  
 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 63 ft. below top of well Date 5-9-11  
 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: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.  
 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.  
 Airtest 2 1/2 gal./min. with stem set at 385 ft. for 4 hrs.  
 Artesian flow \_\_\_\_\_ g.p.m. Date \_\_\_\_\_  
 Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☒ No

## CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Top Soil	0	4
Tight SAND & GRAVEL	4	20
SHALE SLAB	20	23
CLAY Bound GRAVEL	23	28
Limestone & SHALE	28	96
FRAC SHALE	96	99
SHALE & Limestone	99	211
FRAC SHALE	211	217
SHALE & Limestone	217	326
FRAC SHALE	326	331
SHALE & Limestone	331	385

RECEIVED

MAY 11 2011

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Start Date 5-5-11 Completed Date 5-9-11

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) DANIEL B O'CONNELL Drilling Company O'Connell Drilling  
 Driller/Engineer/Trainee Signature Daniel B O'Connell Address 33 Buckingham Alley  
 Driller or trainee License No. 0358 City, State, Zip Brewster WA 98812

**IF TRAINEE,**  
 Driller's Licensed No. \_\_\_\_\_  
 Driller's Signature \_\_\_\_\_

Contractor's  
 Registration No. OCONNOL92205 Date 5-10-11

Ecology is an Equal Opportunity Employer.



# WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle) **319861**

☒ Construction

☐ Decommission ORIGINAL CONSTRUCTION Notice of Intent Number

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

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

DIMENSIONS: Diameter of well 6 inches, drilled 235 ft.  
 Depth of completed well 233 ft.

## CONSTRUCTION DETAILS

Casing ☒ Welded 6 " Diam. from +2 ft. to 233 ft.  
 Installed: ☐ Liner installed " Diam. from " ft. to " ft.  
☐ Threaded " Diam. from " ft. to " ft.

Perforations: ☐ Yes ☒ No

Type of perforator used

SIZE of perfs \_\_\_\_\_ in. by \_\_\_\_\_ in. and no. of perfs \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location

Manufacturer's Name

Type \_\_\_\_\_ Model No. \_\_\_\_\_

Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Diam. \_\_\_\_\_ Slot Size \_\_\_\_\_ from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand

Materials placed from \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 233 ft

Materials used in seal 6" Casing & Bentonite

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 140 ft. below top of well Date 10/24/08

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: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

Yield: \_\_\_\_\_ gal./min. with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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.

Airtest 10 gal./min. with stem set at 232 ft. for 1 hrs.

Artesian flow \_\_\_\_\_ g.p.m. Date

Temperature of water \_\_\_\_\_ Was a chemical analysis made? ☐ Yes ☒ No

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Floyd Garrison

Driller/Engineer/Trainee Signature Floyd Garrison

Driller or Trainee License No. 2812

If trainee, licensed driller's

Signature and License no.

CURRENT Notice of Intent No. W249324

Unique Ecology Well ID Tag No. APT 620

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

Property Owner Name Ty & Kathy Olson

Well Street Address 93 Warren Rd

City Towasket County: Okanogan

Location NW 1/4- 1/4 NW 1/4 Sec 14 Twn 37 R 27 EWM circle or one 27 WWM

Lat/Long: \_\_\_\_\_ Lat Deg \_\_\_\_\_ Lat Min/Sec \_\_\_\_\_

(s, t, r still REQUIRED) Long Deg \_\_\_\_\_ Long Min/Sec d

Tax Parcel No. 372714008

## CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Top Soil	0	6
Sand & small gravel	6	56
Clay grey Hard	56	138
Clay Brown soft	138	147
Clay Grey med	147	175
Clay grey Hard	175	205
Sand w/ Gravel wet	205	216
Sand & gravel w/ water	216	234
Shale grey	234	235

