

SUBJECT: Scenic Waterway Interference Evaluation

PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date 10 July 2015

FROM: Ground Water/Hydrology Section Gerald H. Grondin

Reviewer's Name

SUBJECT: Application G- 18009 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: John, Matilda, & Neil Flynn Living Trust County: Lake

A1. Applicant(s) seek(s) 0.075 cfs (33.7 gpm) cfs from 1 well(s) in the Goose & Summer Lakes Basin,
Warner Lakes subbasin Quad Map: Plush

A2. Proposed use: Primary Irrigation (6.0 acres) 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	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 52509	Well 1	Basalt	0.075	T35S/R24E-sec 33 ACC	24' N, 2480' W fr E qtr cor S 33
2						

* 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	4505	34	31	03/26/14	407	0-50 114-151	+1.5	151	None	1500	?	A
2												

Use data from application for proposed wells.

A4. Comments: _____

This application proposes to add 6.0 acres to the perimeter a 113.6 acre center pivot circle previously permitted under G-17161 (file G-17733).

The application requests a total maximum pumping rate of 0.075 cfs (33.7 gpm) and a total maximum annual volume of 18 acre-feet from a single POA well. The maximum pumping rate and maximum annual volume are what is typically allowed for 6 acres,

A5. ☐ Provisions of the in general OAR 690-513; particularly OAR 690-513-0040 (Warner Lakes sub-basin) 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) # N.A., _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: _____

Comments: Currently, there is 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, 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: _____

The state observation wells with long term data (early 1960s to 2013) closest to the proposed POA wells are state observation well 377 (well LAKE 1886) located in T36S/R24E-sec 33 abb and state observation well 376 (LAKE 1775) located in T35S/R24E-sec 09 dad. LAKE 1886 is about 6.5 miles south of the proposed POA well and LAKE 1775 is about 3.1 miles north of the POA well. The water level data for both wells show long term climate influences as well as annual seasonal influences. Before the 1990s, peak annual groundwater levels were generally between 15 and 17 feet below land surface at LAKE 1886 and between 7 and 8 feet below land surface at LAKE 1775. After 1990, the peak annual groundwater level has often been from 17 to 19 feet below land surface at LAKE 1886 and from 7.5 to 8.5 feet below land surface at LAKE 1775. Climate may be partly to entirely responsible for the lower annual peak levels after 1990. Ongoing groundwater level measurements will help that determination.

If a permit is issued, the following conditions should be included: 7B, 7N, 7T, and

The “large” water use condition: (require a totalizing flow meter at each well. Each flow meter shall be located within 50 feet of the wellhead and adjacent to each flow meter shall be a clearly visible monument with a sign noting the flow meter. Lastly, require for every flow meter the reading, recording (monthly at minimum), and annual reporting of the flow meter data, all flow meters).

Special Condition for groundwater production: “All POA wells under this permit shall comply with existing well construction standards. Groundwater production shall occur from the predominantly basalt unit below the predominantly basin fill unit by continuous casing and continuous seal through the predominantly basin fill unit and into the predominantly basalt unit.” Note: The proposed POA well does not meet this condition, which is included in permit G-17161. The proposed POA well has a split seal rather than a continuous seal, which should have been continuous from land surface to 151 feet depth.

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	Basalt (as required by permit condition)	☐	☒
		☐	☐

Basis for aquifer confinement evaluation: _____

Walker (1973) and Walker and Repenning (1965) respectively map the surface geology at the proposed POA well as Qs (lacustrine sedimentary rocks) and QTs (lacustrine, fluvialite, and Aeolian sedimentary rocks, interstratified tuff, ash, diatomite and unconsolidated clay, sand, and gravel). Alluvial fan deposits are noted near the well as well as rocks of strato-volcanoes (QTv & QTvf) and basalt (Tb) exposed in the uplands to the west of the wells.

