Groundwater Transfer Review Summary Form

Transfer/PA # T- _14011_

GW Reviewer _Grayson Fish_ **Date Review Completed:** _5/20/2025_

Summary of Same Source Review:

☐ The proposed change in point of appropriation is not within the same aquifer as per OAR 690-380-2110(2).

Summary of Water Level Decline Condition Review:

☐ Water levels at the original point(s) of appropriation have exceeded the allowed decline threshold defined by conditions in the originating water right.

Summary of Injury Review:

☒ The proposed transfer will result in another, existing water right not receiving previously available water to which it is legally entitled or result in significant interference with a surface water source as per 690-380-0100(3).

Summary of GW-SW Transfer Similarity Review:

☐ The proposed SW-GW transfer doesn't meet the definition of "similarly" as per OAR 690-380-2130.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations.

Oregon Water Resources Department
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Ground Water Review Form:

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

Application: T-14011 Applicant Name: J.R. Simplot: J.R.S. Properties III, LLP

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

Reviewer(s): Grayson Fish Date of Review: 5/20/2025

Date Reviewed by GW Mgr. and Returned to WRSD: JTI 6/3/25

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 _____

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1. Basic description of the changes proposed in this transfer: This review is a re-review that supersedes the original transfer review completed by Gerald Grondin and dated July 21, 2023. The need for a re-review was triggered when the applicant proposed to replace the originally proposed POA 7 (LAKE 52463) with proposed POA 7R (not constructed) and added an additional POA 11 (also not constructed). Technical findings are updated from the original groundwater transfer review dated July 21, 2023 where necessary. Additional discussion is included in each relevant section of the review form to account for the anticipated changes caused by the above listed changes to proposed POAs.

   The application notes: "Water user proposes to move water from two certificated rights six miles south to a location with a better source."

   This transfer application seeks to make permanent a currently authorized temporary transfer (T-13524).

This application (T-14011) and the currently authorized temporary transfer (T-13524) relates to 2 certificates (certificate 93777 related to file G-15510 and certificate 93778 related to file G-14870) that together authorize using 4 existing POA wells at the north end of Upper Chewaucan Marsh (LAKE 4564, LAKE 51182, LAKE 51031, LAKE 50941) (see attached maps). T-14011 repeats T-13524 by proposing 5 APOA wells south end of Upper Chewaucan Marsh LAKE 52491, LAKE 52492, LAKE 52770 and proposed wells Well 7R and11 (see attached maps) and moving 274.90 POU acres from the north end of Upper Chewaucan Marsh to the south end of Upper Chewaucan Marsh.

The authorized POAs and POUs and the proposed APOAs and POUs have variously been subject to the following transfers: T-11341 (temporary, 2012 to 2016), T- 11602 (temporary, 2013 to 2017), T-11654 (temporary, 2014 to 2018), T-12386 (regular, approved 2018), T-12794 (regular, withdrawn), and current T-13524 (temporary, 2021 to 2025).

This transfer application (T-14011) duplicates the current temporary transfer T-13524. The purpose of T-13524 is to be a "bridge" to allow continued groundwater use at the proposed APOAs and POUs formerly authorized by previous temporary transfers until a final Oregon Water Resources Department (OWRD) determination can be made after sufficient time to obtain additional groundwater level data in the vicinity of the proposed APOAs and POUs.

An OWRD groundwater review of T-12794 (regular, withdrawn) dated 6 March 2020 relied upon groundwater level data for State Observation Well 375 (well LAKE 1719). That review noted, "relatively stable groundwater levels near 4302 feet elevation amsl from 1960 to the mid-1970s, a decline of about 5.5 feet from the mid-1970s to early 1980s to a new equilibrium of about 4297 feet elevation amsl that is close to the Chewaucan River stage near the Narrows (relatively steady from about 1980 to 2000), and an ongoing decline since 2000 of about 0.38 feet per year from 2000 to after 2010 and apparently steepening to about 0.95 feet per year from after 2010 to 2019, possibly taking the groundwater level below the river bottom. The groundwater level decline in the 1970s and after 2010 appears to correspond to increased groundwater development in the area" (see attached hydrographs). Subsequent to that review, the applicant informed OWRD that they maintain a shallow observation well (LAKE 52769, 60-feet total depth, open to basin fill) and a deep observation well (LAKE 52770, 1100-feet total depth, open to volcanic rocks and sediments) with transducer water level recorders at each recording data since 2017 (see attached hydrographs). At that time, the applicant reported no groundwater level decline at either well and sought approval of T-13524 (temporary) to allow sufficient time (multiple years) to obtain additional data to assess groundwater level trends for a subsequent OWRD groundwater review.

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

Available data indicates a predominantly volcanic rock and sediment unit (some identify the unit as predominantly basalt) occurs beneath a predominantly basin fill sediment unit. Reports for the Goose and Summer Lakes Basin indicate groundwater occurs in both the predominantly basin fill sediment unit and predominantly volcanic rock and sediment unit. The groundwater is likely hydraulically connected, making a single groundwater system occurring in different geologic units with different permeability for each unit. A higher permeability and transmissivity generally occur in the predominantly volcanic rock and sediment unit and a lower permeability and transmissivity generally occur in the predominantly basin fill sediment unit.

