PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **03/20/2023**

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

SUBJECT: Application G- **18063** Supersedes review of **07/13/2016**
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: **Louis Marks** County: **Baker**

A1. Applicant(s) seek(s) **0.7** cfs from **3** well(s) in the **Powder** Basin, **North Powder River** subbasin

A2. Proposed use: **Irrigation (6.1 acres) / Supplemental Irrigation (1131.2 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	BAKE 51361	1	Alluvium	0.7	7S/38E-2 NE-NE	1044'S, 70'E fr NW cor, NENE, S2
2	BAKE 52274	2	Alluvium	0.7	7S/38E-2 SE-NE	475'N, 30'E fr SW cor, SENE, S2
3	BAKE 52475	3	Alluvium	0.7	7S/38E-2 SE-NE	1560'S,310'W fr NE cor S 2
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	3465	140	10.41	03/25/2015	623	0-115	0-380	None	140-380	500	?	Air
2	3474	75	19.42	03/23/2015	600	0-45	+2-298	285-600	80-590	850	?	Air
3	3437	68	23	09/24/2015	340	0-114	+1.5-340	NA	160-336	800	?	Air

Use data from application for proposed wells.

A4. **Comments:** Wells 1 and 2 on this application have reported yields of 500 and 850 GPM (1.11 and 1.89 cfs, respectively) on the permit application. The well log report for well 3 (BAKE 52475) reports a yield of 800 gpm (1.89 cfs).

This re-review is being conducted to reevaluate the determination of over-appropriation in Section B1(a) of this review form considering the updated guidance in the Iverson memo of 02/06/2023.

A5. ☒ **Provisions of the** Powder (690-509) 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, "Large 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 _____ 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 long-term groundwater level data is available for the surrounding area. Wells BAKE 50735 and BAKE 109 are within about 5 miles of the proposed POA wells and show stable groundwater elevations (see attached).

Available data for nearby wells do not display significant declines that would suggest over-appropriation of the source aquifer as defined in the Iverson 2023 memo.

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	**Alluvium (Qtg of Brooks, et al., 1976)**	☐	☒
2	**Alluvium (Qtg of Brooks, et al., 1976)**	☐	☒
3	**Alluvium (Qtg of Brooks, et al., 1976)**	☐	☒
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Based on local well logs and geologic maps, the proposed POA wells produce from sand and gravels emplaced as alluvial fan deposits. The presence of interbedded clays is unlikely to be persistent across a wide geographic area, and may provide only local confinement in the immediate vicinity of the POA wells.

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**	**North Powder River**	**3455**	**3430**	**3600**	☒	☐	☐	☐	☒
2	**1**	**North Powder River**	**3455**	**3430**	**4700**	☒	☐	☐	☐	☒
3	**1**	**North Powder River**	**3455***	**3430**	**1530**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Both of the existing wells are constructed to produce from beneath a thick sequence of clay and silt at their respective locations. The water-bearing zones within these wells likely have some degree of local confinement, with diffuse and inefficient connection to local streams. The North Powder Valley is underlain by terrace and alluvial fan deposits, composed of unconsolidated sands, gravels, and cobbles, intermixed with clays and silts (Brooks, et al., 1976). With the complex stratigraphic relationship of materials deposited in differing geologic settings and having variable transmissivity, there is unlikely to be a continuous confining bed that prevents the vertical migration of groundwater. The elevated groundwater level in the wells indicates this is a zone of discharge, and pumping from these alluvial deposits likely intercepts groundwater that would naturally discharge to the North Powder River.

Water Availability Basin the well(s) are located within: Powder R > Snake R – AB UNN STR (72191)

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?
1	**1**	☐	☐	**None**	**None**	☐	**70.3**	☐	**0.01**	☐
2	**1**	☐	☐	**None**	**None**	☐	**70.3**	☐	**0.02**	☐
3	**1**	☐	☐	**None**	**None**	☐	**70.3**	☐	**0.03**	☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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?
	1		☐	**None**	**None**	☐	**70.3**	☐	**0.06**	☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: The proposed pumping rate is less than 1% of 80% of the minimum stream flow for the water availability basin (WAB) in which the proposed POAs are located. Interference calculations were performed using the model of Hunt (2003) with input parameters derived from local pump tests.

