



Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1271
(503) 986-0900
www.wrd.state.or.us

Ground Water Review Form:

- ☐ Water Right Transfer
☒ Permit Amendment
☐ GR Modification
☐ Other

Application: T- 11911

Applicant Name: Chaylon & Amber Shuffield

Proposed Changes: ☒ POA ☐ APOA ☐ SW→GW ☐ RA
☐ USE ☒ POU ☐ OTHER

Reviewer(s): Gerald H. Grondin

Date of Review: 19 December 2014

The information provided in the application is insufficient to evaluate whether the proposed transfer may be approved because:

- ☐ The water well reports provided with the application do not correspond to the water rights affected by the transfer.
- ☐ The application does not include water well reports or a description of the well construction details sufficient to establish the ground water body developed or proposed to be developed.
- ☐ Other _____

1. Basic description of the changes proposed in this transfer: _____

Application T-11911 relates to certificate 54247 (file G-9267). The certificate allows a maximum pumping rate of 0.50 cfs (244 gpm) from POA well LAKE 1503 and a maximum annual volume of 120 acre-feet to irrigate 40 POU acres. The well and acreage are located in T30S/R17E-sec 6. The transfer application seeks to transfer to a center pivot and a POA well in T29S/R17E-sec 24 the following: 7.34 POU acres and the water related to those acres (a maximum pumping rate of 0.09175 cfs (41 gpm) from POA well LAKE 1503 to proposed POA well LAKE 4037 and a maximum annual volume of 22.02 acre-feet).

This transfer is part of the applicant's effort to complete the circle of their center pivot.

2. Will the proposed POA develop the same aquifer (source) as the existing authorized POA?
☒ Yes ☒ No Comments: _____

The answer is both yes and no. See discussion below.

The answer is no given the existing POA well (LAKE 1503) and the proposed POA well (LAKE 4037) obtain groundwater from different geologic material. The existing POA well is 70 feet deep and obtains groundwater primarily from the predominantly basin-fill sediment unit (300 gpm) and secondarily from 6-feet of basalt at the bottom of the well (50 gpm). The proposed APOA well is 380 feet deep and is constructed to obtain groundwater from the predominantly basalt-volcanic rocks and sediment unit below the predominantly basin-fill sediment unit.

The answer is yes given groundwater in the two units (the predominantly basin-fill sediment unit and groundwater in the predominantly basalt-volcanic rocks and sediment unit) is hydraulically connected.

The overall groundwater system is identified as generally unconfined with discontinuous low permeability layers causing local (discontinuous, limited) confinement. This is based upon the following indirect evidence within the Goose and Summer Lakes Basin.

For the Fort Rock sub-basin, Miller (1986) note there is one dominant groundwater "reservoir" with some separate scattered perched groundwater. Recharge is from local precipitation, largely in the upland areas, and there is a lag time for the recharge to reach the dominant groundwater "reservoir". Groundwater discharge occurs via outflow to neighboring areas (including "dramatic" discharge to springs and flowing wells in the Summer Lake sub-basin), evapotranspiration, and groundwater pumping. Groundwater in the dominant groundwater "reservoir" is identified as occurring in several geologic formations (including basalts and sediments) under unconfined or confined conditions.

For the Goose Lake subbasin, Morgan (1988) notes that ground water flow is generally from upland recharge areas to lowland discharge areas. However, local subsystems discharge to lakes, reservoirs, meadows, and streams. Large quantities of ground water move through complexly interbedded, discontinuous, unconsolidated sand, gravel, silt, and clay deposits. Morgan characterizes the upper portion of ground water as unconfined with confined-like conditions increasing with depth. This appears related to anisotropic hydraulic conductivities with horizontal hydraulic conductivity much greater than vertical hydraulic conductivity. For one site noted, the estimated ratios ranged from 2:1 to 179:1. There is no indication of shallower ground water being separated from deeper ground water by a confining layer.

