



WR File NR: CS4-037441CL
WR Doc ID: 4529958

State of Washington REPORT OF EXAMINATION FOR WATER RIGHT CHANGE

Change Point of Diversion/Withdrawal Change Season of Use

PRIORITY DATE	CLAIM NUMBER
December 15, 1898 (asserted on Claim)	S4-037441CL

MAILING ADDRESS	CHANGE APPLICATION NUMBER
Alvin Shannon 8421 Entiat River Rd Entiat, WA 98822-9744	CS4-037441CL

Total Quantity Authorized for Withdrawal or Diversion		
WITHDRAWAL OR DIVERSION RATE	UNITS	ANNUAL QUANTITY (AF/YR)
120	gpm	36

Purpose						
PURPOSE	WITHDRAWAL OR DIVERSION RATE			ANNUAL QUANTITY (AF/YR)		PERIOD OF USE (mm/dd)
	ADDITIVE	NON-ADDITIVE	UNITS	ADDITIVE	NON-ADDITIVE	
Irrigation of 9 acres	90		gpm	36		May 1-Sept. 30

Source Location			
COUNTY	WATERBODY	TRIBUTARY TO	WATER RESOURCE INVENTORY AREA
Chelan			Entiat WRIA 46

SOURCE FACILITY/DEVICE	PARCEL	WELL TAG	TWN	RNG	SEC	QQ Q	LATITUDE	LONGITUDE
Irrigation Well	262029553130	ALC501	26N	20E	29	NWSE	47.72385°	-120.35064°

Datum: WGS84

Place of Use (See Attached Map)

PARCELS

262029553120, 2629553130, 252029553152 and 262029553160

LEGAL DESCRIPTION OF AUTHORIZED PLACE OF USE

Those parcels of land being in the NE¼SE¼, NW¼SE¼, SW¼NE¼, and SE¼NE¼ of Section 29, Township 26 North, Range 20 East of the Willamette Meridian north of the Entiat River and south of the Entiat River Road, including lands recorded in Book 451 and Page 658 of the files of Chelan County as that part of Tract 50, according to the Dependent Resurvey of Township 26 North, Range 20 E. W. M., Chelan County, Washington, dated January 27, 1923, which lies north and east of the Entiat River and south of the County Road as now located, and in that part of said Tract originally patented to Samuel E. Morical as the Northeast quarter of the Southeast quarter of Section 29 of said Township and Range. EXCEPT any portion thereof laying in Tract 50, according to the Dependent Resurvey of Township 26 North, Range 20 E. W. M., Chelan County, Washington, dated January 27, 1923.

Proposed Works

An eight-inch diameter drilled Irrigation Well (Unique Well ID BCA945) with a 10-horsepower submersible pump is connected to 3-inch diameter PVC mainlines that convey water to the orchard rows, where water flows through 1-inch and ¾-inch diameter PVC row lines. A mixture of 5/64-inch nozzle undertree sprinklers and ½-inch nozzle overhead impact sprinklers are installed throughout the property.

Development Schedule

BEGIN PROJECT	COMPLETE PROJECT	PUT WATER TO FULL USE
Began	Completed	October 1, 2015

Measurement of Water Use

How often must water use be measured?	Monthly
How often must water use data be reported to Ecology?	Annually
What volume should be reported?	Total Annual Volume
What rate should be reported?	Annual Peak Rate of Withdrawal (gpm)

Provisions

Wells, Well Logs and Well Construction Standards

Installation and maintenance of an access port as described in WAC 173-160-291(3) is required.

Measurements, Monitoring, Metering and Reporting

An approved measuring device must be installed and maintained for each of the sources identified by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", WAC 173-173, which describes the requirements for data accuracy, device installation and operation,

and information reporting. It also allows a water user to petition the Department of Ecology for modifications to some of the requirements.

Recorded water use data shall be submitted via the Internet. To set up an Internet reporting account, contact the Central Regional Office. If you do not have Internet access, you can still submit hard copies by contacting the Central Regional Office for forms to submit your water use data.

Non-Additive to Confirmed Claims

The water use authorized under this filing will be considered non-additive to any water rights confirmed for said claim as a result of a general adjudication through Superior Court, should adjudication be undertaken.