Given the predominantly basin fill sediment unit and predominantly volcanic rock and sediment unit often have notably different hydraulic properties despite being hydraulically connected, they should be considered different in regard to this portion of the review. Wells completed solely in the predominantly volcanic rock and sediment unit tend to be more seasonally protective of shallower wells and surface water.

The currently authorized POA wells:

LAKE 4564 is 388-feet total depth and constructed to obtain groundwater solely from the shallower and lower permeability predominantly basin fill sediment unit;

LAKE 51031 is 551-feet total depth and constructed with casing to 466-feet blsd and a split seal to obtain groundwater primarily from the deeper and higher permeability predominantly volcanic rock and sediment unit below the casing and minimally from the shallower and lower permeability predominantly basin fill sediment unit;

LAKE 50941 is 490-feet total depth and constructed with casing to 448-feet blsd and a split seal to obtain groundwater solely from the deeper and higher permeability predominantly volcanic rock and sediment unit below the casing;

LAKE 51182 is 619-feet total depth and constructed with casing to 560-feet blsd and a split seal to obtain groundwater solely from the deeper and higher permeability predominantly volcanic rock and sediment unit below the casing.

The proposed POA wells:

LAKE 52491 and LAKE 52492 are 450-feet and 330-feet total depth respectively and constructed to obtain groundwater solely from the shallower and lower permeability predominantly basin fill sediment unit.

LAKE 52770 is 1,100-feet total depth and constructed to obtain groundwater from the deeper and higher permeability predominantly volcanic rock and sediment unit.

The applicant proposes that Wells 7R and 11 would source water from "basalt" with a total depth of 500 feet. However, based on nearby well logs it is likely that wells with the proposed construction would source water the from the shallower and lower permeability predominantly basin fill sediments. In order to source water from the predominantly volcanic rock and sediment unit ("basalt"), the wells would need to be cased and sealed to ~625 feet (closer to the construction of LAKE 52770).

Regardless, the currently authorized wells source water from both the predominantly volcanic and sedimentary units as will the proposed wells, therefore, the proposed wells will develop the same source as the currently authorized wells.

3. a) Is the existing authorized POA subject to a water level decline condition?
☒ Yes ☐ No Comments: Certificate 93777 contains reference levels and water level decline conditions for the authorized wells LAKE 4564, LAKE 51182, LAKE 50941 and LAKE 51031.

b) If yes, for each POA identify the reference level, most recent spring-high water level, and whether an applicable permit decline condition has been exceeded: See table below:

Well	Reference Level (ft bls)	Recent Spring-High (ft bls / date)	Exceeded?
LAKE 4564	20.61	33.82 on 3/14/2013	No (no recent data)
LAKE 51182	68.63	53.90 on 3/25/2025	No
LAKE 50941	60.67	68.65 on 3/25/2025	No
LAKE 51031	71.17	79.22 on 3/25/2025	No

4. a) Is there more than one source developed under the right (e.g., basalt and alluvium)?
☒ Yes ☐ No Comments: See discussion 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.): Changing the pumping from the current "From" authorized POA wells to the proposed "To" APOA wells will shift tapping groundwater from about 73% from the deeper predominantly volcanic rock and sediment unit via three wells and 27% from the shallower predominantly basin fill sediment unit via one well (percentages based upon 2002 to 2022 reported water use for certificates 93777 and 93778) to possibly about 20% from the deeper predominantly volcanic rock and sediment unit via one well (driller report indicate well yield from 500 to 1,000 gpm) and 80% from the shallower predominantly basin fill sediment unit via four wells (driller reports indicate well yields from 2,700 to 3,000 gpm each).

It should be noted that for the sake of data collection to facilitate this review, the only proposed APOA "To" well tapping the deeper predominantly volcanic rock and sediment unit (LAKE 52770) was being used as a "deep" observation well maintained with a transducer water level recorder to about March 2023. During that time the well was necessarily not pumping for data collection. Consequently prior to March 2023, only groundwater from the shallower predominantly basin fill sediment unit was being pumped under T-13524 by the proposed APOA wells.

This proposed POA change is less protective of shallower wells and surface water. To be equally protective or better, the "To" wells should obtain 75% or more groundwater from the deeper predominantly volcanic rock and sediment unit.

5. 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 change will move groundwater pumping about 6.8 to 8.8 mile south from the north side of Upper Chewaucan Marsh to the south side of Upper Chewaucan Marsh (see attached maps). The proposed change will move groundwater pumping closer to a different set of groundwater right wells (see attached maps).

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: The calculated increase in seasonal drawdown at the nearest neighboring groundwater right well (south side of Upper Chewaucan Marsh) ranges from more than 8.75 feet (pro-rated pumping rate) to more than 17.75 feet (full pumping rate) at the end of 30 days to more than 15.25 feet (pro-rated pumping rate) to nearly 31.25 feet (full pumping rate) at the irrigation season end (245 days) (see attached calculations). Interference at wells further away will be less. **A decline condition within certificate 93777 addresses the potential situation of the authorized groundwater use adding 25 or more feet of seasonal interference (decline) at a neighboring senior groundwater right well.** While an increase in seasonal interference (drawdown) of 25 feet or more is possible (see attached hydrograph showing seasonal drawdown exceeding 30 feet total at well LAKE 52770), the maximum increase in seasonal interference at the nearest neighboring groundwater right well due solely to the proposed transfer is likely to be closer to the pro-rated pumping rate calculated nearly 15.50 feet at the end of 245 days. The neighboring well should be able to accommodate 15 feet of additional seasonal drawdown.