RECEIVED

OCT 30 2008

DEPARTMENT OF ECOLOGY  
WELL DRILLING UNIT

RECEIVED

NOV 05 2008

DEPARTMENT OF ECOLOGY - CENTRAL REGIONAL OFFICE

Start Date 10/21/08 Completed Date 10/24/08

Drilling Company Clear Water Drilling

Address P.O. Box 155

City, State, Zip Malo, WA 99150

Contractor's Registration No. CLEAR 24306 Date 10/24/08

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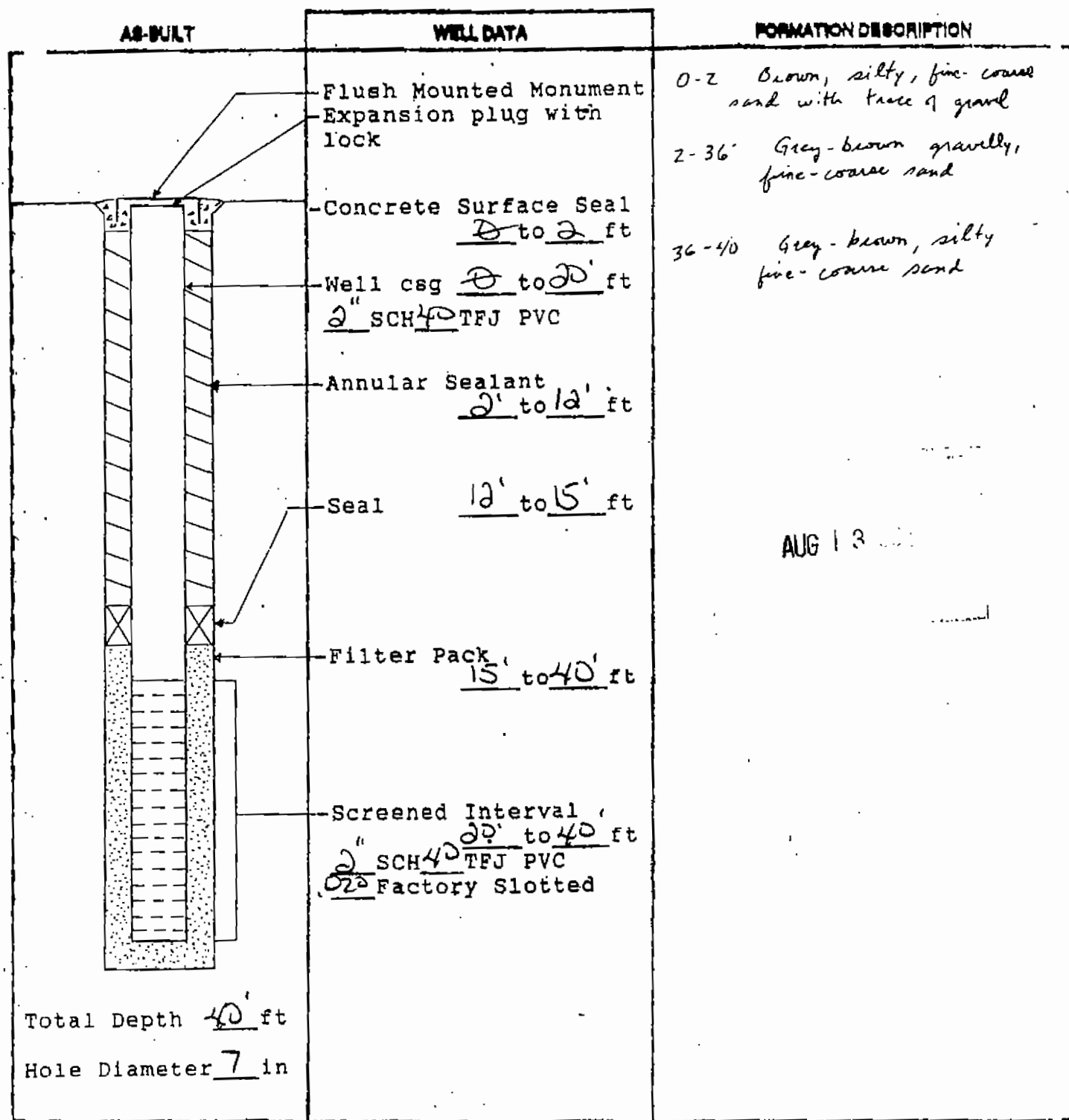
7148

