April 17, 2015

To: Water Rights Application File G-17741
From: Phillip Marcy - Hydrogeologist
Subject: Well interference analysis

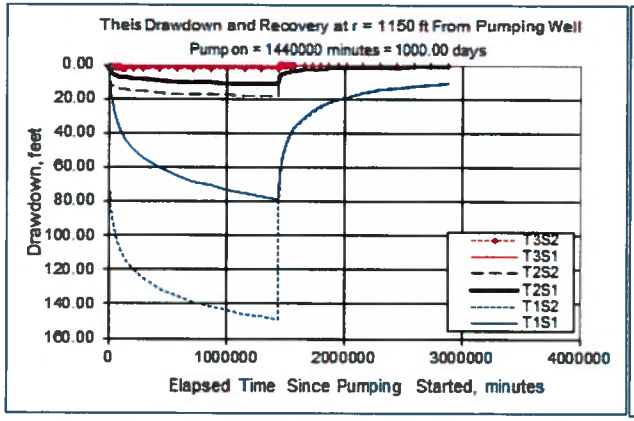
The department received a letter from Greg Sackos, dated April 2, 2015, expressing concern over possible interference to his well (BAKE 1136) from a well Baker City proposed to drill nearby under application G-17741. Originally BAKE 1136 was listed as one of two POAs on the Baker City application, but was later removed due to objections by Greg Sackos.

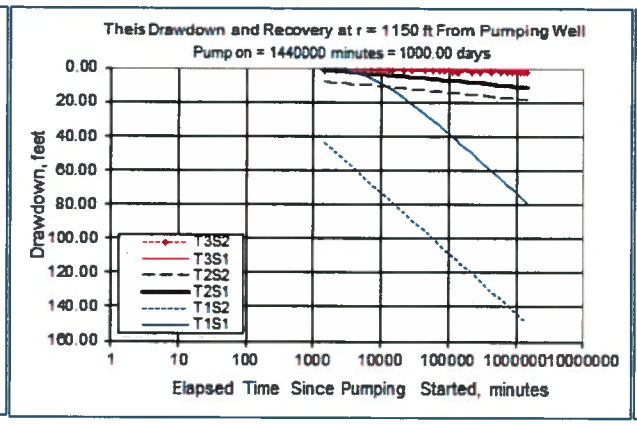
The city's application map puts their proposed well about 1,150 feet from Mr. Sackos' well. An interference analysis was done to assess the potential impacts to BAKE 1136 from pumping at the proposed POA in G-17741. Calculations of expected drawdown were performed using the non-equilibrium solution of Theis (1941) for a pumping period of 1,000 days. The pumping rate (1,000 gpm) was set at the maximum requested rate in G-17741. A range of transmissivities between 1,000 ft^2/day to 10,000 ft^2/day were used in the analysis. This corresponds to local pump test data and values calculated by Gonthier (1985) for sediments in the Grande Ronde Valley. A range of storativity values were utilized in the analytical solution (0.01-0.0001) to capture the range of reasonable aquifer conditions for the geologic material encountered in area wells. In this part of the valley, well logs indicate the saturated zone in the alluvial aquifer system ranges between 200 and 250 feet thick, and is composed of interbedded gravels, sands, and clays.

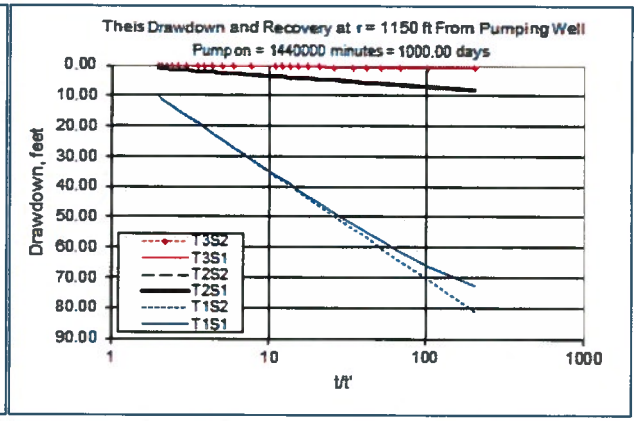
The analysis resulted in estimates of between 11 feet and 149 feet of drawdown at BAKE 1136 after 1,000 days of pumping. The high yield reported in BAKE 1136 by the well owner, in addition to pump test calculations from nearby wells, indicates that the probable drawdown is much closer to the low end of this range. The probability of injury to BAKE 1136 (permit G-17346) is therefore remote considering the saturated aquifer thickness and the well depth of BAKE 1136.

