

[illegible]

PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date 10 June 2016

FROM: Ground Water/Hydrology Section Gerald H. Grondin
Reviewer's Name

SUBJECT: Application G-18276 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: Justin R. & Jayna L. Ferrell County: Lake

A1. Applicant(s) seek(s) 0.88 (395 gpm) cfs from 1 well(s) in the Goose and Summer Lakes Basin,
Lake Abert (Chewaucan) sub basin Quad Map: Valley Falls

A2. Proposed use: Irrigation (70.65 acres primary) Seasonality: 1 March to 31 October (245 days)

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

Well 1	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	LAKE 52618	1	Basalt	0.88	36S/21E-sec 04 BBA	230'S, 1050'E fr NE cor S 04
2						
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	4358	120	4295	05/01/15	427	0 - 90	+2 - 398	None	198 - 398	800	?	A
2												
3												

Use data from application for proposed wells.

A4. Comments: _____

The total proposed rate (0.88 cfs) is what is typically allowed for 70.65 acres (1 cfs per 80 acres).

The proposed aquifer is the predominantly basalt-volcanic rock and sediment unit below the predominantly basin-fill sediment unit. Geologic mapping (Walker 1963) indicates the surface geology is composed of sedimentary deposits (Qts) at the well site. This review includes these sedimentary deposits as part of a more general predominantly basin fill sedimentary unit that overlies a predominantly basalt-volcanic rock and sediment unit below. Walker describes the Qts as composed of lacustrine, fluvatile, and aeolian sedimentary rocks, interstratified tuff, ashv diatomite, and unconsolidated clay, sand, silt, and gravel.

- A5. ☐ Provisions of the Goose & Summer Lakes 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: _____

OAR 690-513-0050 (Chewaucan Subbasin) applies. Groundwater and surface water appear to be classified whereby agricultural use is allowed.

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

Name of administrative area: _____

Comments: Currently, no administrative area.

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) 7B, 7F, 7N, 7T
 - 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: _____

Multiple reports for the Goose and Summer Lakes Basin indicate groundwater occurs in both the predominantly basin-fill sediment unit and the predominantly basalt-volcanic rock and sediment unit and groundwater is vertically connected within each unit and vertically connected between each unit.

The only long-term groundwater data found for the Crooked Creek drainage vicinity were groundwater level measurements at a retired, 20-foot deep, hand-dug state observation well SOW 456 (well LAKE 1808) located in T36S/R21E-sec 06 ABA, one section southwest of the proposed wells. The water level data was from 1938 to 1962. In 1938, the water level was about 17 feet below land surface. From 1938 to 1956, the water level rose about 7 feet to about 10 feet below land surface. From 1958 to 1962, the water level declined to about 3 feet to about 13.5 feet below land surface. These annual trends appear climate controlled. Seasonal fluctuations appear to be about 1.5 feet.

If a groundwater right permit is issued, the following conditions are recommended: 7B, 7F, 7N, 7T, and

Special well construction condition: "Each permitted well shall obtain groundwater solely from the predominantly basalt-volcanic rock and sediment unit (which may contain some sedimentary layers) that underlies the predominantly basin-fill sediment unit (which may contain some basalt layers). Each well shall have continuous casing and continuous seal from land surface, through the predominantly basin-fill unit, and 5 feet into the predominantly basalt-volcanic rock and sediment unit at minimum. Note: the depth to the predominantly basalt-volcanic rock and sediment unit varies with location."

The proposed POA well meets the special well construction condition. The condition is recommended to be included for any potential future POA changes.

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	predominantly basalt-volcanic rock and sediment unit	☐	☒
2		☐	☐
3		☐	☐
4		☐	☐

Basis for aquifer confinement evaluation: _____

System is identified as generally unconfined with discontinuous low permeability layers causing local (discontinuous, limited) confinement. Generally, a low transmissivity (low permeability) predominantly basin-fill sediment unit of varying thickness overlies a higher transmissivity (higher permeability) predominantly basalt-volcanic rock and sediment unit. Available data indicates groundwater occurs in both the predominantly basin-fill sediment unit and the predominantly basalt-volcanic rock and sediment unit and groundwater is vertically connected within each unit and vertically connected between each unit.

The proposed aquifer is the predominantly basalt-volcanic rock and sediment unit below the basin-fill sediments. Geologic mapping (Walker 1963) indicates sedimentary deposits (Qts) at the well sites. This review includes these sedimentary deposits as part of a more general predominantly basin fill sedimentary unit. Walker describes the Qts as composed of lacustrine, fluvial, and aeolian sedimentary rocks, interstratified tuff, ashy diatomite, and unconsolidated clay, sand, silt, and gravel.

This review recommends requiring the wells to obtain groundwater solely from the predominantly basalt-volcanic rock and sediment unit. The proposed POA well meets the recommended requirement. The requirement is recommended to be included any permit issued for any potential future POA changes.

- 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	Crooked Creek	4295	4,290	7,075	☒	☐	☐	☐	☒
2	2	Chewaucan River	4295	4,280	9,980	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: _____

Crooked Creek drains to the Chewaucan River that drains to Lake Abert.

Available data indicates ground water discharges to surface water in the sub-basin. These include reports, water availability data, USGS map showing Crooked Creek and the Chewaucan River are a perennial creek and river, air photo (FSA 2009) indicating the creek and river are perennial, and reported static groundwater levels for wells LAKE 52618 (the proposed POA well), LAKE 52274, LAKE 1769, and LAKE 51282 indicating groundwater levels above the creek and river and a local groundwater flow gradient toward the creek.