Additionally, the proposed change moves groundwater pumping into a vicinity that appears to be experiencing a groundwater level decline since 2005 (see attached hydrographs). The groundwater level at well LAKE 1719 is relatively stable, near 4302 feet elevation amsl from 1960 to the mid-1970s, a decline of about 5.5 feet from the mid-1970s to early 1980s to a new equilibrium of about 4297 feet elevation amsl that is close to the Chewaucan River stage near the Narrows (relatively steady from about 1980 to 2005), and an ongoing decline since 2005, possibly taking the groundwater level below the river bottom. The groundwater level decline in the 1970s and after 2010 may correspond to increased groundwater development in the area.

The applicant has submitted 2017 to 2023 data (see hydrographs) for wells LAKE 52769 [60 feet total depth], and LAKE 52770 [1,100 feet total depth]), and LAKE 52463 [410 feet total depth]. The data can be interpreted as showing an annual decline similar to LAKE 1719.

The change/addition of POAs 7R and 11 do not change the analysis/findings completed for the original review as these locations are not substantially different than those originally proposed. Based on a preponderance of the evidence standard, it is unlikely that another groundwater right will not receive the water to which it is legally entitled.

6. 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: **Yes. Despite the proposed POA change moving the net groundwater pumping further away from Chewaucan River, which typically decreases the net seasonal groundwater level drawdown at the river and the net groundwater interference with the river, the proposed POA change will likely increase the net seasonal groundwater level drawdown at the river and the net groundwater interference with the river due to a higher percentage of To wells sourcing water from the shallow basin fill sediments (see the attached seasonal drawdown calculation and seasonal interference calculation summary).**

The proposed POA change will likely increase the net seasonal groundwater level drawdown at the river and the net groundwater interference with the river given the current "From" POA wells tap groundwater from mostly from the deeper predominantly volcanic rock and sediment unit (73%) and less from the shallower predominantly basin fill sediment unit (27%) (percentages based upon 2002 to 2022 reported water use for certificates 93777 and 93778); whereas the proposed "To" POA wells tap groundwater less from the deeper predominantly volcanic rock and sediment unit (possibly 20%, one well, driller report indicates well yield from 500 to 1,000 gpm) and more from the shallower predominantly basin fill sediment unit (about 80%, four wells, driller reports indicate well yields from 2,700 to 3,000 gpm each). This is less protective of shallower wells and surface water. **Consequently, the seasonal groundwater interference with the river at the end of the irrigation season (240 days) is calculated to increase from about 11.5 percent of the pumping rate when pumping the "From" wells to about 31.5 percent of the pumping rate when pumping the "To" wells.**

Additionally, an annual groundwater level decline appears to be occurring in the vicinity of the "To" wells (see section 5a discussion), there is risk that the long-term groundwater level elevation will drop below the river bottom if it has not occurred already.

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: Chewaucan River ☐ Minimal ☒ Significant

Stream: _____ ☐ Minimal ☐ Significant

Provide context for minimal/significant impact: **See discussion in part 6a above. There is a potential that the seasonal groundwater interference with the Chewaucan River could increase from about 11-percent to about 31-percent of the pumping rate. There is a potential of contributing to an annual declining groundwater level that has or will drop below the Chewaucan River bottom that can result in a perched river perennially losing water.**

7. For SW-GW transfers, will the proposed change in point of diversion affect the surface water source similarly (as per OAR 690-380-2130) to the authorized point of diversion specified in the water use subject to transfer?

☐ Yes ☐ No Comments: N/A

8. What conditions or other changes in the application are necessary to address any potential issues identified above: **The following are technical groundwater review recommendations. It is recognized that one or more technically recommended conditions may or may not be allowed under the transfer process rules and statutes. This technical groundwater review relies on other appropriate and authorized Department staff to make that determination.**

   The groundwater reference level at wells LAKE 1719, Well 7R, LAKE 52491, LAKE 52492, LAKE 52770, Well 11, and any observation well shall be 4295 feet elevation above mean sea level (amsl).