Proof of Appropriation

The water right holder must file the notice of Proof of Appropriation of water (under which the certificate of water right is issued) when the permanent distribution system has been constructed and the quantity of water required by the project has been put to full beneficial use. The certificate will reflect the extent of the project perfected within the limitations of the superseding permit. Elements of a proof inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and satisfaction of provisions.

Schedule and Inspections

Department of Ecology personnel, upon presentation of proper credentials, will have access at reasonable times, to the project location, and to inspect at reasonable times, records of water use, wells, diversions, measuring devices and associated distribution systems for compliance with water law.

Findings of Facts

Upon reviewing the investigator's report, I find all facts, relevant and material to the subject application, have been thoroughly investigated. Furthermore, I concur with the investigator that water is available from the source in question; that there will be no impairment of existing rights; that the purpose(s) of use are beneficial; and that there will be no detriment to the public interest.

Therefore, I ORDER approval of Change Application No. CS4-037441CL subject to existing rights and the provisions specified above.

Your Right To Appeal

You have a right to appeal this Order to the Pollution Control Hearings Board (PCHB) within 30 days of the date of receipt of this Order. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2).

To appeal you must do the following within 30 days of the date of receipt of the Order.

File your appeal and a copy of this Order with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.

- Serve a copy of your appeal and this Order on Ecology in paper form – by mail or in person. (See addresses below.) E-mail is not accepted.
- You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

Address and Location Information	
Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	Department of Ecology Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 111 Israel Road SW STE 301 Tumwater, WA 98501	Pollution Control Hearings Board PO Box 40903 Olympia, WA 98504-0903

Signed at Yakima, Washington, this _____ day of _____, 2014.

 Mark Kemner, LHG, Section Manager
 Water Resources Program/CRO

DRAFT

If you need this document in a format for the visually impaired, call the Water Resources Program at 509-575-2490. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

INVESTIGATOR'S REPORT

BACKGROUND

On June 10, 2008, Alvin Shannon submitted an Application for Change/Transfer of Water Right to the Washington State Department of Ecology (Ecology). The application was assigned Change Application No. CS4-037441CL. Shannon proposes to change the point of diversion (POD) of Water Right Claim No. S4-037441 to a point of withdrawal (POW) from a new well located approximately 270 feet downstream of the POD. Attributes of the existing Claim and the Application for Change are presented below in Table 1.

Table 1: Attributes of the Existing Water Right Claim and Proposed Change

Attributes	Existing (S4-037441CL)	Proposed (CS4-037441CL)
Name	Arvil R. Shannon	Alvin Shannon
Priority Date/Change Application Date	December 15, 1898 (on Claim)	June 10, 2008
Instantaneous Quantity	90 gpm	120 gpm
Annual Quantity	36 acre-feet	36 acre-feet
Purpose of Use	Irrigation	Irrigation
Period of Use	May 1 to September 30	No change
Place of Use	SE $\frac{1}{4}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$, and NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.	SE $\frac{1}{4}$ NE $\frac{1}{4}$, SW $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$, and NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M., Parcels 262029553120, 262029553130 262029553152 and 262029553160
Point of Diversion	Entiat River NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.	Irrigation Well ALC501 NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.
Irrigated Acres	9	Not specified

Stated in a letter from Washington Rivers Conservancy accompanying the change application, the POD change is part of a larger effort being conducted by the Cascadia Conservation District to eliminate instream diversions on the Entiat River. The biological benefits to this are numerous and important to the long-term management goals for the Entiat River as laid out in the Entiat (WRIA 46) Watershed Plan.

Legal Requirements for Proposed Change

The following is a list of requirements that must be met prior to authorizing the proposed Change Application No. CS4-037441CL.

Public Notice

A public notice of the Change Application must be published in a local newspaper once a week for two consecutive weeks (RCW 90.03.280). The public notice of Change Application No. CS4-037441CL was

published in the Wenatchee World during the weeks of December 27, 2012 and January 3, 2013. A revised public notice was published in the Wenatchee World February 2, 2014 and February 9, 2014.

