

Transfer #79938

**Proposed Change of POD for Water Rights
34-14167 & 34-14169**

Township 05N, Range 26E, Section 29

Prepared for
Boyd Burnett
3219N 3400W
Moore, Idaho
83255

February 9, 2017

Prepared by: Boyd Burnett Jr, P.E.

**RECEIVED
FEB 10 2017**

Department of Water Resources
Eastern Region

Table of Contents

Introduction.....	3
Surrounding Wells	4
Drawdown Estimates	5
Drawdown for Current POD versus Proposed POD	9
Conclusions.....	10
References	11
Appendix.....	
Appendix A – Burnett Application for Transfer of Water Right – Point of Diversion (POD).....	A
Appendix B – Location Map.....	B
Appendix C – Proximity to Area of Interest from 1992 Bassick and Jones Well Orchard Aquifer Test.....	C
Appendix D – Preparers Resume	D

Introduction

Mr. Boyd Burnett submitted an "Application for Transfer of Water Right", on March 30, 2015. Transfer 79938 would change the point of diversion for Water Rights 34-14167 (1.1-cfs) and 34-14169 approximately 3/4 mile to the south and onto the property assigned as the legal point of use as shown in Figure 1. Multiple water rights currently exist within the same POD, as the land irrigated by all water rights was previously owned by a single land owner. The place of use for all irrigated lands irrigated with water rights from the "Carpenter Well" are shown in Figure 1 below. Water was previously delivered from the Carpenter Well to the property now owned by Mr. Burnett, via a buried mainline shown in red in Figure 1. The mainline carried flows approximately 2,930-ft to the place of use.

The subsequent division of the original property between two land owners has led to the need to transfer the Burnett water rights 34-14167 and 34-14169 POD to a separate well. The proposed well location is indicated by the yellow star in Figure 1 on the designated place of use, property now owned by Mr. Burnett.

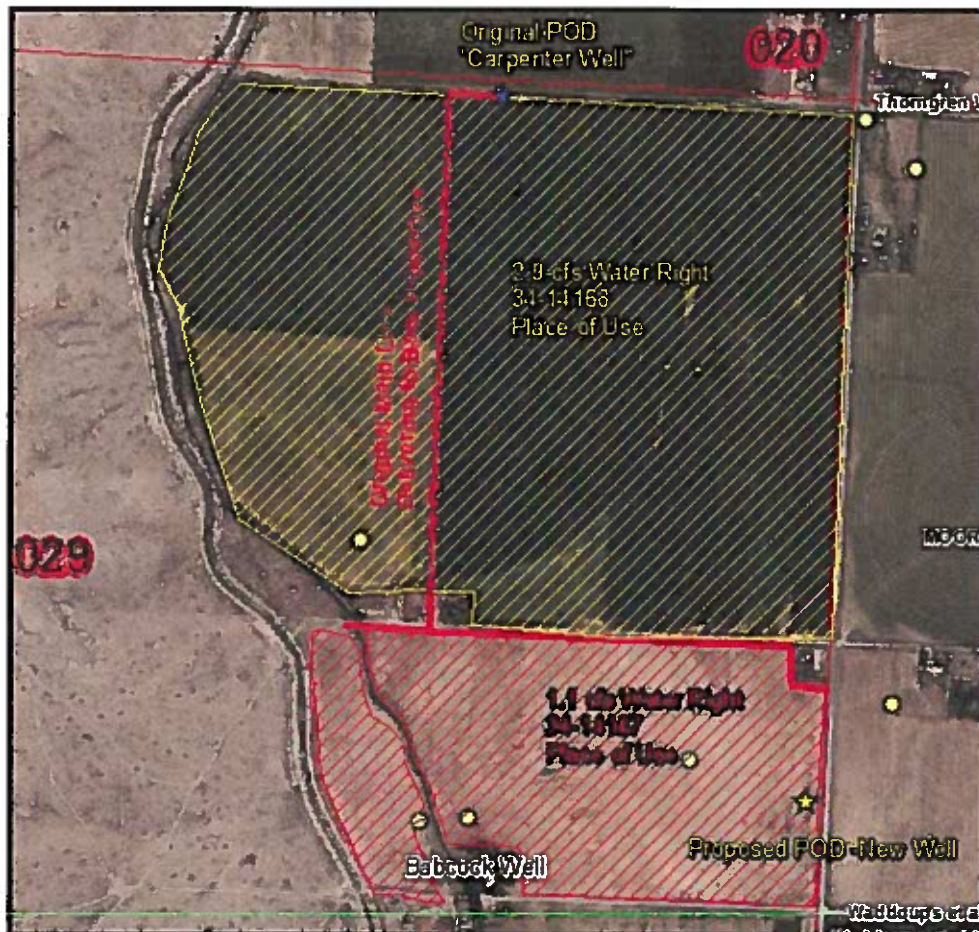


Figure 1 The original layout of irrigated lands from the well now known as the "Carpenter Well" for both Water Right 34-14167 and 34-14169. Original POD is shown as a blue star and the proposed POD for Water Right 34-14167 shown as yellow star.

Water right 34-14167 allows for the diversion of 1.1 cfs (493.7 gpm) of ground water from April 1 to November 1 to irrigate a total of 69 acres on the land now owned by Mr Burnett. The total volumetric water withdrawal is limited to 241 Acre-ft (AF) annually. In order for this water right to be utilized, a new well near the Carpenter Well within the current legal POD would need to be constructed and the diverted flow conveyed to the place of use either by pipeline or a combination of pipeline and the Moore Canal. There would be a significant cost to construct the required pipeline and water losses from use of the Moore canal to convey the water over 3,300 ft in the canal, from evaporation, transpiration, and infiltration, "canal shrink".

There are multiple benefits to moving the water rights 34-14167 and 34-14169 POD downstream to the place of use. They include:

- Moving the point of diversion downstream and closer to the point of use reduces waste of water pulled from the aquifer by reducing evaporation, transpiration, and or shrink associated with transporting the water to the point of use.
- Greatly reduces impacts to the Carpenter well if a new well were to be drilled within the legal POD near the existing Carpenter well.
- Would have nearly no measureable increase in impact on the Babcock well than if drilled in the current point of diversion up gradient of the Babcock well.

Surrounding Wells

Following the public notice process associated with the proposed transfer of water right POD, three water right holders in vicinity of the transfer submitted protests to the transfer, Nathan Carpenter, Reuben Babcock, and Russell Babcock. It is noted that Mr. Nathan Carpenter is the current owner of the "Carpenter Well", the current POD for water rights 34-14167 and 34-14167. Over the course of the last 12 months two of the three water right holders withdrew their protests. The remaining protest is from Mr. Russell Babcock.

The Babcock irrigation well is shown in Figure 2 and is located on the west side of the Moore Canal approximately 1,930 ft west of the proposed location of the Burnett water rights POD and associated new well. The Babcock irrigation well is approximately 3,610 ft from the existing POD at the Carpenter well.



