



STATE OF WASHINGTON  
DEPARTMENT OF ECOLOGY

**REPORT OF EXAMINATION**  
*Change of:* Point of Withdrawal  
*WRTS File No.* CS4-037441CL

PRIORITY DATE	CLAIM NO.	PERMIT NO.	CERTIFICATE NO.
December 15, 1898	037441		
NAME			
Alvin Shannon			
ADDRESS/STREET		CITY/STATE	ZIP CODE
8421 Entiat River Road		Entiat, WA	98822-9744

**PUBLIC WATERS TO BE APPROPRIATED**

SOURCE		
A Well		
TRIBUTARY OF (IF SURFACE WATERS)		
N/A		
MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE FEET PER YEAR
	90	36
QUANTITY, TYPE OF USE, PERIOD OF USE		
90 gallons per minute, 36 acre-feet per year for the irrigation of 9 acres from May 1 to September 30		

**LOCATION OF DIVERSION/WITHDRAWAL**

APPROXIMATE LOCATION OF DIVERSION--WITHDRAWAL					
2,580 feet north and 1,180 feet west of the SE corner of Section 29, T. 26 N., R. 20 E.W.M.					
LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION)	SECTION	TOWNSHIP	RANGE	WRIA	COUNTY
NW1/4 SE1/4	29	26 N.	20 E.W.M.	46	Chelan
PARCEL NUMBER	LATITUDE	LONGITUDE		DATUM	
262029553130	47.72378	-120.35076		NAD83	

**RECORDED PLATTED PROPERTY**

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
N/A	N/A	N/A

**LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED**  
[Attachment 1 shows location of the authorized place of use and point(s) of diversion or withdrawal]

Those parcels of land being in the NE $\frac{1}{4}$  SE $\frac{1}{4}$ , NW $\frac{1}{4}$  SE $\frac{1}{4}$ , SW $\frac{1}{4}$ NE, and SE $\frac{1}{4}$  NE 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.

And a portion of land described as the SE $\frac{1}{4}$ NE $\frac{1}{4}$  of Section 29, Township 26 North, Range 20 East of the Willamette Meridian, 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.

Portions of Chelan County Assessor Parcel Nos. 262029553120, 262029553130, 262029553152, and 262029553160.

**DESCRIPTION OF PROPOSED WORKS**

An eight-inch diameter drilled well with a 10-horsepower submersible pump connected to 3-inch diameter PVC mainlines that convey water to the orchard rows, where water flows through 1-inch and 3/4-inch diameter PVC row lines. A mixture of 5/64-inch nozzle undertree sprinklers and 1/8-inch nozzle overhead impact sprinklers are installed throughout the property.

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**DEVELOPMENT SCHEDULE**

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BEGIN PROJECT BY THIS DATE	COMPLETE PROJECT BY THIS DATE	WATER PUT TO FULL USE BY THIS DATE
Begun	May 1, 2010	September 30, 2010

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**PROVISIONS**

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**1. Wells, Well logs and Well Construction Standards**

- 1.1. Installation and maintenance of an access port as described in WAC 173-160- 291(3) is required.
- 1.2. In accordance with Chapter 173-160 WAC, wells shall not be located within certain minimum distances of potential sources of contamination. These minimum distances shall comply with local health regulations, as appropriate. In general, wells shall be located at least 100 feet from sources of contamination. Wells shall not be located within 1,000 feet of the boundary of a solid waste landfill.
- 1.3. All wells constructed in the state shall meet the construction requirements of Chapter 173-160 WAC titled "Minimum Standards for the Construction and Maintenance of Wells" and Chapter 18.104 RCW titled "Water Well Construction". Any well which is unusable, abandoned, or whose use has been permanently discontinued, or which is in such disrepair that its continued use is impractical or is an environmental, safety or public health hazard shall be decommissioned.
- 1.4. All wells shall be tagged with a Department of Ecology unique well identification number. Please contact the well-drilling coordinator at the Central Regional Office. The well tag shall remain attached to the well. Reference the well tag number when submitting all water measuring reports.