The groundwater system is identified as generally unconfined with discontinuous low permeability layers causing local (discontinuous, limited) confinement. Generally, lower transmissivity (lower permeability) sediment (predominantly basin-fill sediment unit) of varying thickness overlies higher transmissivity (higher permeability) basalt (predominantly basalt unit). Groundwater occurs in both the predominantly basin-fill sediment unit and the predominantly basalt unit. Groundwater is vertically connected within each unit and between each unit. This is based upon investigations by Sammel and Craig (1981) for Warner Valley, Morgan (1988) for Goose Lake Valley and Miller (1984 and 1986) for the Fort Rock and Christmas Valley area. Sammel and Craig (1981) particularly note the similarity of the hydrogeology in the Warner lakes Valley to the Klamath Basin.

The predominant basin-fill sediment unit thickness can vary. For example, the depth to the top of the predominantly basalt unit is about 122 feet at nearby LAKE 1779 located 1250 feet south of the proposed POA; the depth to the top of the predominantly basalt unit is less than 20 feet at well LAKE 1840 located about 3.2 miles south of the proposed POA well; and the depth to the top of the predominantly basalt unit is about 22 feet at state observation well 376 (LAKE 1775) located about 3.1 miles north of the proposed POA well. The depth to the top of the predominantly basalt unit is about 146 feet at the proposed POA well.

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	Miner's Draw	4474	4515	785	☐	☒	☐	☐	☒
1	2	Un-named Lakes (ponds)	4474	4470	6730	☒	☐	☐	☐	☒
1	3	Anderson Lake	4474	4466	19000	☒	☐	☐	☐	☒
1	3	Hart Lake	4474	4473	19050	☒	☐	☐	☐	☒
2	4	Honey Creek	4474	4505	26250	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: _____

Available reports indicate groundwater and surface water are connected in the Warner lakes Valley, and groundwater flows from south to north in the valley.

Miners Draw is an intermittent stream that appears to be runoff flow only. Groundwater appears to be below the stream-bed. The un-named lakes, Anderson Lake, and Hart Lake appear to be coincident with groundwater.

The distance to Honey Creek is to the perennial flow portion of the creek.

Water Availability Basin the well(s) are located within: HONEY CR > HART L – AT MOUTH

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

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

There is no analysis in this section given the proposed POA is not hydraulically connected to Miners Draw, and additionally, it is more than 1.0 mile from the un-named lakes, Anderson Lake, Hart Lake, and Honey Creek.

This image shows a single sheet of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

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	4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Well Q as CFS		0.00	0.00	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.00	0.00
Interference CFS		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(A) = Total Interf.		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
(B) = 80 % Nat. Q		5.06	6.64	12.6	41.5	53.8	26.8	4.32	2.27	2.07	2.14	3.01	3.74
(C) = 1 % Nat. Q		0.0506	0.0664	0.1260	0.4150	0.5380	0.2680	0.0432	0.0227	0.0207	0.0214	0.0301	0.0374
(D) = (A) > (C)		No	No	No	No	No	No	No	No	No	No	No	No
(E) = (A / B) x 100		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

(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: _____

Analysis is done in this section given the proposed POA well is more than 1.0 mile from Honey Creek, un-named lakes (ponds), Anderson Lake, and Hart Lake.

The Table above was used for interference with Honey Creek only given it is the water body in the area with water availability data.

A pro-rated pumping rate of 0.70 cfs (314 gpm) was used for the pumping rate. The pro-rated rate is the maximum annual volume of water allowed (340 ac-ft) divided the total time (245 days). This distributes the pumping over the entire proposed irrigation season. The results of 0.00% and 0.000 cfs indicate the calculated interference was less than 0.00005 cfs.

Hunt (2003) was used to calculate the interference:

Used pro-rated pumping rate = 0.037 cfs (16.625 gpm),

Used aquifer transmissivity = 10,000 ft²/day based on specific capacity of LAKE 1779, LAKE 1825, LAKE 1839, & LAKE 1840. The value is within the range noted by Sammel and Craig (1981)

Used, an intermediate storage coefficient = 0.001

Used, sediment hydraulic conductivity Kv = 1.00 ft/day (horizontal conductivity (Kh) divided by 100)

Used sediment thickness below creek = 150 feet (based on LAKE 1888 near Honey Creek)

Used stream width = 20 feet.

