

WATER RESOURCES DEPARTMENT

MEMO

August 14, 2015

TO: Application G- 18070

FROM: GW: Phil Marcy (Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

[] YES The source of appropriation is within or above a Scenic Waterway
[X] NO

[] YES Use the Scenic Waterway condition (Condition 7J)
[X] 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.

Table with 12 columns: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec. All cells are empty.

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 08/14/2015
 FROM: Groundwater Section Phillip I. Marcy / Ivan K. Gall
Reviewer's Name
 SUBJECT: Application G- 18070 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: Moose Creek Investments, LLC County: Baker

A1. Applicant(s) seek(s) 6.6 cfs from 3 well(s) in the Powder River Basin,
 _____ subbasin

A2. Proposed use: Supplemental Irrigation (1393.3 acres) Seasonality: March 1st – October 31st (244 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	Proposed	1	Basalt	6.6	9S/40E-23 NE-NW	1265'S, 1570'E fr NW cor S 23
2	Proposed	2	Basalt	6.6	9S/40E-14 NE-SW	2188'N, 1556'E fr NW cor S 14
3	Proposed	3	Basalt	6.6	9S/40E-15 SE-NE	3800'N, 1105'W fr NW cor S 23
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	3562	?	?	?	500±	0-360±	0-40±	?	?	?	?	?
2	3537	?	?	?	500±	0-360±	0-40±	?	?	?	?	?
3	3475	?	?	?	500±	0-360±	0-40±	?	?	?	?	?

Use data from application for proposed wells.

A4. **Comments:** Elevations derived from proposed well locations. The applicant states the desire to use each well at the full applied rate at different times to supplement surface water irrigation. The maximum duty for the acreage listed is 8.64 cfs.

A5. **Provisions of the** Powder River 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, 7T, "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:

Special Conditions:

1. The wells shall be constructed to produce only from the volcanic aquifer beneath the valley-fill alluvium, the top of which typically occurs at a depth of 600-900 feet below land surface in this area.
2. Each well shall be continuously cased and continuously sealed at least 10 feet into volcanic rock.
3. The open interval below the casing shall extend no more than 200 feet into the volcanic aquifer. However, a larger open interval may be approved by the Department if the applicant can demonstrate to the satisfaction of the Department that each well is only open to a single aquifer. Substantial evidence of a single aquifer completion may be collected by video log, downhole flowmeter, water chemistry and temperature, or other downhole geophysical methods approved by the Department. These methods shall characterize the nature of the basalt rock and assess whether water is moving in the borehole. Any discernable movement of water within the well bore when the well is not being pumped shall be assumed as evidence of the presence of multiple aquifers in the open interval.
4. Drill cuttings shall be collected at 10-foot intervals and at changes in formation in the well and a split of each sampled interval shall be provided to the Department.
5. For each well drilled under this permit, a constant-rate aquifer test shall be conducted to determine aquifer properties and to assess the potential impacts from use of the well before beneficial use begins. The test shall be designed and conducted by an Oregon Registered Geologist and the test design shall be subject to the approval of the Groundwater Section of the Department prior to the test. At a minimum, the test shall include discharge and water-level measurements in the pumping well and simultaneous water-level measurements in all other wells drilled under this water right. Pumping duration for the test shall be determined by the Department after well yield and specific capacity are determined. The requirement for a constant-rate aquifer test on each well may be waived if a multiple-well aquifer test is performed involving all permitted wells on this water right within five years of the date of permit issuance. The results of

- each aquifer test shall be presented in a report to the Department that includes an analysis of aquifer properties, aquifer boundaries, and the potential impact on nearby wells that is likely to occur over the duration of an irrigation season if the well is used at the licensed rate and duty.
6. Copies of all geologic and hydrogeologic reports completed for the permittee during the development of the well, including geophysical well logs and borehole video logs, shall be provided to the Department. Except for borehole video logs, two paper copies, or a single electronic copy, shall be provided of each report. Digital tables of any data shall be provided upon request.