3. a) Is there more than one source developed under the right (e.g., basalt and alluvium)?

☒ Yes ☒ No

The answer is yes and no. It is yes given the well is 70 feet deep and obtains groundwater primarily from the predominantly basin-fill sediment unit (300 gpm) and secondarily from 6-feet of basalt at the bottom of the well (50 gpm). It is no given groundwater in the two units (the predominantly basin-fill sediment unit and groundwater in the predominantly basalt-volcanic rocks and sediment unit) is hydraulically connected. This is explained in greater detail in part 2 above.

- b) If yes, estimate the portion of the right supplied by each of the sources and describe any limitations that will need to be placed on the proposed change (rate, duty, etc.):

See part 3a above.

4. a) Will this proposed change, at its maximum allowed rate of use, likely result in an increase in interference with **another ground water right**?

☒ Yes ☐ No Comments:

The proposed POA change from the existing POA well to the proposed POA well will potentially increase the groundwater level drawdown at the water right well closest to the proposed POA well. The increased groundwater level drawdown at the end of 245 days pumping is calculated to be less than 0.30 feet. The increased drawdown at other wells near the proposed POA well should be less given their greater distance from the proposed POA well. This potentially increased groundwater level drawdown at the neighboring water right wells should be easily accommodated by those wells.

- b) If yes, would this proposed change, at its maximum allowed rate of use, likely result in another groundwater right not receiving the water to which it is legally entitled?

☐ Yes ☒ No If yes, explain:

See part 4a above for comment.

5. a) Will this proposed change, at its maximum allowed rate of use, likely result in an increase in interference with **another surface water source**?

☒ Yes ☒ No Comments: _____

The answer is no in relation to Ana Springs and Ana River. The proposed POA well is further away from the spring and river than the existing POA well.

The answer is yes in relation to Johnson Creek and Spring. The Proposed POA well is closer to the creek and spring than the existing POA well. The calculated increase in groundwater level drawdown at the spring and creek at the end of 245 days pumping is less than 0.02 feet. The expected change in degree of interference with the creek and spring is expected to be minimal.

The answer is yes in relation to un-named ponds and spring. The Proposed POA well is closer to the ponds and spring than the existing POA well. The calculated increase in groundwater level drawdown at the spring and creek at the end of 245 days pumping is less than 0.20 feet. The expected change in degree of interference with the creek and spring is expected to be minimal.

- b) If yes, at its maximum allowed rate of use, what is the expected change in degree of interference with any **surface water sources** resulting from the proposed change?

Stream: Johnson Creek & Spring ☒ Minimal ☐ Significant
Stream: Un-named ponds & spring ☒ Minimal ☐ Significant

Provide context for minimal/significant impact: _____

See part 4a above for comment.

6. What conditions or other changes in the application are necessary to address any potential issues identified above: _____

The following conditions are recommended:

Condition 7 P (well tag condition) applied to all the POA wells.