Water Availability Basin the well(s) are located within:

Officially: CHEWAUCAN R > L ABERT - AT MOUTH

Unofficially: CROOKED CR > CHEWAUCAN R - AT MOUTH

The wells are closer to Crooked Creek and hydraulically connected to the creek. The wells are additionally hydraulically connected to the Chewaucan River which is further away from the wells than Crooked Creek. Both the creek and river are considered in the interference assessments.

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: _____

No evaluation. The proposed POA well is more than 1.0 mile from Crooked Creek and more than 1.0 mile from the Chewaucan River.

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
1	1	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%
Well Q as CFS		0.00	0.00	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.00	0.00
Interference CFS		0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
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													
(A) = Total Interf.		0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
(B) = 80 % Nat. Q		8.03	13.90	22.60	44.50	55.40	26.90	9.06	6.09	6.05	6.65	7.08	7.43
(C) = 1 % Nat. Q		0.080	0.139	0.226	0.445	0.554	0.269	0.091	0.061	0.061	0.067	0.071	0.074
(D) = (A) > (C)		No	No	No	No	No	No	No	No	No	No	No	No
(E) = (A / B) x 100		0.0125	0.0072	0.0000	0.0022	0.0018	0.0037	0.0110	0.0164	0.0165	0.0150	0.0140	0.0135

(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: _____

SW# 1 is Crooked Creek. The proposed POA well is more than 1.0 mile from Crooked Creek.

Hunt (2003) was used to calculate the interference given the proposed POA well obtains groundwater from the predominantly basalt-volcanic rock and sediment unit below the predominantly basin fill sediment unit, and obtaining groundwater solely from that unit is a recommended permit condition. The calculations used a horizontal hydraulic conductivity of 30 feet/day (transmissivity = 15,000 ft²/day which is consistent with Morgan (1988) and McFarland and Ryals (1991)), a vertical conductivity of 0.3 feet/day, 0.01 for the storage coefficient, and a basin-fill sediment thickness of 350 feet at the stream (based on LAKE 52274). The stream width used for the calculation (100 feet) is approximate to wide stream width sections. A smaller stream width would result in a smaller calculated interference. A pro-rated pumping rate of 0.44 cfs (total maximum annual volume allowed divided by 245 day irrigation season) was used for the calculation.

When obtaining groundwater from the predominantly basalt-volcanic rock and sediment unit, the calculated interference with the creek for each month remains less than 1.00 percent of the natural stream flow (80 percent exceedance). It should be noted that pumping groundwater from the predominantly basin-fill unit would likely result in interference with the creek that exceeds the 1.00 percent of the natural stream flow (80 percent exceedance) during some months.

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
1	2	0.2%	0.2%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.2%
Well Q as CFS		0.00	0.00	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.00	0.00
Interference CFS		0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
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													
(A) = Total Interf.		0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
(B) = 80 % Nat. Q		33.80	64.90	103.0	161.0	314.0	234.0	81.90	47.40	42.30	42.20	34.40	32.80
(C) = 1 % Nat. Q		0.338	0.649	1.030	1.610	3.140	2.340	0.819	0.474	0.423	0.422	0.344	0.328
(D) = (A) > (C)		No	No	No	No	No	No	No	No	No	No	No	No
(E) = (A / B) x 100		0.0030	0.0015	0.0000	0.0006	0.0003	0.0004	0.0012	0.0021	0.0024	0.0024	0.0029	0.0030

(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: _____

SW# 2 is the Chewaucan River. The proposed POA well is more than 1.0 mile from the Chewaucan River.

Hunt (2003) was used to calculate the interference given the proposed POA well obtains groundwater from the predominantly basalt-volcanic rock and sediment unit below the predominantly basin fill sediment unit, and obtaining groundwater solely from that unit is a recommended permit condition. The calculations used a horizontal hydraulic conductivity of 30 feet/day (transmissivity = 15,000 ft²/day which is consistent with Morgan (1988) and McFarland and Ryals (1991)), a vertical conductivity of 0.3 feet/day, 0.01 for the storage coefficient, and a basin-fill sediment thickness of 350 feet at the stream (based on LAKE 52274). The stream width used for the calculation (100 feet) is approximate to the actual stream width. A smaller stream width would result in a smaller calculated interference. A pro-rated pumping rate of 0.44 cfs (total maximum annual volume allowed divided by 245 day irrigation season) was used for the calculation.

When obtaining groundwater from the predominantly basalt-volcanic rock and sediment unit, the calculated interference with the river for each month remains less than 1.00 percent of the natural stream flow (80 percent exceedance).

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 _____

System is identified as generally unconfined with discontinuous low permeability layers causing local (discontinuous, limited) confinement. Generally, a low transmissivity (low permeability) predominantly basin-fill sediment unit of varying thickness overlies a higher transmissivity (higher permeability) predominantly basalt-volcanic rock and sediment unit. Available data indicates groundwater occurs in both the predominantly basin-fill sediment unit and the predominantly basalt-volcanic rock and sediment unit and groundwater is vertically connected within each unit and vertically connected between each unit.

The proposed aquifer is the predominantly basalt-volcanic rock and sediment unit below the basin-fill sediments. Geologic mapping (Walker 1963) indicates sedimentary deposits (Qts) at the well sites. This review include these sedimentary deposits as part of a more general predominantly basin fill sedimentary unit. Walker describes the Qts as composed of lacustrine, fluvial, and aeolian sedimentary rocks, interstratified tuff, ashy diatomite, and unconsolidated clay, sand, silt, and gravel.

This review recommends requiring the wells to obtain groundwater solely from the predominantly basalt-volcanic rock and sediment unit. The proposed POA well meets the recommended requirement. The requirement is recommended to be included any permit issued for any potential future POA changes.