The Theis equation (Theis, 1935) was used to calculate the groundwater level drawdown at un-named lakes (ponds), Anderson Lake, and Hart Lake using the same values above. The calculated drawdowns are shown below:

Pumping Scenario	Elapsed Time (days)	Calculated Drawdown (feet)		
		Un-named Lakes	Anderson Lake	Hart Lake
Continuous Full Rate (0.075 cfs)	30	0.14	0.05	0.05
	245	0.25	0.14	0.14
Continuous Pro-Rated (0.037 cfs)	30	0.07	0.02	0.02
	245	0.12	0.07	0.07

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) 7B, 7N, 7T;
- ii. ☒ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. SW / GW Remarks and Conditions _____

If a permit is issued, the following conditions should be included: 7B, 7N, 7T, and

The "large" water use condition: (require a totalizing flow meter at each well. Each flow meter shall be located within 50 feet of the wellhead and adjacent to each flow meter shall be a clearly visible monument with a sign noting the flow meter. Lastly, require for every flow meter the reading, recording (monthly at minimum), and annual reporting of the flow meter data, all flow meters).

Special Condition for groundwater production: "All POA wells under this permit shall comply with existing well construction standards. Groundwater production shall occur from the predominantly basalt unit below the predominantly basin fill unit by continuous casing and continuous seal through the predominantly basin fill unit and into the predominantly basalt unit." **Note: The proposed POA well does not meet this condition, which is included in permit G-17161. The proposed POA well has a split seal rather than a continuous seal, which should have been continuous from land surface to 151 feet depth.**

The groundwater system is identified as generally unconfined with discontinuous low permeability layers causing local (discontinuous, limited) confinement. Generally, lower transmissivity (lower permeability) sediment (predominantly basin-fill sediment unit) of varying thickness overlies higher transmissivity (higher permeability) basalt (predominantly basalt unit). Groundwater occurs in both the predominantly basin-fill sediment unit and the predominantly basalt unit. Groundwater is vertically connected within each unit and between each unit. This is based upon investigations by Sammel and Craig (1981) for Warner Valley, Morgan (1988) for Goose Lake Valley and Miller (1984 and 1986) for the Fort Rock and Christmas Valley area. Sammel and Craig (1981) particularly note the similarity of the hydrogeology in the Warner lakes Valley to the Klamath Basin.

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.

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

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.

Theis, C.V. 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage. American Geophysical Union Transactions, 16 annual meeting, vol. 16, pg. 519-524.

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.

Walker, G.W. and Repenning, C.A., 1965, Reconnaissance geologic map of the Adel quadrangle, Lake, Klamath, and Malheur Counties, Oregon: USGS Miscellaneous Geologic Investigations Map I-446.

Walker, G.W., 1973, Preliminary geologic and tectonic maps of Oregon east of the 121st meridian: USGS Miscellaneous Field Studies Map MF-495

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).

State Observation Wells SOW 377 (LAKE 1886) and SOW 376 (LAKE 1775).

Water well reports for wells in Township 36 South/Range 24 East

USGS Plush and Hart Lake quad maps (1:24,000 scale)

D. WELL CONSTRUCTION, OAR 690-200

D1. Well #: 1 Logid: LAKE 52509
 Well #: _____ Logid: _____

D2. **THE WELL does not 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:**

- a. ☐ constitutes a health threat under Division 200 rules;
- b. ☐ commingles water from more than one ground water reservoir;
- c. ☐ permits the loss of artesian head;
- d. ☐ permits the de-watering of one or more ground water reservoirs;
- e. ☐ other: (specify) _____

D4. **THE WELL construction deficiency is described as follows:** _____

- D5. **THE WELL**
- a. ☐ was, or ☐ was not constructed according to the standards in effect at the time of original construction or most recent modification.
 - b. ☐ I don't know if it met standards at the time of construction.