The application proposes to produce water from basalts, estimating a depth of 500 feet. The few well logs in the area that penetrate the volcanic aquifer system encountered volcanic rock near 700 feet. Little is known about the capacity of the local volcanic aquifer, and it is possible that current levels of withdrawal nearly equal the rate of annual recharge (Trauger, 1951). Therefore the ongoing development of this groundwater reservoir should be approached with caution. Also, since the construction of these wells is likely to be costly, the department recommends the drilling of a test hole to assess the actual depth of volcanic rock and to give an accurate estimate of yield from these volcanic rocks.

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	Basalt	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	Basalt	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	Basalt	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: Static water levels of wells completed within the local basalt aquifer system are significantly higher than the water-bearing zones at which water was encountered. Two 740 foot deep wells in this section, located within 500 feet of the proposed location for "Well 3" on this application, encounter basalt at 700 feet. Stated water levels at these wells are less than 20 feet below land surface, and stated yields are 1500 GPM (BAKE 1080) and 2200 GPM (BAKE 1079). According to Trauger (1951), these wells produce water from Tertiary volcanic and sedimentary rocks on the northward dipping limb of an anticline.

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	Powder River		3420	11500	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	1	Powder River		3420	11420	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	1	Powder River		3420	8800	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: The volcanic aquifer here appears to be buried beneath about 700 feet of alluvium, and connection to surface waters is likely tortuous and inefficient. Little information is available concerning the physical properties of the volcanic aquifer system, but assuming the character is similar to regional basalt aquifers of the Columbia Plateau, groundwater would migrate much more quickly horizontally than vertically, dispersing impacts to surface water out beyond one mile.

Water Availability Basin the well(s) are located within: POWDER R > SNAKE R – AB UNN STREAM (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?
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

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?
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: The only perennial surface water within 1 mile of the proposed POAs is Smith Reservoir, whose surface water right belongs to the applicant.

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													
		%	%	%	%	%	%	%	%	%	%	%	%
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: This section does not apply.

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:

Trauger, F.D. (1951). Ground-Water Resources of Baker Valley, Baker County, Oregon. Portland, Oregon: United States Geological Survey

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.

Local Well Logs (see attached)

Application file G 18070.