**2. Measurements, Monitoring, Metering and Reporting**

- 2.1. An approved measuring device shall be installed and maintained for each of the sources authorized by this water right in accordance with the rule "Requirements for Measuring and Reporting Water Use", Chapter 173-173 WAC. <http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html>
- 2.2. Water use data shall be recorded weekly and maintained by the property owner for a minimum of five years. The maximum rate of diversion/withdrawal and the annual total volume shall be submitted to the Department of Ecology by January 31st of each calendar year.
- 2.3. Chapter 173-173 WAC 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. Installation, operation and maintenance requirements are enclosed as a document titled "Water Measurement Device Installation and Operation Requirements". <http://www.ecy.wa.gov/programs/wr/measuring/measuringhome.html>
- 2.4. Ecology prefers water use data submitted via e-mail in the form on an electronic spreadsheet. However, hard copies are still accepted. In the future, recorded water use data may be submitted via the Internet. Contact the Central Regional Office for forms or information on available options for submittals.

**3. Schedule and Inspections**

- 3.1. Department of Ecology personnel, upon presentation of proper credentials, shall 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.
- 3.2. The water right holder shall file the notice of project completion 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 of Change* will reflect the extent of beneficial use within the limitations of the change authorization. Elements of the project completion inspection may include, as appropriate, the source(s), system instantaneous capacity, beneficial use(s), annual quantity, place of use, and compliance with provisions.

**4. Water Use Efficiency**

Use of water under this authorization shall be contingent upon the water right holder's maintenance of efficient water delivery systems and use of up-to-date water conservation practices consistent with established regulation requirements and facility capabilities.

**5. Non-Additive to Confirmed Claims**

The water use authorized under this filing shall 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.

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**FINDINGS OF FACT AND ORDER**

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Upon reviewing the investigator's report, I find all facts relevant and material to the subject application have been thoroughly investigated. Furthermore, I find the change of water right as recommended will not be detrimental to existing rights or the public welfare.

Therefore, I ORDER approval of the recommended change to point of withdrawal under Surface Water Change Application No. CS4-037441CL, subject to existing rights and the provisions listed above.

You have a right to appeal this ORDER. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours
- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your Notice of Appeal.
- Serve and file your appeal in paper form; electronic copies are not accepted.

**1. To file your appeal with the Pollution Control Hearings Board**

Mail appeal to:

The Pollution Control Hearings Board  
PO Box 40903  
Olympia, WA 98504-0903

OR

Deliver your appeal in person to:

The Pollution Control Hearings Board  
4224 – 6th Ave SE Rowe Six, Bldg 2  
Lacey, WA 98503

**2. To serve your appeal on the Department of Ecology**

Mail appeal to:

The Department of Ecology  
Appeals Coordinator  
P.O. Box 47608  
Olympia, WA 98504-7608

OR

Deliver your appeal in person to:

The Department of Ecology  
Appeals Coordinator  
300 Desmond Dr SE  
Lacey, WA 98503

**3. And send a copy of your appeal to:**

Mark C. Schuppe, Acting Section Manager  
Department of Ecology  
Central Region Office  
15 W Yakima Ave Ste 200  
Yakima WA 98902

For additional information visit the Environmental Hearings Office Website: <http://www.eho.wa.gov>. To find laws and agency rules visit the Washington State Legislature Website: <http://www1.leg.wa.gov/CodeReviser>.

Signed at Yakima, Washington, this \_\_\_\_\_ day of April 2009.

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Mark C. Schuppe, Section Manager  
Water Resources Program  
Central Region Office

## BACKGROUND

### Description and Purpose of Proposed Change

On June 10, 2008, Alvin Shannon submitted an *Application for Change/Transfer of Water Right* to the Department of Ecology (Ecology). The application was assigned Change Application No. CS4-037441CL. Mr. Shannon proposes changing the point of diversion (POD) of Water Right Claim No. 037441 to a point of withdrawal (POW) that is constructed "135 meters downstream of the surface water diversion and is directly adjacent to the river".

Stated in a letter 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 of the Entiat River as laid out in the Entiat Watershed Plan (WRIA 46).