State Environmental Policy Act (SEPA)

A water right application is subject to a SEPA threshold determination (i.e., an evaluation whether there are likely to be significant adverse environmental impacts) if any one of the following conditions are met:

- It is a surface water right application for more than 1 cubic-foot per second (cfs), unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cfs, so long as that irrigation project will not receive public subsidies;
- It is a groundwater right application for more than 2,250 gallons per minute (gpm);
- It is an application that, in combination with other water right applications for the same project, exceeds the amounts above;
- It is a part of a larger proposal that is subject to SEPA for other reasons (e.g., the need to obtain other permits that are not exempt from SEPA);
- It is part of a series of exempt actions that, together, trigger the need to do a threshold determination, as defined under WAC 197-11-305.

Because this Change Application does not meet any of these conditions, it is categorically exempt from SEPA and a threshold determination is not required.

Water Resources Statutes and Case Law

Based on the provisions of RCW 43.21A.690 and RCW 90.03.265, this Change Application has been processed by Licensed Hydrogeologists with GeoEngineers, Inc. under Ecology Cost-Reimbursement Agreement No. GEO005 (master contract No. C1000187).

RCW 90.03.380(1) states that a water right that has been put to beneficial use may be changed. The point of diversion, place of use, and purpose of use may be changed if it would not result in harm or injury to other water rights.

The Washington Supreme Court has held that Ecology, when processing an application for change to a water right, is required to make a tentative determination of extent and validity of the claim or right. This is necessary to establish whether the claim or right is eligible for change. *R.D. Merrill v. PCHB* and *Okanogan Wilderness League v. Town of Twisp*.

The actual extent and validity of a water right claim can only be determined by a Superior Court in adjudication. Any tentative determination made on the extent and validity of a claim by Ecology as part of an application for change investigation is not an adjudication of the claim.

Administrative Status of Surface Water Bodies

Surface water bodies in the region are subject to administrative regulations governing the right to withdraw water for beneficial use. Minimum instream flow regulations for the Entiat watershed (WRIA 46) have been adopted in WAC Chapter 173-546. Maximum future water right allocations in the Entiat River basin have been established for May 1 through July 15.

INVESTIGATION

The examination of Application for Change of surface Water Right Claim S4-037441CL submitted by Alvin Shannon was led by consultants from GeoEngineers, Inc. contracted as part of the Ecology's Cost-Reimbursement Program to facilitate the processing of the application. Kelsey Collins of the Water Resources Program, Ecology (Central Region), oversaw the examination and provided review.

The investigation included the review of:

- The State Water Code, specifically Title 173 Washington Administrative Code (WAC) and Title 90 Revised Code of Washington (RCW).
- United States Geological Survey (USGS) topographic maps.
- Washington State Department of Ecology, 2012, Washington State Well Log Viewer website, <http://apps.ecy.wa.gov/wellog/index.asp> (Accessed November 2012).
- Washington State Department of Ecology, 2012, Water Rights Tracking System (WRTS) website <http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html> (Accessed November 2012).
- T. Kirk, P. Kerr, and H. Riddle, 1995, Draft: Initial Watershed Assessment, Water Resources Inventory Area 46, Entiat River Watershed. Washington Department of Ecology Open File Report 95-02.
- W. A. Long, 1951, Glacial Geology of the Wenatchee-Entiat Area, Washington. Northwest Science 25, 3–16.
- R.M. Dixon, 2003, Use of a GIS-based Hydrogeologic Database to Estimate Groundwater Storage Volumes and Annual Recharge Volumes within the Entiat River Valley, Chelan County, Washington. Washington Department of Ecology draft unpublished report. Prepared for the Entiat WRIA Planning Unit. Yakima, WA: WDOE Central Regional Office.
- R. W. Tabor, V. A. Frizzell, Jr., J. T. Whetten, R. B. Waitt, D. A. Swanson, G. R. Byerly, D. B. Booth, M. J. Hetherington, and R. E. Zartman, 1987, Geologic Map of the Chelan 30-Minute by 60-Minute Quadrangle, Washington. Map 1-1661. U.S. Geological Survey. Miscellaneous Investigations Series.
- Chelan County Conservation District (CCCD), October 2004, Entiat Water Resources Inventory Area (WRIA) 46 Management Plan.
- K. Walker, 2009, Technical Memorandum: Hydrogeologic technical analysis for Water Right Change Application Nos. CS4-069703CL@1, CS4-069703CL@2, CS4-069703CL@3, CS4-069703CL@4 and CS4-069703CL@5, Chelan County, Washington. Report by Kurt Walker and reviewed by Thomas Mackie.
- D. R. Schroeder, 1987, Analytical Stream Depletion Model: Ground Water Software Publication No. 1, Office of the State Engineer, Colorado Division of Water Resources.
- Google Earth aerial photographs from 1998, 2005, 2006, 2009 and 2011.
- Photocopies of aerial photographs from 1965, 1988 and 1994 obtained from the Chelan County Assessor's office in Wenatchee.
- Photocopies of 1945 aerial photographs provided by Ecology.
- Information submitted by and conversations and/or meetings with the applicant Alvin Shannon, Kurt Hosman of Cascadia Conservation District and Jason Hatch of Trout Unlimited.
- A site visit on December 4, 2012.