Comments: **Well construction does not meet existing permit condition in permit G-17161.**

Special Condition for groundwater production: "All POA wells under this permit shall comply with existing well construction standards. Groundwater production shall occur from the predominantly basalt unit below the predominantly basin fill unit by continuous casing and continuous seal through the predominantly basin fill unit and into the predominantly basalt unit."

Note: The proposed POA well does not meet this condition, which is included in permit G-17161. The proposed POA well has a split seal rather than a continuous seal, which should have been continuous from land surface to 151 feet depth.

- D6. ☐ **Route to the Enforcement Section.** I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Enforcement Section and the Ground Water Section.

THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

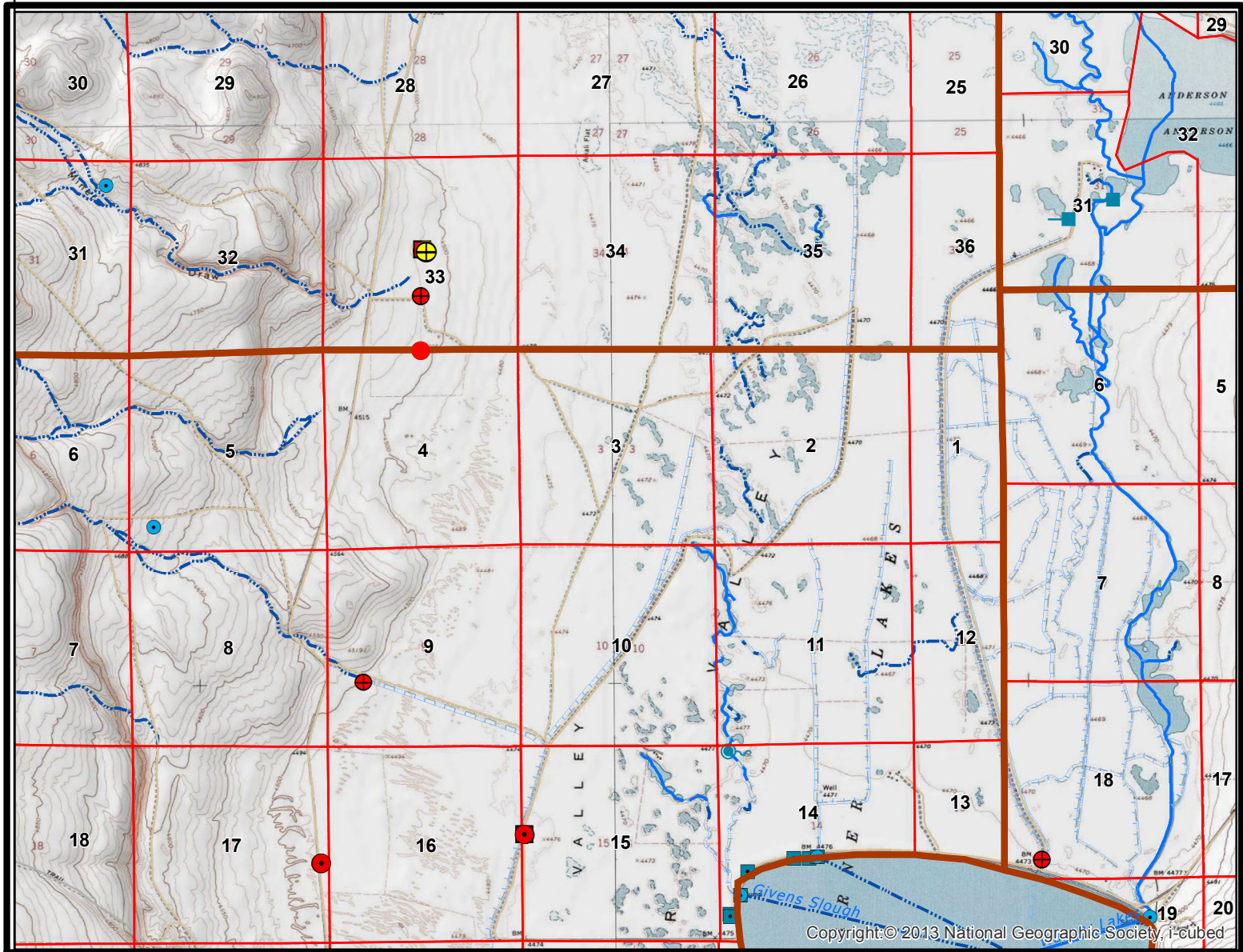
- D7. ☐ Well construction deficiency has been corrected by the following actions: _____