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
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
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.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(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: For each model run, the appropriate distance and pumping duration were used for each well, using a value for transmissivity calculated from a pump test performed on BAKE 51361 (~500 ft^2/day).

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:**

References Used:

Local well logs; review of applications G-16614 and G-16798

OWRD Ground Water Report #6.

Ground Water Resources of Baker Valley, Baker County, Oregon, by Frederick D. Trauger.

Brooks, H.C., McIntyre, J.R., and Walker, G.W. Geologic Map of the Oregon Part of the Baker 1 degree by 2 degree Quadrangle/GMS 7. Scale 1:250,000. State of Oregon Department of Geology and Mineral Industries, 1976.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: Journal of Hydrologic Engineering, January/February, 2003.

Iverson, J.I. 2023, Clarification of current policy for determining over-appropriation in section B1a of the PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS.

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

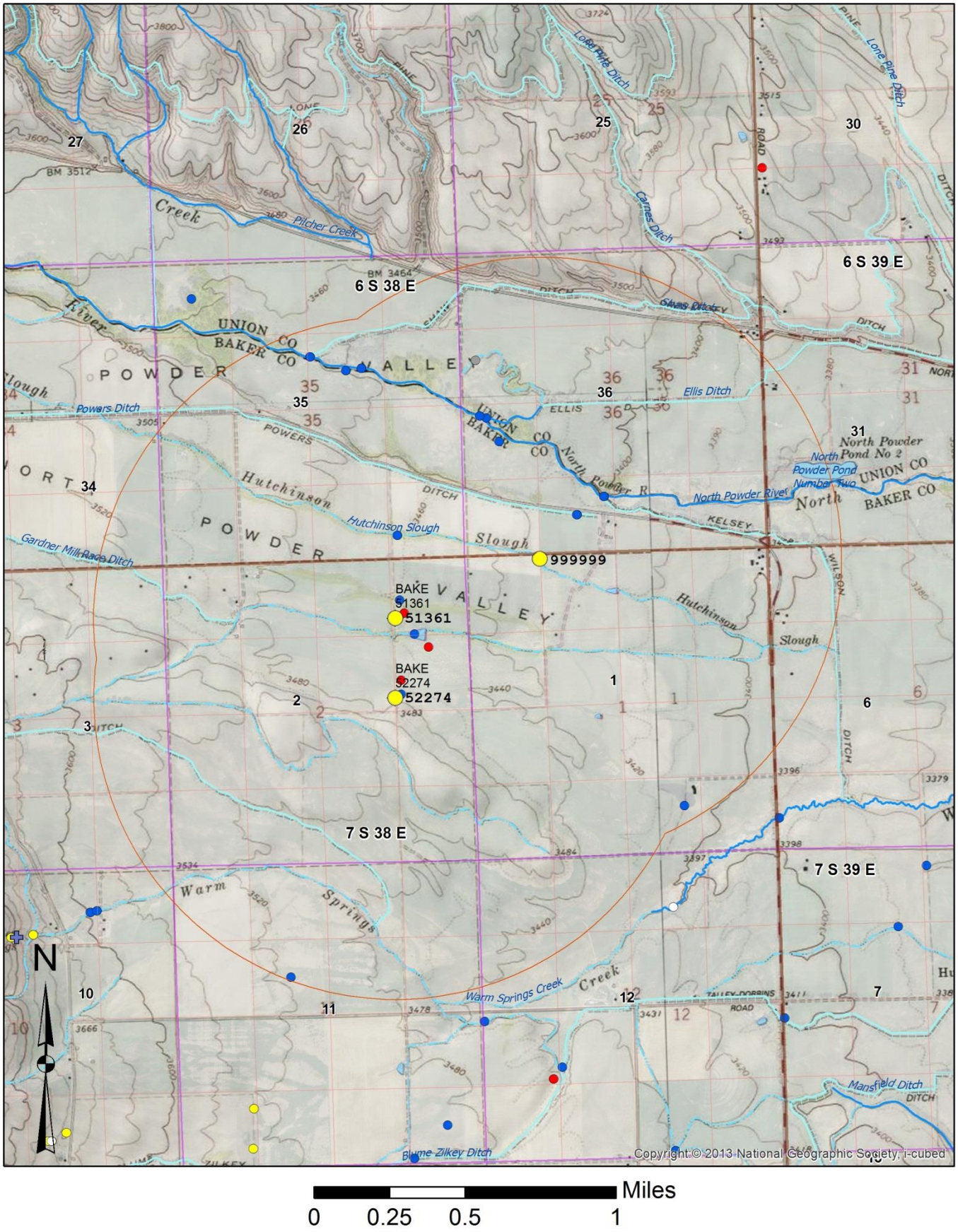
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