Hunt (2003) was used to calculate the interference given the recommended condition that the wells obtain groundwater from the predominantly basalt unit below the predominantly basin fill sediment unit. When obtaining groundwater from the predominant basalt unit, the calculated interference with the Crooked Creek and the Chewaucan River for each month remains less than 1.00 percent of the natural stream flow (80 percent exceedance). It should be noted that pumping groundwater from the predominantly basin-fill unit would likely result in interference with the creek and river that exceeds the 1.00 percent of the natural stream flow (80 percent exceedance) during some months. That is a major reason why groundwater needs to be obtained from the predominantly basalt-volcanic rock and sediment unit only.

If a groundwater right permit is issued, the following conditions are recommended: 7B, 7F, 7N, 7T, and

Special well construction condition: "Each permitted well shall obtain groundwater solely from the predominantly basalt-volcanic rock and sediment unit (which may contain some sedimentary layers) that underlies the predominantly basin-fill sediment unit (which may contain some basalt layers). Each well shall have continuous casing and continuous seal from land surface, through the predominantly basin-fill unit, and 5 feet into the predominantly basalt-volcanic rock and sediment unit at minimum. Note: the depth to the predominantly basalt-volcanic rock and sediment unit varies with location."

The proposed POA well meets the special well construction condition. The condition is recommended to be included for any potential future POA changes.

References Used: References consulted were:

Hampton, E.R., 1964, Geologic factors that control the occurrence and availability of ground water in the Fort Rock Basin, Lake County, Oregon: USGS Professional Paper 383-B, 29 p.

McFarland, W.D. and Ryals, G.N., 1991, Adequacy of available hydrogeologic data for evaluation of declining ground-water levels in the Fort Rock Basin, south-central Oregon: USGS Water Resources Investigations Report 89-4057, 47 p.

Miller, D.W., 1984, Appraisal of ground-water conditions in the Fort Rock Basin, Lake County, Oregon: OWRD Open File Report, 157 p.

Miller, D.W., 1986, Ground-water conditions in the Fort Rock Basin, northern Lake County, Oregon: OWRD Ground Water Report No. 31, 196 p.

Morgan, D.S., 1988, Geohydrology and numerical model analysis of ground-water flow in the Goose Lake Basin, Oregon and California: USGS Water Resources Investigations Report 87-4058, 92 p.

Oregon Water Resources Department, 1989, Goose and Summer Lakes Basin report: OWRD Basin Report, 112 p.

Peterson, N.V. and McIntyre, J.R., 1970, The reconnaissance geology and mineral resources of eastern Klamath County and western Lake County, Oregon: DOGAMI Bulletin 66, 70 p.

Phillips, K.N. and VanDenburgh, A.S., 1971, Hydrology and geochemistry of Abert, Summer, and Goose Lakes, and other closed-basin lakes in south-central Oregon: USGS Professional Paper 502-B, 86p.

Sammel, E.A. and Craig, R.W., 1981, The geothermal hydrology of Warner Valley, Oregon: a reconnaissance study: USGS Professional Paper 1044-I, 147 p.

Walker, G.W., 1963, Reconnaissance geologic map of the eastern half of the Klamath Falls (AMS) quadrangle, Lake and Klamath Counties, Oregon: USGS Mineral Investigations Field Studies Map MF-260.

Waring, G.A., 1908, Geology and water resources of a portion of south-central Oregon: USGS Water Supply Paper 220, 85 p.

Goose and Summer Lakes Basin Program rules (OAR 690-513).

Water well reports for wells LAKE 1769, LAKE 52274, LAKE 51282, LAKE 51294, LAKE 52618 (the proposed POA well).

USGS quadrangle maps (1:24,000 scale): Valley Falls, Little Honey Creek, Cogan Buttes SE, Lake Abert South

D. WELL CONSTRUCTION, OAR 690-200D1. Well #: 1 Logid: LAKE 52618D2. **THE WELL does not appear to meet current well construction standards based upon:**