_____, 200____.
 (Enforcement Section Signature)

- D8. ☐ **Route to Water Rights Section (attach well reconstruction logs to this page).**

Groundwater Permit Application G-18009

John, Matilda, Niel Flynn Living Trust



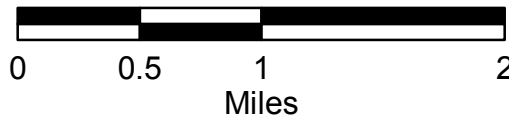
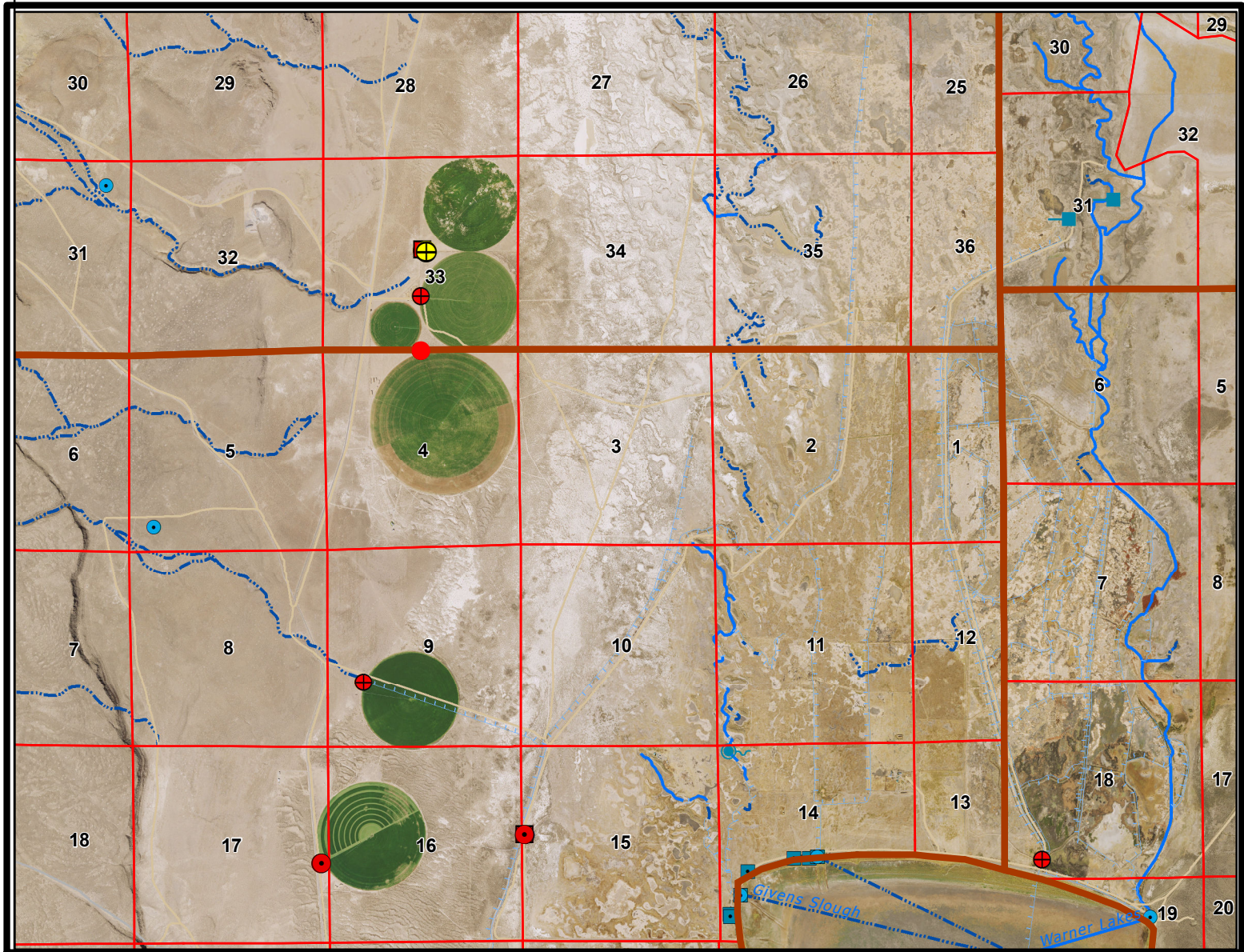
Yellow = Application Noted Well(s)
Red = Other Existing or Proposed Wells