POWDER R > SNAKE R - AB UNN STR

Watershed ID #: 72191 Basin: POWDER Exceedance Level: 80
Time: 11:47 AM Date: 08/11/2015

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
	Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.					
JAN	65.90	89.00	-23.10	0.00	25.00	-48.10
FEB	103.00	108.00	-5.34	21.30	30.00	-56.60
MAR	203.00	193.00	10.10	62.40	40.00	-92.30
APR	456.00	352.00	104.00	259.00	40.00	-196.00
MAY	714.00	844.00	-130.00	153.00	40.00	-323.00
JUN	593.00	995.00	-402.00	0.00	40.00	-442.00
JUL	204.00	530.00	-326.00	0.00	25.00	-351.00
AUG	107.00	313.00	-206.00	0.00	25.00	-231.00
SEP	72.70	240.00	-167.00	0.00	25.00	-192.00
OCT	70.30	90.20	-19.90	0.00	25.00	-44.90
NOV	75.10	71.30	3.82	0.00	25.00	-21.20
DEC	77.90	82.90	-5.00	0.00	25.00	-30.00
ANN	241,000	236,000	47,100	29,900	22,000	4,150

Well Location Map



Water-Level Trends in Nearby Wells

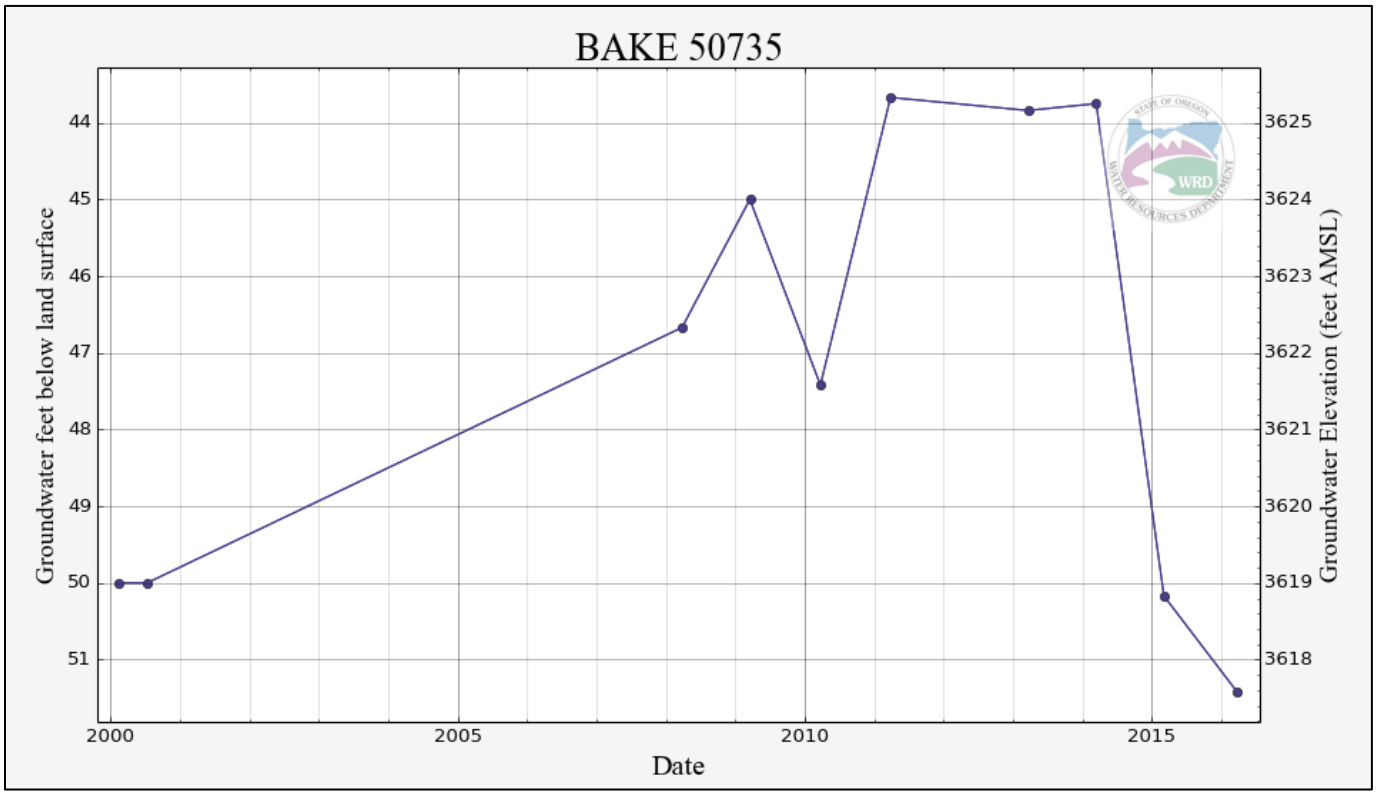


Figure 1: Water level data from BAKE 50735, located about 4 miles south of the proposed POA wells.