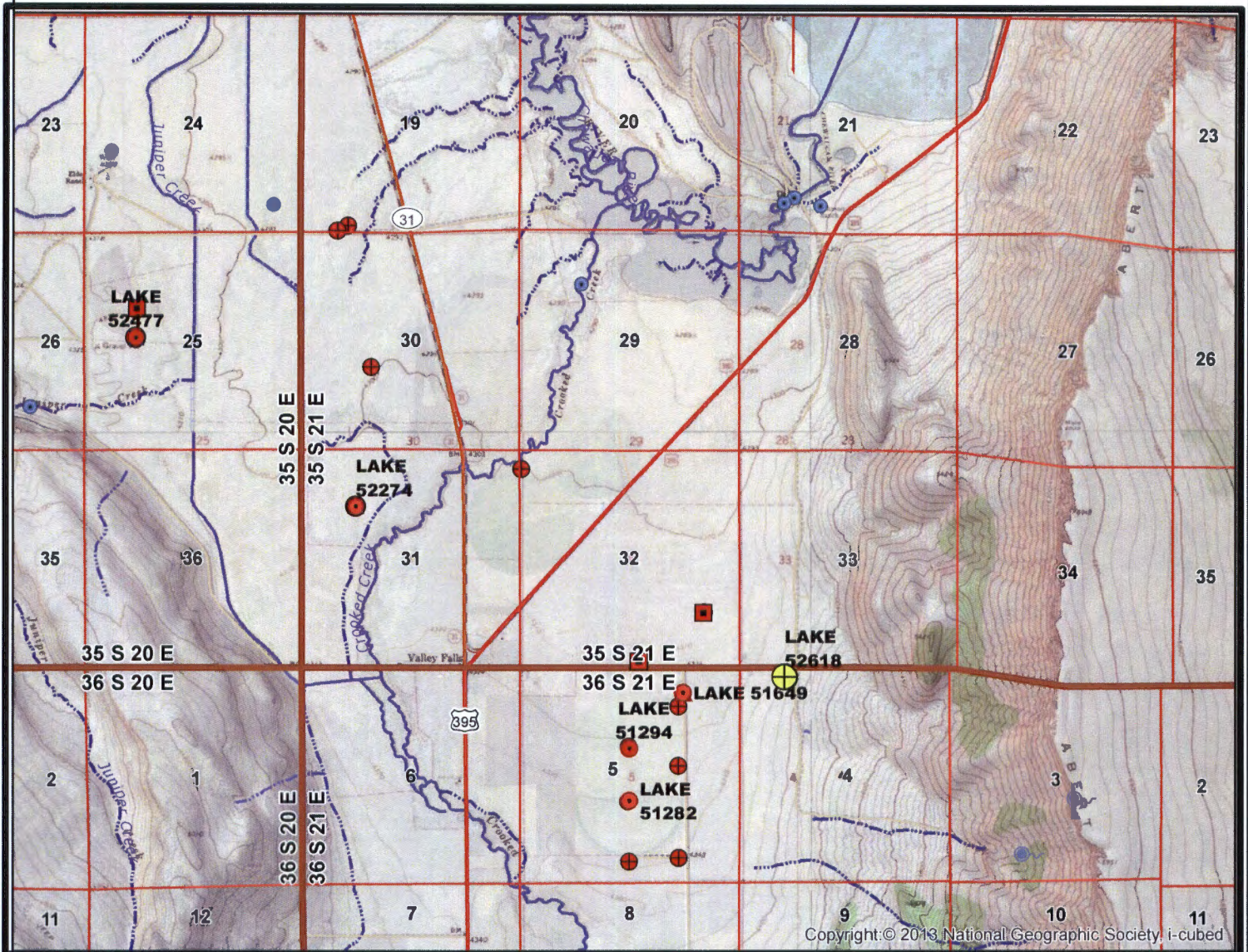
- a. ☐ review of the well log;
- b. ☐ field inspection by _____;
- c. ☐ report of CWRE _____;
- d. ☐ other: (specify) _____

D3. **THE WELL construction deficiency or other comment is described as follows:** _____No deficiency foundD4. ☐ Route to the Well Construction and Compliance Section for a review of existing well construction.