Blue and Other = surface water rights



Groundwater Permit Application G-18009

John, Matilda, Niel Flynn Living Trust



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 52509

4/1/2014

WELL I.D. LABEL# L

START CARD #

ORIGINAL LOG #

114177

1022514

(1) LAND OWNER

Owner Well I.D. _____

First Name _____ Last Name _____

Company FLYNN & SONS, LLC.

Address 421 SOUTH "G" STREET

City LAKEVIEW State OR Zip 97630

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

Dial + From To Gauge Stl Plstc Wld Thrld

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 CONSTRUCTION**Special Standard ☐ (Attach copy)

Depth of Completed Well 407.00 ft.

BORE HOLE

Dia	From	To	Material	From	To	Amt	sacks/lbs
22	0	31	Bentonite Chips	0	50	112	S
18	31	151	Cement	114	151	88	S
12.25	151	407					

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

Backfill placed from 50 ft. to 114 ft. Material BENTONITE CHIPS

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 Thrld

☒	☐	14	☒	1.5	151	.250	☒	☐	☒	☐	
☐	☐		☐				☐	☐	☐	☐	
☐	☐		☐				☐	☐	☐	☐	
☐	☐		☐				☐	☐	☐	☐	
☐	☐		☐				☐	☐	☐	☐	

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

Perforations Method _____

Screens Type _____ Material _____

Perf/ Screen	Casing/ Liner	Screen Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size

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

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

1500		380	2

Temperature 60 °F Lab analysis ☐ Yes By _____Water quality concerns? ☐ Yes (describe below) TDS amount

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)

County LAKE Twp 35.00 S N/S Range 24.00 E E/W WM

Sec 28 SW 1/4 of the SE 1/4 Tax Lot 205

Tax Map Number _____ Lot _____

Lat _____ " or _____ DMS or DD

Long _____ " or _____ DMS or DD

☐ Street address of well ☐ Nearest address

SIX MILES NORTH OF PLUSH, OREGON

(10) STATIC WATER LEVEL

Date SWL(psi) + SWL(ft)

Existing Well / Pre-Alteration _____

Completed Well 3/26/2014 _____ 30

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

Depth water was first found 34.00

SWL Date	From	To	Est Flow	SWL(psi)	+ SWL(ft)
3/21/2014	34	146	500		31
3/24/2014	146	407	1500		31

(11) WELL LOG

Ground Elevation _____

Material	From	To
Silty Sand & Gravels	0	20
Brown Clay with Gravels	20	80
Sand & Gravels & Broken Basalt	80	146
Hard Gray Basalt	146	192
Broken Brown Basalt	192	209
Hard Black Basalt	209	230
Medium Gray & Red Basalt	230	265
Brown & Gray Basalt with Ash Seams	265	345
Hard Gray Basalt with Broken Seams	345	407

Date Started 3/17/2014 Complete 3/26/2014

(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 _____ Date _____

Signed _____

(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 1385 Date 4/1/2014

Signed ROBERT BUCKNER (E-filed)