Figure 2 Location of existing POD Carpenter well, Babcock irrigation well, and proposed new well POD on the legal place of use property owned by Boyd Burnett.

Drawdown Estimates

In order to evaluate the potential for impact to the Babcock irrigation well from pumping the new well at the proposed POD, the Theis method for drawdown estimation was utilized. The effect of pumping from the aquifer has a drawdown of the groundwater surface elevation effect as shown in Figure 3. As water flow (Q) is pumped from the permeable soil material, the water level declines in the vicinity of withdrawal and the shape of the water table extending beyond the well resembles an inverted cone, often referred to as the cone of depression. As seen graphically in Figure 3. The drawdown ($h_0 - h$) in the water table is highest at the point of withdrawal and reduces the further the distance (r) from the well you get.

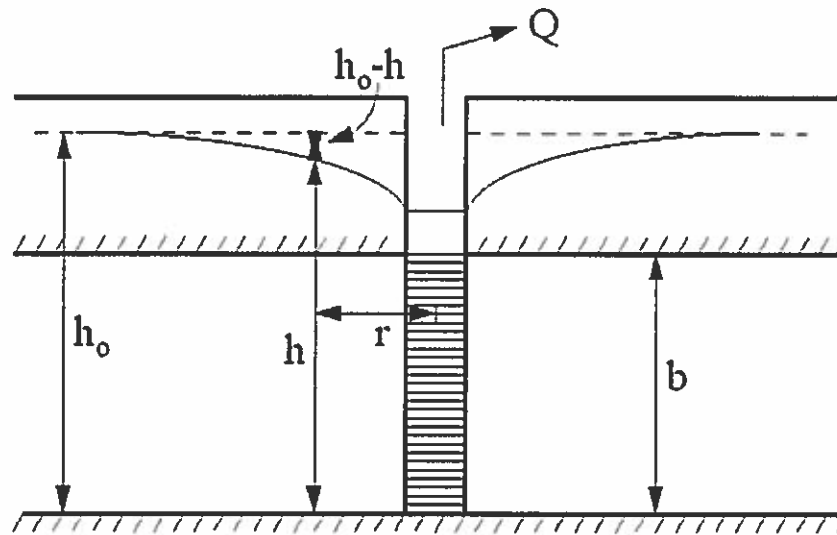


Figure 3. Draw down graphic showing drawdown based on aquifer characteristics and volume pumped from the aquifer

The overall size and shape of the cone of depression (or drawdown in the water table due to pumping the well) is dependent upon the (1) to total flow rate and duration of pumping; (2) the aquifer characteristics (transmissivity and storage coefficient); (3) increases in recharge; and (4) any decreases in aquifer natural discharge and or aquifer barrier boundary. In order to apply the Theis method to estimate drawdown from the proposed POD several assumptions and estimates of aquifer characteristics are required.

A literature review has indicated several studies suggesting that this portion of the Big Lost River Basin aquifer is most likely confined. Furthermore, likely the best aquifer test completed in the area to utilize for an estimate of drawdown due to pumping from the proposed well site, was the data collected by Bassick & Jones 1992. The 1992 study was conducted in an area locally known as the Well Orchard approximately 1.6 miles south of the proposed POD transfer. The location of the 1992 study area in relation to the proposed POD transfer is shown in Appendix C.

To estimate aquifer parameter the Well Orchard study pumped the test well continuously at a flow rate ranging from 2,300 to 2,400-gpm for 25 hours while closely monitoring well draw down in eight different nearby wells ranging in distance from the test well from approximately 400 to approximately 2000-ft. Using the Theis analysis for a confined aquifer, the authors concluded that the most probable transmissivity values for this portion of the aquifer would range between 130,000 to 200,000 ft²/day. The study also concluded that the most probable storage coefficient for the aquifer would be 0.001.

The assumptions of the Theis Method include that the aquifer in the area of interest is approximately constant in thickness (some studies suggesting 130-150ft thickness) and an aquifer of infinite area extent, homogeneous, and isotropic. With these assumptions the drawdown can be approximated at any distance from the pumped well by:

$$h_o - h = \frac{Q}{4\pi T} W(u) \quad u = \frac{r^2 S}{4Tt}$$

Where (h_o-h) is the drawdown

Q is the pumping flow rate

T is the transmissivity

S is the Storage Coefficient

r is the radial distance from the pumped well

t is the time of constant pumping in days

and W(u) and u are the well function (Standard Well Function tables from *Wenzel, 1942* were utilized in this analysis)

Table 1 Drawdown evaluation criteria parameters.

Theis Method Parametrs	value	Units
Constant pumping rate proposed POD well, Q	1.1	cfs
Constant pumping rate current POD well Carpenter right only, Q	2.9	cfs
Constant pumping rate current POD well with combined Carpenter/Burnett water rights, Q	4.0	cfs
Aquifer transmissivity, T	130,000	ft ² /day
Aquifer storativity, S	0.001	unitless
Time since pumping began, t	110	days
Radial distance from Proposed well to Babcock well, r	1,930	feet
Radial distance from current POD well to Babcock well, r	3,612	feet

As seen in Table 1, the pumping time used in this analysis is 110 days of constant pumping. This is the time period required for a continuous pumping of 1.1 cfs to meet the 241 AF volumetric limit on water right 34-14167. It is noted that normal irrigation practices for the most common crop irrigated by Mr. Burnett, alfalfa, would have multiple breaks in pumping throughout the year which would actually reduce the total days of continuous pumping. However 110 days is used to provide the most conservative estimate of highest drawdown. Furthermore, a transmissivity of 130,000 ft²/day was utilized representing the most conservative estimate from the Well Orchard pump test and resulting "most probable" transmissivity range of 130,000 to 200,000 ft²/day.

Applying the Theis method with reasonable estimates of aquifer characteristics derived from nearby studies, predicts an approximate drawdown at the Babcock well of **0.53 ft** from the pumping of 1.1 cfs continuously for 110 days at the proposed POD well of Mr. Burnett. Figure 4 below, shows the predicted drawdown in the vicinity of the Babcock irrigation well due to continuous pumping at the proposed new well if continuous pumping were to occur hypothetically for one full year.