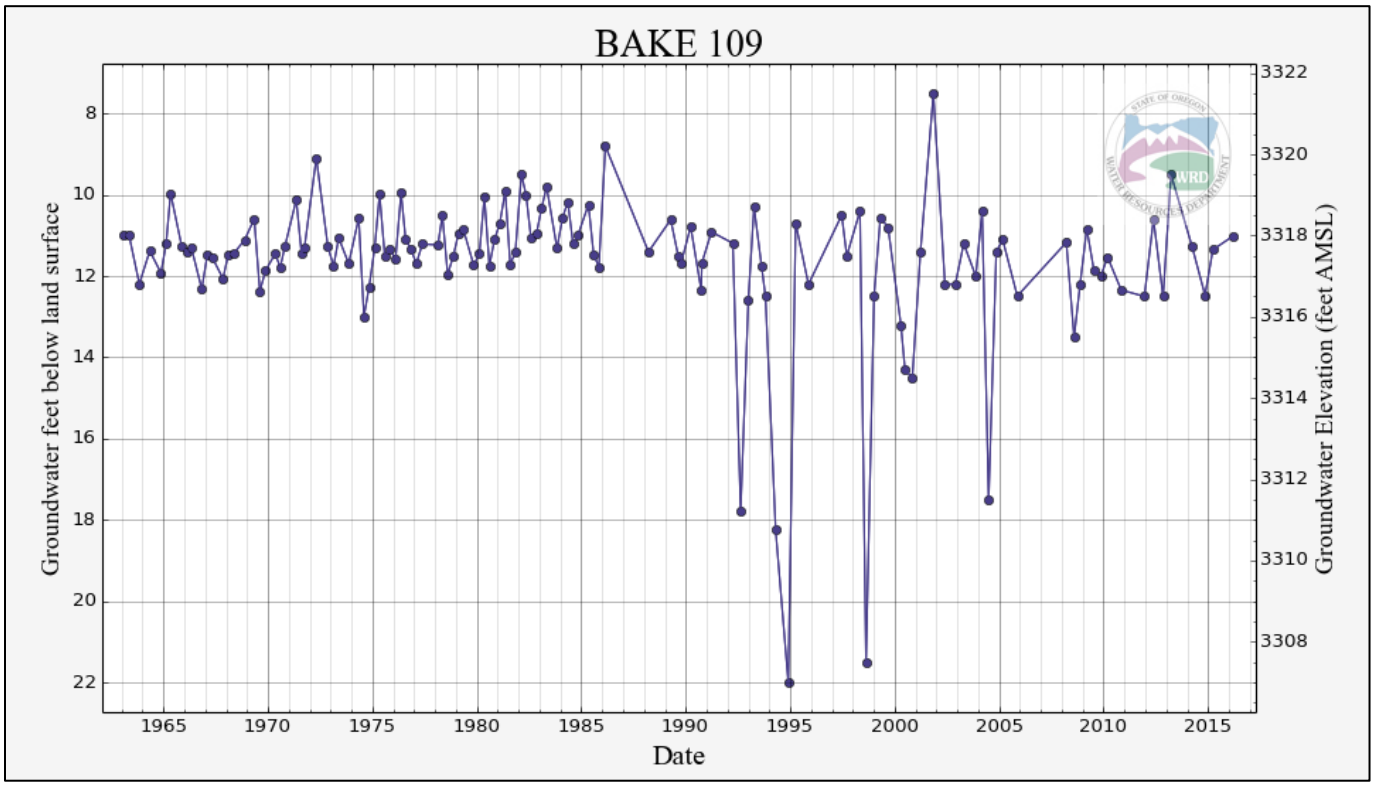
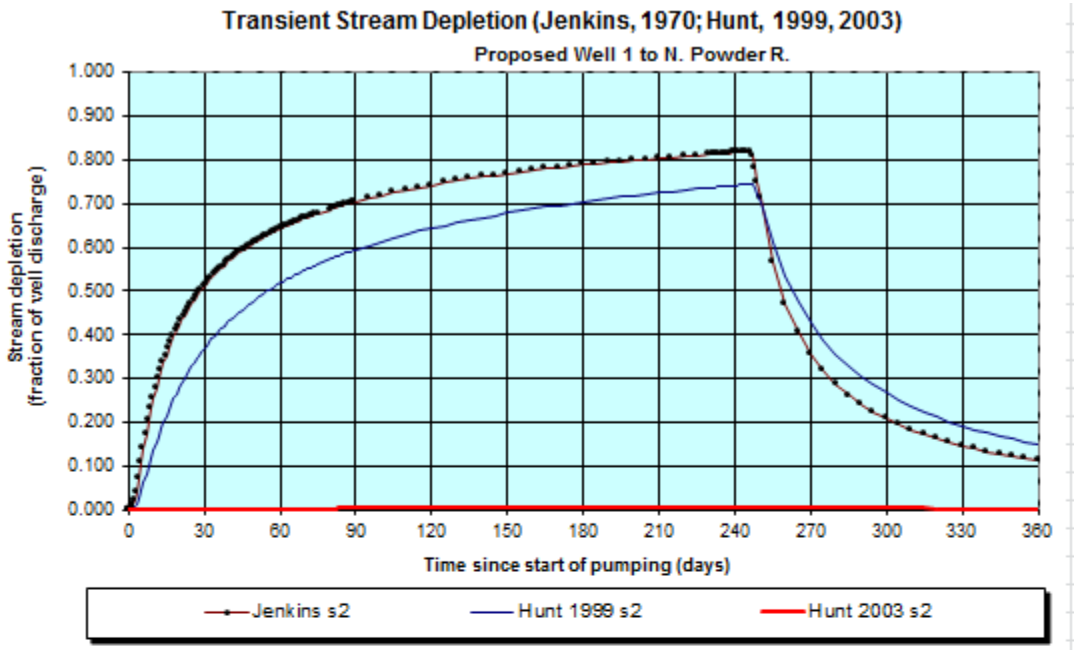