Water Availability Tables

Groundwater Permit Application G-18276

Justin R. & Jayna L. Ferrell

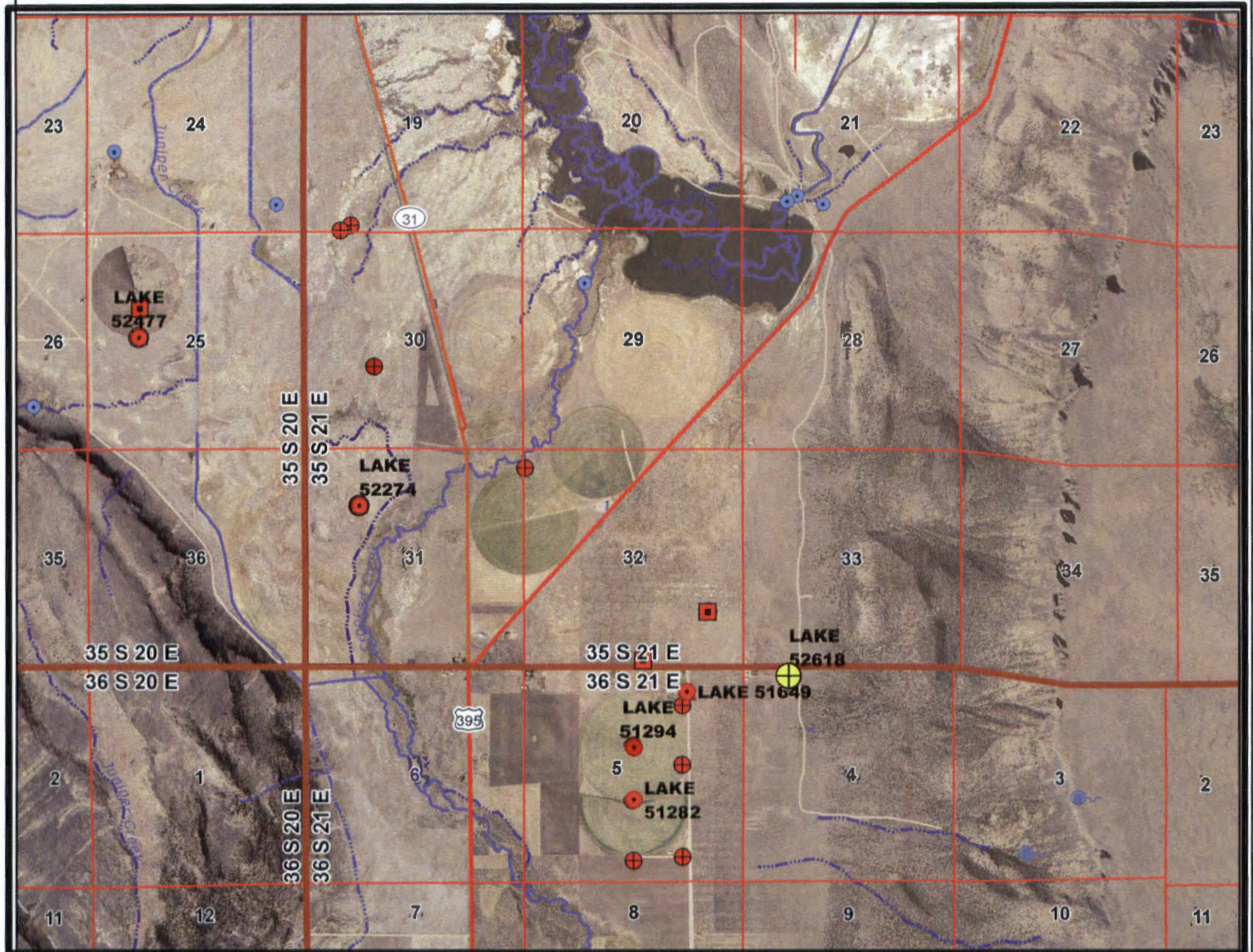


Yellow = Application Noted Well(s)
Red = Other Existing or Proposed Wells
Blue and Other = surface water rights



Groundwater Permit Application G-18276

Justin R. & Jayna L. Ferrell



Yellow = Application Noted Well(s)
Red = Other Existing or Proposed Wells
Blue and Other = surface water rights



STATE OF OREGON
WATER SUPPLY WELL REPORT
 (as required by ORS 537.765 & OAR 690-205-0210)

LAKE 52618

5/19/2015

WELL I.D. LABEL# L 117168
 START CARD # 1025777
 ORIGINAL LOG #

(1) LAND OWNER

Owner Well I.D.

First Name JUSTIN

Last Name FERRELL

Company

Address 29261 ABERT RIM RD.

City LAKEVIEW State OR Zip 97630

(2) TYPE OF WORK☒ New Well ☐ Deepening ☐ Conversion☐ Alteration (complete 2a & 10) ☐ Abandonment (complete 5a)**(2a) PRE-ALTERATION**

Dia + From To Gauge Stl Plstc Wld Thrd
 Casing: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
 Material From To Amt sacks/lbs
 Seal: ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

(3) DRILL METHOD

☐ Rotary Air ☒ Rotary Mud ☐ Cable ☐ Auger ☐ Cable Mud
☐ Reverse Rotary ☐ Other

(4) PROPOSED USE

☐ Domestic ☒ Irrigation ☐ Community
☐ Industrial/ Commercial ☐ Livestock ☐ Dewatering
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTIONSpecial Standard ☐ (Attach copy)

Depth of Completed Well 427.00 ft.

BORE HOLE

Dia	From	To	Material	From	To	Amt	sacks/ lbs
24	0	90	Bentonite Chips	0	90	275	S
22	90	398				Calculated	270
12	398	427				Calculated	

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E☒ Other POURED DRY

Backfill placed from _____ ft. to _____ ft. Material _____

Filter pack from _____ ft. to _____ ft. Material _____ Size _____

Explosives used: ☐ Yes Type _____ Amount _____**(5a) ABANDONMENT USING UNHYDRATED BENTONITE**

Proposed Amount

Actual Amount

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
☒	☐	16	☒	2	238	.250	☒	☐	☒	☐
☐	☐	16	☐	238	398	.375	☐	☐	☒	☐
☐	☐		☐				☐	☐	☐	☐
☐	☐		☐				☐	☐	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____Temp casing ☐ Yes Dia _____ From _____ To _____**(7) PERFORATIONS/SCREENS**

Perforations Method plasma cutter

Screens Type _____

Material _____

Perf/ Screen	Casing/ Liner	Dia	From	To	Scrnm/slot width	Slot length	# of slots	Tele/ pipe size
Perf	Casing	16	198	238	.125	3	1292	
Perf	Casing	16	268	398	.125	3	4199	

(8) WELL TESTS: Minimum testing time is 1 hour☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
800		200	2

Temperature 58 °F Lab analysis ☐ Yes By _____Water quality concerns? ☐ Yes (describe below) TDS amount 139 ppm

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County LAKE Twp 36.00 S N/S Range 21.00 E E/W WM

Sec 4 NE 1/4 of the NW 1/4 Tax Lot 400

Tax Map Number _____ Lot _____

Lat _____ " or _____ DMS or DD

Long _____ " or _____ DMS or DD

☐ Street address of well ☒ Nearest address

29261 ABERT RIM RD.

LAKEVIEW

(10) STATIC WATER LEVEL

Date	SWL(psi)	+ SWL(ft)
Existing Well / Pre-Alteration		
Completed Well 5/1/2015		63

Flowing Artesian? ☐ Dry Hole? ☐**WATER BEARING ZONES**

Depth water was first found 120.00

SWL Date From To Est Flow SWL(psi) + SWL(ft)

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)
5/1/2015	120	403	800		63

(11) WELL LOG

Ground Elevation _____

Material	From	To
sandy soil with basalt boulders	0	8
broken basalt with cinders	8	17
cinders	17	21
shattered basalt with cinders	21	52
fractured basalt	52	73
basalt	73	94
shattered basalt	94	126
coarse black sand with shattered basalt	126	192
fractured basalt	192	237
fractured grey sandstone with basalt	237	254
fractured basalt	254	315
shattered basalt with cinders	315	403
grey sandy clay	403	427

Date Started 3/16/2015 Completed 5/1/2015

(unbonded) Water Well Constructor Certification

I certify that the work I performed on the construction, deepening, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

License Number 1940

Date 5/19/2015

Signed BENJAMIN FRY (E-filed)

(bonded) Water Well Constructor Certification

I accept responsibility for the construction, deepening, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

License Number 1355

Date 5/19/2015

Signed ARTHUR L FRY (E-filed)