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

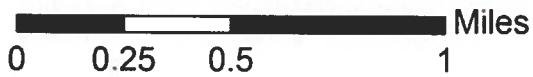
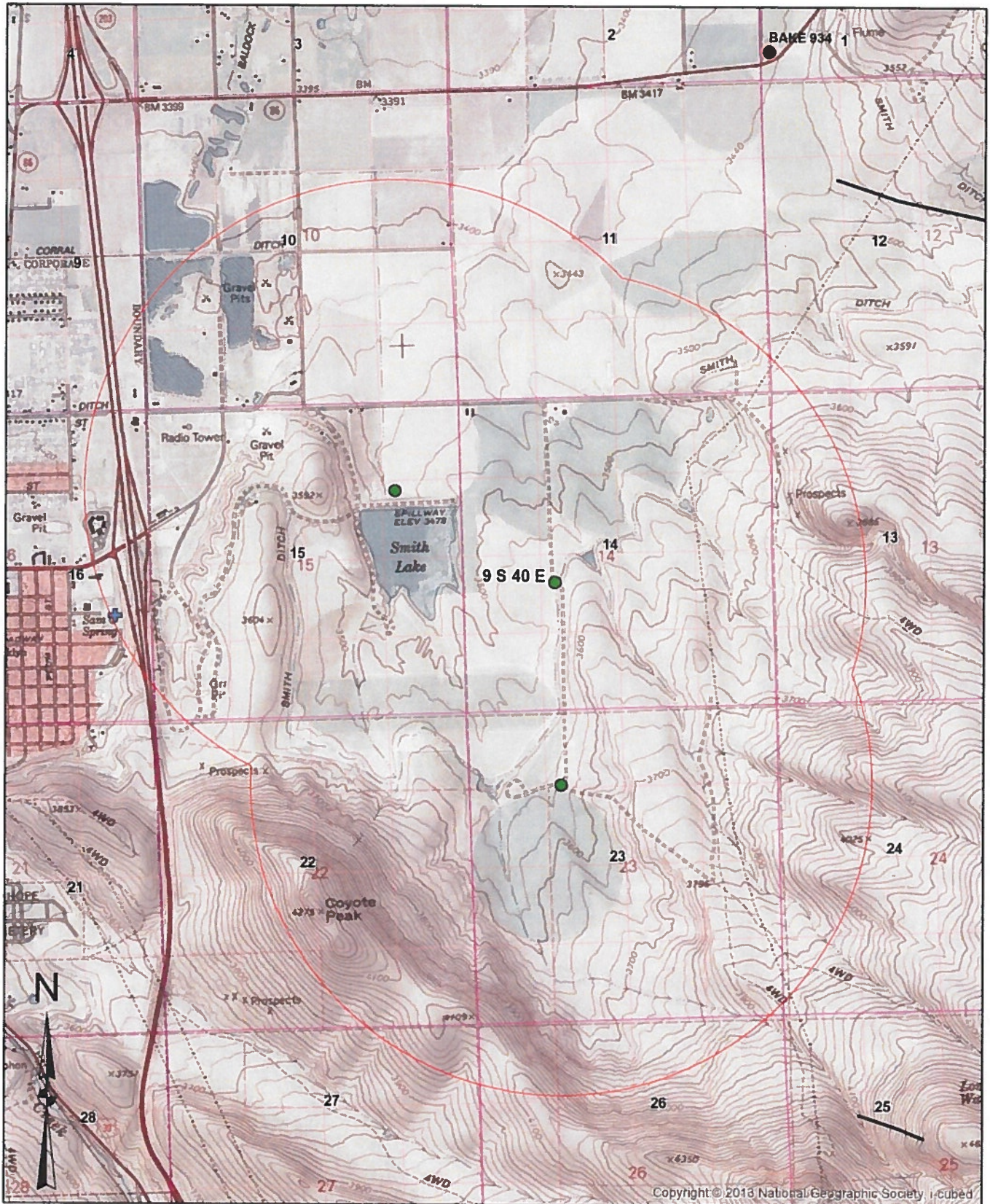
Watershed ID #: 72191
Time: 4:25 PM