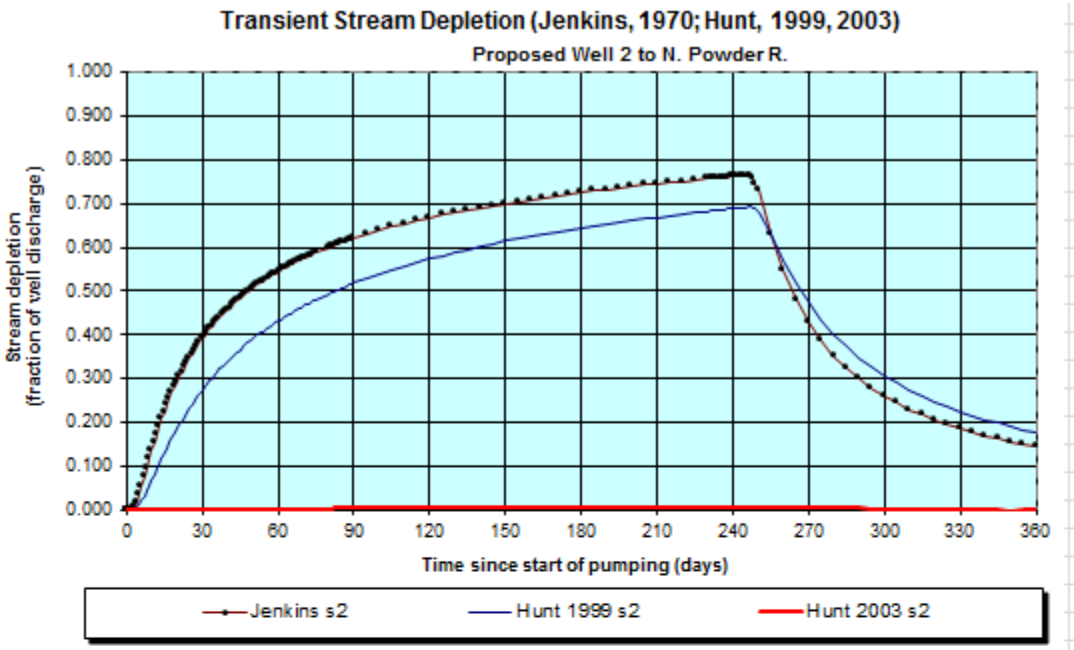