### Attributes of the Claim and Proposed Change

**Table 1** Summary of Proposed Changes to Water Right Claim No. 037441

<i>Attributes</i>	<i>Existing</i>	<i>Proposed</i>
Name	Arvil R. Shannon	Alvin Shannon
Priority Date   Date of Application for Change	December 15, 1898	June 10, 2008
Instantaneous Quantity	90 gallons per minute	No change
Annual Quantity	36 acre-feet per year	No change
Source	Entiat River	No change
Point of Diversion/Withdrawal	POD: SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.	POW: NW $\frac{1}{4}$ SE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.
Purpose of Use	Irrigation of 9 acres	No change
Period of Use	May 1 to September 30	No change
Place of Use	Parcels of land being in the NE $\frac{1}{4}$ SE $\frac{1}{4}$ , the SE $\frac{1}{4}$ NE $\frac{1}{4}$ , the NW $\frac{1}{4}$ SE $\frac{1}{4}$ , and in the SW $\frac{1}{4}$ NE $\frac{1}{4}$ of Sec. 29, T. 26 N., R. 20 E.W.M.	No change

### Legal Requirements for Proposed Change

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

- **Public Notice**

A public notice was published in the *Wenatchee World* on the 20<sup>th</sup> and 27<sup>th</sup> of October 2008. No protests or comments were received during the 30-day protest period.

- **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 feet per second, unless that project is for agricultural irrigation, in which case the threshold is increased to 50 cubic feet per second (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, collectively exceed 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 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

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 an 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.

## INVESTIGATION

Information comprising this investigation was obtained during a site visit conducted on October 8, 2008, with Ecology representatives Taylor Horne and Kurt Walker and the applicant Alvin Shannon present.

Additional information was obtained from:

- applicable RCW and WAC chapters,
- phone conversations with Alvin Shannon,
- Ecology records,
- historical aerial photographs,
- historical maps,
- Ecology's Geographic Information System (GIS) data,
- Chelan County records,
- Ecology and USGS streamflow records,
- documents listed in the References section of this report.

## History of Water Use

The Shannon property is located in the Entiat River valley, Water Resource Inventory Area (WRIA) 46. Mr. Shannon owns three parcels (Assessor Nos. 262029553120, 262029553130, and 262029553152) that comprise a 6.8 acre apple orchard and homestead with 1.2 acres of turf located at about river mile 9, two 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.

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

On August 30, 1973, Arvil R. Shannon submitted to Ecology a Claim that asserts a surface water right to 90 gallons per minute (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. The Claim was assigned Water Right Claim No. 037441. The claimed date of first putting water to use is December 15, 1898.

## Historic Place of Use

An inconsistency exists on the Claim form regarding the POU described in Water Right Claim No. 037441. The POU is stated on the Claim as:

“A parcel of land being in the northeast quarter of the southeast quarter and in the southwest quarter of the northeast quarter of Section 29, Township 26 North, Range 20 East of the Willamette Meridian as 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.”

Also included in the Claim filing was an “Affidavit and Real Estate Excise Tax Receipt” dated March 7, 1957. The legal description of the property appears to be included in the asserted POU of Water Right Claim No. 037441:

“The SE $\frac{1}{4}$  of NE $\frac{1}{4}$  of Sec 29, Township 26 W., Range 20 E.W.M, Chelan Co. Wash, EXCEPT any portion thereof lying in Tract 50, all as shown on [Dependent] Resurvey of Township 25 N, Range 20, dated Jan 27, 1923.”

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.

Aerial photographs and statements from Mr. Shannon indicate that irrigation has continuously occurred on the NW $\frac{1}{4}$ SE $\frac{1}{4}$ , NE $\frac{1}{4}$ SE $\frac{1}{4}$ , SE $\frac{1}{4}$ NE $\frac{1}{4}$ , and the SW $\frac{1}{4}$ NE $\frac{1}{4}$  of Section 29, T. 26 N., R. 20 E.W.M. under Water Right Claim No. 037441. If the proposed change in POU is approved, the report of examination and all superseding documents will contain a corrected POU description that accurately describe the lands to which Water Right Claim No. 037441 is appurtenant.

Dated June 18, 1948, an agreement of sale documenting the land transfer from Dale and Hazel Packwood to Arvil and Versa Shannon, includes the following language regarding orchards on the Shannon land:

“[Mr. and Mrs. Shannon] agree that during each year of the life of this contract to prune the fruit trees now on the premises and to irrigate and cultivate the land and to grow, harvest and deliver the fruit crops to market, all in accordance with the best rules of horticulture prevailing in that section on which said land is located.”

Statements by Alvin Shannon and corroborating historical information confirms that irrigation of orchards has occurred, continuing throughout the time Mr. Shannon inherited the land from his parents, Arvil and Versa Shannon.