History of Water Use

The Shannon property is located in the Entiat River Valley, WRIA 46. Mr. Shannon owns three parcels (Parcel Nos. 262029553120, 262029553130, and 262029553152) as shown on **Attachment 1** that comprise the POU and include a 6.2 acre apple orchard and homestead with 1.0 acres of turf located at about river mile (RM) 9, 2-miles south of the town of Ardenvoir, Washington. The Shannon property lies in the valley bottom bounded to the south by the Entiat River and to the north by Entiat River Road.

The most recent survey of Section 29, T. 26 N., R. 20 E.W.M., shows four quarter corners intersecting on the Shannon property. However, the undated Chelan County plat map submitted with Water Right Claim No. 037441 shows the quarter corner intersection falling in the Entiat River to the southwest of the Shannon property. The shape of Section 29, T. 26 N., R. 20 E.W.M., resembles a rhombus; therefore, the measured distances from the section corners differ from a standard square-shaped section. This discrepancy in surveys results in the POU description on the Claim inaccurately describing the lands to which Water Right Claim No. 037441 is appurtenant when measured using the most recent survey.

Michael K. Bell owns a parcel (Assessor No. 262029553160) directly north of the Shannon property, on the north side of Entiat River Road (see Attachment 1). One-half acre of turf on the parcel is included in the POU.

The Shannon apple orchard historically was irrigated using surface water from a POD located about 65 feet southwest of the residence at 8421 Entiat River Road. On August 30, 1973, Arvil R. Shannon submitted to Ecology a Claim (No. 037441) that asserts a surface water right to 90 gpm, 36 acre-feet per year (ac-ft/yr), for the irrigation of 9 acres from May 1 to September 30 from the Entiat River. This claim was amended by Administrative Order No. 10310 on October 18, 2013 by the Department of Ecology to correct an error changing the instant demand rate from 90 gpm to 120 gpm. The claimed date of first putting water to use is December 15, 1898. The request is to change the POD from the Entiat River to a POW at an existing 8-inch-diameter well (Unique Well ID ALC501, Irrigation Well 1) located in the southwest portion of the orchard approximately 40 feet from the left bank of the Entiat River (see Attachment 1). Irrigation Well 1 is one of three new wells drilled on the site in 2005.

In total, there are four wells on the property. Along with Irrigation Well 1, there are three other 8-inch-diameter domestic wells on the property: a domestic well located northwest of the residence (no ID Tag), domestic well 3 (ALF282) located south of the residence and proposed for future domestic use, and a domestic well 2 (ALF283) proposed for future domestic uses located approximately 30 feet northwest of Irrigation Well 1.