Figure 2: Water level data from BAKE 109, located about 5 miles southeast of the proposed POA wells.



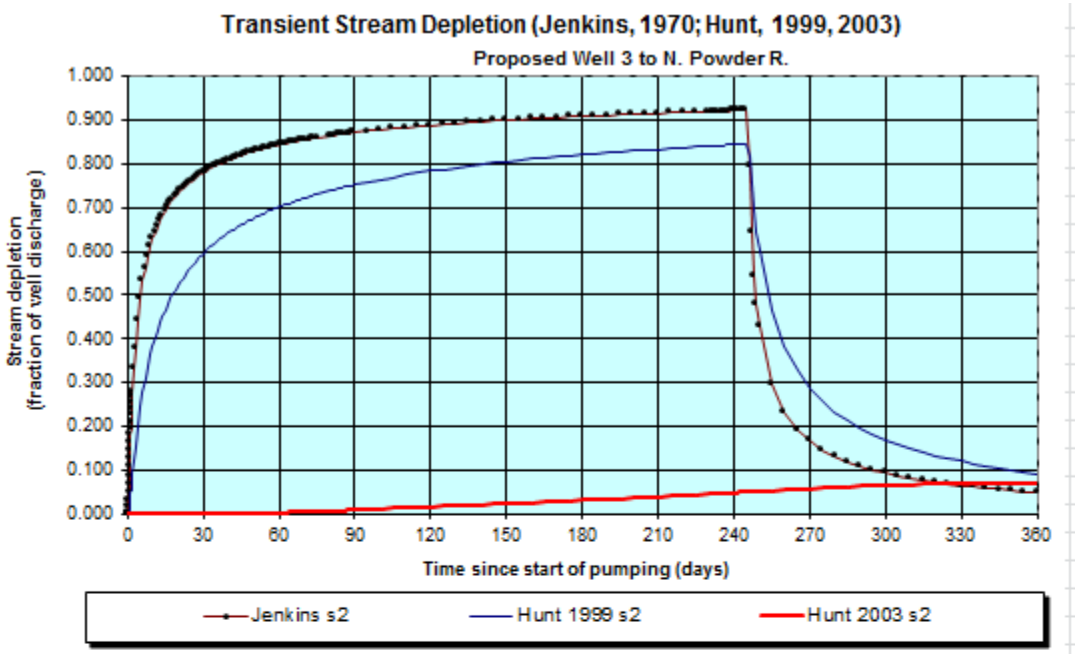
Output for Stream Depletion, Scenerio 2 (s2):	Time pump on (pumping duration) = 245 days											
Days	30	60	90	120	150	180	210	240	270	300	330	360
JSD	51.1%	64.2%	70.4%	74.2%	76.9%	78.8%	80.4%	81.6%	35.5%	20.8%	14.7%	11.2%
HSD 1999	36.9%	51.8%	59.5%	64.4%	67.9%	70.5%	72.5%	74.2%	42.8%	26.7%	19.3%	14.9%
HSD 2003	0.01%	0.13%	0.41%	0.54%	0.54%	0.54%	0.51%	0.53%	0.52%	0.46%	0.22%	0.11%
Qw, cfs	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
HSD 99, cfs	0.258	0.363	0.417	0.451	0.475	0.493	0.508	0.519	0.300	0.187	0.135	0.105
HSD 03, cfs	0.000	0.001	0.003	0.004	0.004	0.004	0.004	0.004	0.004	0.003	0.002	0.001