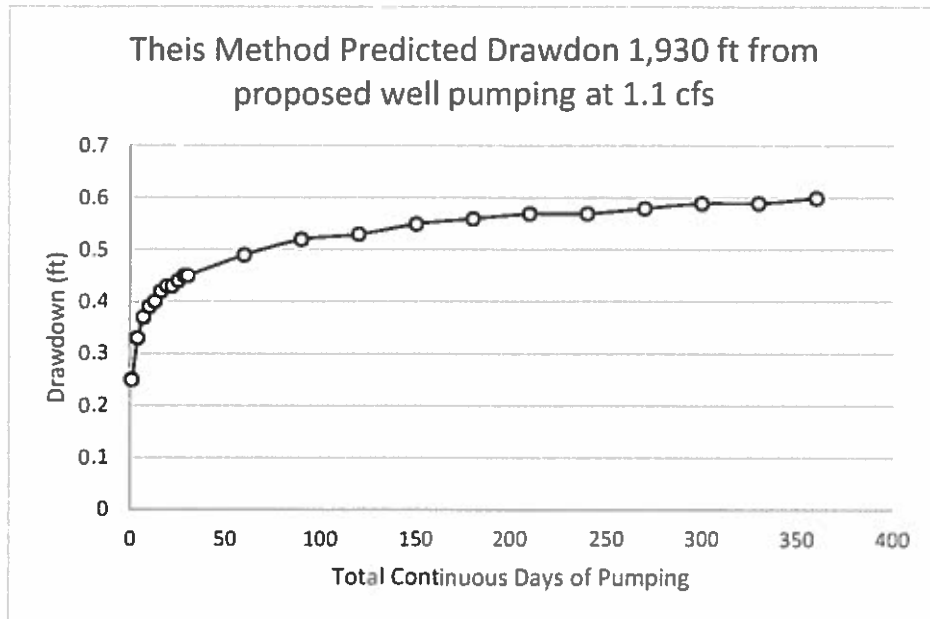


Figure 4. Theis predicted drawdown 1,930 ft from proposed well pumping continuously at 1.1 cfs (493-gpm) with storage coefficient of 0.001 and transmissivity T 130,000 ft²/day.

In an effort to be as conservative as possible in drawdown estimates, drawdown was also calculated for varying transmissivities ranging from 50,000 to 200,000 ft²/day. The results are presented graphically in Figure 5. This evaluation would predict drawdown in the water table in the vicinity of the Babcock well ranging from 1.23-ft to 0.36-ft following 110 days of continuous pumping (total volume 241AF) by Mr Burnett at the proposed new POD location approximately 1,930 ft to the east.

Given the well construction of the Babcock well and the characteristics of the aquifer in this location, it is concluded that an estimated drawdown of 0.53 ft (6.3 inches) caused by the proposed transfer of POD, would not impact or harm the Babcock irrigation wells ability to divert water rights associated with the well.

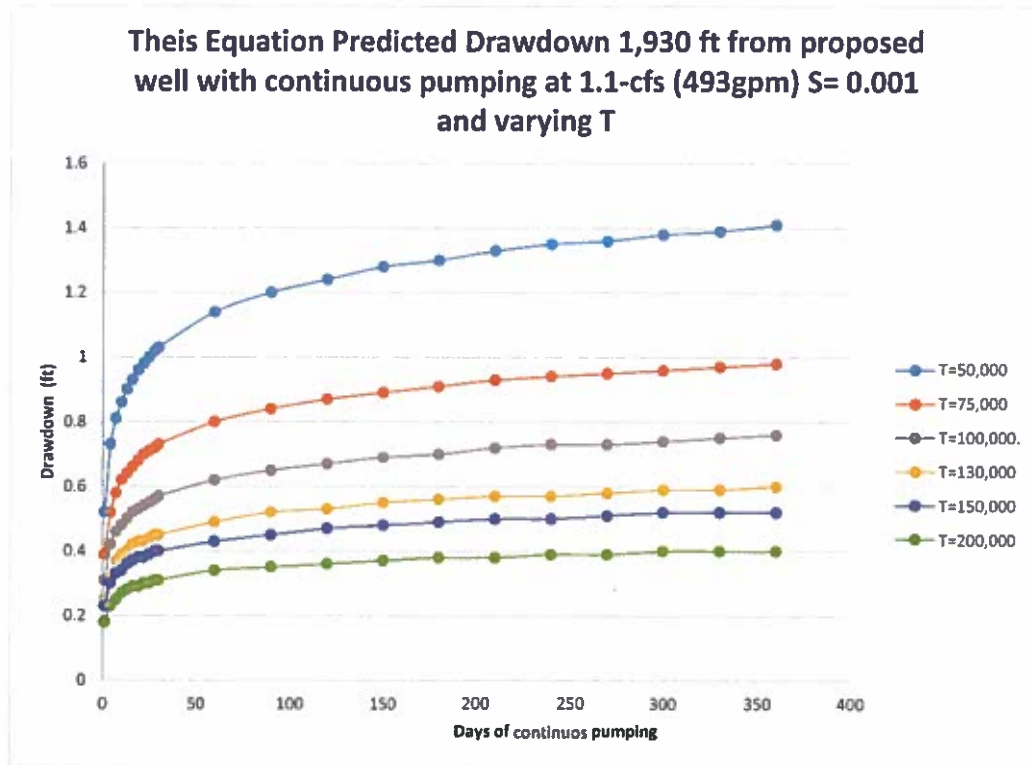


Figure 5. Theis predicted drawdown 1,930 ft from proposed well pumping continuously at 1.1 cfs (493-gpm) with storage coefficient of 0.001 and varying transmissivity T from 50,000 to 200,000 ft^2/day .

Drawdown for Current POD versus Proposed POD

This section evaluates the difference in total drawdown at the Babcock well between withdrawals of the existing water right of 1.1 cfs from the existing POD, Carpenter well. Whether a new well was drilled near the Carpenter well or the existing Carpenter well was used to withdraw the Burnett water right, a total diversion of 4.0 cfs (Water right 34-14168 of 2.9 cfs and 34-14167 of 1.1 cfs) could be pumped from or near the Carpenter well. Figure 2 shows the locations of each respective well as well as the proposed new well location. As seen in Figure 2 the Carpenter Well is approximately 3,610 ft north of the Babcock irrigation well.

The Theis method was again utilized using the parameters provided in Table 1. Again with a conservative 110 day continuous pumping of a total 4.0 cfs at the current POD (Carpenter well), a drawdown in the vicinity of the Babcock well with a transmissivity of 130,000 ft^2/day would reach approximately 1.65 ft. Reducing the flow rate to the Carpenter right of 2.9 cfs reduces to total drawdown seen in the vicinity of the Babcock well to approximately 1.2 ft. Therefore the drawdown near the Babcock well as a result of pumping the 1.1 cfs water right from the current POD at the Carpenter well, is approximately 0.45 ft. This shows that changing the legal point of diversion to the proposed POD on the Burnett property, in reality only reduces the water table in the vicinity

of the Babcock well by approximately **0.08ft**, less than 1 inch, (0.96 inch) from what it would be pumping at the current POD when the combined effect of total water right pumping at the current POD is considered.

Conclusions

The evaluation of groundwater aquifer characteristics and drawdown due to groundwater extraction is a challenging and complex process. General assumptions combined with actual testing is required to make accurate approximations of drawdown associated with groundwater extraction. Past studies in the near vicinity of the proposed change of POD for the Burnett water rights 34-14167 and 3414169 were utilized to evaluate potential impacts to nearby groundwater water user wells. Estimates using accepted methods estimate total drawdown from continuous pumping of **1.1cfs for 110 days of 0.53 ft** in the vicinity of the Babcock well should the change of diversion be accepted and a new well drilled. When compared to current water right POD drawdown in the vicinity of the Babcock well, this represents only a **0.08ft** (less than one inch) greater drawdown than currently possible with existing water rights and POD, at the Carpenter well.