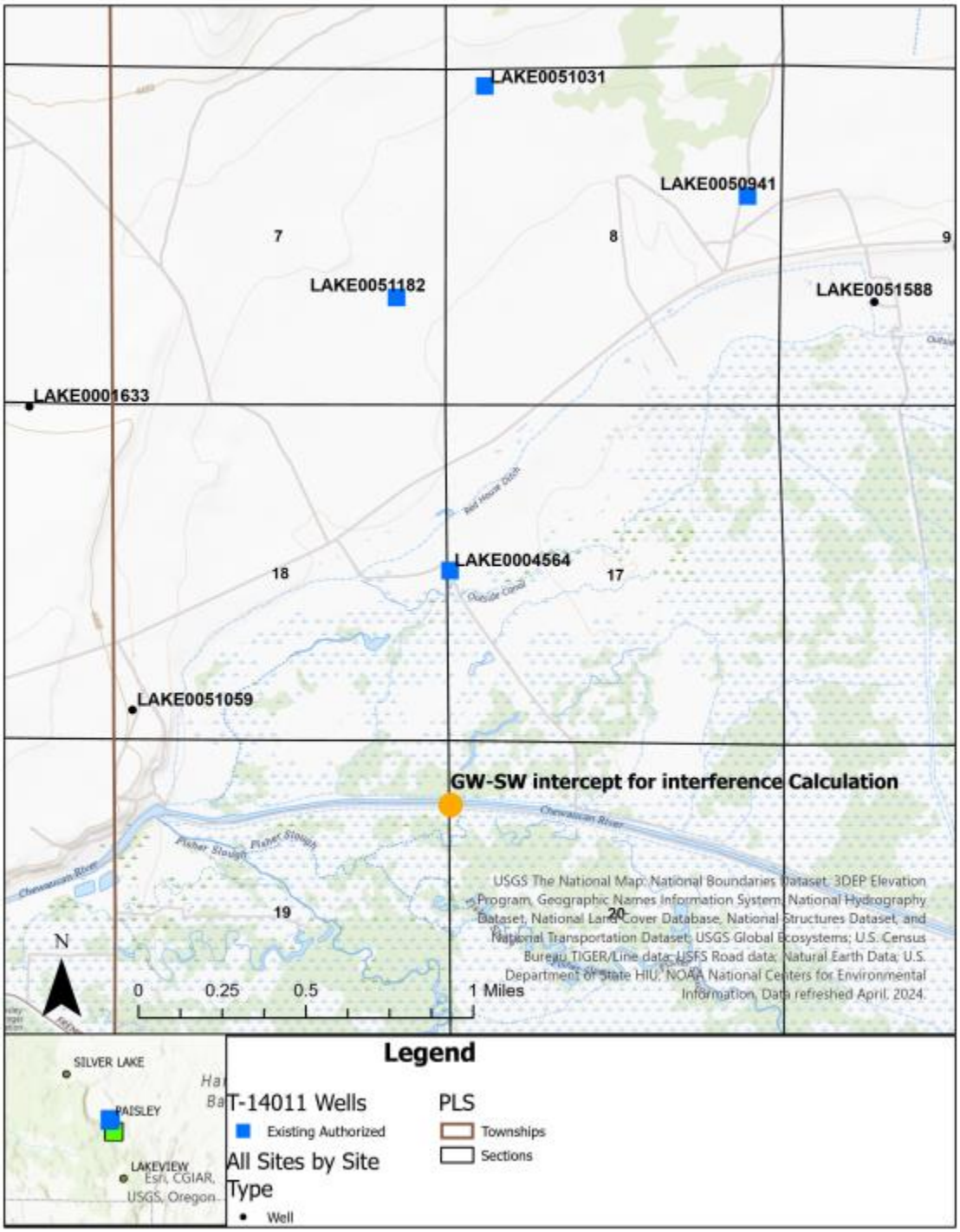
   "Large" flow meter condition for all the "From" POA and the proposed "To" POA wells to prevent enlargement. Require the flow meter for each well be properly installed and maintained. Each meter shall be either within 50 feet of the well head with a clearly visible monument adjacent to the meter or a surveyed location shall be provided and a clearly visible monument adjacent to the meter shall be installed for each meter more than 50 feet from the well head.

   Condition 7P (well tag condition) for all the "To" and "From" POA wells.