## RESOURCE PROTECTION WELL REPORT

START CARD NO. 207132

PROJECT NAME: US Forest Service Tonasket  
 WELL IDENTIFICATION NO. MLD-1  
 DRILLING METHOD: Tension Hammer-Reverse A/C  
 DRILLER: Richard Jimenez  
 FIRM: Layne Environmental Services, Inc.  
 SIGNATURE: [Signature]  
 CONSULTING FIRM: Layne & Moore  
 REPRESENTATIVE: Bill Fees

COUNTY: Chelan  
 LOCATION: NE 1/4 NE 1/4 Sec 16 Twp 37N R 27E  
 STREET ADDRESS OF WELL: TONASKET  
RANGER STATION - WINESAP RD.  
 WATER LEVEL ELEVATION: 30.96'  
 GROUND SURFACE ELEVATION: 920'  
 INSTALLED: 7-24-92  
 DEVELOPED: \_\_\_\_\_



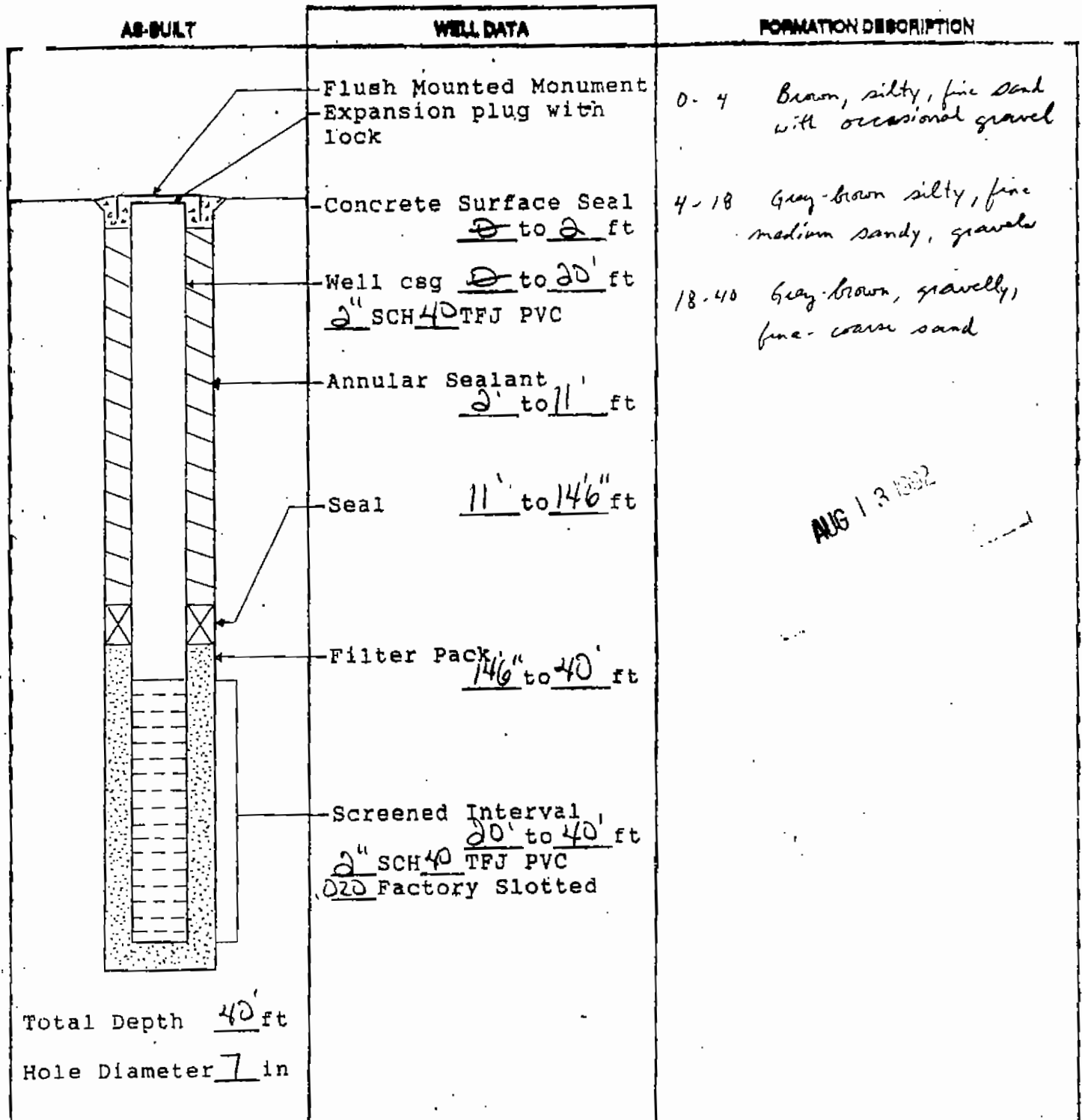
# RESOURCE PROTECTION WELL REPORT

7/49

START CARD NO. 204132

PROJECT NAME: US Forest Service Tonasket  
 WELL IDENTIFICATION NO. MW-2  
 DRILLING METHOD: Telescopic Hammer, Buckskin  
 DRILLER: Richard Jimenez  
 FIRM: Layne Environmental Services, Inc.  
 SIGNATURE: [Signature]  
 CONSULTING FIRM: DANCO & MOORE  
 REPRESENTATIVE: Bill Fees

COUNTY: Chelan  
 LOCATION: NE 1/4 NG 14 Sec 16 T37N R27E  
 STREET ADDRESS OF WELL: TONASKET RANGER  