These estimates show that moving the legal POD for water rights 34-14167 and 34-14169 to the legal place of use, will not impact or harm the ability for the Babcock Well to divert total water rights for the Babcock well. To not approve this transfer to the legal place of use would require transporting the 1.1cfs water right over 3,300 ft in the Moore Canal which would lead to significant losses due to evaporation, transpiration, and shrink. This would be wasteful management of our precious groundwater resources.

References

- Bassick, M.D. and M.J. Jones, 1992, Aquifer-Test Results, Direction of Ground-Water Flow, and 1984-90 Annual Ground-Water Pumpage for Irrigation, Lower Big Lost River Valley, Idaho, Water Resources Investigation Report 92-4006
- Crosthwaite, E.G., C.A. Thomas, and K.L. Dyer, 1970, Water Resources in the Big Lost River Basin, South-Central Idaho, Open File Report 70-93, U.S. Geological Survey.
- Kunkel, Fred, 1960, Time Distance and Drawdown Relationships in a Pumped Ground-Water Basin, Geological Survey Circular 433.
- Wenzel, L.K., 1942, Methods for Determining Permeability of Water-Bearing Materials. U.S. Geol. Survey Water-Supply Paper 887.

Appendix

**Appendix A – Burnett Application for Transfer of Water
Right – Point of Diversion (POD)**

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED
MAR 10 2015
VERSION Water Res.
Eastern Region

APPLICATION FOR TRANSFER OF WATER RIGHT – POINT(S) OF DIVERSION

This form may be used to apply to change and/or add points of diversion for existing water rights and to report an ownership change for a water right(s) in connection with the proposed point of diversion change(s). Do not use this form to apply for changes to other elements of a water right. See the Application for Transfer Instructions for help completing this form and for mailing addresses of Department offices where your application can be submitted.

Check all that apply:

- ☒ Change diversion point(s) ☐ Add diversion point(s) ☐ Ownership change ☐ Ownership split

1. APPLICANT(S) Boyd Burnett Phone 554 4943

2. MAILING ADDRESS 3219 N 3400 W City Moore

State ID Zip 83255 Email

- ☐ If the applicant is not an individual and not registered to do business in the State of Idaho, attach documentation identifying officers authorized to sign for the applicant.
- ☐ If the applicant is not the current water right(s) owner, attach documentation of authority to file the application.
- ☐ If the application includes a change in ownership of water right(s), attach a copy of the conveyance document, such as a warranty deed, court decree, contract of sale, etc. The conveyance document must include a legal description of the property conveyed or description of the water right if no land is conveyed. Additional fee(s) are required for water right ownership changes; see Item 9 for the fee schedule.

If the ownership change resulted in the water right(s) being split, how did the division occur? Mark one:

- ☐ The water rights or claims were divided as specifically identified in a deed, contract, or other conveyance document.
- ☐ The water rights or claims were divided proportionately based on the portion of their place(s) of use acquired by the new owner.
- ☐ If the application is not signed by the applicant, attach a Power of Attorney or other documentation providing authority to sign for the applicant.

3. LIST WATER RIGHT NUMBER(S) 34-14167 and 34-14169

- ☐ Attach a copy of the water right(s) as recorded, available at www.idwr.idaho.gov, *Water Right Transfers, Step 1*, or by contacting any Department office.

4. TOTAL AMOUNT OF WATER transferred is 1.10 cubic feet per second and/or acre-feet per annum.
(diversion rate) (storage volume)

5. POINT OF DIVERSION – Describe all the point(s) of diversion to be included on the water right(s) after the proposed change.

- ☐ Attach Eastern Snake Plain Aquifer (ESPA) analysis if this transfer proposes to change a point of diversion affecting the ESPA. ESPA analysis information is available at www.idwr.idaho.gov, *Water Right Transfers, Online Resources*.

[illegible]

6. GENERAL INFORMATION

- a. Describe the complete diversion system, including how you will accommodate a measuring device and lockable controlling works should they be required now or in the future:

Pump running to suit approx 85 hp. Dedicated power meter - PCC.

- b. Who owns the property at the point(s) of diversion? The applicant

If other than the applicant, describe the arrangement enabling the applicant to access the property for the diversion system:

- c. To your knowledge, has/is any portion of the water right(s) proposed to be changed:

Yes No

- ☐ ☒ undergone a period of five or more consecutive years of non-use,
☐ ☒ currently used in a mitigation plan limiting the use of water under the right(s), or
☐ ☒ currently enrolled in a Federal set-aside program limiting the use of water under the right(s)?

If yes, describe:

- d. Is any portion of the water right(s) proposed to be changed currently leased to the Water Supply Bank? ☐ Yes ☒ No

- ☐ If yes and there are multiple owners, attach a Lessor Designation form.
☐ If yes, the individual owner or designated lessor must complete, sign and attach an IRS Form W-9.
(Disregard if these items are on file and ownership has not changed.)

7. MAP - ☒ Attach a map of the diversion, measurement, control and distribution system. Include the place of use if a split of the water right occurred. Clearly label the map with township, range, section and $\frac{1}{4}$ $\frac{1}{4}$ of section information. The Map Tool, available at maps.idwr.idaho.gov/TransferApplicationLayouts/ provides a satisfactory template for creating the required map.

8. SIGNATURE - The information in this application is true to the best of my knowledge. I understand any willful misrepresentations in this application may result in rejection of the application or cancellation of an approval.

Boyd B. Burnett
Signature of applicant or authorized agent

Boyd Burnett
Print name and title if applicable

3-30-15
Date

Signature of applicant or authorized agent

Print name and title if applicable

Date

9. FEE - ☒ The application filing fee provided in Section 42-221, Idaho Code, must be submitted with the application for transfer. The Application fee is based on the total amount of water proposed for transfer in Item 4: the larger fee for either cubic feet per second (diversion rate) or acre-feet per annum (storage volume). The Fee Schedule is available at www.idwr.idaho.gov, Water Right Transfers, Step 4 and in the Application for Transfer Instructions.

FOR DEPARTMENT USE ONLY

Transfer includes _____ pages of attachments.

