

Groundwater Application Review Summary Form

Application # G- 18441

GW Reviewer M. Thoma Date Review Completed: July 27, 2017

Summary of GW Availability and Injury Review:

[] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

☒ There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

MEMO

July 27, 2017

FROM: GW: M. Thomas
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☒ YES

The source of appropriation is within or above a Scenic Waterway

☐ NO

☒ YES

Use the Scenic Waterway condition (Condition 7J)

☐ NO

☐ Per ORS 390.835, the Groundwater Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.

☒ Per ORS 390.835, the Groundwater Section is **unable** to calculate ground water interference with surface water that contributes to a scenic waterway; **therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway.**

DISTRIBUTION OF INTERFERENCE

Calculate the percentage of consumptive use by month and fill in the table below. If interference cannot be calculated, per criteria in 390.835, do not fill in the table but check the "unable" option above, thus informing Water Rights that the Department is unable to make a Preponderance of Evidence finding.

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

[illegible]

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date July 27, 2017
 FROM: Groundwater Section Michael Thoma
 Reviewer's Name
 SUBJECT: Application G- 18441 Supersedes review of _____
 Date of Review(s) _____

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525. Department staff review groundwater applications under OAR 690-310-140 to determine whether the presumption is established. OAR 690-310-140 allows the proposed use be modified or conditioned to meet the presumption criteria. This review is based upon available information and agency policies in place at the time of evaluation.*

A. GENERAL INFORMATION: Applicant's Name: Robert and Janet Bothwell County: Jackson

A1. Applicant(s) seek(s) 0.21* cfs from 2 well(s) in the Rogue Basin,
Upper Rogue subbasin

A2. Proposed use Irrigation (16.5 ac) Seasonality: March 1 – October 31 (244 d)

*The application lists only "Max" for the requested rate and irrigation for the Proposed Use so this review assumes 1/80 cfs x 16.5 acres = 0.20 cfs as the requested rate

A3. Well and aquifer data (attach and number logs for existing wells; mark proposed wells as such under logid):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	JACK 61311	1	bedrock	0.21	35S/02W-12 SWSW	933'N, 177'E from SW cor S 12
2	PROP	2	none provided	0.21	35S/02W-12 SWSW	585'N, 122'E from SW cor S 12
3						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	1400	50	20	8/28/2012	100	0-19	+1-19	0-100	0-100	40		A
2	1400	50	20*		**	0-18**	+1-18**					

Use data from application for proposed wells.

A4. **Comments:** *Given the geology in the area, it is likely that Well #2 will encounter similar hydrogeologic conditions (e.g., First Water, SWL) as Well #1

**The application provided no well construction information for Well #2 so this review assumes minimum case and seal depths. Maximum Well Depth is conditioned below in Section B2

A5. ☒ **Provisions of the** Rogue (OAR 690-515) Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ are, or ☒ are not, activated by this application. (Not all basin rules contain such provisions.)

Comments: _____

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.

Name of administrative area: _____

Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, the Department has determined that groundwater* for the proposed use:

- a. ☐ is over appropriated, ☒ is not over appropriated, or ☐ cannot be determined to be over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;
- b. ☐ will not or ☐ will likely be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
- c. ☐ will not or ☐ will likely be available within the capacity of the groundwater resource; or
- d. ☒ will, if properly conditioned, avoid injury to existing groundwater rights or to the groundwater resource:
 - i. ☒ The permit should contain condition #(s) 7C (7-yr SWL); 7J (Scenic); Medium Water-use Reporting;
 - ii. ☒ The permit should be conditioned as indicated in item 2 below.
 - iii. ☐ The permit should contain special condition(s) as indicated in item 3 below;

- B2. a. ☒ **Condition** to allow groundwater production from no deeper than 200 ft. below land surface;
- b. ☐ **Condition** to allow groundwater production from no shallower than _____ ft. below land surface;
- c. ☐ **Condition** to allow groundwater production only from the _____ groundwater reservoir between approximately _____ ft. and _____ ft. below land surface;
- d. ☐ **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