 STATION: WENESAP RD.  
 WATER LEVEL ELEVATION: 29.36'  
 GROUND SURFACE ELEVATION: 9.19  
 INSTALLED: 7-24-92  
 DEVELOPED: \_\_\_\_\_



AUG 13 1992



## RESOURCE PROTECTION WELL REPORT

START CARD NO. 204132

PROJECT NAME: US Forest Service Tonasket  
 WELL IDENTIFICATION NO. MD-3  
 DRILLING METHOD: Perussion Hammer Reverse Air  
 DRILLER: Richard Simenez  
 FIRM: Layne Environmental Services, Inc.  
 SIGNATURE: [Signature]  
 CONSULTING FIRM: Layne + Moore  
 REPRESENTATIVE: Bill Fees

COUNTY: OKANOGAN  
 LOCATION: NE 1/4 NE 1/4 Sec 16 T37N R27N  
 STREET ADDRESS OF WELL: TONASKET RANGER  
STATION - WINESAP RD.  
 WATER LEVEL ELEVATION: 29.32'  
 GROUND SURFACE ELEVATION: 917'  
 INSTALLED: 7-24-92  
 DEVELOPED: \_\_\_\_\_

AS-BUILT	WELL DATA	FORMATION DESCRIPTION
	Flush Mounted Monument	0-14 Brown, silty, fine sand with occasional gravel
	Expansion plug with lock	
	Concrete Surface Seal	14-40 Gray-Brown, fine-medium sand
	Well csg	
	Annular Sealant	
	Seal	
	Filter Pack	
	Screened Interval	
Total Depth <u>40</u> ft Hole Diameter <u>7</u> in		