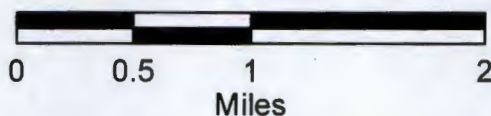
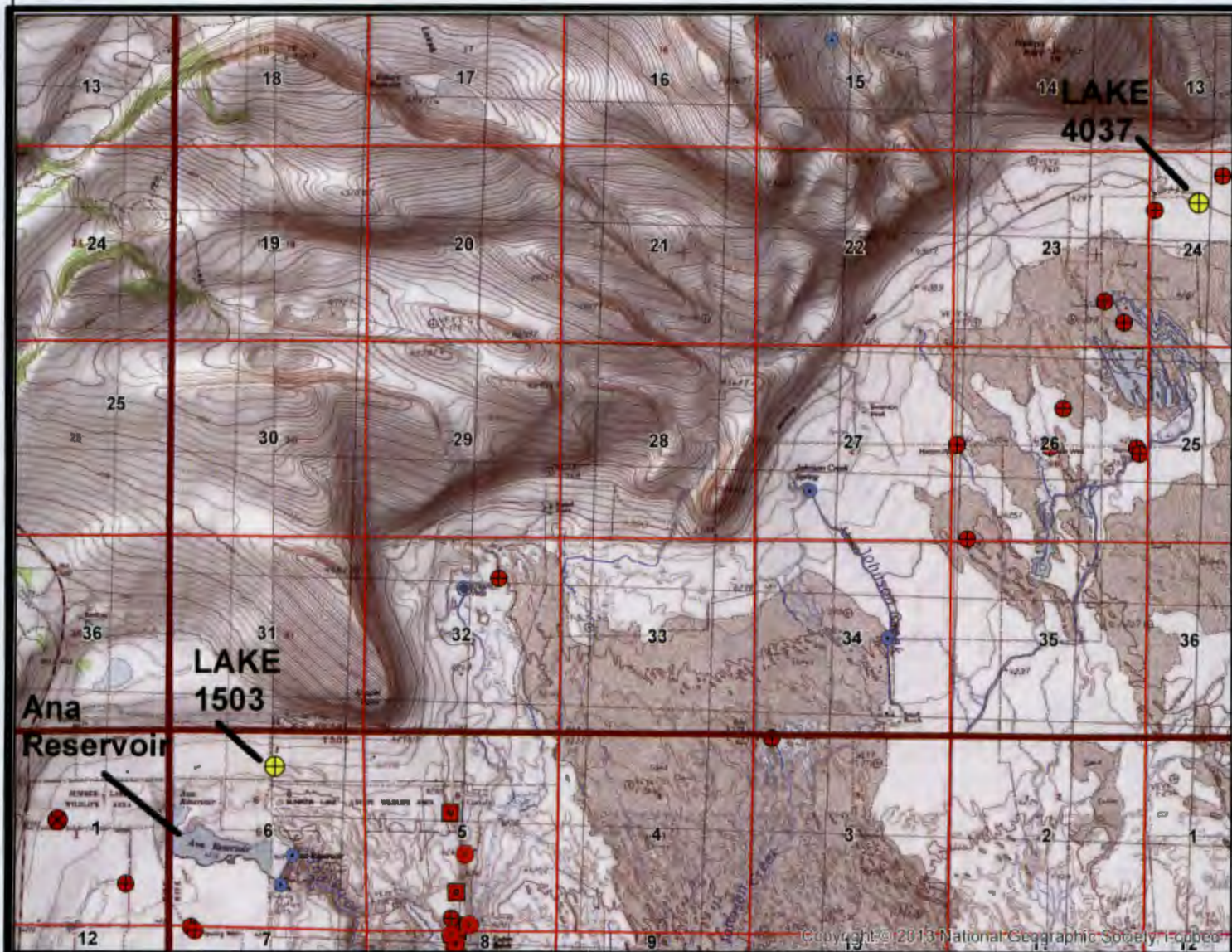
"Large" condition (flow meter) applied to all the POA wells