POWDER R > SNAKE R - AB UNN STR
Basin: POWDER

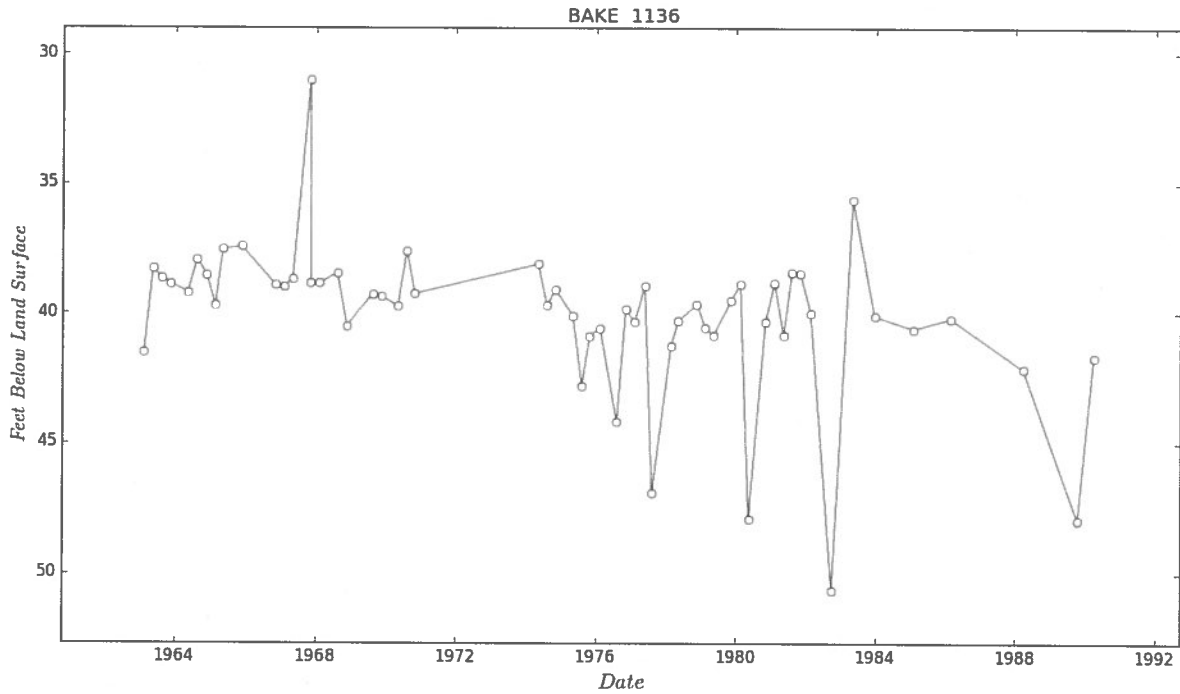
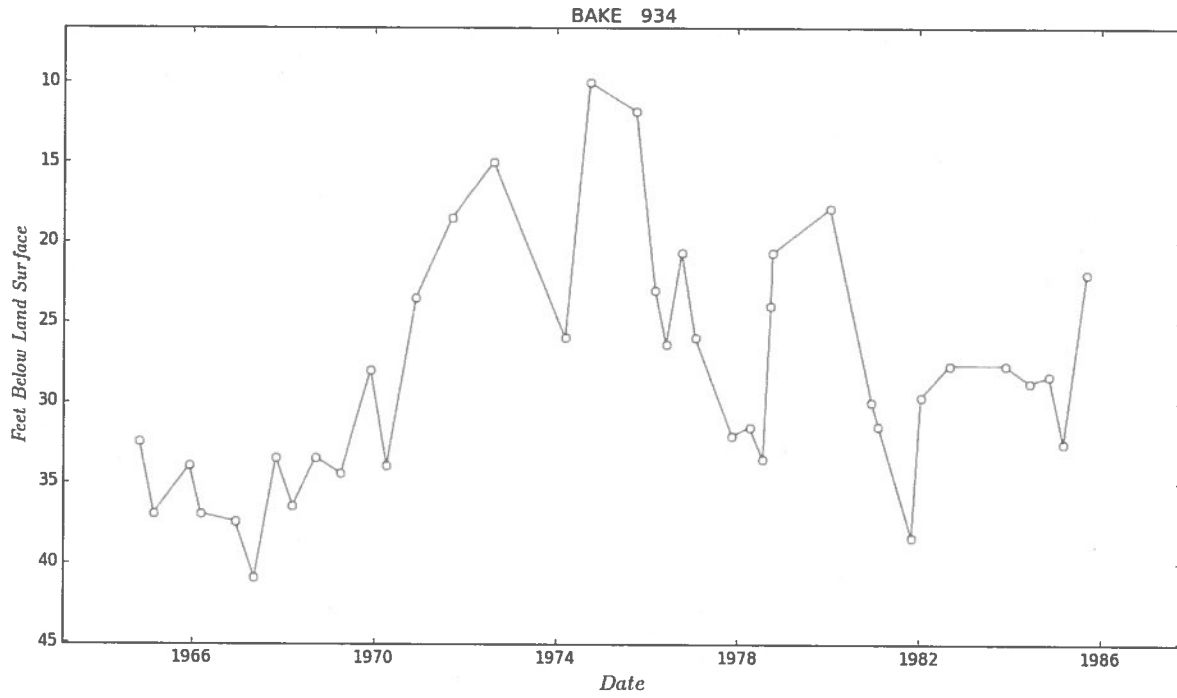
Exceedance Level: 80
Date: 08/12/2015

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



STATE ENGINEER
Salem, Oregon

Baker
1079
Well Record

STATE WELL NO. 9/40-15G(1)
COUNTY Baker
APPLICATION NO. _____

OWNER: Sunny Slope Co.