Historic Points of Diversion (PODs)

There is conflicting information related to the POD location on the Claim form. The claimed location of the POD is 1,250 feet west and 25 feet south from the east quarter corner of Section 29, within the SE $\frac{1}{4}$ of Section 29, T. 26 N., R. 20 E.W.M. This measurement was based on the map contained within the Claim. Included in the Claim file, a Chelan County historic plat map shows two unnamed irrigation canals originating at a POD on the Entiat River in the NW $\frac{1}{4}$ NE $\frac{1}{4}$ of Section 29, T. 26 N., R. 20 E.W.M. north of the Shannon property. One canal appears on the map to have crossed the length of the Shannon property, terminating at the southeastern end of the orchard. The other canal runs along the hillside north and east of the Shannon property. These canals most likely conveyed water to the historically irrigated lands under Water Right Claim No. S4-037441 and diverted from the Entiat River at the original POD that operated at the asserted time of first putting water to use – 1898.

Stanley Irrigation Ditch – Included in the Claim file for Water Right Claim No. 037441, an Agreement of Sale, dated June 18, 1948, documented the land transfer from Dale and Hazel Packwood to Arvil and

Versa Shannon. Included in the property transfer were “the water rights out of the Stanley Irrigation Ditch and subject to the rights of way of the Stanley Irrigation Ditch over said property – this conveyance being made.” The Stanley Irrigation Ditch POD was likely the original POD as asserted under Water Right Claim No. 037441. Mr. Shannon stated that the Stanley Irrigation Ditch serviced the property until the 1950s, when the new Entiat POD was constructed. The approximate location of the Stanley Irrigation Ditch POD corresponds to a parcel currently owned by J.D. Johnson (Parcel No. 262029553200) located approximately 1,450 feet upstream of the Shannon property, within the NW¼NE¼ of Section 29, T. 26 N., R. 20 E.W.M.

Entiat River POD – Operating until 2007, the Entiat POD on the Shannon property was 2,450 feet south and 1,850 feet west of the NE corner of Section 29, T. 26 N., R. 20 E.W.M. (Parcel No. 262029553130). This places the POD in the SW¼ of the NE¼ of Section 29. Mr. Shannon indicated that water was diverted using a 5-horsepower pump at the Entiat POD. The Entiat POD was last used during the 2006 irrigation season and is currently decommissioned. Although the Claim indicates that the Entiat POD is located in the SE¼ of Section 29, the POD observed in the SW¼ of the NE¼ of Section 29 is likely the same as filed in the Claim.

Proposed Point of Withdrawal

The proposed POW is an 8-inch-diameter well (Irrigation Well 1) drilled in April 2005 to 46 feet. The well was assigned Ecology unique well identification number ALC501 and is located approximately 2,680 feet south and 1,670 feet west of the northeast corner of Section 29, T. 26 N., R. 20 E.W.M., approximately 30 feet northeast of the Entiat River and 270 feet downstream of the Entiat River POD. Since 2007, the well has been connected to the irrigation system through a 3-inch line and laterals and is used to provide irrigation water for the orchard and turf throughout the Shannon and Bell properties. A 10-horsepower submersible pump is installed in the well. No water meter is installed on Irrigation Well 1.

Site Visit

A site visit was conducted on December 4, 2012 by Joel Purdy Senior Hydrogeologist with GeoEngineers. Alvin Shannon provided a tour of the place of use (POU), existing Entiat POD, proposed POW and irrigation system. The locations of the POD and POW were measured and recorded using a GPS mapping system. Photographs were also taken of facilities.

The existing Entiat POD is located on the Entiat River about 70 feet southwest of the residence. This is shown as “pump” on the plat map included with the original Claim. The valve on the POD was shut at the time of the visit.

Along with the proposed POW, Irrigation Well 1 (ALC501), there are three other 8-inch-diameter domestic wells on the property: a well located northwest of the residence used for drinking water supply, a domestic well (ALF282) proposed for future use, and a domestic well (ALF283) proposed for future use located approximately 30 feet northwest of the proposed POW. Irrigation Well 1 was not pumping at the time of the visit and no meter or water level access port was observed to be installed.

Extent and Validity

Aerial photographs from 1945 to 2011 were obtained from public sources. These photographs were reviewed to assess the areas irrigated after 1967 per RCW 90.14.160. Based on the aerial photographs and the site visit, there are four main areas of irrigation on the Shannon parcels:

- 1) a main block of orchard that comprises the eastern half of the orchard;
- 2) the western block of orchard;
- 3) the lawn, landscaping and miscellaneous trees surrounding and west of the residence; and
- 4) lawn and garden areas surrounding the Michael Bell residence north of Entiat River Road.