7. Any additional comments: _____

None

Groundwater Transfer Application T-11911

Chaylon & Amber Shuffield

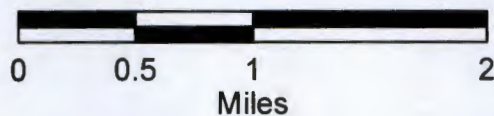
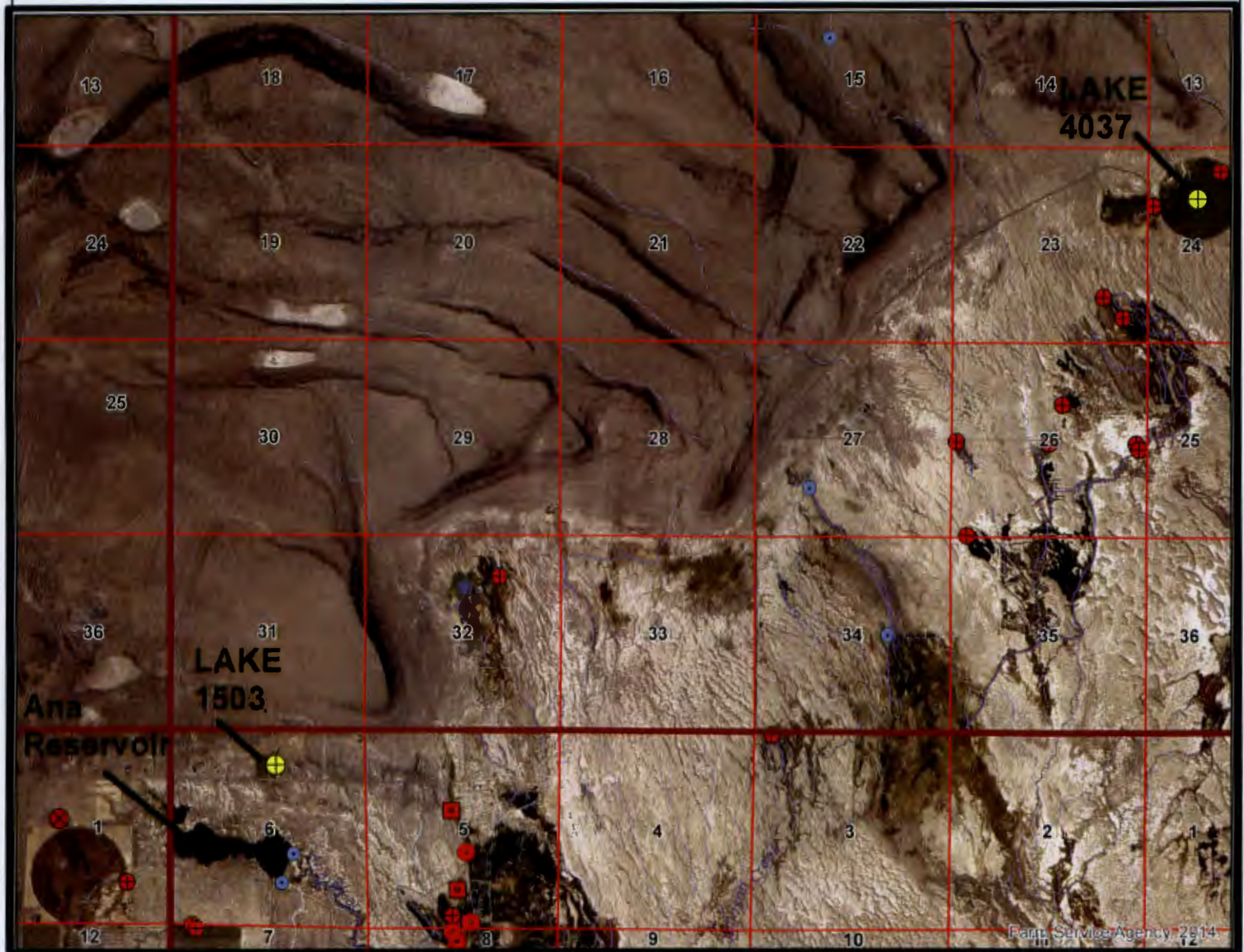


Yellow = Application Noted Well(s)
Red = Other Existing or Proposed Wells
Blue and Other = surface water rights



Groundwater Transfer Application T-11911

Chaylon & Amber Shuffield



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



State Permit No. _____

G-8707

SP*12858-690

LAKE 4037



Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem Oregon 97301
(503) 986-0900
www.wrd.state.or.us

Application for Well ID Number

Do not complete if the well already has a Well I.D Number.