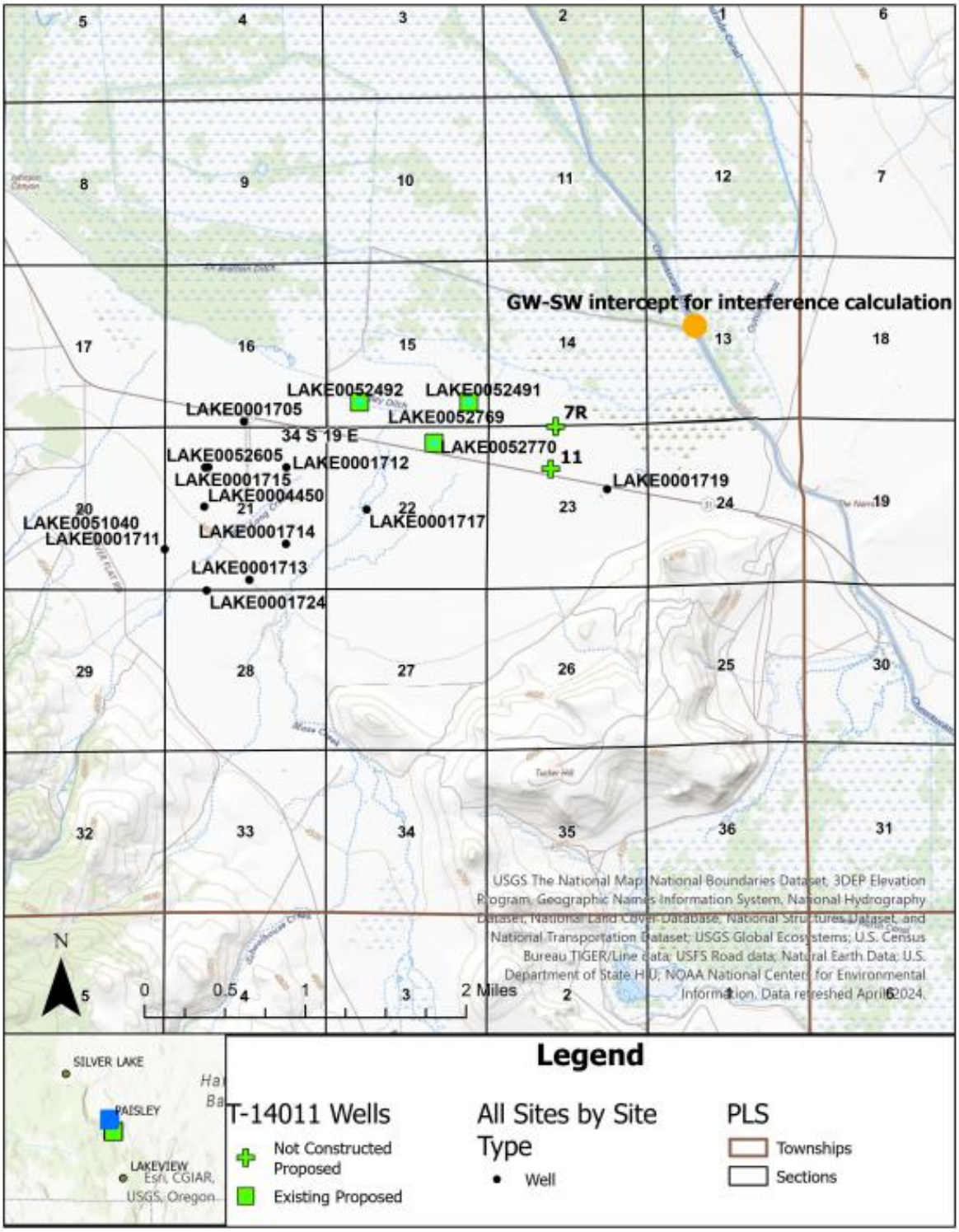
   Condition 7T (modified) for both the proposed "To" wells: "Prior to use, the proposed "To" wells shall be configured to allow a strictly clean water (no oil) static water level measurements with an electric-tape. That can include measurement access via an unobstructed vertical discharge pipe that allows the groundwater level to fluctuate freely within the discharge pipe (no valves, etc.). Otherwise, a dedicated measuring tube must be installed prior to use. The tube must be unobstructed, have a diameter of ¾ inch (0.75 inch) or greater, and pursuant to figure 200-5 in OAR 690-200."

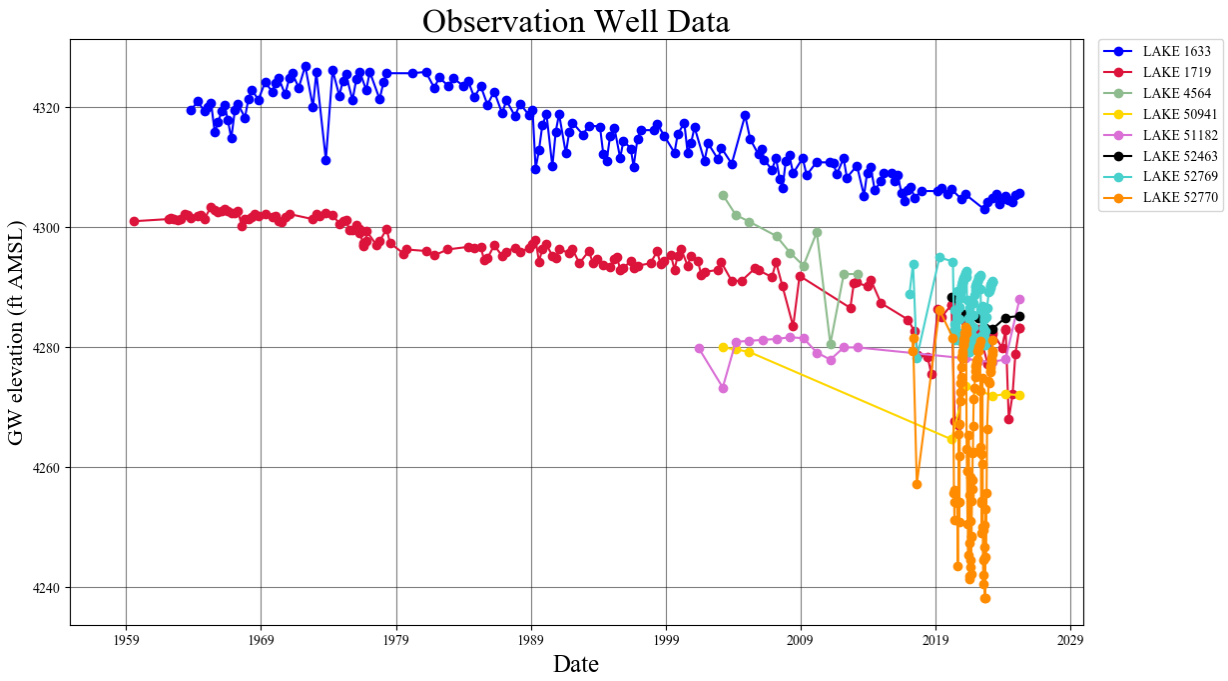
9. Any additional comments:

T-14011 - From Wells



T-14011 - To Wells





Theis_Equation_specific_capacity_to_transmissivity					
From Driller Water Well Report Recorded Pump Test Data					
Basin_Fill					
Well County	Well Num	Transmissivity	Transmissivity	Open Interval	Conductivity
		gpd/ft	ft2/day	feet	ft/day
From Wells					
LAKE	4564	51,036.85	6,822.63	360.00	18.95
		51,036.85	**6,822.63**	**From Wells Average**	**18.95**
To Wells					
LAKE	1712	5,187.30	693.44	435.00	1.59
LAKE	1714	4,869.60	650.97	365.00	1.78
LAKE	1717	3,657.33	488.91	464.00	1.05
LAKE	1715	17,137.04	2,290.89	252.00	9.09
LAKE	1719	71,089.20	9,503.24	284.00	33.46
LAKE	1724	6,934.26	926.98	297.00	3.12
		18,145.79	**2,425.74**	**To Wells Average**	**8.35**
		22,844.51	**3,053.87**	**Overall Average**	**9.87**
Basalt, Vocanic Rocks & Sediments					
Well County	Well Num		Transmissivity	Open Interval	Conductivity
			ft2/day	feet	ft/day
From Wells					
LAKE	51882	76,985.84	10,291.51	59.00	174.43
LAKE	50941	56,521.18	7,555.78	42.00	179.90
LAKE	51031	66,988.37	8,955.04	85.00	105.35
		66,831.80	**8,934.11**	**From Wells Average**	**153.23**
To Wells					
None	(all air tests, no pump test)				
		----	----	**To Wells Average**	----
		66,831.80	**8,934.11**	**Overall Average**	**153.23**

Drawdown Calculations Using Theis Equation

Theis Equation: s = [Q/(4*T*pi)][W(u)]
u = (r*r*S)/(4*T*t)
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...

s = drawdown (L) r = radial distance (L)
T = transmissivity (L*L/T) t = time (T)
S = storage coefficient (dimensionless) u = dimensionless
pi = 3.141592654 W(u) = well function

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Drawdown s (feet)	Drawdown Change s (feet)	Well	Comments
								Note : W(u) calculation valid when u < 7.1					
Note: yellow grid areas are where values are calculated								7.0000	1.1545E-04				W(u) calculation test
"From" POA wells to closest Water Right Well LAKE 51588 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	7,910.00	3.14	0.1707	1.3545	2.6187		LAKE 4564	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	7,525.00	3.14	0.0528	2.4159	1.5970		LAKE 51182	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	2,600.00	3.14	0.0063	4.4955	2.9718		LAKE 50941	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	7,015.00	3.14	0.0459	2.5495	1.6854		LAKE 51031	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						8.87			
"To" POA wells to closest Water Right Well Solheim Well POD #1 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	4,425.00	3.14	0.0534	2.4052	4.6502		LAKE 52463	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	3,555.00	3.14	0.0345	2.8245	5.4609		LAKE 52491	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	4,515.00	3.14	0.0556	2.3671	4.5765		LAKE 52492	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	2,170.00	3.14	0.0044	4.8552	3.2095		LAKE 52770	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						17.90	9.0242		
"From" POA wells to closest Water Right Well LAKE 51588 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	7,910.00	3.14	0.1707	1.3545	1.2933		LAKE 4564	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	7,525.00	3.14	0.0528	2.4159	0.7887		LAKE 51182	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	2,600.00	3.14	0.0063	4.4955	1.4677		LAKE 50941	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	7,015.00	3.14	0.0459	2.5495	0.8324		LAKE 51031	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						4.38			
"To" POA wells to closest Water Right Well Solheim Well POD #1 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	4,425.00	3.14	0.0534	2.4052	2.2966		LAKE 52463	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	3,555.00	3.14	0.0345	2.8245	2.6970		LAKE 52491	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	4,515.00	3.14	0.0556	2.3671	2.2602		LAKE 52492	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	2,170.00	3.14	0.0044	4.8552	1.5851		LAKE 52770	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						8.84	4.4569		

Drawdown Calculations Using Theis Equation

Theis Equation: s = [Q/(4*T*pi)][W(u)]
u = (r*r*S)/(4*T*t)
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...

s = drawdown (L) r = radial distance (L)
T = transmissivity (L*L/T) t = time (T)
S = storage coefficient (dimensionless) u = dimensionless
pi = 3.141592654 W(u) = well function

