WATER RESOURCES DEPARTMENT

MEMO April 27 ,20 16

TO: **Application G-** 18206

FROM: **GW:** Phillip Marcy
(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.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **04/27/2016**

FROM: Groundwater Section **Phillip I. Marcy**
Reviewer's Name

SUBJECT: Application G- **18206** 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: **Paul Kesler** County: **Malheur**

A1. Applicant(s) seek(s) **3.56** cfs from **2** well(s) in the **Malheur** Basin, _____ subbasin

A2. Proposed use **Supplemental Irrigation (447.2 acres)** Seasonality: **March 1st – October 31st (245 days)**

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	MALH 54160	1	Alluvium	1.78	19S/46E SW-NE	2600'S, 3160'E fr NW cor S 14
2	MALH 54229	2	Alluvium	1.78	19S/46E NW-SW	1380'N, 300'E fr SW cor S 14
3						
4						
5						

* 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	2470	199	76.75	11/04/2015	504	0-196	+1.5-201	None	201-504	550	15	Pump
2	2463	15	80.60	11/04/2015	520	0-125	+1.5-220	None	220-488	500	?	Air

Use data from application for proposed wells.

A4. **Comments:** Both wells are constructed to produce groundwater from sand and gravel lenses within the Glenns Ferry Formation. Reported yields for each well do not match the requested maximum rate of 800 GPM.

A5. ☒ **Provisions of the** Malheur (690-510) 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**, I have 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 to 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) **7N**;
   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 _____ 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:** Little groundwater data is available for this area, but drought measurements for each of the two proposed POA wells in November of 2015 show no evidence of water level decline after 1 season of use. Gannett (1990) concluded that groundwater development within the Glenns Ferry Formation should be approached with caution, due to the possibility that overdrafting may cause infiltration from overlying shallow systems. This could potentially introduce a variety of contaminants into the Glenns Ferry aquifer system.

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	**Sand lenses with Glenns Ferry Fmn**	☐	☒
2	**Sand lenses with Glenns Ferry Fmn**	☐	☒
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Studies conducted by the Department have concluded that the Glenns Ferry Formation discharges groundwater to the overlying sand and gravel aquifer (Gannett, 1990). This conclusion is based partially upon the fact that groundwater elevations within wells completed into the Glenns Ferry Formation are substantially higher than in wells completed into the near-surface sand and gravel aquifer. While this also illustrates some degree of confinement, our conceptual model of this deeper aquifer includes a lack of laterally continuous lithologies, as reported on local well logs. Within this framework, vertical migration of groundwater is likely inefficient, and variable by location and distribution of fine-grained sediments above the production zone.

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? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	1	**Snake River**	**2393**	**2163**	**19000**	☒	☐	☐	☐	☒
2	2	**Snake River**	**2382**	**2163**	**21850**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The Glenns Ferry Formation is incised by the channel of the Snake River, where horizontal movement of groundwater results in discharge to the stream. There is likely a surficial deposit of low-permeability silts and clays within the stream channel and floodplain, which may inhibit this flow to some degree.

Water Availability Basin the well(s) are located within: None

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?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: This section does not apply.

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#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	**1**	%	%	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.01%**	**0.01%**
Well Q as CFS				**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**		
Interference CFS				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
2	**1**	%	%	**0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**	**0.0 %**
Well Q as CFS				**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**	**1.78**		
Interference CFS				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.				**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(B) = 80 % Nat. Q				**467**	**780**	**524**	**324**	**150**	**100**	**84**	**106**	**135**	**132**
(C) = 1 % Nat. Q				**4.67**	**7.80**	**5.24**	**3.24**	**1.50**	**1.00**	**0.84**	**1.06**	**1.35**	**1.32**
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**	**0 %**

(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: Evaluation of expected impacts to the Snake River were calculated using the model of Hunt (2003) to consider the effects of low-permeability beds within the aquifer in addition to fine-grained fluvial sediments within the stream channel. A range of hydraulic conductivity values were used that fell within the range of local pump test results from the deeper Glenns Ferry Formation aquifer. The calculated impacts to the Snake river were negligible for both proposed POAs, largely due to their distance from the stream.