I. OWNER INFORMATION

Current Owner Name (please print): Ernest Duane Shuffield
Mailing Address: P.O. Box 85
City: Summer Lake State: Oregon Zip: 97640
Mailing Address (to send Well I.D.): P.O. Box 85
City: Summer Lake State: Oregon Zip: 97640

II. WELL INFORMATION (Do not complete this section if the well report is attached.)

Township: _____ (North/South) Range: _____ (East/West) Section: _____
Tax Lot: _____ County: _____ 1/4 _____ 1/4
Street Address of Well: _____ City: _____
Owner at time the well was constructed, (if known): _____
If the property had a different street address in the past: County Rd 416-A is now Shuffield Rd

III. GENERAL WELL INFORMATION (Do not complete this section if the well report is attached)

Use of Well (domestic, irrigation, commercial, industrial, monitoring): _____
Date Well Constructed: _____ Total Well Depth: _____ Casing Diameter: _____
Other Information: _____

SUBMITTED BY (please print): Chaylon Duane Shuffield (for Ernest Duane Shuffield)
PHONE: 541.207.2310 FAX: 541.943.3170

Send application to Oregon Water Resources Department; 725 Summer St NE, Suite A; Salem, Oregon 97301-1266; fax (503) 986-0902. Applications are processed and Well I.D. Numbers are mailed every Wednesday.

: For Official Use Only by the Oregon Water Resources Department:

Received Date: _____

Well Log Number: _____

Well Identification #: _____

LAKE 4037

107330

Drawdown Calculations Using Theis Equation

Theis Equation:

$$s = \frac{Q}{4\pi T} W(u)$$

$$u = \frac{r^2 S}{4 T t}$$

$$W(u) = (-\gamma - u) - 0.5772157 + (u^{1/4}) - (u^{3/4}) + (u^{5/4}) - (u^{7/4}) + (u^{9/4}) - \dots$$

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)	pl	u	W(u)	Drawdown s (feet)	Drawdown Difference (feet)	Ana Spring Flow Change ft ³ /s	Spring Flow Difference ft ³ /s	Comments
Note: yellow grid areas are where values are calculated														
Existing POA Well (LAKE 1503) to Scott Well (certificate 75981, no log found) (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	30,360.00	3.14	0.5121	0.5454	0.0229				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	30,360.00	3.14	0.0627	2.2539	0.0948				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	30,360.00	3.14	0.5121	0.5454	0.0113				Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	30,360.00	3.14	0.0627	2.2539	0.0468				Pro-Rated Pumping Rate
Proposed POA Well (LAKE 4037) to Scott Well (certificate 75981, no log found) (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	975.00	3.14	0.0005	6.9695	0.2931	0.2702			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	975.00	3.14	0.0001	9.0691	0.3814	0.2866			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	975.00	3.14	0.0005	6.9695	0.1448	0.1334			Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	975.00	3.14	0.0001	9.0691	0.1884	0.1416			Pro-Rated Pumping Rate
Existing POA Well (LAKE 1503) to Un-Named Ponds & Stream (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	26,930.00	3.14	0.4029	0.8975	0.0293				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	26,930.00	3.14	0.0493	2.4806	0.1043				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	26,930.00	3.14	0.4029	0.8975	0.0145				Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	26,930.00	3.14	0.0493	2.4806	0.0515				Pro-Rated Pumping Rate
Proposed POA Well (LAKE 4037) to Un-Named Ponds & Stream (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	3,100.00	3.14	0.0053	4.6609	0.1960	0.1667			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	3,100.00	3.14	0.0007	6.7562	0.2841	0.1798			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	3,100.00	3.14	0.0053	4.6609	0.0968	0.0823			Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	3,100.00	3.14	0.0007	6.7562	0.1403	0.0888			Pro-Rated Pumping Rate
Existing POA Well (LAKE 1503) to Johnson Creek & Spring (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	16,360.00	3.14	0.1487	1.4720	0.0619				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	16,360.00	3.14	0.0182	3.4468	0.1450				Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	16,360.00	3.14	0.1487	1.4720	0.0306				Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	16,360.00	3.14	0.0182	3.4468	0.0716				Pro-Rated Pumping Rate
Proposed POA Well (LAKE 4037) to Johnson Creek & Spring (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.001														
112,207.80	15,000.00	0.00100	41.18	0.09	30.00	13,090.00	3.14	0.0952	1.8676	0.0785	0.0166			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	41.18	0.09	245.00	13,090.00	3.14	0.0117	3.8863	0.1634	0.0185			Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00100	20.34	0.05	30.00	13,090.00	3.14	0.0952	1.8676	0.0388	0.0082			Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00100	20.34	0.05	245.00	13,090.00	3.14	0.0117	3.8863	0.0907	0.0091			Pro-Rated Pumping Rate