Transmissivity T (gpd/ft)	Transmissivity T (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Drawdown s (feet)	Drawdown Change s (feet)	Well	Comments
								Note : W(u) calculation valid when u < 7.1					
Note: yellow grid areas are where values are calculated								7.0000	1.1545E-04				W(u) calculation test
"From" POA wells to closest Water Right Well LAKE 51588 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	7,910.00	3.14	0.0209	3.3117	6.4027		LAKE 4564	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	7,525.00	3.14	0.0065	4.4703	2.9551		LAKE 51182	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	2,600.00	3.14	0.0008	6.5901	4.3564		LAKE 50941	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	7,015.00	3.14	0.0056	4.6098	3.0473		LAKE 51031	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						16.76			
"To" POA wells to closest Water Right Well Solheim Well POD #1 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	4,425.00	3.14	0.0065	4.4591	8.6211		LAKE 52463	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	3,555.00	3.14	0.0042	4.8946	9.4632		LAKE 52491	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	4,515.00	3.14	0.0068	4.4191	8.5438		LAKE 52492	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	2,170.00	3.14	0.0005	6.9514	4.5952		LAKE 52770	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						31.22	14.4619		
"From" POA wells to closest Water Right Well LAKE 51588 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	7,910.00	3.14	0.0209	3.3117	3.1621		LAKE 4564	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	7,525.00	3.14	0.0065	4.4703	1.4595		LAKE 51182	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	2,600.00	3.14	0.0008	6.5901	2.1515		LAKE 50941	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	7,015.00	3.14	0.0056	4.6098	1.5050		LAKE 51031	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						8.28			
"To" POA wells to closest Water Right Well Solheim Well POD #1 (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	4,425.00	3.14	0.0065	4.4591	4.2578		LAKE 52463	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	3,555.00	3.14	0.0042	4.8946	4.6736		LAKE 52491	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	4,515.00	3.14	0.0068	4.4191	4.2196		LAKE 52492	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	2,170.00	3.14	0.0005	6.9514	2.2695		LAKE 52770	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						15.42	7.1424		

Drawdown Calculations Using Theis Equation

Theis Equation: s = [Q/(4*T*pi)][W(u)]
u = (r*r*S)/(4*T*t)
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...

s = drawdown (L)
T = transmissivity (L*L/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 (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Drawdown s (feet)	Drawdown Change s (feet)	Well	Comments
								Note : W(u) calculation valid when u < 7.1					
Note: yellow grid areas are where values are calculated								7.0000	1.1545E-04				W(u) calculation test
"From" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	3,700.00	3.14	0.0373	2.7474	5.3117		LAKE 4564	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	8,020.00	3.14	0.0600	2.2955	1.5174		LAKE 51182	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	10,680.00	3.14	0.1064	1.7671	1.1682		LAKE 50941	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	11,315.00	3.14	0.1194	1.6639	1.0999		LAKE 51031	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						9.10			
"To" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	5,635.00	3.14	0.0866	1.9538	3.7775		LAKE 52463	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	7,810.00	3.14	0.1664	1.3760	2.6602		LAKE 52491	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	30.00	11,325.00	3.14	0.3499	0.7945	1.5361		LAKE 52492	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	30.00	9,350.00	3.14	0.0815	2.0094	1.3283		LAKE 52770	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						9.30	0.2049		
"From" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	3,700.00	3.14	0.0373	2.7474	2.6234		LAKE 4564	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	8,020.00	3.14	0.0600	2.2955	0.7494		LAKE 51182	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	10,680.00	3.14	0.1064	1.7671	0.5769		LAKE 50941	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	11,315.00	3.14	0.1194	1.6639	0.5432		LAKE 51031	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						4.49			
"To" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	5,635.00	3.14	0.0866	1.9538	1.8656		LAKE 52463	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	7,810.00	3.14	0.1664	1.3760	1.3138		LAKE 52491	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	30.00	11,325.00	3.14	0.3499	0.7945	0.7586		LAKE 52492	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	30.00	9,350.00	3.14	0.0815	2.0094	0.6560		LAKE 52770	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						4.59	0.1012		

Drawdown Calculations Using Theis Equation

Theis Equation: s = [Q/(4*T*pi)][W(u)]
u = (r*r*S)/(4*T*t)
W(u) = (-ln u)-(0.5772157)+(u/1*1!)-(u*u/2*2!)+(u*u*u/3*3!)-(u*u*u*u/4*4!)+...