Received by _____ Date _____

Fee paid \$580.- Date 3/30/2015

Received by JB

Receipt # E040836

Preliminary review by JB

Date 3/30/2015

Active in the Water Supply Bank? Yes ☐ No ☐

W-9 received? Yes ☐ No ☐

Name on W-9 _____

W-9 forwarded to fiscal? Yes ☐ No ☐

(Do NOT scan the W-9 - confidential information is held by fiscal only)

Close

IDAHO DEPARTMENT OF WATER RESOURCES
Water Right Report

3/19/2015

WATER RIGHT NO. 34-14167

<u>Owner Type</u>	<u>Name and Address</u>
Current Owner	FRED N BURT
Current Owner	MARY ANN BURT
	PO BOX 628
	MOORE, ID 83255
	(208)554-3662
Original Owner	MARION PEARSON
	MOORE, ID

Priority Date: 09/16/1960

Basis: Decreed

Status: Active

<u>Source</u>	<u>Tributary</u>
GROUND WATER	

<u>Beneficial Use</u>	<u>From</u>	<u>To</u>	<u>Diversion Rate</u>	<u>Volume</u>
IRRIGATION	04/01	11/01	1.1 CFS	
Total Diversion			1.1 CFS	

Location of Point(s) of Diversion:

GROUND WATER|NENWNE|Sec. 29|Township 05N|Range 26E|BUTTE County

IRRIGATION Use:

Acre Limit: 55.2

79938

Place(s) of use:

Place of Use Legal Description: IRRIGATION BUTTE County

Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
05N	26E	29		NESE	36		NWSE	33						

Total Acres: 69

Conditions of Approval:

1. C18 THIS PARTIAL DECREE IS SUBJECT TO SUCH GENERAL PROVISIONS NECESSARY FOR THE DEFINITION OF THE RIGHTS OR FOR THE EFFICIENT ADMINISTRATION OF THE WATER RIGHTS AS MAY BE ULTIMATELY DETERMINED BY THE COURT AT A POINT IN TIME NO LATER THAN THE ENTRY OF A FINAL UNIFIED DECREE. SECTION 42-1412(6), IDAHO CODE.
2. C05 RIGHT INCLUDES ACCOMPLISHED CHANGE IN PLACE OF USE PURSUANT TO SECTION 42-1425, IDAHO CODE.
3. USE OF THIS RIGHT WITH RIGHT NO. 34-14169 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 1.10 CFS AND TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 241.5 AF
4. USE OF THIS RIGHT WITH RIGHT NO. 34-14169 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 69 ACRES IN A SINGLE IRRIGATION SEASON
5. K06 This right is limited to the irrigation of 55.2 acres within the place of use described above in a single irrigation season.
6. RIGHT NO. 34-14169 IS ALSO DIVERTED THROUGH POINT OF DIVERSION DESCRIBED ABOVE.
7. K01 RIGHT NUMBER 34-14169 IS AN ENLARGEMENT OF THIS RIGHT PURSUANT TO SECTION 42-1426, IDAHO CODE.
8. USE OF THIS RIGHT WITH RIGHTS LISTED BELOW IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 1.94 CFS. COMBINED RIGHT NOS.: 34-14153, 34-14155, 34-14157, 34-14159, 34-14161, 34-14163, 34-14165, 34-14167 AND 34-14169.
9. USE OF THIS RIGHT WITH RIGHTS LISTED BELOW IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 74 ACRES IN A SINGLE IRRIGATION SEASON. COMBINED RIGHT NOS.: 34-14153, 34-14155, 34-14157, 34-14159, 34-14161, 34-14163, 34-14165, 34-14167 AND 34-14169

Dates:

Licensed Date:

Decreed Date: 12/14/2001

Enlargement Use Priority Date:

Enlargement Statute Priority Date:

79938

Close

IDAHO DEPARTMENT OF WATER RESOURCES
Water Right Report

3/19/2015

WATER RIGHT NO. 34-14169

<u>Owner Type</u>	<u>Name and Address</u>
Current Owner	FRED N BURT
Current Owner	MARY ANN BURT
	PO BOX 628
	MOORE, ID 83255
	(208)554-3662

Priority Date: 09/16/1972

Basis: Decreed

Status: Active

<u>Source</u>	<u>Tributary</u>
GROUND WATER	

<u>Beneficial Use</u>	<u>From</u>	<u>To</u>	<u>Diversion Rate</u>	<u>Volume</u>
IRRIGATION	04/01	10/31	0.22 CFS	
Total Diversion			0.22 CFS	

Location of Point(s) of Diversion:

GROUND WATER|NENWNE|Sec. 29|Township 05N|Range 26E|BUTTE County

IRRIGATION Use:

Acre Limit: 13.8

7 9 9 3 8

Place(s) of use:

Place of Use Legal Description: IRRIGATION BUTTE County

Township	Range	Section	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres	Lot	Tract	Acres
05N	26E	29		NESE	36		NWSE	33						

Total Acres: 69

Conditions of Approval:

1. USE OF THIS RIGHT WITH RIGHT NO. 34-14167 IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 1.10 CFS AND TO A TOTAL COMBINED ANNUAL DIVERSION VOLUME OF 241.5 AF.
2. RIGHT NO. 34-14167 IS ALSO DIVERTED THROUGH POINT OF DIVERSION DESCRIBED ABOVE.
3. K09 THIS RIGHT IS FOR AN ENLARGEMENT OF 13.8 ACRES WITHIN THE PLACE OF USE DESCRIBED FOR THIS RIGHT.
4. C18 THIS PARTIAL DECREE IS SUBJECT TO SUCH GENERAL PROVISIONS NECESSARY FOR THE DEFINITION OF THE RIGHTS OR FOR THE EFFICIENT ADMINISTRATION OF THE WATER RIGHTS AS MAY BE ULTIMATELY DETERMINED BY THE COURT AT A POINT IN TIME NO LATER THAN THE ENTRY OF A FINAL UNIFIED DECREE. SECTION 42-1412(6), IDAHO CODE.
5. USE OF THIS RIGHT WITH RIGHT NO. 34-14167 IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 69 ACRES IN A SINGLE IRRIGATION SEASON
6. C11 THIS WATER RIGHT IS SUBORDINATE TO ALL WATER RIGHTS WITH A PRIORITY DATE EARLIER THAN APRIL 12, 1994, THAT ARE NOT DECREED AS ENLARGEMENTS PURSUANT TO SECTION 42-1426, IDAHO CODE. AS BETWEEN WATER RIGHTS DECREED AS ENLARGEMENTS PURSUANT TO SECTION 42-1426, IDAHO CODE, THE EARLIER PRIORITY RIGHT IS THE SUPERIOR RIGHT.
7. K02 THIS RIGHT IS BASED UPON AN ENLARGEMENT OF RIGHT NO. 34-14167 TO SECTION 42-1426, IDAHO CODE.
8. USE OF THIS RIGHT WITH RIGHTS LISTED BELOW IS LIMITED TO A TOTAL COMBINED DIVERSION RATE OF 1.94 CFS. COMBINED RIGHT NOS.: 34-14153, 34-14155, 34-14157, 34-14159, 34-14161, 34-14163, 34-14165, 34-14167 AND 34-14169.
9. USE OF THIS RIGHT WITH RIGHTS LISTED BELOW IS LIMITED TO THE IRRIGATION OF A COMBINED TOTAL OF 74 ACRES IN A SINGLE IRRIGATION SEASON. COMBINED RIGHT NOS.: 34-14153, 34-14155, 34-14157, 34-14159, 34-14161, 34-14163, 34-14165, 34-14167 AND 34-14169