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.70	0.70	0.70	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	3600	3600	3600	ft
Well depth	d	600	600	600	ft
Aquifer hydraulic conductivity	K	5	25	500	ft/day
Aquifer saturated thickness	b	20	20	20	ft
Aquifer transmissivity	T	100	500	10000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	1	1	1	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	30	30	30	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.666667	0.666667	0.666667	ft/day
Stream depletion factor	sdf	129.600000	25.920000	1.296000	days
Streambed factor	sbf	24.000000	4.800000	0.240000	
input #1 for Hunt's Q_4 function	t'	0.007716	0.038580	0.771605	
input #2 for Hunt's Q_4 function	K'	4320.000000	864.000000	43.200000	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	24.000000	4.800000	0.240000	



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
JSD	39.1%	54.4%	62.0%	66.8%	70.1%	72.6%	74.6%	76.2%	42.8%	26.0%	18.6%	14.3%
HSD 1999	27.4%	43.2%	51.8%	57.4%	61.5%	64.5%	66.9%	68.9%	47.3%	30.7%	22.5%	17.6%
HSD 2003	0.02%	0.14%	0.42%	0.51%	0.48%	0.46%	0.46%	0.42%	0.42%	0.32%	0.04%	-0.10%
Qw, cfs	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
HSD 99, cfs	0.192	0.302	0.363	0.402	0.430	0.451	0.468	0.482	0.331	0.215	0.158	0.123
HSD 03, cfs	0.000	0.001	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.002	0.000	-0.001

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.70	0.70	0.70	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	4700	4700	4700	ft
Well depth	d	600	600	600	ft
Aquifer hydraulic conductivity	K	5	25	500	ft/day
Aquifer saturated thickness	b	20	20	20	ft
Aquifer transmissivity	T	100	500	10000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	1	1	1	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	30	30	30	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.666667	0.666667	0.666667	ft/day
Stream depletion factor	sdf	220.900000	44.180000	2.209000	days
Streambed factor	sbf	31.333333	6.266667	0.313333	
input #1 for Hunt's Q_4 function	t'	0.004527	0.022635	0.452694	
input #2 for Hunt's Q_4 function	K'	7363.333333	1472.666667	73.633333	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	31.333333	6.266667	0.313333	



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
JSD	78.0%	84.3%	87.2%	88.9%	90.1%	90.9%	91.6%	92.1%	16.6%	9.3%	6.5%	4.9%
HSD 1999	59.5%	70.2%	75.3%	78.4%	80.5%	82.1%	83.4%	84.4%	28.9%	17.0%	12.0%	9.2%
HSD 2003	0.03%	0.27%	0.88%	1.64%	2.30%	3.10%	3.94%	4.89%	5.80%	6.51%	6.97%	7.10%
Qw, cfs	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700	0.700
HSD 99, cfs	0.417	0.491	0.527	0.549	0.564	0.575	0.584	0.591	0.202	0.119	0.084	0.064
HSD 03, cfs	0.000	0.002	0.006	0.011	0.016	0.022	0.028	0.034	0.041	0.046	0.049	0.050

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.70	0.70	0.70	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	1530	1530	1530	ft
Well depth	d	600	600	600	ft
Aquifer hydraulic conductivity	K	5	25	500	ft/day
Aquifer saturated thickness	b	20	20	20	ft
Aquifer transmissivity	T	100	500	10000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	1	1	1	ft/day
Aquitard saturated thickness	ba	30	30	30	ft
Aquitard thickness below stream	babs	30	30	30	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.666667	0.666667	0.666667	ft/day
Stream depletion factor	sdf	23.409000	4.681800	0.234090	days
Streambed factor	sbf	10.200000	2.040000	0.102000	
input #1 for Hunt's Q_4 function	t'	0.042719	0.213593	4.271861	
input #2 for Hunt's Q_4 function	K'	780.300000	156.060000	7.803000	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	10.200000	2.040000	0.102000	