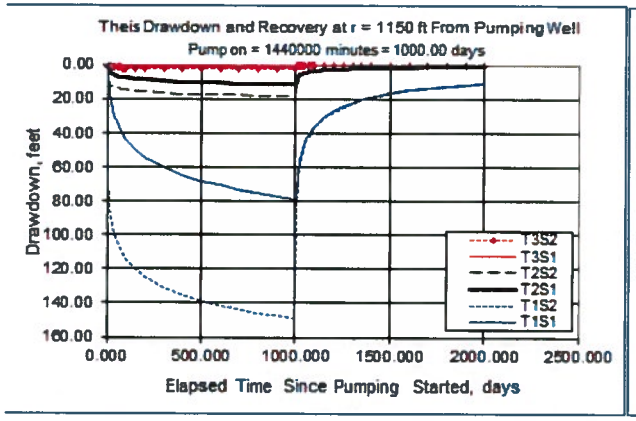
Input Data:	Var Name	Scenario 1	Scenario 2	Scenario 3	Units	
Total pumping time	t		1000		d	
Radial distance from pumped well:	r		1150.00		ft	Q conversions
Pumping rate	Q		1000.0		gpm	1,000.00 gpm
Hydraulic conductivity	K	5	50	500	ft/day	2.23 cfs
Aquifer thickness	b		200		ft	133.69 cfm
Storativity	S_1		0.01000			192,513.37 cfd
	S_2		0.00010			4.42 af/d
Transmissivity Conversions	T_f2pd	1,000	10,000	100,000	ft2/day	
	T_ft2pm	0.6944	6.9444	69.4444	ft2/min	
	T_gpdpft	7,480	74,800	748,000	gpd/ft	

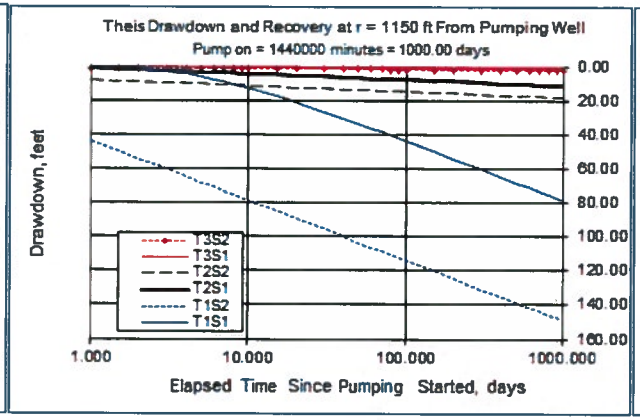
Recalculate Use the Recalculate button if recalculation is set to manual

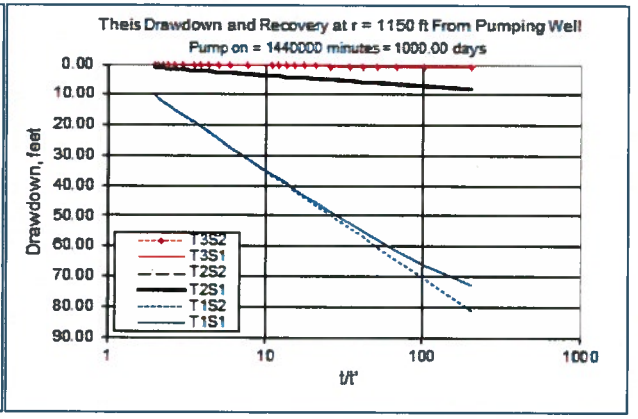













Baker City
Proposed
999999
1,150'
BAKE 1136
McCoy Ditch
9S 40E
NWSE
SWSE
NWNE
19
NENE
N
Miles
0 0.0175 0.035 0.07 0.105 0.14

Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE # # G - 17741

ROUTED TO: Water Rights - Mary

TOWNSHIP/
RANGE-SECTION: 9S/40E - 18

CONDITIONS ATTACHED?: [X] yes [ ] no

REMARKS OR FURTHER INSTRUCTIONS:

Reviewer: Mike Zwart

WATER RESOURCES DEPARTMENT

MEMO December 18, 2013

TO: **Application G-** 17741

FROM: **GW:** Mike Zwart
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☐ YES
☑ NO — The source of appropriation is within or above a Scenic Waterway

☐ YES
☑ NO — Use the Scenic Waterway condition (Condition 7J)

☐ 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 **December 18, 2013**

FROM: Groundwater Section **Mike Zwart**
Reviewer's Name

SUBJECT: Application G- **17741** 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 ground water 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: **City of Baker City** County: **Baker**

A1. Applicant(s) seek(s) **2.23** cfs from **two** well(s) in the **Powder** Basin, _____ subbasin Quad Map: **Baker City**

A2. Proposed use **Municipal** Seasonality: **Year Round**

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 1136**	**1**	**Bedrock**	**2.23**	**9S/40E-18 SW-SE**	**616' N, 1984' W fr SE cor S 18**
2	**Proposed**	**2**	**Bedrock**	**2.23**	**9S/40E-18 SE-SE**	**760' N, 900' W fr SE cor S 18**
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	**3465**	**?**	**41.69**	**3/28/1990**	**575**	**0-400***	**0-575**		**Yes**	**1100**	**166**	**?**
2	**3432**				**600**	**0-400**	**0-600**	**None**	**400-600**			

Use data from application for proposed wells.

A4. **Comments: *Proposed seal depth following well repair. This well was constructed in 1954-1955 and the log fails to report whether there is a surface seal and the intervals where the casing is perforated.**

A5. ☒ **Provisions of the Powder** Basin rules relative to the development, classification and/or management of ground water 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. GROUND WATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. **Based upon available data**, I have determined that ground water* 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 ground water 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 ground water 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 ground water resource; or

d. ☒ **will, if properly conditioned**, avoid injury to existing ground water rights or to the ground water 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 ground water production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow ground water production from no shallower than _____ ft. below land surface;

c. ☐ **Condition** to allow ground water production only from the _____ ground water 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 Ground Water 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. **Ground water availability remarks:** BAKE 1136 is a non-current observation well with a period of record that ended in 1990. The water level record was very stable during that period. There are no other nearby wells with a sufficient record of water level measurement to judge if the local water levels continue to be stable.

C. GROUND WATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1,2	**Granite and/or other pre-Tertiary rocks (MzPza)**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Local well logs appear to indicate that the bedrock aquifer is under confined conditions.

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**	**Powder River**	**3423±**	**3435**	**7900**	☐	☒	☐	☐	☒
2	**1**	**Powder River**	**3423±**	**3440**	**6300**	☐	☒	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: The bedrock aquifer is likely discharging to overlying and adjacent younger deposits and therefore is in indirect and likely inefficient hydraulic connection with the river.

Water Availability Basin the well(s) are located within: Powder R > Snake R ab Rock Cr (30902327).

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.

Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Non-Distributed Wells													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells													
		%	%	%	%	%	%	%	%	%	%	%	%
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: _____

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 ground water 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: **Geology of the Oregon Part of the Baker 1° by 2° Quad, Brooks, McIntyre and Walker, 1976; OWRD Ground Water Report #6; Ground Water Resources of Baker Valley, Baker County, Oregon, by Frederick D. Trauger; Ground Water of Baker Valley, Baker County, Oregon, by Lystrom, Nees and Hampton, 1967; Nearby well logs and application reviews.**

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 **Logid:** BAKE 1136

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:** There is no well seal reported at BAKE 1136. This well was also proposed in file G-17718 and the Department is requiring repair of it prior to issuing a permit. Since the well log does not report multiple water-bearing zones, the requirement was to only provide a seal to at least 18 feet. The proposal here is for a much deeper seal. This will therefore eliminate any possibility of commingling, should there actually be water-bearing zones in the shallow gravels that were not reported on the original well log.

D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Water Availability Tables

Application G-17741, City of Baker City, Douglas P. Schwin, PE