Dates:

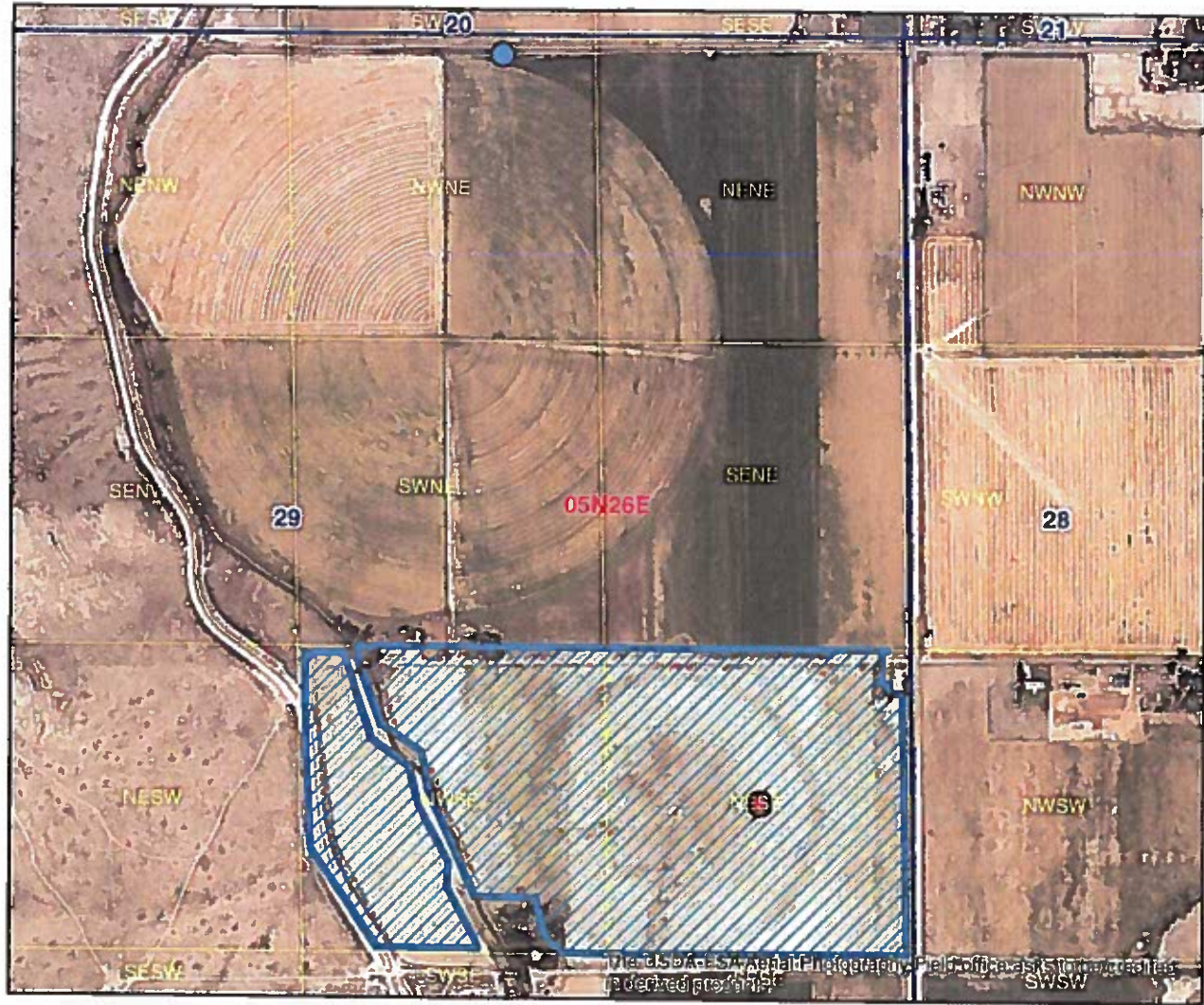
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Decreed Date: 12/14/2001

Enlargement Use Priority Date:

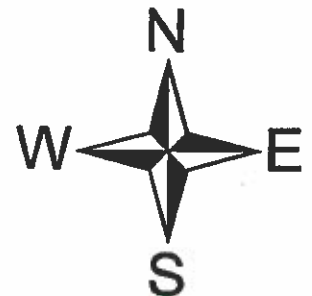
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WRs 34-14167 & 34-14169



Legend

- Proposed Point of Diversion
- Existing Point of Diversion
- Place of Use
- Township/Range
- Sections
- QQ



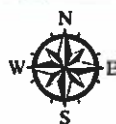
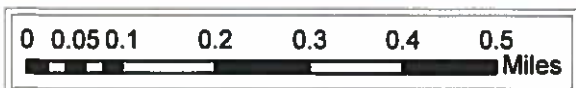
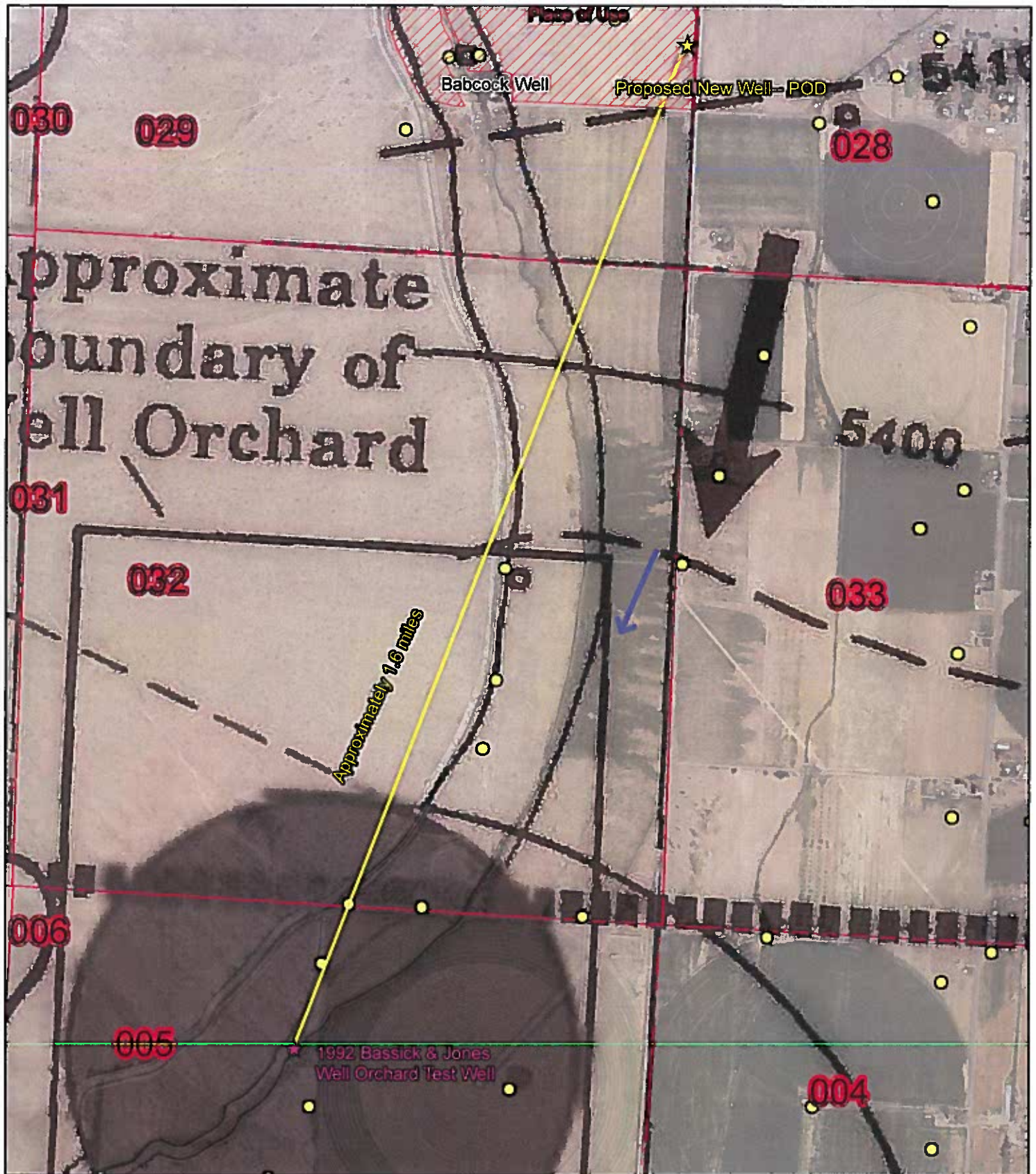
Appendix B – Location Map