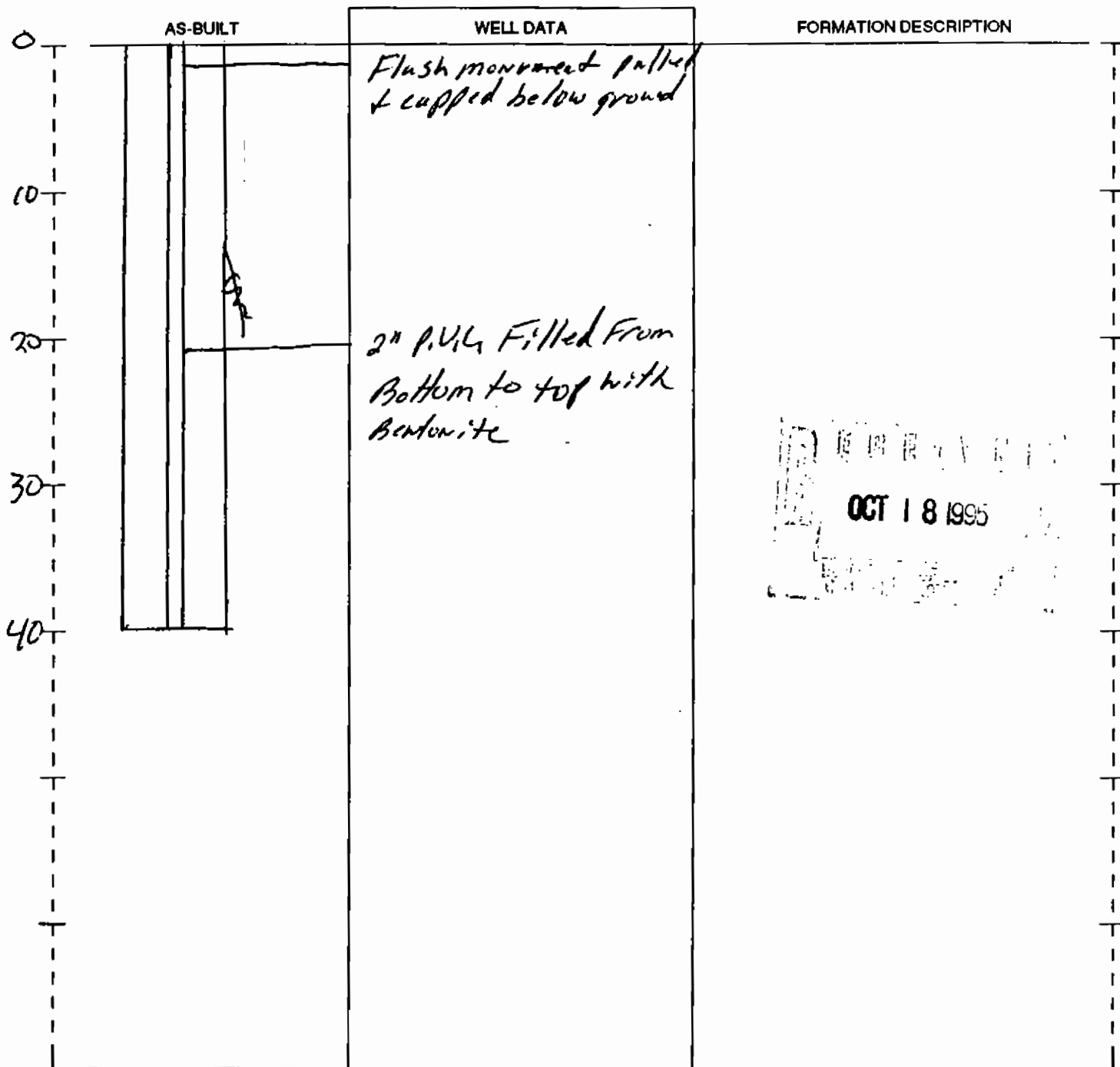
AUG 13 1992

# RESOURCE PROTECTION WELL REPORT

START CARD NO. 00833

PROJECT NAME: U.S. Forest Service  
 WELL IDENTIFICATION NO. MW-1  
 DRILLING METHOD: Abandonment  
 DRILLER: Robert A. Sheldon  
 FIRM: Environmental West Explor.  
 SIGNATURE: Robert A. Sheldon  
 CONSULTING FIRM: Olympia Environmental  
 REPRESENTATIVE: Stacy Patterson

COUNTY: Okanogan  
 LOCATION: 1/4 NW 1/4 SE 1/4 Sec 16 Twn 32N R 22E  
 STREET ADDRESS OF WELL: Tonasket site  
 WATER LEVEL ELEVATION: NA.  
 GROUND SURFACE ELEVATION: NA.  
 INSTALLED: Abandoned 10-10-95  
 DEVELOPED: NA.