- B3. **Groundwater availability remarks:** There are several wells in the area of the proposed POA that have water-level data over the past decade. These data show a stable trend which implies that groundwater is not currently over-appropriated in the area. There are numerous permitted groundwater POAs scattered throughout the area of the proposed POAs (approx. 20 within 1 mile, the nearest being just over ¼ mile from Well #2) so there is potential for injury to existing permitted and thus conditions described in B1(d) are recommended on any permit that results from this review.
- _____
- _____
- _____

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040**C1. 690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	Bedrock of Payne Cliffs Fm.	☒	☐
2	Bedrock of Payne Cliffs Fm.	☒	☐

Basis for aquifer confinement evaluation: The well log for the applicant's Well #1 along with logs for the surrounding area and of similar depths typically report SWL above First Water indicating confined aquifer conditions. However, confinement in this aquifer system is not the result of a low-permeability confining layer but rather is due to weathering of the near-surface bedrock.

C2. 690-09-040 (2) (3): Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected?			Potential for Subst. Interfer. Assumed?	
						YES	NO	ASSUMED	YES	NO
1	1	Constance Creek	1380	1300-1320	9900*	☒	☐	☐	☐	☒
2	1	Constance Creek	1380	1300-1320	9800*	☒	☐	☐	☐	☒
1	2	Snider Creek†	1380	1300-1400	6740	☒	☐	☐	☐	☒
2	2	Snider Creek†	1380	1300-1400	6800	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: GW elevations are estimated to be above SW elevations suggesting that groundwater is flowing towards and discharging to surface water;

*Distance measured to Constance Creek is to the nearest point where the creek is assumed to be perennial based on aerial imagery and site visits;

†Although the proposed POAs are not within the Snider Creek watershed the basin divide in this area is subdued and does not likely represent a prominent groundwater divide.

Water Availability Basin the well(s) are located within: Rogue R > Pacific Ocean -AB Curry G at Gage 1435900 (ID#270)

Water Availability Basin the well(s) are hydraulically connected to: Snider Cr > Rogue R – At Mouth (ID# 71626)

C3a. 690-09-040 (4): Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% natural flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
		☐	☐			☐		☐		☐

Comments: No hydraulically-connected surface water sources within 1 mile

C3b. 690-09-040 (4): Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

SW #	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
	☐			☐		☐		☐

Comments:

- C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells													
Well	SW#	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1	2	0.1 %	1.2 %	3.4 %	6.2 %	9.1 %	12 %	15 %	17 %	20 %	21 %	21 %	20 %
Well Q as CFS		0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Interference CFS		< 0.01	< 0.01	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.04
Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.		< 0.01	< 0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04
(B) = 80 % Nat. Q		8.40	17.2	12.4	8.61	4.44	2.07	1.23	1.04	0.94	0.90	1.01	4.33
(C) = 1 % Nat. Q		0.08	0.17	0.12	0.09	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.04
(D) = (A) > (C)								✓	✓	✓	✓	✓	
(E) = (A / B) x 100		< 1	< 1	< 1	< 1	< 1	1	2	2	4	4	4	1

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation: Impacts to surface waters were evaluated for the nearest well to the WAB with the smallest monthly flows (i.e., maximum impacts), in this case Well #1 to Snider Creek. Stream depletion was estimated using the Hunt (2003) stream-depletion model with aquifer parameters that are representative of a fractured bedrock aquifer overlain by medium-to-coarse alluvial or weathered bedrock material. Model results are presented in Section E

- C4b. **690-09-040 (5) (b)** The potential to impair or detrimentally affect the public interest is to be determined by the Water Rights Section.