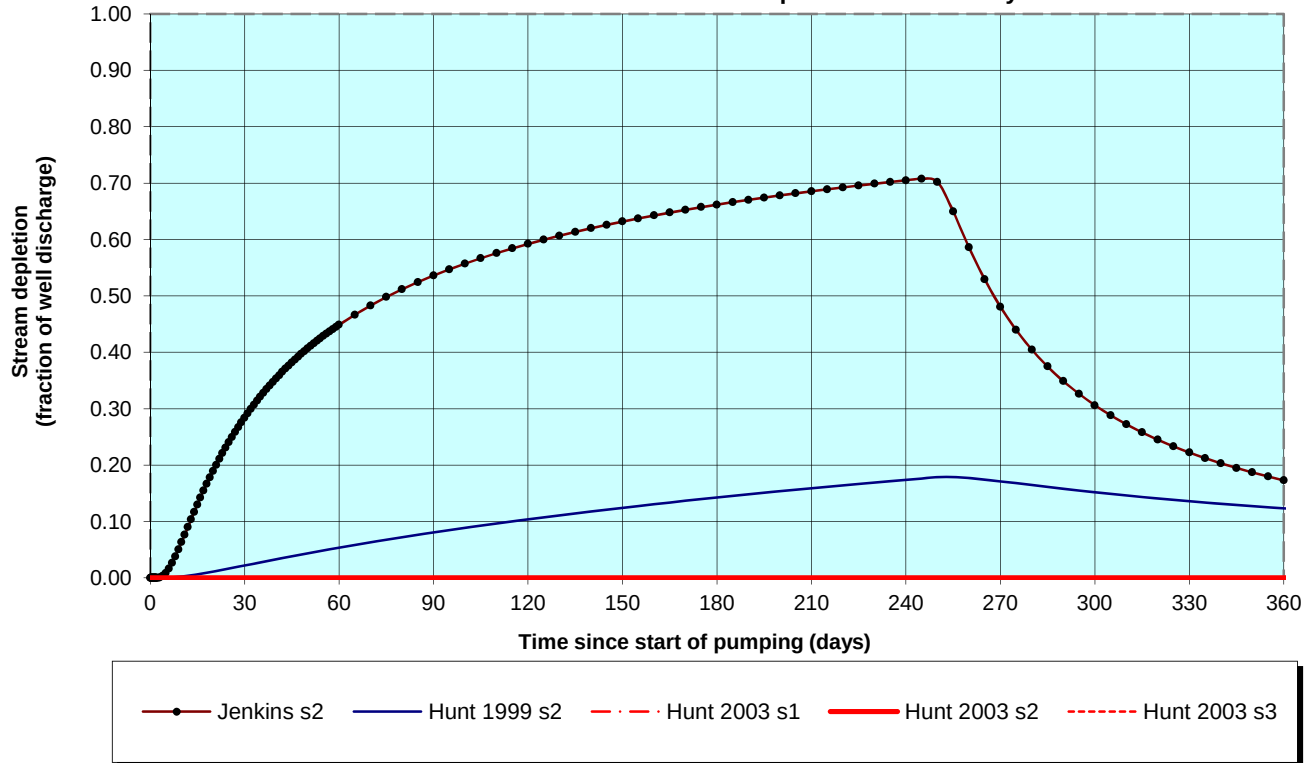
Contact Info (optional) Robert Buckner

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)