Proposed Change of Diversion for 34-14167 & 34-14169



**Appendix C – Proximity to Area of Interest from 1992
Bassick and Jones Well Orchard Aquifer Test**

Proximity of Bassick and Jones 1992 Well Orchard Aquifer test to Location of Proposed POD



USGS 2011 NAIP Aerial Photos
Overlay of Bassick and Jones 1992 Aquifer Test results and
Groundwater Flow direction

Appendix D – Preparers Resume

Boyd Burnett Jr, P. E.
510 Iris Ridge Road
Ramsay, Montana 59748
Home Phone: (406) 438-0061
Cell: (406) 437-2573
boyd.burnett@northwestern.com

REGISTRATION

Professional Civil Engineer
State of Montana, No. 20180, 2011

EDUCATION

University of Idaho, Moscow, Idaho 83843

Master of Science in Civil Engineering, December 2007

Major: Civil Engineering, Water Resources Emphasis

Relevant Coursework:

Computational Hydrology, Evapotranspiration Theory, Fluvial Geomorphology, Hydraulic Design, Sedimentation Engineering, Fundamentals of Western Water Law, Hydraulics, Open Channel Hydraulics, Hydrologic Applications of GIS and Remote Sensing, Sprinkle/Micro Irrigation Systems

University of Idaho, Moscow, Idaho 83843

Bachelor of Science in Biological and Agricultural Engineering, August 2005

Biological Systems Emphasis

Relevant Coursework:

Fundamentals of Hydrology, Irrigation System Design, Environmental Water Quality, General Ecology

PUBLICATIONS

Allen, R.G., Burnett, B., Kramber, W. Hunington, J. Kjaersgaard, J., Kilie, A., Kelly, C., and Terezza, R.
Automated Calibration of the METRIC-Landsat Evapotranspiration Process. Journal of the
American Water Resources Association, June 2013.

EMPLOYMENT HISTORY

NorthWestern Energy

NorthWestern Energy- 11 E. Park Butte, MT 59701

Position: Lead Dam Safety Engineering

August 2012-Present

Professional Experience

Compliance Professional/ Hydro Engineering-FERC Dam Safety Program:

FERC Dam Safety Program Annual Reports for Eleven NorthWestern Energy Dams, MT: Completed Dam Safety Surveillance and Monitoring Reports (DSSMR) for NorthWestern Energy's eleven high hazard dams. Lead Dam Safety Engineer for the Dam Safety Surveillance and Monitoring Program. Worked closely with Plant Operators and other Hydro Engineers, to ensure accurate presentation of data collected at each dam as part of each respective Dam Safety Monitoring Plan. Provided follow up information with submittal letters to the FERC when needed. Oversee data acquisition and monitoring of alignment, uplift, and seepage at NorthWestern Energy Hydroelectric Developments.

Cochrane Reservoir Sedimentation Study, Great Falls, MT: Current Project Engineer assisting with sedimentation evaluations at Cochrane dam. This includes working with survey teams in collecting bathymetric information upstream of Cochrane pre and post runoff to determine operational changes that can be made to reduce sedimentation of Cochrane Reservoir in the vicinity of the dam. Estimated sediment scour in front of the dam at varying river flow rates. This project is ongoing with current tasks including the documentation of operational changes during high water events that may lead to reduce sedimentation at the dam face.

FERC Dam Safety Alignment Surveys, Hydro sites, MT: Assisted current Senior Dam Safety Project Engineer with Alignment surveys for, Black Eagle, Rainbow, Cochrane, Ryan, Hauser, Holter, Mystic, Kerr, and Thompson Falls dams over the last two years. Worked closely with Mr. Curtis during preparations for the surveys and with data collection during the surveys. Became familiar with the location and monitoring methods for most seepage monitoring devices,

FERC Dam Safety Inspections, 12 Hydro sites, MT: Attended nearly all annual FERC Dam Safety inspections for the twelve NWE hydro projects since August 2012. Working with the current Senior Dam Safety Project Engineer and NWE Chief Dam Safety Engineer, prepared Owners Inspection Preparation Form for all of the five Great Falls Hydro sites, Hauser, Holter, Mystic, Kerr, and Thompson Falls Projects in addition to normal EAP Coordinator tasks.

Holter Dam, Mystic Lake Dam, and Rainbow Dam Tabletop and Functional Exercises, MT: Planned and conducted the Development Emergency Action Plan Tabletop and Functional Exercises for NWE. Worked with a diverse Design Team including County DES, County Sheriff, the National Weather Service, and State of Montana DES. Facilitated Tabletop discussion with the major objective of validating the each Development Emergency Action Plan. Attendees included representatives from a wide array of emergency response entities including a representative of the FERC Portland Office. Prepared and submitted summary reports to the FERC Portland Office meeting all FERC requirements.