- C5. ☐ If properly conditioned, the surface water source(s) can be adequately protected from interference, and/or groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:
- ☐ The permit should contain condition #(s) _____;
 - ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

- C6. **SW / GW Remarks and Conditions:** The applicant's proposed POAs would be producing from an aquifer that has been found to be hydraulically connected to surface waters Constance Creek and Snider Creek at distances of > 1 mile. The estimated interference to streamflow (stream depletion) was calculated to be > 1% of one or more of the monthly 80%-exceedance natural flows so there is a preponderance of evidence to require the Department to assume that the proposed use will have the Potential for Substantial Interference with surface water. If the requested rate were reduced below 0.05 cfs (22 gal/min) then PSI would not be assumed for this review.

References Used:

Hunt, B. 2003. *Unsteady Stream Depletion when Pumping from a Semiconfined Aquifer*. Journal of Hydrologic Engineering. Vol 8(1), pp 12-19

Oregon Department of Geology and Mineral Industries, *Geologic Map of Oregon*. <http://www.oregongeology.org/geologicmap/>

OWRD Well Log Database – Accessed 7/27/2017.

Smith, J. G., N. J. Page, M. G. Johnson, B. C. Moring, F. Gray. 1982. *Preliminary Geologic Map of the Medford 1 by 2 Degree Quadrangle, Oregon and California*. USGS Open-file Report 82-955

D. WELL CONSTRUCTION, OAR 690-200

- D1. Well #: _____ Logid: _____
- D2. **THE WELL does not appear to meet current well construction standards based upon:**
- a. ☐ review of the well log;
 - b. ☐ field inspection by _____;
 - c. ☐ report of CWRE _____;
 - d. ☐ other: (specify) _____
- D3. **THE WELL construction deficiency or other comment is described as follows:** _____
- D4. ☐ Route to the Well Construction and Compliance Section for a review of existing well construction.

E. ATTACHMENTS**Water Availability Tables**

Water Availability Analysis Detailed Reports						
ROGUE R > PACIFIC OCEAN - AB CURRY G AT GAGE 14359000 ROGUE BASIN						
Water Availability as of 7/27/2017						
Watershed ID #: 270 (Map)			Exceedance Level: 80%			
Date: 7/27/2017			Time: 3:22 PM			
Water Availability Calculation		Consumptive Uses and Storages		Instream Flow Requirements		Reservations
Water Rights		Watershed Characteristics				
Water Availability Calculation						
Monthly Streamflow in Cubic Feet per Second Annual Volume at 50% Exceedance in Acre-Feet						
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	2,180.00	1,130.00	1,050.00	0.00	1,200.00	-147.00
FEB	2,710.00	2,040.00	666.00	0.00	1,200.00	-534.00
MAR	2,750.00	1,820.00	934.00	0.00	1,200.00	-266.00
APR	2,810.00	1,030.00	1,780.00	0.00	1,200.00	576.00
MAY	2,750.00	367.00	2,380.00	0.00	1,200.00	1,180.00
JUN	1,760.00	343.00	1,420.00	0.00	1,200.00	217.00
JUL	1,330.00	368.00	962.00	0.00	1,200.00	-238.00
AUG	1,160.00	330.00	830.00	0.00	1,200.00	-370.00
SEP	1,130.00	275.00	855.00	0.00	1,200.00	-345.00
OCT	1,160.00	227.00	933.00	0.00	1,200.00	-267.00
NOV	1,370.00	344.00	1,030.00	0.00	1,200.00	-174.00
DEC	1,810.00	561.00	1,250.00	0.00	1,200.00	48.80
ANN	1,900,000.00	528,000.00	1,370,000.00	0.00	869,000.00	533,000.00

Water Availability Analysis

Detailed Reports

SNIDER CR > ROGUE R - AT MOUTH
ROGUE BASIN

Water Availability as of 7/27/2017

Watershed ID #: 71626 ([Map](#))