SCALE: 1" = 10'

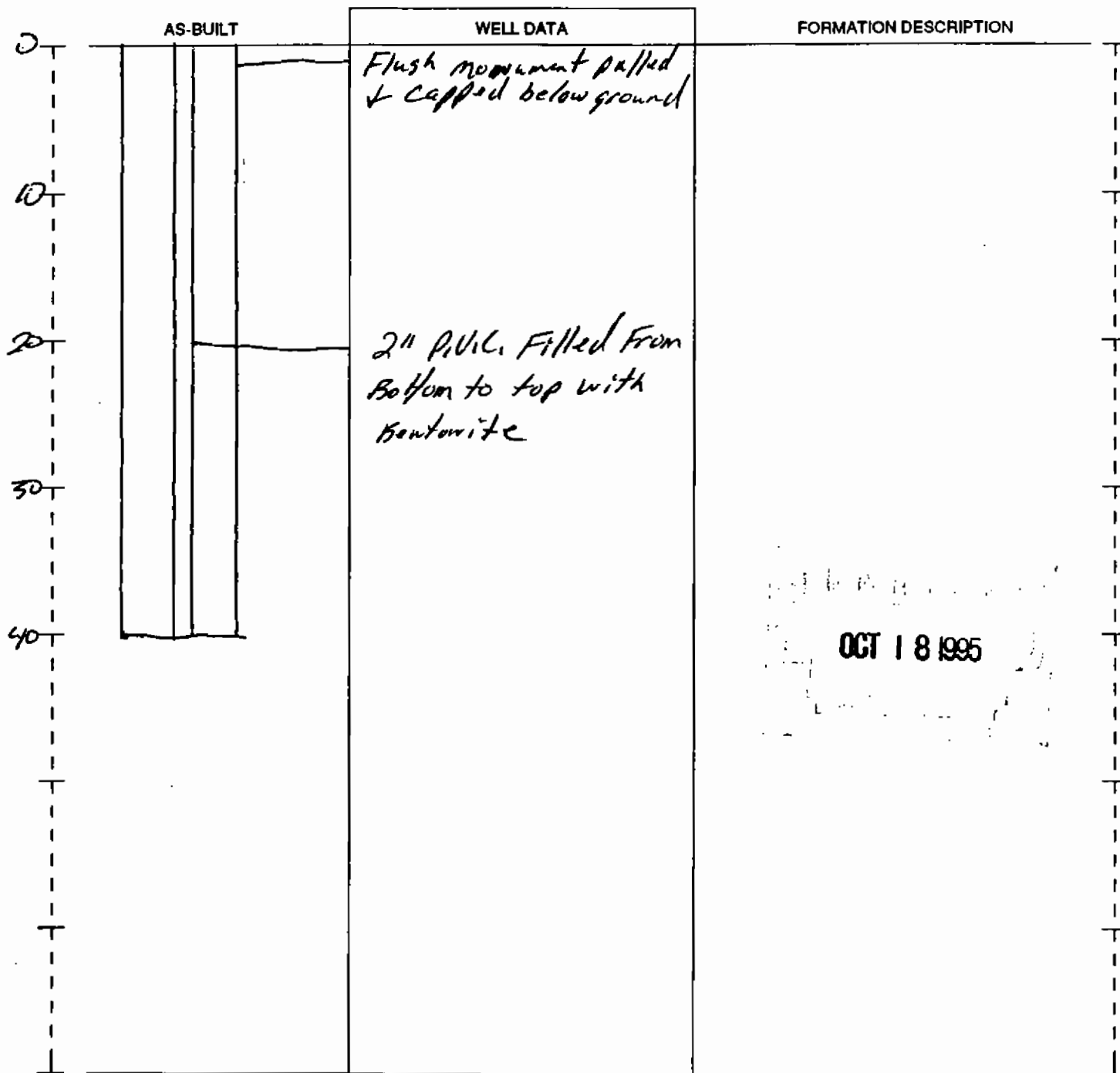
PAGE 1 OF 1

## RESOURCE PROTECTION WELL REPORT

START CARD NO. 00833

PROJECT NAME: U.S. Forest Service  
WELL IDENTIFICATION NO. MW-2  
DRILLING METHOD: Abandonment  
DRILLER: Robert A. Shelton  
FIRM: Environmental West Explor.  
SIGNATURE: Robert A. Shelton  
CONSULTING FIRM: Olympus Environments  
REPRESENTATIVE: Stacy Patterson