Area 1, approximately 4.7 acres, is irrigated using overhead 1-inch impact sprinklers. Area 2, approximately 2.1 acres, is irrigated with under-tree 1-inch impact sprinklers. Area 3, approximately 1 acre, is irrigated with manually-placed lawn sprinklers and impact sprinklers. Area 4 is approximately 1 acre of turf irrigated with manually placed sprinklers.

It appears that all four areas within the POU have been irrigated continuously for the period of review. No documentation was found that verifies that the property has been continuously irrigated since before 1917, the year surface water right requirements were enacted in Washington State. However, there was no evidence found to dispute that the irrigation has been continuous.

Annual Quantity

The areas of the POU estimated above have been irrigated continuously for the last 5 years and within each 5-year block of time since 1967, based on the review of historical aerial photos. For the Entiat watershed, the average monthly and seasonal irrigation water usage was estimated for tree and pasture/turf irrigation in WAC 173-546-070 (Table 4-15). The estimates were for an average condition and for 65 percent application efficiency. Accounting for the age of the irrigation system, 65 percent is a reasonable estimate of the irrigation system application efficiency. Based on crop irrigation requirements in the Washington Irrigation Guide (WIG) the total irrigation requirement for apple orchard is 4.78 acre-feet per season per acre (af/ac), and for pasture/turf is 4.06 af/ac at 65 percent efficiency:

$$\begin{aligned} 6.7 \text{ acres of orchard} \times 4.78 \text{ af/ac} &= 32.03 \text{ af} \\ 2.0 \text{ acres of turf/pasture} \times 4.06 \text{ af/ac} &= 8.12 \text{ af} \\ \text{Total irrigation requirement} &= 40.15 \text{ af} \end{aligned}$$

Water Right Claim No. S4-037441 asserts the right to use a maximum of 36 af/yr. That quantity has been historically put to beneficial use and is available for change. The number of acres described above is an approximation. In the absence of detailed survey data, it can be assumed that the POU includes 9 acres as stated on the claim.

Other Water Rights Appurtenant to the Place of Use

Information on water rights in the Entiat River valley was obtained from Ecology's Water Resources Explorer online database. There were two groundwater right claims submitted by Arvil Shannon at the same time as the subject surface water Claim. The groundwater Claim G4-037150CL appears to be for the same property as the subject change application. Groundwater Claim G4-037149CL appears to be associated with the Bell residence north of Entiat River Road. Both groundwater Claims are for domestic use of an unspecified amount. No other claims or water rights were found on Ecology's water right database website for the proposed POU.

In addition to the three claims related to the Shannon property, there are 50 surface water claims and 94 groundwater claims downstream within the Entiat River valley. There are also 13 groundwater rights and 30 surface water rights downstream of the Shannon property.

Hydrologic/Hydrogeologic Evaluation

The following are excerpts from a January 28, 2009, Technical Memorandum regarding the “Hydrogeologic Analysis for Water Right Change Application CS4-037441, Alvin Shannon, Chelan County, Washington, WRIA 46” written by Kurt Walker. The entire memorandum is included in the file for Change Application No. CS4-037441, available at Ecology’s Central Region Office in Yakima, Washington.

Site Location and Well Description

The proposed well is completed into fluvial sediments approximately 30 feet from the bank of the Entiat River. The well is 8-inches in diameter and was drilled to a depth of 46 feet in April of 2005. An 8-inch-diameter telescoping stainless steel screen with 0.050-inch slots was placed from 34 to 44 feet. The driller estimated well yield at 100+ gpm by air test with no measurable drawdown after four hours. A static water level of 13 feet below top of casing is reported on the well log. Ecology staff measured a static water level of 11 feet below ground surface on October 8, 2008.