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:

i. ☐ The permit should contain condition #(s)_____;

ii. ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions:** The large distance of the two proposed POA wells from the Snake River results in minimal projected impacts from the proposed pumping rate.

References Used:

Gannett, M.W. 1990, Hydrogeology of the Ontario Area, Malheur County, Oregon: Oregon Water Resources Department Groundwater Report No. 34.

Ferns, M.L., Brooks, H.C., Evans, J.G., and Cummings, M.L. 1993. Geologic Map of the Vale 30 X 60 Minute Quadrangle, Malheur County, Oregon, and Owyhee County, Idaho: Oregon Department of Geology and Mineral Industries Geological Map Series GMS-77, scale 1:100,000.

Local well log reports; pump tests.

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.**

Water Availability Tables (nearby WAB to north)

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

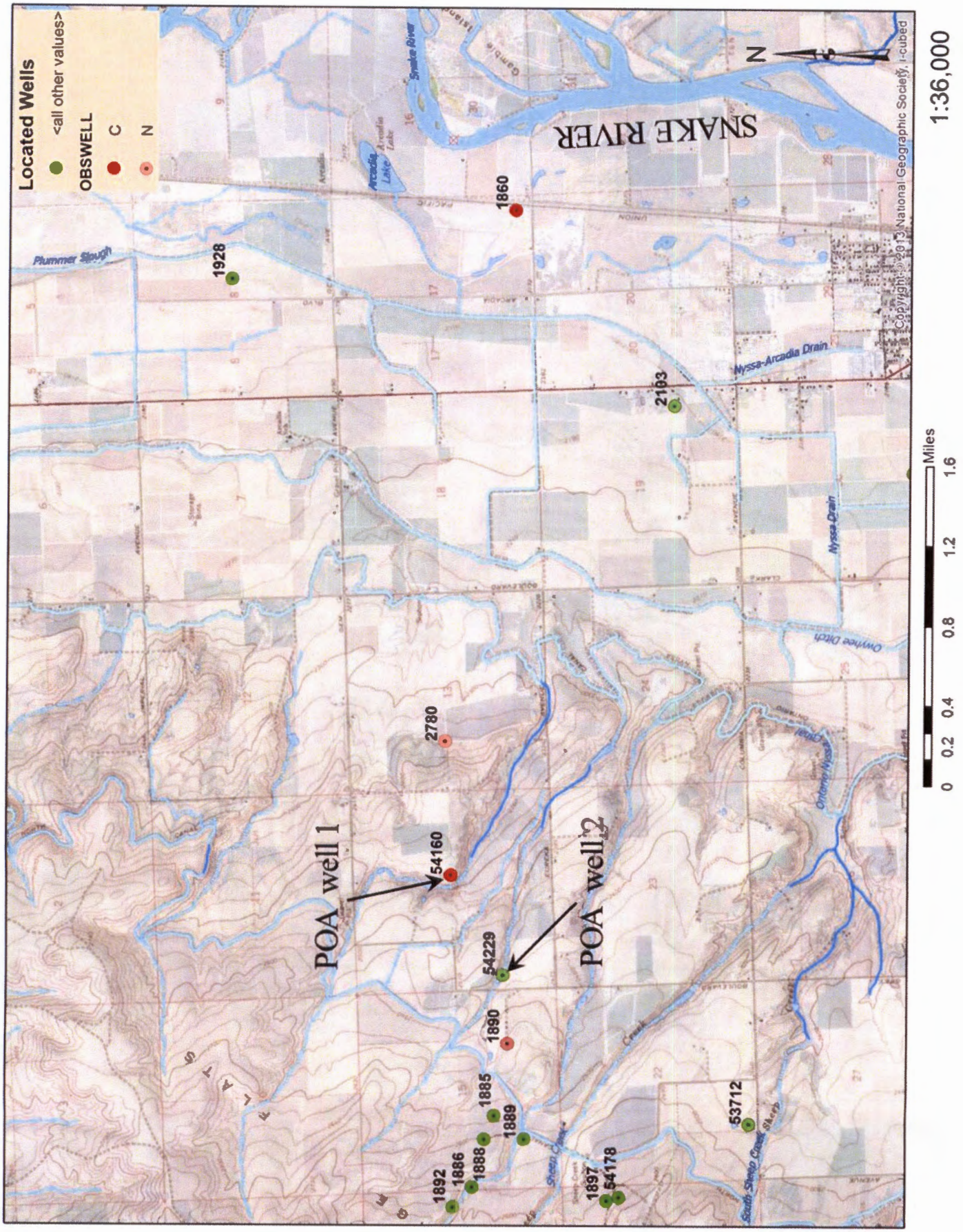
MALHEUR R > SNAKE R - AT MOUTH

Watershed ID #: 31011701 Basin: MALHEUR Exceedance Level: 80
Time: 11:45 AM Date: 04/27/2016

Monthly values are in cfs.
Storage is the annual amount at 50% exceedance in ac-ft.

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
JAN	154.00	427.00	-273.00	0.00	0.00	-273.00
FEB	267.00	626.00	-359.00	0.00	0.00	-359.00
MAR	467.00	911.00	-444.00	329.00	0.00	-774.00
APR	780.00	1,060.00	-278.00	470.00	0.00	-748.00
MAY	524.00	957.00	-433.00	0.00	0.00	-433.00
JUN	324.00	857.00	-533.00	0.00	0.00	-533.00
JUL	150.00	686.00	-536.00	0.00	0.00	-536.00
AUG	99.90	540.00	-440.00	0.00	0.00	-440.00
SEP	83.80	376.00	-292.00	0.00	0.00	-292.00
OCT	106.00	209.00	-103.00	0.00	0.00	-103.00
NOV	135.00	223.00	-87.90	0.00	0.00	-87.90
DEC	132.00	297.00	-165.00	0.00	0.00	-165.00
ANN	338,000	432,000	29,500	48,200	0	0