COUNTY: Okanogan  
LOCATION: NW 1/4 SE 1/4 Sec 16 Twn 32N R 27E  
STREET ADDRESS OF WELL: Tonasket site  
WATER LEVEL ELEVATION: N.A.  
GROUND SURFACE ELEVATION: \_\_\_\_\_  
INSTALLED: abandoned 10-10-95  
DEVELOPED: \_\_\_\_\_

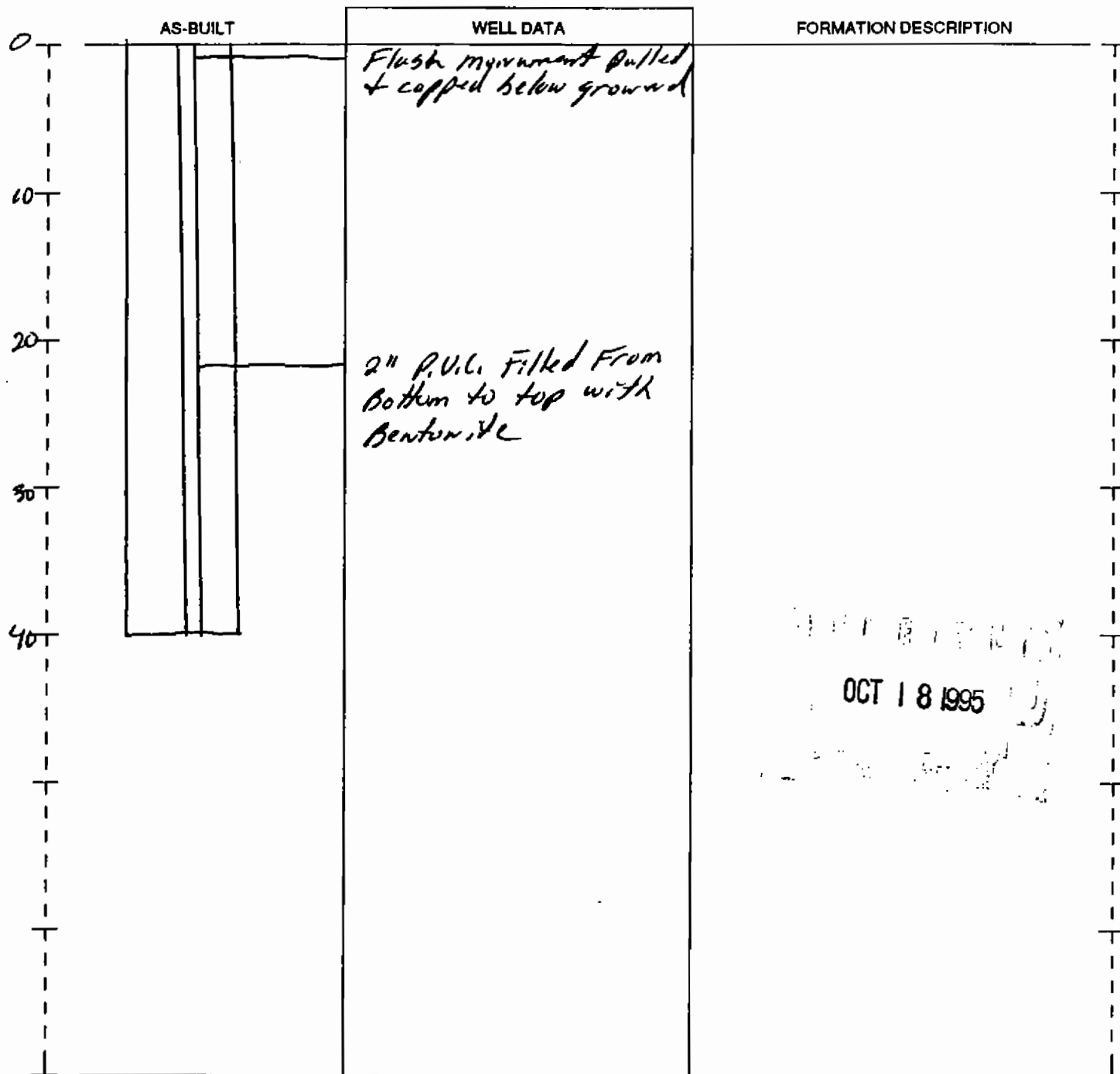
SCALE: 1" = 10'PAGE 1 OF 1

## RESOURCE PROTECTION WELL REPORT

START CARD NO. 00833

PROJECT NAME: U.S. Forest Service  
WELL IDENTIFICATION NO. MW-3  
DRILLING METHOD: Abandonment  
DRILLER: Robert A. Sheldon  
FIRM: Environmental West Explor.  
SIGNATURE: Robert A. Sheldon  
CONSULTING FIRM: Olympus Environ.  
REPRESENTATIVE: Stacy Patterson

COUNTY: Okanagan  
LOCATION: NA 1/4 SE 1/4 Sec 16 Twn 32N R 22E  
STREET ADDRESS OF WELL: Tonasket  
WATER LEVEL ELEVATION: NA.  
GROUND SURFACE ELEVATION: \_\_\_\_\_  
INSTALLED: abandoned 10-10-85  
DEVELOPED: \_\_\_\_\_

SCALE: 1" = 10'PAGE 1 OF 1

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

# WATER WELL REPORT

## STATE OF WASHINGTON

Application No. 1Permit No. R

(1) OWNER: Name Varian Nelson Address 31580 Hwy 97 N Tonasket  
(2) LOCATION OF WELL: County OKANOGAN T4S5 R1E1 S5 SE 1/4 Sec 9 T37N R27W.M.  
Be. SE 1/4 SE 1/4 Sec 9 and distance from section or subdivision corner

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

(4) TYPE OF WORK: Owner's number of well (if more than one) 6  
New well ☒ Method: Dug ☐ Bored ☐  
Deepened ☐ Cable ☐ Driven ☐  
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.  
Drilled 40 ft. Depth of completed well 39 ft.

### (6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from 6 ft. to 6 ft.  
Threaded ☐ " Diam. from 6 ft. to 6 ft.  