Exceedance Level: 80% ▾

Date: 7/27/2017

Time: 2:47 PM

Water Availability Calculation

Consumptive Uses and Storages

Instream Flow Requirements

Reservations

Water Rights

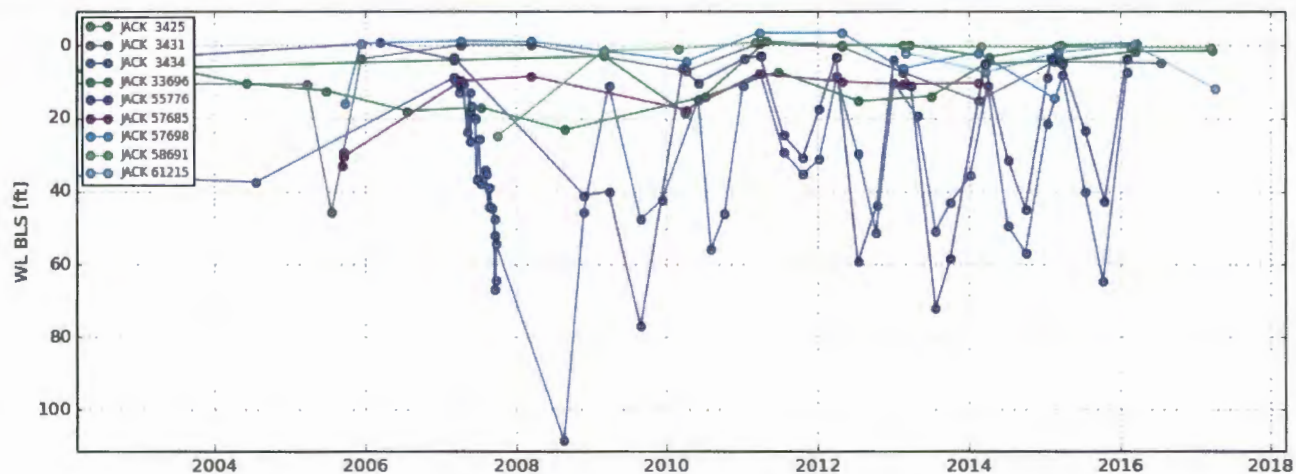
Watershed Characteristics

Water Availability Calculation

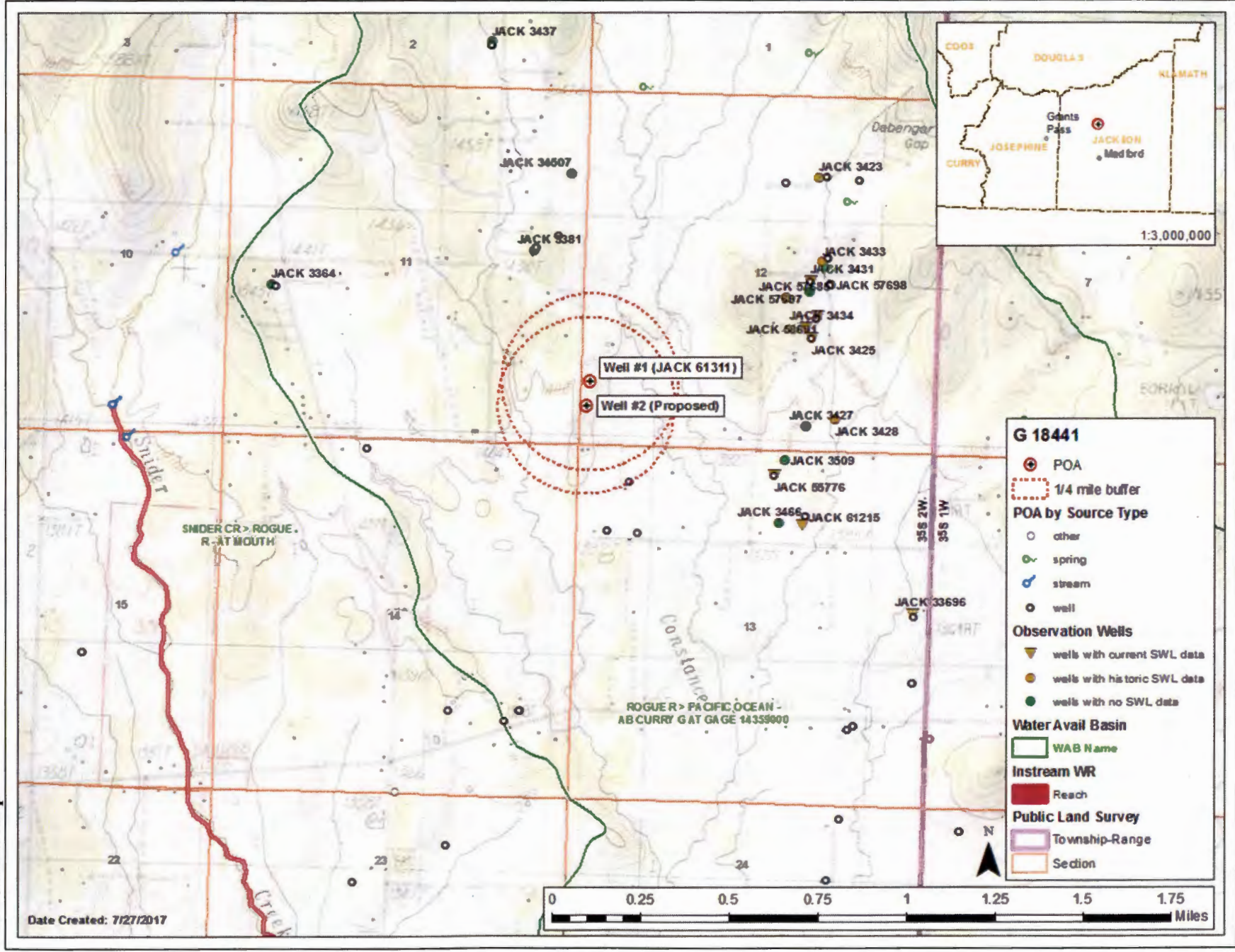
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	8.40	1.78	6.62	0.00	26.00	-19.40
FEB	17.20	2.05	15.10	0.00	26.00	-10.90
MAR	12.40	1.39	11.00	0.00	26.00	-15.00
APR	8.61	0.51	8.10	0.00	11.80	-3.70
MAY	4.44	0.81	3.63	0.00	4.98	-1.35
JUN	2.07	1.13	0.94	0.00	4.92	-3.98
JUL	1.23	1.51	-0.28	0.00	2.58	-2.86
AUG	1.04	1.25	-0.21	0.00	1.60	-1.81
SEP	0.94	0.82	0.12	0.00	0.96	-0.84
OCT	0.90	0.27	0.63	0.00	1.00	-0.37
NOV	1.01	0.18	0.83	0.00	2.55	-1.72
DEC	4.33	0.91	3.42	0.00	14.70	-11.30
ANN	7,760.00	759.00	7,000.00	0.00	7,390.00	357.00