Well Location Map



Water-Level Trends in Nearby Wells

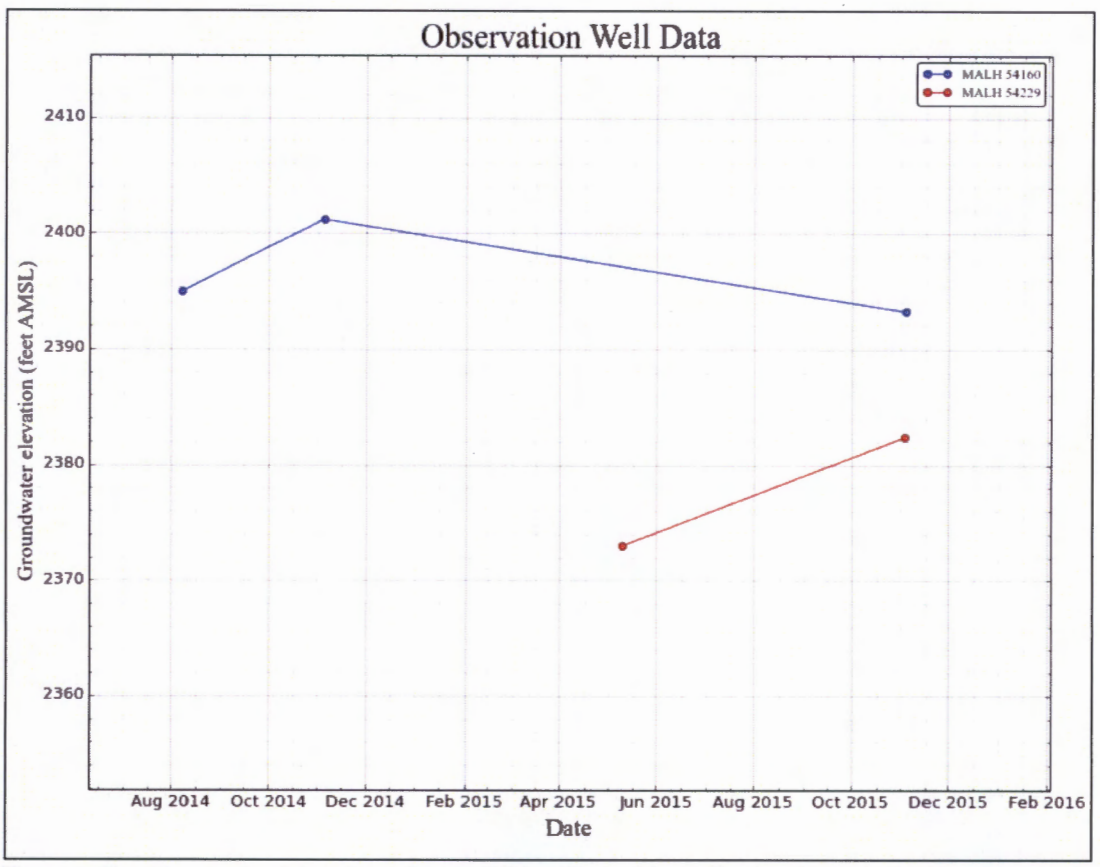
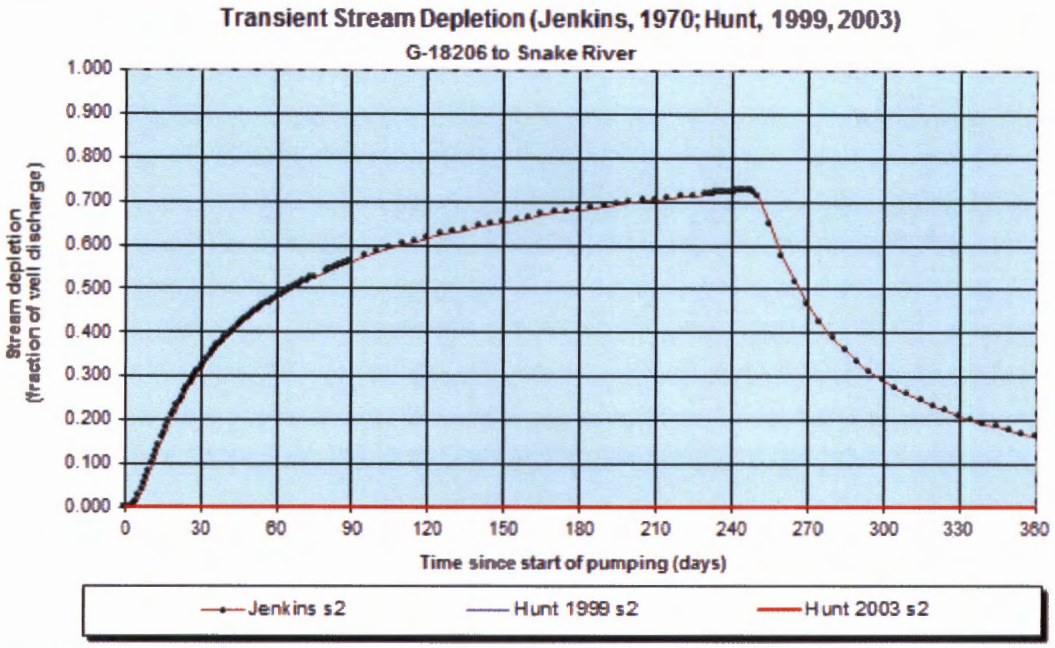