Welded ☒ " Diam. from 6 ft. to 39 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                      Model No.                       
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 ☒ No ☐ To what depth? 20 ft.  
Material used in seal PORTLAND CEMENT  
Did any strata contain unusable water? Yes ☐ No ☐  
Type of water?                      Depth of strata                       
Method of sealing strata off                     

(7) PUMP: Manufacturer's Name                       
Type                      HP                     

(8) WATER LEVELS: Land-surface elevation above mean sea level                      ft.  
Static level 20 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: 10-15 gal./min. with                      ft. drawdown after                      hrs.  
"EST. 4' 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                       
Baller test                      gal./min. with                      ft. drawdown after                      hrs.  
Artesian flow                      g.p.m. Date                       
Temperature of water                      Was a chemical analysis made? Yes ☐ No ☐

### (10) WELL LOG:

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

MATERIAL	FROM	TO
OVER BURDEN	0	1
SAND med. 13 ROWS	1	19
GRAVEL med MULTICOLOR	19	40

RECEIVED  
AUG 15 1984  
DEPARTMENT OF ECOLOGY  
SPOKANE REGIONAL OFFICE

RECEIVED

AUG 3 1984

DEPARTMENT OF ECOLOGY  
SPOKANE REGIONAL OFFICE

Work started 4/16 19 84 Completed 4/16 19 84

### 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 Fogler Pump  
(Person, firm, or corporation) (Type or print)

Address 316 W. 5th Colville

[Signed] William J. Davis  
(Well Driller)

License No. 1356 Date 4/16 19 84