Proposed POA to Honey 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	28.4%	44.9%	53.6%	59.2%	63.2%	66.2%	68.5%	70.5%	48.1%	30.6%	22.2%	17.3%	
H SD 1999	2.2%	5.4%	8.1%	10.4%	12.4%	14.3%	15.9%	17.4%	17.1%	15.2%	13.6%	12.3%	
H SD 2003	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
Qw, cfs	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	
H SD 99, cfs	0.001	0.002	0.003	0.004	0.005	0.005	0.006	0.006	0.006	0.006	0.005	0.005	
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.04	0.04	0.04	cfs
Time pump on (pumping duration)	tpon	245	245	245	days
Perpendicular from well to stream	a	26250	26250	26250	ft
Well depth	d	460	460	460	ft
Aquifer hydraulic conductivity	K	100	100	100	ft/day
Aquifer saturated thickness	b	100	100	100	ft
Aquifer transmissivity	T	10000	10000	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	150	150	150	ft
Aquitard thickness below stream	babs	150	150	150	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.133333	0.133333	0.133333	ft/day
Stream depletion factor	sdf	68.906250	68.906250	68.906250	days
Streambed factor	sbfb	0.350000	0.350000	0.350000	
input #1 for Hunt's Q_4 function	t'	0.014512	0.014512	0.014512	
input #2 for Hunt's Q_4 function	K'	459.375000	459.375000	459.375000	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.350000	0.350000	0.350000	

Drawdown Calculations Using Theis Equation

Theis Equation: $s = [Q/(4 \cdot T \cdot \pi)] [W(u)]$

$u = (r^2 S)/(4 \cdot T \cdot t)$

$W(u) = (-\ln u) - (0.5772157) + (u/1 \cdot 1!) - (u^2/2 \cdot 2!) + (u^3/3 \cdot 3!) - (u^4/4 \cdot 4!) + \dots$

s = drawdown (L)

T = transmissivity (L²/T)

S = storage coefficient (dimensionless)

pi = 3.141592654

r = radial distance (L)

t = time (T)

u = dimensionless

W(u) = well function

Transmissivity T (gpd/ft)	Transmissivity T (ft ² /day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft ³ /sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Drawdown s (feet)	Comments
								Note : W(u) calculation valid when u < 7.1			
								7.0000	1.1545E-04		W(u) calculation test
Note: yellow grid areas are where values are calculated											
Proposed POA Well to un-named lakes (Transmissivity from specific capacity data)											
74,805.20	10,000.00	0.00100	33.662	0.075	30.00	6,730.00	3.14	0.0377	2.7371	0.1411	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	33.662	0.075	245.00	6,730.00	3.14	0.0046	4.8044	0.2477	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	16.625	0.037	30.00	6,730.00	3.14	0.0377	2.7371	0.0697	Pro-Rated Pumping Rate
74,805.20	10,000.00	0.00100	16.625	0.037	245.00	6,730.00	3.14	0.0046	4.8044	0.1224	Pro-Rated Pumping Rate
Proposed POA Well to Anderson Lake (Transmissivity from specific capacity data)											
74,805.20	10,000.00	0.00100	33.662	0.075	30.00	19,000.00	3.14	0.3008	0.9036	0.0466	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	33.662	0.075	245.00	19,000.00	3.14	0.0368	2.7605	0.1424	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	16.625	0.037	30.00	19,000.00	3.14	0.3008	0.9036	0.0230	Pro-Rated Pumping Rate
74,805.20	10,000.00	0.00100	16.625	0.037	245.00	19,000.00	3.14	0.0368	2.7605	0.0703	Pro-Rated Pumping Rate
Proposed POA Well to Hart Lake (Transmissivity from specific capacity data)											
74,805.20	10,000.00	0.00100	33.662	0.075	30.00	19,050.00	3.14	0.3024	0.8997	0.0464	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	33.662	0.075	245.00	19,050.00	3.14	0.0370	2.7555	0.1421	Continuous Pumping at Full Rate
74,805.20	10,000.00	0.00100	16.625	0.037	30.00	19,050.00	3.14	0.3024	0.8997	0.0229	Pro-Rated Pumping Rate
74,805.20	10,000.00	0.00100	16.625	0.037	245.00	19,050.00	3.14	0.0370	2.7555	0.0702	Pro-Rated Pumping Rate

Theis_Equation_specific_capacity_to_transmissivity		
Volcanics-Basalt Rocks & Sediments		
Well County	Well Num	Transmissivity
		ft²/day
LAKE	1779	4,299.52
LAKE	1825	15,338.56
LAKE	1839	12,012.45
LAKE	1840	4,532.75
Average		9,045.82