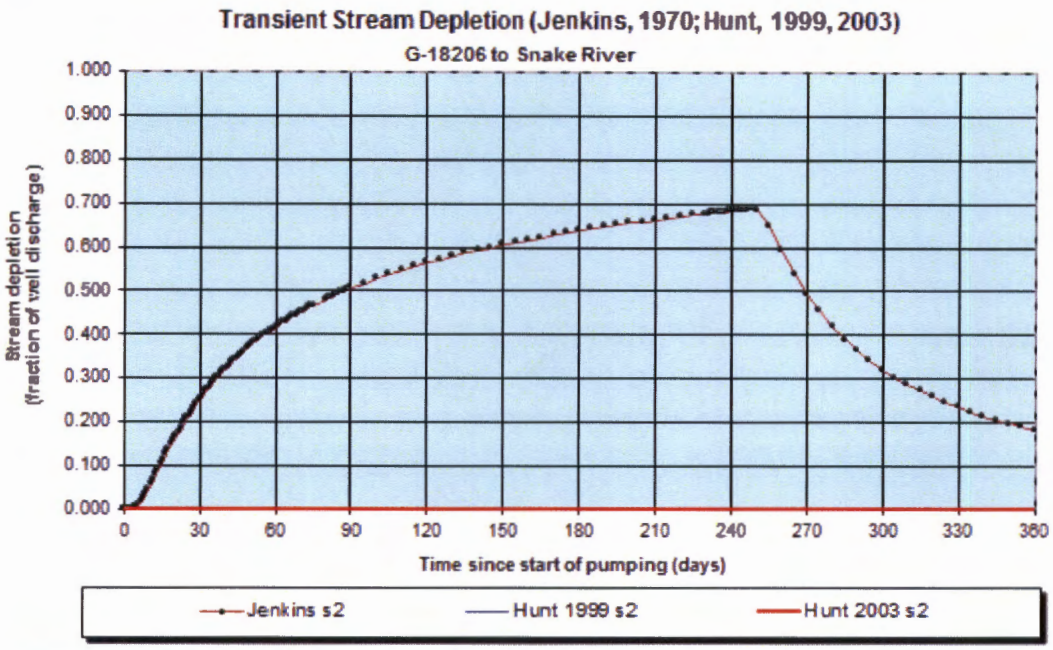
Figure 1: Recent water level data from the two POA wells on this application do not indicate measurable declines from pumping under drought permit in 2015. Little other groundwater data is available for this area, particularly for wells within the Glenns Ferry Formation.



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 245 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	31.7%	47.9%	56.3%	61.7%	65.4%	68.3%	70.5%	72.3%	46.6%	29.2%	21.1%	16.3%
H SD 1999	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
H SD 2003	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	0.01%	0.01%	0.01%	0.01%
Qw, cfs	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780
H SD 99, cfs	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.78	1.78	1.78	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	19000	19000	19000	ft
Well depth	d	504	504	504	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	120	120	120	ft
Aquifer transmissivity	T	6000	6000	6000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.5	5	25	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	500	500	500	ft
Streambed conductance (lambda)	sbc	83.333333	833.333333	4166.666667	ft/day
Stream depletion factor	sdf	60.166667	60.166667	60.166667	days
Streambed factor	sbf	263.888889	2638.888889	13194.444444	
input #1 for Hunt's Q_4 function	t'	0.016620	0.016620	0.016620	
input #2 for Hunt's Q_4 function	K'	1504.166667	15041.666667	75208.333333	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	263.888889	2638.888889	13194.444444	

Figure 2: Hunt (2003) calculation of expected stream interference from pumping at POA 1.



Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 245 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	24.9%	41.5%	50.6%	56.5%	60.7%	63.8%	66.3%	68.4%	49.4%	32.1%	23.5%	18.3%
H SD 1999	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
H SD 2003	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	0.00%	0.00%	0.00%	0.00%
Qw, cfs	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780	1.780
H SD 99, cfs	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####	#####
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.78	1.78	1.78	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	21850	21850	21850	ft
Well depth	d	504	504	504	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	120	120	120	ft
Aquifer transmissivity	T	6000	6000	6000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	1	5	10	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	500	500	500	ft
Streambed conductance (lambda)	sbc	166.666667	833.333333	1666.666667	ft/day
Stream depletion factor	sdf	79.570417	79.570417	79.570417	days
Streambed factor	sbf	606.944444	3034.722222	6069.444444	
input #1 for Hunt's Q_4 function	t'	0.012567	0.012567	0.012567	
input #2 for Hunt's Q_4 function	K'	3978.520833	19892.604167	39785.208333	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	606.944444	3034.722222	6069.444444	

Figure 3: Hunt (2003) calculation of expected stream interference due to pumping at POA 2.