North of the Entiat River Road one acre of turf has historically been irrigated with the Shannon irrigation system under Water Right Claim No. 037441, using impact sprinklers of undetermined size. The property is currently owned by Michael K. Bell (Assessor No. 262029553160).

### **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 1250 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 may have been taken from the SE $\frac{1}{4}$  corner of the NE $\frac{1}{4}$  of Section 29. The location corresponds to an approximate location of the Entiat River POD, not the original Stanley Irrigation Ditch POD (further described below). 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. 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 was “the water rights out of the Stanley Irrigation ditch and subject to the rights of way of the Stanly irrigation ditch over said property – this conveyance being made.” Mr. Shannon stated that the Stanley Irrigation Ditch serviced the property until the 1950’s, when the Entiat POD was constructed. The Stanley Irrigation Ditch POD was likely the original POD whereby water was diverted as asserted under Water Right Claim No. 037441. The approximate location of the Stanley Irrigation Ditch POD corresponds to a parcel currently owned by J. D. Johnson (Assessor No. 262029553200) located approximately 1,450 feet upstream of the Shannon property, within the NW $\frac{1}{4}$ NE $\frac{1}{4}$  of Section 29, T. 26 N., R. 20 E.W.M.

**Entiat River POD** - Operating until 2007, the POD was 2450 feet south and 1848 feet west of the NE corner of Section 29, T. 26 N., R. 20 E.W.M., located on the Shannon property (Assessor No. 262029553130). Mr. Shannon indicated that a five horsepower pump was used. The historic POD was last used during the 2006 irrigation season and is currently decommissioned. This is most likely the POD location asserted in Water Right Claim No. 037441.

## **Proposed Point of Withdrawal**

The proposed POW is an eight-inch diameter well drilled 44 feet deep, sealed with bentonite to a depth of 20 feet. The well drilling was completed April 13, 2005. The well was assigned Ecology unique well identification number ALC501, located approximately 2,580 feet north and 1,180 feet west of the southeast corner of Section 29, T. 26 N., R. 20 E.W.M., approximately 30 feet north of the Entiat River and 315 feet downstream of the historic POD. Since 2007, the well has been connected to the irrigation system and used to provide irrigation water for the orchard and turf throughout the Shannon property. A 10-horsepower submersible pump is installed in the well. No water meter is installed on the proposed well.

## **Measuring and Reporting Water Use**

RCW 90.03.360 requires that the owner of any water diversion maintain substantial controlling works and a measuring device. It must be constructed and maintained to permit accurate measurement and practical regulation of the flow of water diverted. Technical requirements for the measuring and reporting of water use are described in Chapter 173-173 WAC. If approved, this decision will contain provisions requiring the measuring and reporting of the quantities of water withdrawn or diverted.

## **Water Quantities**

Aerial photographs dating from 1945, 1998, 2004, 2005, and 2006 suggest orchard production on the Shannon parcels in those years.

Water Right Claim No. 037441 asserts a water right in the amount of 90 gpm, 36 ac-ft/yr, for the irrigation of 9 acres. No water meter was installed on the historic PODs or the proposed POW well; therefore, a direct measurement of the quantity of water historically diverted and withdrawn under the Claim is not available.

A reasonable estimate of water use based on crop irrigation requirements and irrigation system design is used in lieu of water use records to estimate the annual water use (Qa). Historical aerial photography and site investigation data indicate that 1.2 acres of turf and 6.8 acres of tree fruit have been historically irrigated on the Shannon property. An additional one acre of turf has been historically irrigated on the Bell property, north of the Entiat River Road. The claimed instantaneous quantity (Qi) of 90 gpm is equivalent to 10 gpm per acre to irrigate 9 acres, a Qi that is often applied to the crop types in the local area.

The irrigation system installed throughout the Shannon property consists of approximately 6.8 acres of apple orchard and 1.2 acres of turf irrigated. In the orchard, 4.7 acres are irrigated with overhead impact sprinklers and 2.1 acres are irrigated with undertree impact sprinklers. The undertree nozzles are 5/64 inch and the overhead nozzles are 1/8 inch diameter. Three-inch diameter PVC mainlines convey water to the orchard rows, where water flows through 1-inch and 3/4 inch diameter PVC row lines. The operating pressure ranges from 56 to 58 pounds per square inch (psi).