Geologic Setting

Site Geology near the Shannon Property

The site specific geology description is based on geologic mapping (Tabor et al., 2007), well logs, topographic maps, air photos, and site observations. The granitic Entiat pluton forms the bedrock floor in the Entiat River Valley from roughly RM 7 to RM 20. The Shannon property (RM 9) is situated on a point bar that lies approximately 10 to 15 feet above the river level on an inside bend of the Entiat River. Four wells have been constructed on the Shannon orchard since 1983. All the wells are completed into the unconsolidated fluvial valley fill sediments. Sands and gravels comprise the majority of material while silts and clays are found near ground surface in a generally upward-fining sequence. The total thickness of the fluvial sediments is not completely known and varies with the topography of the underlying bedrock. The proposed POW and another nearby well (Unused Domestic Well 3 shown on Attachment 1) encountered bedrock at 44 and 39 feet, respectively. However, the Shannon domestic well located at a similar elevation to the aforementioned wells was drilled to 60 feet without encountering bedrock.

Hydrogeologic Analysis

Entiat River Valley Hydrogeology

The unconsolidated valley fill deposits compose the primary aquifer in the area, with the underlying bedrock forming the base of the aquifer unit. In general, the valley fill aquifer thickness ranges from 10 feet to greater than 150 feet across the Entiat River Valley (Dixon, 2003). The unconsolidated sediment aquifer, although thin, has relatively high hydraulic conductivities as would be expected from deposition by a fast-moving/high-energy Entiat River and glacial melt water streams. Basin-wide estimates of transmissivity for the Entiat valley fill deposits range from 12,000 to 60,000 gallons per day per foot (gpd/ft) (Kirk, 1995).

Recharge and discharge to the subject aquifer is dominated by surface water/ground water exchanges between the Entiat River and valley fill sediments. Ground water recharge also

occurs through precipitation and irrigation return flows. The subject aquifer discharges to pumping wells and as seepage to the river where head relationships and aquifer geometries facilitate.

Most wells in the valley are shallow (less than 100 feet) and are completed into the sands and gravels without reaching the underlying bedrock. Wells completed in the unconsolidated valley fill deposits typically yield between approximately 10 and 800 gpm depending on location, well design, and intended water use (Kirk et al., 1995; Ecology Well Log Database).

Hydrogeology near the Shannon Property

Near the proposed well, the subject aquifer has a saturated thickness of around 30 feet, depending on the underlying bedrock topography. Ground water elevations range from 10 to 30 feet bgs and appear to closely correlate with the surface elevation of Entiat River. Ground water and surface water elevations, aquifer characteristics, high well yield, and small pumping induced drawdown suggest hydraulic communication between the Entiat River and the valley fill aquifer.

Wells completed into the subject aquifer near the proposed well have report yields of between 15 and 100+ gpm. The reported well yields reflect well efficiencies, well design, intended use, and test method, rather than actual maximum aquifer yield. Sediment composition, available saturated thickness, well yields, reported pumping-induced drawdown, and literature estimates suggest that the subject aquifer in the vicinity of the proposed well has a transmissivity (30,000 to 60,000 gpd/ft) that falls within the upper range of the basin-wide estimates.

Impairment

The irrigation well is located about 40 feet from the left bank of the Entiat River and about 500 feet from the nearest domestic well not on the Shannon property associated with the Bell residence to the north of Entiat River road. No pumping test data are available for the irrigation well. However, aquifer transmissivities are assumed to be high based on pumping tests conducted elsewhere in the valley as discussed above. An analysis was conducted assuming an aquifer transmissivity of between 12,000 and 60,000 gpd/ft, the basin-wide range of transmissivity. The interference drawdown at a distance of 500 feet is expected to be between 2 and 3 feet based on image well theory taking into account the positive boundary of the river and the negative boundary of the valley walls. Thus, the use of the Shannon Irrigation Well 1 at a rate of 90 gpm will not impair other groundwater or surface water users in the vicinity based on available information.

The Entiat River Valley forms a laterally bounded system with groundwater in the alluvial flood plain in direct hydraulic continuity with the Entiat River. Water that is pumped from the well is derived in part from the river, and causes drawdown in the aquifer that intercepts a portion of (or reduces) groundwater discharge from the aquifer as baseflow to the river. Consequently, the net effect on river flow of changing to a groundwater source is generally less than if all the water came directly from the river, as is the case with a surface water diversion.