Dam Safety Training Instructor, Hydro Personnel, MT: Presented Annual Dam Safety Training for all Hydro Operators and Great Falls Maintenance crews in 2014 using CEATI Dam Safety for Hydroelectric Plant Operators.

FERC EAP Training Instructor, Hydro Personnel, MT: Presented FERC EAP Training for all Hydro Operators and Great Falls Maintenance personnel since fall 2012.

Black Eagle Road Rehabilitation Project, Great Falls, MT: Current Project Engineer assisting Black Eagle Operations to oversee the rehabilitation of over 70 feet of an existing steel soldier pile retaining wall located along the south side of the access road to Black Eagle Dam and powerhouse. The wall will be replaced with a Mechanically Stabilized Earth (MSE) retaining wall. The project includes overseeing the removal and replacement of the pavement roadway and guardrail system to current MDT standards and specifications.

1 Engineering Place, Helena, MT 59601

Position: Water Resource Engineer, Natural Resource Group

Hours: 40 Hours/Week

Supervisor: Mark Brooke

Telephone: (406) 442-3050

Professional Experience

Water Resource Engineering:

Big Sky Dam Flood Inundation Mapping Update and Loss of Life Estimation, Big Sky, MT: Project Engineer assisting the City of Big Sky with updating the flood inundation mapping for Big Sky Dam. Project includes updating original flood plain Inundation and Evacuation Maps using Arc GIS and corresponding dam break analysis and HEC-RAS modeling.

Pirate Dam, Highwood, MT: Performed hydraulic analysis and design of the principle spillway to pass the design flood of approximately 700 cfs. Assisted in the design of plunge pool energy dissipation facility following SCS design recommendations. The principal spillway was designed as a drop inlet spillway with a 5 foot diameter discharge outlet.

Flower Creek Dam Hydropower Feasibility Study Libby, MT: Performed hydraulic analysis and hydropower generation retrofit alternatives for the existing Flower Creek Dam near Libby Montana. Alternatives included updates to the existing dam to include hydropower generation facilities at the dam structure and at the City of Libby water intake facility approximately 2 miles below Flower Creek Dam. Tasks included conceptual turbine design and cost estimate generation.

Yavapai Apache Nation OK Draw Dam Feasibility Study, Camp Verde, AZ. Project Engineer for feasibility analysis of new off stream storage reservoir for up to 1900 acre-feet. Preliminary reservoir sizing conducted using ArcGIS and USGS DEM's with comparison to USGS 1:24,000 topographic maps. Study included preliminary sizing of 175-ft tall RCC Dam and associated hydraulic structure components for cost estimating purposes.

Pondera County Canal and Reservoir Company Wasteway Rehabilitation Project, Valier, MT: Currently Project Manager and Design Engineer for the design and construction of an approximate 40 acre-ft earthen embankment dam, designed to capture canal wasteway flows on the Canal Companies E canal. Construction is anticipated for October of 2012.

Pondera County Canal and Reservoir Company Lake Francis East Dam Automation, Valier, MT: Project Manager and Design Engineer for the automation of the Lake Francis East Dam. Worked closely with Senior Electrical engineer to determine SCADA requirements for the control of the east dam operating gates. Project included the installation of , installation of new actuators on the Hein Coulee gates approximately 1 mile downstream of the east dam.

Canal Flow Measurement Training Instructor for Montana Irrigation Districts and Watershed Groups, Montana: Instructor for Canal Flow Measurement techniques using SonTek Aquostic Doppler Flow Tracker hand held flow meters for local Montana irrigators and Watershed Groups. Trainings funded by Montana Department of Natural Resources Irrigation Development Program. Prepared training materials, course objectives, and hands on field exercises, for up to 15 participants. Guided water users in the basics of canal flow measurement techniques. Provided training courses in Hamilton, Fort Shaw, and Helena, Montana.

Pondera County Canal and Reservoir Company Reservoir Planning, Valier, MT: Project Engineer for the Canal Companies evaluation of potential off stream reservoir sites for improvements to the systems wasteway channels. Utilized GIS capabilities coupled with on ground site evaluation to determine areas where highest benefits from water conservation and reduction in sedimentation of the Marias River could be attained. Prepared successful DNRC RRGL grant application.

Pondera County Canal and Reservoir Company AN Wasteway, Valier, MT: Project Engineer for the completion of Water Sampling and Analysis Plan for the AN-Wasteway. Assisted the Canal Company and Pondera County Conservation District. Assisted senior project engineer with final inspection of earthen dam

embankment. Collect wasteway flow rate data and water samples for final DEQ sampling requirements. Prepared final water sampling report which was submitted to DEQ for final project closeout.

Hedge Canal Fish Screen, Hamilton, MT: Fish screen design engineer for the analysis of fish screening alternatives and design of fish screening facilities on the Hedge Canal, which conveys 140 cubic feet per second. This project prevents fish entrainment into the canal system and enhances the migratory component of a Bitterroot River fish population, thereby boosting fisheries and recreation associated with favorable fisheries. Performed upstream fish and aquatic organism passage evaluation on main canal head gates and submitted technical report to U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers.

Hysham Irrigation District Spatial Decision Support System, Hysham, MT: Project Engineer for the compilation of the Spatial Decision Support System (SDSS) Program document. Document delineates GIS data requirements, specific functionality for the SDSS, and interface for the Hysham Irrigation District website. Assisted in the compilation of GIS data layers which will correctly display pertinent irrigation information within the project area. The Hysham SDSS project represents model irrigation district management, conservation, and development of resources by the implementation of GIS and available technologies

University of Idaho, Kimberly Research and Extension Office

June 2006-September 2007

Kimberly, ID 83341

Position: Graduate Research Assistant

Hours: 40 Hours/Week

Supervisor: Dr. Richard Allen

Telephone: (208) 423-6601

Employer may be contacted

Job Duties:

- Remote Sensing of Evapotranspiration (ET)
- Procedure for estimating total ET using satellite-based vegetation indices with separate estimates of evaporation from bare soil
- Collected and analyzed AgriMet weather and satellite data
- Data analysis of spatially distributed surface energy fluxes using ArcGIS, and ERDAS
- Statistical analysis, model calibration, and thesis preparation

Idaho State University

January 2003-May 2004

Pocatello, Idaho 83204

Position: Undergraduate Research Assistant

Hours: 10-25 Hours/Week

Supervisor: Dr. Rob Van Kirk

Email: rob.vankirk@humboldt.edu

Employer may be contacted

Job Duties:

- Conducted undergraduate Research on the Henry's Fork of the Snake River, Watershed level hydrologic assessment
- Collected stream flow, reservoir operation, hydropower diversion, and irrigation diversion data from IDWR, USGS, USBR, private entities and the US Forest Service
- Assessed hydrologic alteration by reconstructing "unregulated" flows at ten gauging stations and then comparing regulated with unregulated flows using statistical methods
- Presented results to the Western Division of American Fisheries Society Symposium, and the Idaho Academy of Science Symposium at Idaho State University