The irrigation system installed on the Bell property consists of one acre of turf irrigated via impact sprinklers. A mainline conveys water under the Entiat River Road, connecting the Bell irrigation system to water supplied from the Shannon irrigation system

In this report, seasonal crop irrigation requirement calculations are based on figures provided in Chapter 173-546 WAC Table 4-15 "Average monthly tree and pasture/turf irrigation water use (ac-in) estimates". The crop irrigation requirement of 2.2 acres of turf and 6.8 acres of tree fruit in Entiat is 27.00 ac-ft/yr. Accounting for the age of the irrigation system, consultation with Mr. Shannon, and use of application efficiency ranges included in Water Resource Program Guidance 1210<sup>1</sup>, a reasonable estimate of the irrigation system application efficiency is 70 percent. The resulting estimate of Qa under Water Right Claim No. 037441 is 38.57 ac-ft/yr. The Qa authorized for change cannot exceed the amount asserted on the Claim form; therefore, 36 ac-ft/yr is the maximum Qa available for change under Water Right Claim No. 037441.

## **Other Rights Appurtenant to the Place of Use**

### *Water Right Claim No. 037149 – Arvil R. Shannon*

On August 28, 1973, Arvil R. Shannon submitted to Ecology a Claim on a short form asserting a ground water right for domestic use. A map included with the Claim indicates that the well is located north of the Entiat River Road. The current Shannon property lies exclusively south of the road. This Claim may cover domestic water use for the home north of the Shannon's, currently owned by Michael K. Bell (Assessor No. 262029553160).

<sup>1</sup> The estimated application efficiency range for solid-set overtree sprinklers is 55 to 80 percent. The estimated application efficiency range for solid-set overtree sprinklers is 60-85 percent (Water Resource Program Guidance 1210).

### *Water Right Claim No. 037150 – Arvil R. Shannon*

On August 28, 1973, Arvil R. Shannon submitted to Ecology a Claim on a short form asserting a ground water right for domestic use. The place of use of this Claim includes a portion of the Shannon property. This Claim may cover the domestic use water for the homestead currently owned by Alvin Shannon.

## **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-in diameter 50-slot stainless steel Johnson screen was placed from 34 to 44 feet below ground surface (bgs.) The driller estimated well yield at 100+ gpm by air test with no measurable drawdown after four hours. A static water level of 11 feet bgs was measured by Ecology staff during the October 8, 2008, site visit.

### **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 river mile 7 to river mile 20. The Shannon property (river mile 9) is situated on a point bar which lies approximately 10-15 feet above the river level on an inside bend of the Entiat River. Five wells have been constructed on the Shannon farm since 1983. All the wells are completed into the unconsolidated fluvial valley fill sediments. The well logs record that boulders, cobbles, gravel, and sand with occasional silt and clay were encountered. Sands and gravels comprise the majority of material while silts and clays are found near ground surface in an 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 well and another well near the POD encountered bedrock at 44 and 39 feet bgs 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 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 gallons per minute (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 good hydraulic communication between the Entiat River and the valley fill aquifer.

Wells completed into the subject aquifer near the proposed well have yields [reported] 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 high transmissivity (30,000 to 60,000 gpd/ft) which falls within [the] upper range of the basin wide estimates.

### **Impairment of Groundwater Users**

An evaluation of well logs, aerial photographs, and discussions with Mr. Shannon indicate the closest pumping well completed into the subject aquifer is the Shannon domestic well located approximately 350 feet to the northwest. Aquifer characteristics and the hydraulic communication between the valley fill aquifer and the Entiat River will limit potential interference with other wells in the area. Because the proposed well is located approximately 30 feet from the Entiat River, the pumping drawdown cone will encounter a recharge boundary and [likely] stabilize before it extends to wells located 350 feet away or farther. Therefore, withdrawals from the proposed well are not anticipated to result in the impairment of any ground water users (see Appendix A).

### **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 ground water. 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 ground water 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 model was used to evaluate the hydraulic relationship between the original source of water and the proposed well.

The Analytical Stream Depletion Model (ASDM) (Schroeder, 1987) was used to estimate the amount and timing of pumping-induced stream flow depletion from the proposed well. 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 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 were used to predict the rate and timing of stream depletion of the Entiat River. The model predicts that after one day of pumping, stream depletion accounts for approximately 90% of the water drawn from the proposed wells. 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.