s = drawdown (L)
T = transmissivity (L*L/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 (ft2/day)	Storage Coefficient S	Pumping Rate Q (gal/min)	Pumping Rate Q (ft3/sec)	Time t (days)	Distance r (feet)	pi	u	W(u)	Drawdown s (feet)	Drawdown Change s (feet)	Well	Comments
								Note : W(u) calculation valid when u < 7.1					
Note: yellow grid areas are where values are calculated								7.0000	1.1545E-04				W(u) calculation test
"From" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	3,700.00	3.14	0.0046	4.8150	9.3093		LAKE 4564	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	8,020.00	3.14	0.0073	4.3438	2.8714		LAKE 51182	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	10,680.00	3.14	0.0130	3.7766	2.4965		LAKE 50941	Continuous Pumping at Full Rate (Volcanics Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	11,315.00	3.14	0.0146	3.6626	2.4212		LAKE 51031	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						17.10			
"To" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	5,635.00	3.14	0.0106	3.9797	7.6943		LAKE 52463	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	7,810.00	3.14	0.0204	3.3366	6.4509		LAKE 52491	Continuous Pumping at Full Rate (Basin Fill Portion)
22,852.99	3,055.00	0.00100	385.57	0.86	245.00	11,325.00	3.14	0.0428	2.6155	5.0567		LAKE 52492	Continuous Pumping at Full Rate (Basin Fill Portion)
66,838.45	8,935.00	0.00100	385.57	0.86	245.00	9,350.00	3.14	0.0100	4.0395	2.6703		LAKE 52770	Continuous Pumping at Full Rate (Volcanics Portion)
			1,542.30	3.44						21.87	4.7738		
"From" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	3,700.00	3.14	0.0046	4.8150	4.5976		LAKE 4564	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	8,020.00	3.14	0.0073	4.3438	1.4181		LAKE 51182	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	10,680.00	3.14	0.0130	3.7766	1.2330		LAKE 50941	Continuous Pro-Rated Pumping (Volcanics Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	11,315.00	3.14	0.0146	3.6626	1.1958		LAKE 51031	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						8.44			
"To" POA wells to closest reach of Chewaucan River (Transmissivity from specific capacity data: Used S = 0.001)													
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	5,635.00	3.14	0.0106	3.9797	3.8000		LAKE 52463	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	7,810.00	3.14	0.0204	3.3366	3.1859		LAKE 52491	Continuous Pro-Rated Pumping (Basin Fill Portion)
22,852.99	3,055.00	0.00100	190.43	0.42	245.00	11,325.00	3.14	0.0428	2.6155	2.4974		LAKE 52492	Continuous Pro-Rated Pumping (Basin Fill Portion)
66,838.45	8,935.00	0.00100	190.43	0.42	245.00	9,350.00	3.14	0.0100	4.0395	1.3188		LAKE 52770	Continuous Pro-Rated Pumping (Volcanics Portion)
			761.71	1.70						10.80	2.3577		

T-14011 JRS Properties III LP River Interence Compared Updated 2025

From Wells			Distance to	Pumping rate		River Interference (cfs)		River Interference (cfs)		River Interference (cfs)	
			Chewaucan River	Full Rate	Pro-Rated	Full Rate	Pro-Rated	Full Rate	Pro-Rated	Full Rate	Pro-Rated
Well	GW Source	Transmissivity (ft2/day)	(Feet)	(cfs)	(cfs)	30 days	30 days	120 days	120 days	240 days	240 days
LAKE 4564	Basin Fill Seds	3055	3700	0.8591	0.4243	0.1480	0.0730	0.2950	0.1460	0.3820	0.1890
LAKE 51182	Basalt	8935	8020	0.8591	0.4243	0.0000	0.0000	0.0020	0.0010	0.0080	0.0040
LAKE 51031	Volcanic Seds & Rocks	8935	11315	0.8591	0.4243	0.0000	0.0000	0.0000	0.0000	0.0020	0.0010
LAKE 50941	Basin Fill and Basalt	8935	10680	0.8591	0.4243	0.0000	0.0000	0.0000	0.0000	0.0020	0.0010
		Average	8428.75	0.8591	0.4243	0.0370	0.0183	0.0743	0.0368	0.0985	0.0488
		Net Total	33715	3.4364	1.6972	0.1480	0.0730	0.2970	0.1470	0.3940	0.1950
Total River Interference as Percent of Total Pumping Rate						4.31%	4.30%	8.64%	8.66%	11.47%	11.49%

To Wells			Distance to	Pumping rate		River Interference (cfs)		River Interference (cfs)		River Interference (cfs)	
			Chewaucan River	Full Rate	Pro-Rated	Full Rate	Pro-Rated	Full Rate	Pro-Rated	Full Rate	Pro-Rated
Well	GW Source	Transmissivity	(Feet)	(cfs)	(cfs)	30 days	30 days	120 days	120 days	240 days	240 days
7R (prop)	Basin Fill Seds	3055	5635	0.6880	0.3400	0.0970	0.0480	0.2160	0.1070	0.2890	0.1430
LAKE 52491	Basin Fill Seds	3055	7810	0.6880	0.3400	0.0760	0.0380	0.1950	0.0960	0.2700	0.1330
LAKE 52492	Basin Fill Seds	3055	11325	0.6880	0.3400	0.0500	0.0250	0.1630	0.0810	0.2400	0.1190
LAKE 52770	Volcanic Seds & Rocks	8935	9350	0.6880	0.3400	0.0000	0.0000	0.0010	0.0000	0.0040	0.0020
11 (prop)	Basin Fill Seds	3055	6500	0.6880	0.3400	0.0880	0.0440	0.2070	0.1030	0.2810	0.1390
		Average	8124	0.6880	0.3400	0.0622	0.0310	0.1564	0.0774	0.2168	0.1072
		Net Total	40620	3.4400	1.7000	0.3110	0.1550	0.7820	0.3870	1.0840	0.5360
Total River Interference as Percent of Total Pumping Rate						9.04%	9.12%	22.73%	22.76%	31.51%	31.53%