Water-Level Trends in Nearby Wells

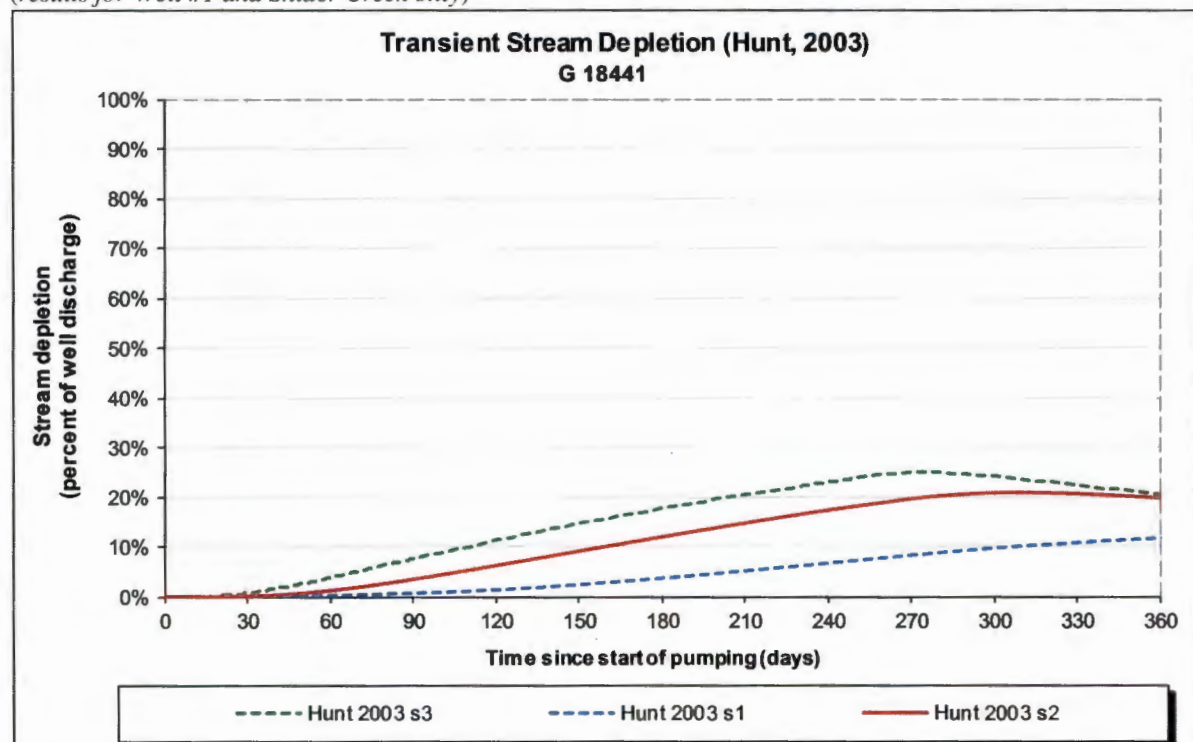


Well Location Map



Stream-depletion Model Results

(results for Well #1 and Snider Creek only)

**Output for Stream Depletion, Scenerio 2 (s2):****Time pump on (pumping duration) = 244 days**

Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	38.4%	53.8%	61.5%	66.4%	69.7%	72.2%	74.2%	75.8%	42.2%	25.9%	18.6%	14.4%
H SD 1999	23.0%	38.3%	47.1%	53.0%	57.3%	60.6%	63.2%	65.3%	47.0%	31.9%	23.8%	18.9%
H SD 2003	0.07%	1.18%	3.42%	6.17%	9.06%	11.91%	14.67%	17.25%	19.52%	20.72%	20.57%	19.69%
Qw, cfs	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
H SD 99, cfs	0.046	0.077	0.094	0.106	0.115	0.121	0.126	0.131	0.094	0.064	0.048	0.038
H SD 03, cfs	0.000	0.002	0.007	0.012	0.018	0.024	0.029	0.034	0.039	0.041	0.041	0.039

Parameters:

		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.20	0.20	0.20	cfs
Time pump on (pumping duration)	tpon	244	244	244	days
Perpendicular from well to stream	a	6740	6740	6740	ft
Well depth	d	133	133	133	ft
Aquifer hydraulic conductivity	K	20	50	100	ft/day
Aquifer saturated thickness	b	200	200	200	ft
Aquifer transmissivity	T	4000	10000	20000	ft ² /day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	5	5	5	ft/day
Aquitard saturated thickness	ba	5	5	5	ft
Aquitard thickness below stream	babs	4	4	4	ft
Aquitard porosity	n	0.1	0.1	0.1	
Stream width	ws	5	5	5	ft
Streambed conductance (lambda)	sbc	6.250	6.250	6.250	ft/day
Stream depletion factor	sdf	113.569	45.428	22.714	days
Streambed factor	sbf	10.531	4.213	2.106	
input #1 for Hunt's Q_4 function	t'	8.81E-03	2.20E-02	4.40E-02	
input #2 for Hunt's Q_4 function	K'	1.14E+04	4.54E+03	2.27E+03	
input #3 for Hunt's Q_4 function	epsilon'	1.00E-01	1.00E-01	1.00E-01	
input #4 for Hunt's Q_4 function	lamda'	1.05E+01	4.21E+00	2.11E+00	