### **Impairment Considerations**

#### Impairment of Minimum Instream Flow Water Rights and Other Water Rights

The term "instream flow" is used to identify a specific stream flow (typically measured in cubic feet per second, or cfs) at a specific location for a defined time, and typically following seasonal variations. Instream flows are usually defined as the stream flows needed to protect and preserve instream resources and values, such as fish, wildlife and recreation. Instream flows are most often described and established in a formal legal document, typically an adopted state rule.

Once established, a minimum flow constitutes an appropriation with a priority date as of the effective date of the rule establishing the minimum flow (RCW 90.03.345). Thus, a minimum flow set by rule is an existing right which may not be impaired (RCW 90.03.345; RCW 90.44.030).

Adopted in 2005, Chapter 173-546 WAC established a minimum instream flow for the three stream management units in the Entiat River Basin WRIA 46. Both the claimed POD and the proposed POW are within the Lower Entiat stream management unit. The December 15, 1898 claimed date of first water use under Water Right Claim No. 037441 predates the September 3, 2005 priority date of the minimum instream flow; therefore, the asserted right to divert water under Water Right Claim No. 037441 is not subject to curtailment when minimum instream flow levels are not met. However, the water right asserted under Water Right Claim No. 037441 is subject to curtailment based on the priority system, whereby senior rights must be satisfied before a junior right may divert water.

There is no history of curtailment of water rights due to unavailability of water in the Entiat basin. If the proposed change is approved and in the event water flows in the Entiat River are insufficient for the water right asserted by Water Right Claim No. 037441 to be fully exercised, any curtailment of water rights junior to the December 15, 1898, claimed date of first water use is limited to junior water right holders upstream of the originally claimed POD.

The originally claimed POD was located 2450 feet south and 1848 feet west of the NE corner of Section 29, T. 26 N., R. 20 E.W.M. Ecology water right records indicate that no points of diversion exist in the 315-foot reach of the Entiat River between the claimed POD and the proposed POW.

If the proposed POW change is approved, 90 gpm will remain instream for the 315-foot reach, allowing the same quantity to be available for withdrawal from a well in continuity with the river at the proposed POW location. No complaints of impairment or detriment to existing water rights have been submitted to Ecology since 2007, when the proposed POW was first operated.

As indicated in the hydrogeologic evaluation, the only nearby well is Mr. Shannon's domestic well and the potential for ground water drawdown induced impairment is minimal.

### **Public Interest Considerations**

The addition of a point of withdrawal to a water right must not have a detrimental effect upon the public interest. A public interest investigation includes analyzing harm to fish and wildlife, effects on endangered or threatened species, impacts to wetlands, recreation, water quality, and any other concerns expressed by commenting and protesting parties.

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 and review of historical use of water indicate that water has been diverted at the claimed POD and water that is not diverted will remain in the Entiat River for the 315-foot reach to the proposed 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 maintain 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.

### **CONCLUSIONS**

After careful consideration of the facts presented in this report, I make the following conclusions:

- The portion of Water Right Claim No. 037441 that has been put to beneficial use and is eligible for change is 90 gallons per minute, 36 acre-feet per year, for the irrigation of 9 acres.
- The claimed water right will not be enlarged by approving the proposed change from point of diversion to point of withdrawal. The quantity of water diverted at the authorized point of withdrawal is limited to the quantities historically put to beneficial use, as listed on the cover page of this report.
- The change of point of diversion to a point of withdrawal of water for beneficial use is allowed by law.
- The proposed change in point of diversion to point of withdrawal will not impair existing rights.
- The proposed change in point of diversion to point of withdrawal will not be detrimental to the public interest.

### **RECOMMENDATIONS**

Based on the above investigation and conclusions, I recommend that the request for change to Water Right Claim No. 037441 be approved in the amounts and within the limitations listed below and subject to the provisions beginning on Page 2, et seq.

#### **Purpose of Use and Authorized Quantities**

The amount of water recommended is a maximum limit and the water user may only use that amount of water within the specified limit that is reasonable and beneficial:

- 90 gallons per minute
- 36 acre-feet per year
- For the irrigation of 9 acres from May 1 to September 30