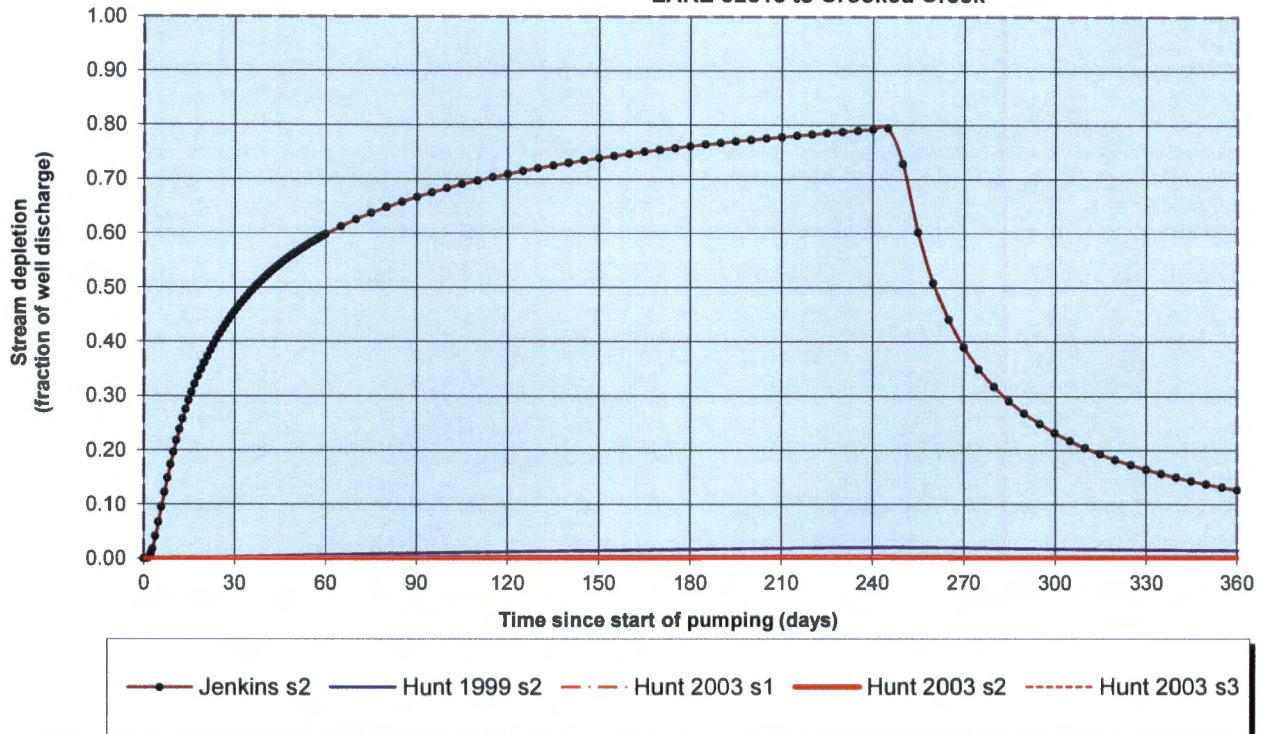
Contact Info (optional) _____

ORIGINAL - WATER RESOURCES DEPARTMENT

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK Form Version:

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

LAKE 52618 to Crooked Creek

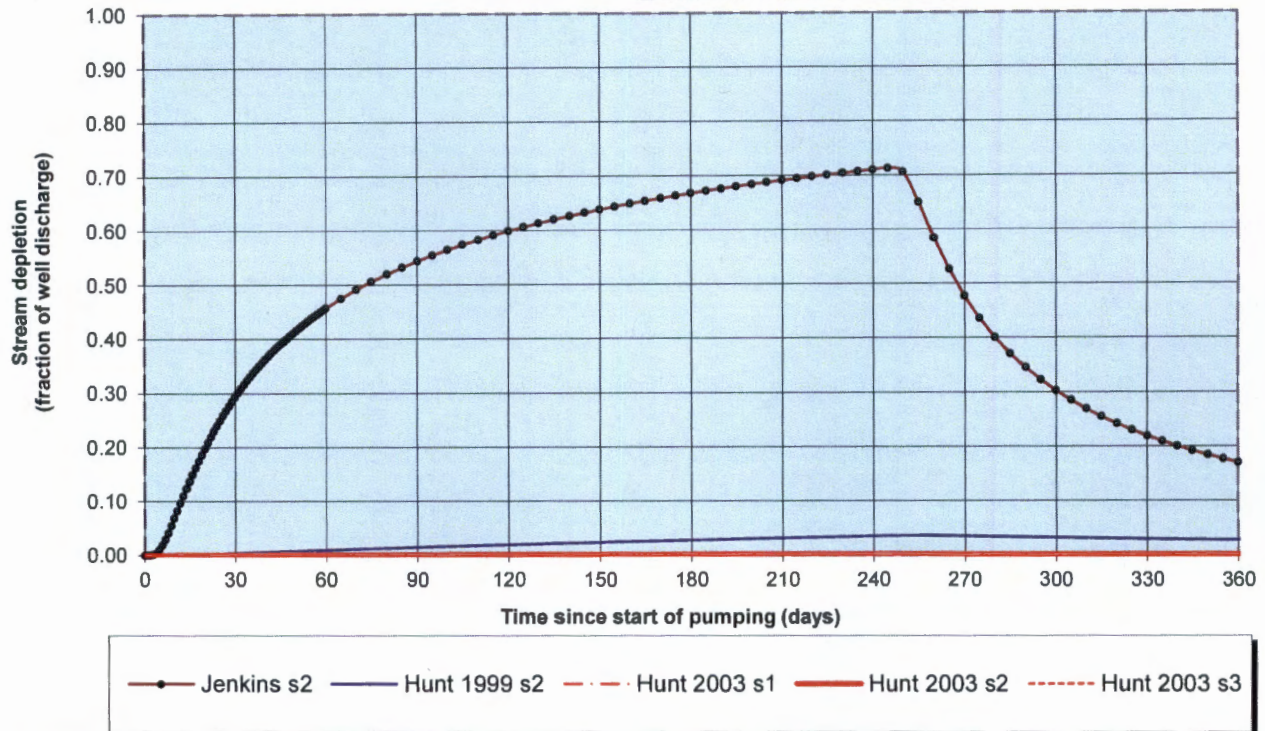


Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 245 days							
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	45.6%	59.8%	66.7%	70.9%	73.9%	76.1%	77.8%	79.2%	39.0%	23.2%	16.4%	12.6%	
H SD 1999	0.4%	0.7%	1.0%	1.3%	1.5%	1.7%	1.9%	2.1%	2.0%	1.8%	1.6%	1.5%	
H SD 2003	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	
Qw, cfs	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	
H SD 99, cfs	0.002	0.003	0.004	0.006	0.007	0.008	0.008	0.009	0.009	0.008	0.007	0.007	
H SD 03, cfs	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.44	0.44	0.44	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	7075	7075	7075	ft
Well depth	d	427	427	427	ft
Aquifer hydraulic conductivity	K	30	30	30	ft/day
Aquifer saturated thickness	b	500	500	500	ft
Aquifer transmissivity	T	15000	15000	15000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.3	0.3	0.3	ft/day
Aquitard saturated thickness	ba	350	350	350	ft
Aquitard thickness below stream	babs	350	350	350	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	50	50	50	ft
Streambed conductance (lambda)	sbc	0.042857	0.042857	0.042857	ft/day
Stream depletion factor	sdf	33.370417	33.370417	33.370417	days
Streambed factor	sbfb	0.020214	0.020214	0.020214	
input #1 for Hunt's Q_4 function	t'	0.029967	0.029967	0.029967	
input #2 for Hunt's Q_4 function	K'	2.860321	2.860321	2.860321	
input #3 for Hunt's Q_4 function	epsilon'	0.050000	0.050000	0.050000	
input #4 for Hunt's Q_4 function	lamda'	0.020214	0.020214	0.020214	

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

LAKE 52618 to Chewaucan River



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	29.3%	45.7%	54.4%	59.9%	63.8%	66.8%	69.1%	71.0%	47.7%	30.2%	21.9%	17.0%	
H SD 1999	0.4%	1.0%	1.5%	2.0%	2.4%	2.8%	3.2%	3.5%	3.6%	3.3%	3.0%	2.8%	
H SD 2003	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	
Qw, cfs	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	0.440	
H SD 99, cfs	0.002	0.004	0.007	0.009	0.011	0.012	0.014	0.016	0.016	0.014	0.013	0.012	
H SD 03, cfs	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.44	0.44	0.44	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	9980	9980	9980	ft
Well depth	d	427	427	427	ft
Aquifer hydraulic conductivity	K	30	30	30	ft/day
Aquifer saturated thickness	b	500	500	500	ft
Aquifer transmissivity	T	15000	15000	15000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.3	0.3	0.3	ft/day
Aquitard saturated thickness	ba	350	350	350	ft
Aquitard thickness below stream	babs	350	350	350	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	100	100	100	ft
Streambed conductance (lambda)	sbc	0.085714	0.085714	0.085714	ft/day
Stream depletion factor	sdf	66.400267	66.400267	66.400267	days
Streambed factor	sbf	0.057029	0.057029	0.057029	
input #1 for Hunt's Q_4 function	t'	0.015060	0.015060	0.015060	
input #2 for Hunt's Q_4 function	K'	5.691451	5.691451	5.691451	
input #3 for Hunt's Q_4 function	epsilon'	0.050000	0.050000	0.050000	
input #4 for Hunt's Q_4 function	lamda'	0.057029	0.057029	0.057029	



Water Availability Analysis

CROOKED CR > CHEWAUCAN R - AT MOUTH
 GOOSE & SUMMER LAKE BASIN
 Water Availability as of 6/11/2016

Watershed ID #: 31300603 ([Map](#))
 Date: 6/11/2016

Exceedance Level:
 Time: 7:38 AM

[Download Data](#)

Water Availability

Select any Watershed for Details

Nesting Watershed Order	Stream Name ID #	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Sto
1	31300602 CHEWAUCAN R > L ABERT - AT MOUTH	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
2	31300603 CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes

Limiting Watersheds

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

Month	Limiting Watershed ID #	Stream Name	Water Available?	Net Water Available
JAN	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	7.48
FEB	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	13.10
MAR	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	19.30
APR	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	32.30
MAY	31300602	CHEWAUCAN R > L ABERT - AT MOUTH	Yes	14.90
JUN	31300602	CHEWAUCAN R > L ABERT - AT MOUTH	No	-15.10
JUL	31300602	CHEWAUCAN R > L ABERT - AT MOUTH	No	-0.76
AUG	31300602	CHEWAUCAN R > L ABERT - AT MOUTH	No	-0.14
SEP	31300602	CHEWAUCAN R > L ABERT - AT MOUTH	Yes	1.93
OCT	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	4.57
NOV	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	6.70
DEC	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	6.95
ANN	31300603	CROOKED CR > CHEWAUCAN R - AT MOUTH	Yes	17,900.00