Same Source Consideration

To change from a point of diversion to a point of withdrawal, the well must be in direct hydraulic continuity with the original surface water source. Direct hydraulic continuity exists when, as a result of pumping the proposed well, additional water from the original surface water source will flow into and recharge the aquifer where it can eventually be captured as groundwater. Additionally, the proposed well must be located and constructed such that within a short time

after pumping starts, the majority of the pumped water should be derived from, or replaced by, the surface water source; and within a short time after pumping stops, the groundwater that has been removed from aquifer storage should be replaced by infiltration from the surface water source. This requirement ensures that the POW can be managed in the same manner as the POD. An analytical groundwater flow model that included representation of the river was used to evaluate the hydraulic relationship between the original source of water and the proposed well.

The Integrated Decision Support Alluvial Water Accounting System (IDS AWAS) was used to compute amount and timing of pumping-induced stream flow depletion from operation of the proposed well based on the Analytical Stream Depletion Model (ASDM) (Schroeder, 1987). The rate and timing of stream depletion are dependent on the properties of the subject aquifer and the distance between the pumping well and the stream. In general, the greater the distance between the pumping well and the stream, the greater the time period is between pumping and stream flow impact. The aquifer characteristics and pumping well properties described above were used to define the ASDM parameters. An average pumping rate of 90 gpm and a transmissivity of 30,000 gpd/ft were used to predict the rate and timing of stream depletion of the Entiat River. The model predicts that after one day of continuous pumping, stream depletion accounts for approximately 90% of the water drawn from the proposed well. Similarly, when the pumping ceases, stream depletion is expected to decrease by more than 90% within one day. As a result, the proposed well is considered to be in direct hydraulic continuity with the Entiat River, and the proposed well can be effectively managed in the same manner as the historic POD.

The stream depletion due to pumping Irrigation Well 1 is distributed over a reach of the Entiat River that is adjacent to the well.

Impairment Consideration

The requested Claim is for use from a well that is located approximately 500 feet from the nearest neighboring well and will not impair this or other existing groundwater users. The change from a direct surface water diversion to a groundwater withdrawal will buffer the impacts of water usage to the Entiat River and, thus, will provide a net benefit to maintain instream flows.

Public Interest Considerations

RCW 90.03.290 requires that a proposed appropriation not be detrimental to the public interest. The seasonal withdrawal of up to 120 gpm under this Water Right Claim for irrigation at the Shannon orchard is consistent with state policy without adversely impacting instream flows or other public needs and values. No detriment to public interest could be identified during the examination of the subject application.

A review of the proposed change by the Washington Department of Fish and Wildlife (WDFW) was conducted on October 3, 2008. The recommendation states, "WDFW supports moving from surface waters to a well, provided that this results in actual water left in the Entiat River" (WDFW 2008). The hydrogeologic analysis using ASDM shows a transient net gain due to depletion of groundwater storage within the aquifer. Also, a review of historical use of water indicates that water has been diverted at the claimed POD; water that is no longer diverted at the POD will remain in the Entiat River with streamflow depletion now occurring progressively over a reach downstream of the POD that is adjacent to the new POW.

In general, removing PODs and instream structures from a river has a positive impact on aquatic habitat. Diversions and instream pumps require frequent servicing that involves entering the river to repair structures, remove silt and debris from screens, and maintaining pushup dams. Replacing a POD with a POW alleviates the need for repeated construction in the river and the associated disturbances from increased silt loading and streambank modifications.

Consideration of Protests and Comments

No protests or comments have been filed.

CONCLUSIONS

Change Application CS4-037441CL passes the four-part statutory test.

RECOMMENDATIONS

Based on the information presented above, the author recommends that:

Change Application CS4-037441CL be approved in the amounts, and subject to the provisions described in the Order for Report of Examination CS4-037441CL, pages 2-3.

Report by: _____ Date _____
Joel W. Purdy, LG, LHG

DRAFT

Attachment 1

Place of Use, Existing Point of Diversion, Proposed Point of Withdrawal and Irrigated Areas for the Shannon Change Application CS4-037441CL.