Drawdown Calculations Using Theis Equation

Theis Equation:

$$s = \frac{Q}{4\pi T} \left(\frac{W(u)}{u} \right)$$

$$u = \frac{r^2 S}{4 \pi T t}$$

$$W(u) = (-\gamma(u) - 0.5772157) + (\gamma(u^2/2)) + (\gamma(u^2/3)) - (\gamma(u^2/4)) + \dots$$

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)	pl	u	W(u)	Drawdown s (feet)	Drawdown Difference (feet)	Ana Spring Flow Change ft ³ /s	Spring Flow Difference ft ³ /s	Comments
Note: yellow grid areas are where values are calculated														
Existing POA Well (LAKE 1503) to Ana Spring (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.0001														
112,207.80	15,000.00	0.00010	41.18	0.09	30.00	2,460.00	3.14	0.0003	7.4209	0.3121		0.5201		Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00010	41.18	0.09	245.00	2,460.00	3.14	0.0000	9.5207	0.4004		0.6673		Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00010	20.34	0.05	30.00	2,460.00	3.14	0.0003	7.4209	0.1541		0.2569		Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00010	20.34	0.05	245.00	2,460.00	3.14	0.0000	9.5207	0.1977		0.3296		Pro-Rated Pumping Rate
Proposed POA Well (LAKE 4037) to Ana Spring (Transmissivity from Morgan (1988) and McFarland and Ryals (1991)): Used S = 0.0001														
112,207.80	15,000.00	0.00010	41.18	0.09	30.00	30,250.00	3.14	0.0508	2.4521	0.1031	-0.2090	0.1719	-0.3483	Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00010	41.18	0.09	245.00	30,250.00	3.14	0.0062	4.5082	0.1896	-0.2108	0.3160	-0.3513	Continuous Pumping at Full Rate
112,207.80	15,000.00	0.00010	20.34	0.05	30.00	30,250.00	3.14	0.0508	2.4521	0.0509	-0.1032	0.0849	-0.1720	Pro-Rated Pumping Rate
112,207.80	15,000.00	0.00010	20.34	0.05	245.00	30,250.00	3.14	0.0062	4.5082	0.0936	-0.1041	0.1561	-0.1735	Pro-Rated Pumping Rate

$$\Delta Q(\text{change}) = Q(\text{original}) - (Q(\text{original}) * ((h(\text{original}) - h(\text{change})) / h(\text{original})))$$

Q(change) = change in flow rate at Ana Spring (ft³/s)
Q(original) = Ana Spring flow rate observed by Brown (1957) = 90 ft³/s
h(original) = GW head above Ana Reservoir lake observed by Brown (1957) = 54 ft
h(change) = calculated drawdown at Ana Spring

Note: Given the equation above, a positive value is a decrease in flow and a negative value is an increase in flow

Note: the change in Ana Spring flow is about 1.67 ft³/s per 1.0 foot of groundwater level change using the Brown (1957) methodology