Detailed Reports for Watershed ID #31300602

CHEWAUCAN R > L ABERT - AT MOUTH
 GOOSE & SUMMER LAKE BASIN
 Water Availability as of 6/11/2016

Watershed ID #: 31300602 ([Map](#))
 Date: 6/11/2016

Exceedance Level:
 Time: 7:38 AM

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	33.80	0.82	33.00	0.00	0.00	33.00
FEB	64.90	1.10	63.80	0.00	0.00	63.80
MAR	103.00	23.80	79.20	0.00	0.00	79.20
APR	161.00	113.00	48.30	0.00	0.00	48.30
MAY	314.00	299.00	14.90	0.00	0.00	14.90
JUN	234.00	249.00	-15.10	0.00	0.00	-15.10
JUL	81.90	82.70	-0.76	0.00	0.00	-0.76
AUG	47.40	47.50	-0.14	0.00	0.00	-0.14
SEP	42.30	40.40	1.93	0.00	0.00	1.93
OCT	42.20	22.40	19.80	0.00	0.00	19.80
NOV	34.40	0.63	33.80	0.00	0.00	33.80
DEC	32.80	0.68	32.10	0.00	0.00	32.10
ANN	120,000.00	53,400.00	66,600.00	0.00	0.00	66,600.00

Detailed Report of Consumptive Uses and Storage

Consumptive Uses and Storages in Cubic Feet per Second

Month	Storage	Irrigation	Municipal	Industrial	Commercial	Domestic	Agricultural	Other	Total
JAN	0.62	0.00	0.00	0.17	0.00	0.02	0.01	0.00	0.82
FEB	0.90	0.00	0.00	0.17	0.00	0.02	0.01	0.00	1.10
MAR	1.29	22.30	0.00	0.17	0.00	0.02	0.01	0.00	23.80
APR	2.32	110.00	0.00	0.17	0.00	0.02	0.01	0.00	113.00
MAY	3.72	295.00	0.00	0.17	0.00	0.02	0.01	0.00	299.00
JUN	1.88	247.00	0.00	0.17	0.00	0.02	0.01	0.00	249.00
JUL	0.55	81.90	0.00	0.17	0.00	0.02	0.01	0.00	82.70
AUG	0.30	47.00	0.00	0.17	0.00	0.02	0.01	0.00	47.50
SEP	0.32	39.90	0.00	0.17	0.00	0.02	0.01	0.00	40.40
OCT	0.32	21.90	0.00	0.17	0.00	0.02	0.01	0.00	22.40
NOV	0.43	0.00	0.00	0.17	0.00	0.02	0.01	0.00	0.63
DEC	0.48	0.00	0.00	0.17	0.00	0.02	0.01	0.00	0.68

Detailed Report of Reservations for Storage and Consumptive Uses

Reserved Streamflow in Cubic Feet per Second

No reservations were found for this watershed.

Detailed Report of Instream Flow Requirements

Instream Flow Requirements in Cubic Feet per Second

No instream flow requirements were found for this watershed.

Detailed Reports for Watershed ID #31300603

CROOKED CR > CHEWAUCAN R - AT MOUTH

GOOSE & SUMMER LAKE BASIN

Water Availability as of 6/11/2016

Watershed ID #: 31300603 ([Map](#))

Date: 6/11/2016

Exceedance Level:

Time: 7:38 AM

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	8.03	0.55	7.48	0.00	0.00	7.48
FEB	13.90	0.78	13.10	0.00	0.00	13.10
MAR	22.60	3.33	19.30	0.00	0.00	19.30
APR	44.50	12.20	32.30	0.00	0.00	32.30
MAY	55.40	29.60	25.80	0.00	0.00	25.80
JUN	26.90	22.80	4.11	0.00	0.00	4.11
JUL	9.06	6.55	2.51	0.00	0.00	2.51
AUG	6.09	4.12	1.97	0.00	0.00	1.97
SEP	6.05	3.60	2.45	0.00	0.00	2.45
OCT	6.65	2.08	4.57	0.00	0.00	4.57
NOV	7.08	0.38	6.70	0.00	0.00	6.70
DEC	7.43	0.48	6.95	0.00	0.00	6.95
ANN	23,100.00	5,240.00	17,900.00	0.00	0.00	17,900.00

Detailed Report of Consumptive Uses and Storage

Consumptive Uses and Storages in Cubic Feet per Second

Month	Storage	Irrigation	Municipal	Industrial	Commercial	Domestic	Agricultural	Other	Total
JAN	0.53	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.55
FEB	0.76	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.78
MAR	1.30	2.01	0.00	0.01	0.00	0.01	0.00	0.00	3.33
APR	2.45	9.75	0.00	0.01	0.00	0.01	0.00	0.00	12.20
MAY	3.22	26.40	0.00	0.01	0.00	0.01	0.00	0.00	29.60
JUN	1.33	21.40	0.00	0.01	0.00	0.01	0.00	0.00	22.80
JUL	0.36	6.17	0.00	0.01	0.00	0.01	0.00	0.00	6.55
AUG	0.20	3.89	0.00	0.01	0.00	0.01	0.00	0.00	4.12
SEP	0.23	3.35	0.00	0.01	0.00	0.01	0.00	0.00	3.60
OCT	0.27	1.79	0.00	0.01	0.00	0.01	0.00	0.00	2.08
NOV	0.36	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.38
DEC	0.46	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.48

Detailed Report of Reservations for Storage and Consumptive Uses

Reserved Streamflow in Cubic Feet per Second

No reservations were found for this watershed.

Detailed Report of Instream Flow Requirements

Instream Flow Requirements in Cubic Feet per Second

No instream flow requirements were found for this watershed.