MAILING ADDRESS: _____

LOCATION OF WELL: Owner's No. _____ CITY AND STATE: _____

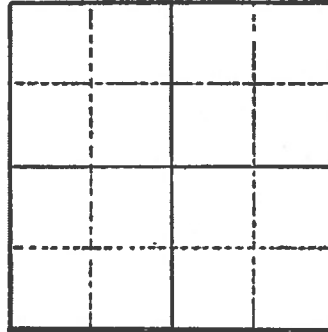
SW ¼ NE ¼ Sec. 15 T. 9 N S., R. 40 E W., W.M.

Bearing and distance from section or subdivision corner _____

Altitude at well 3473

TYPE OF WELL: drilled Date Constructed _____

Depth drilled 740 Depth cased _____



Section _____

CASING RECORD: 1 1/2 inches

FINISH: _____

AQUIFERS: Basalt from 700 ft. to 740 ft.

WATER LEVEL: 18 feet below land surface, March 24, 1949

PUMPING EQUIPMENT: Type turbine H.P. _____
Capacity 2200 G.P.M.

WELL TESTS:
Drawdown _____ ft. after _____ hours _____ G.P.M.
Drawdown _____ ft. after _____ hours _____ G.P.M.

USE OF WATER irrigation Temp. _____ °F., 19 _____

SOURCE OF INFORMATION USGS

DRILLER or DIGGER _____

ADDITIONAL DATA:
Log _____ Water Level Measurements _____ Chemical Analysis Aquifer Test _____

REMARKS: Drilled 16-inch, and gravel-packed around 1 1/2-inch casing; drawdown of 16 feet reported.

STATE ENGINEER
Salem, Oregon

*Baker
1080*

Well Record

STATE WELL NO. 9/40-150(2)
COUNTY Baker
APPLICATION NO. _____

OWNER: Sunny Slope Co. MAILING ADDRESS: _____

LOCATION OF WELL: Owner's No. _____ CITY AND STATE: _____

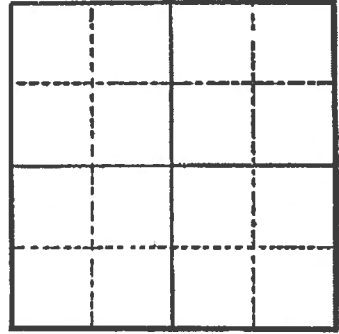
SW $\frac{1}{4}$ NE $\frac{1}{4}$ Sec. 15 T. 2 N S., R. 40 E. W.M.

Bearing and distance from section or subdivision corner _____

Altitude at well 3,466

TYPE OF WELL: drilled Date Constructed _____

Depth drilled 740 Depth cased 60



Section _____

CASING RECORD: 18 inches

FINISH: _____

AQUIFERS: Basalt from 700 ft. to 740 ft.

WATER LEVEL: 10.79 feet below land surface, March 24, 1949

PUMPING EQUIPMENT: Type turbine H.P. _____
Capacity 1500 G.P.M.

WELL TESTS:
Drawdown _____ ft. after _____ hours _____ G.P.M.
Drawdown _____ ft. after _____ hours _____ G.P.M.

USE OF WATER stock Temp. _____ °F, 19_____

SOURCE OF INFORMATION _____
DRILLER or DIGGER _____

ADDITIONAL DATA:
Log _____ Water Level Measurements _____ Chemical Analysis _____ Aquifer Test _____

REMARKS: Hardness 57 ppm, chloride 6 ppm. Drawdown of 16 feet reported; water has slight oror of hydrogen sulfide; temp. reported to be 78°F.