WATER RESOURCES DEPARTMENT

MEMO 13 September, 2007

TO: **Application G-** 16908

FROM: **GW:** GERALD H. GRONDIN
(Reviewer's Name)

SUBJECT: **Scenic Waterway Interference Evaluation**

_____YES
_X_NO The source of appropriation is within or above a Scenic Waterway

_____YES
_____NO Use the Scenic Waterway condition (Condition 7J)

_____Per ORS 390.835, the Ground Water Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.

_____Per ORS 390.835, the Ground Water Section is **unable** to calculate ground water interference with surface water that contributes to a scenic waterway; **therefore, the Department is unable to find that there is a preponderance of evidence that the proposed use will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway.**

DISTRIBUTION OF INTERFERENCE

Calculate the percentage of consumptive use by month and fill in the table below. If interference cannot be calculated, per criteria in 390.835, do not fill in the table but check the "unable" option above, thus informing Water Rights that the Department is unable to make a Preponderance of Evidence finding.

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date **13 September 2007**

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

SUBJECT: Application G- **16908** Supersedes review of **none**
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:** **Blackburn Ranches, L.L.C. (Jett Blackburn)** **County:** **Harney**

A1. Applicant(s) seek(s) **(763 gpm) 1.7** cfs from **2** well(s) in the **Malheur Lake** Basin, **Silvies River** subbasin Quad Map: **Lawen**

A2. Proposed use: **Irrigation (primary 133.2 acres)** Seasonality: **1 March – 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	**HARN 51322**	**Well 3**	**Basin Fill**	**0.67**	**24S/32.5E-sec 30DDD**	**27' N, 655' W fr SE cor S 30**
2	**See comment**	**Well 2**	**Basin Fill**	**1.02**	**24S/32.5E-sec 31AAC**	**811' S, 1151' W fr NE cor S 31**
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	**4108**	**17**	**17**	**01/22/07**	**227**	**0 – 18**	**+1 - 20**	**+2 - 227**	**115 – 215**	**100**	**10**	**B**
2	**4106**	**?**	**?**	**?**	**?**	**?**	**?**	**?**	**?**	**?**	**?**	

Use data from application for proposed wells.

A4. **Comments:** **Well 2 may or may not be HARN 967 & HARN 1725 (this review assumes it is).**

Proposed pumping rate is 1.70 cfs (763 gpm), the rate allowed for 133.2 acres is 1.67 (747 gpm).

Piper and others (1939), Greene and others (1972), and Walker (1979) maps and the water well reports noted above show basin fill sediment including gravel, sand, black sand, silt, clay, and black clay.

A5. ☐ **Provisions of the** **Malheur Lake** 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 690-512 applies (see attached).**

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;
   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:** Recommend conditions 7B, 7F, and 7N

The proposed well sites are located within Harney Valley in an area southeast of Burns and north of Malheur Lake, within the Silvies River sub-basin but near the boundary with the Harney-Malheur Lakes sub-basin. The area is surficially mapped as Qal by Piper and others (1939), Qal by Leonard (1970), and Qs by Greene and others (1972). Water well reports for the proposed wells show basin fill sediment including gravel, sand, silt, and clay.

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in the basin fill is generally unconfined and hydraulically connected to Malheur and Harney Lakes. Some local confinement can occur where discontinuous low permeability layers are present. Leonard (1970) indicates confined ground water occurs at depth in the basin in deep basin fill sediments and underlying Tertiary volcanic and sedimentary rocks. Hubbard (1975) indicates the ground water contribution to flow into Malheur Lake is small with the lake perched above ground water in most areas.

The closest wells with ground water level trend data in the Silvies River sub-basin is well HARN 463 in T23S/R31E-sec 16 (about 13.1 miles to the northwest) and in the Harney-Malheur Lakes sub-basin are wells HARN 547 in T23S/R32E-sec 07 (about 11.5 miles to the northwest) and HARN 741 in T23S/R34E-sec 31 (about 13.0 miles to the northeast). All are completed in sediments. All three are in basin fill sediments upgradient of the applicant's wells. Well HARN 463 appears to be in a recharge area, wells HARN 547 and HARN 741 do not. The ground water level data for HARN 463 and HARN 547 is from 1960 to 2006 and for HARN 741 is from 1974 to 2006. The ground water level trend for the three sites show seasonal and climatic influences. No decline is apparent at HARN 463, but a possible net decline of less than 5 feet may have occurred at both HARN 547 and HARN 741 sites. Interestingly, no recovery of the annual trend is apparent at HARN 547 and HARN 741 from 1996 to 1999, a generally wetter than average period in Oregon. Seasonal ground water level fluctuations range from 5 to 15 feet at HARN 463 and 10 to 40 feet at HARN 547 and HARN 741. This could adversely impact the use of shallow wells, but likely not adversely impact the use of deeper wells.

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	Basin fill sediments	☐	☒
2	Basin fill sediments	☐	☒
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation:

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in the basin fill is generally unconfined and hydraulically connected to surface water including Malheur and Harney Lakes. Some local confinement can occur where discontinuous low permeability layers are present. Leonard (1970) indicates confined ground water occurs at depth in the basin in deep basin fill sediments and underlying Tertiary volcanic and sedimentary rocks. Hubbard (1975) indicates ground water flow into Malheur Lake is small with the lake perched above ground water in most areas.

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? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1		Silvies River	4090	4100	8,100	☒	☐	☐	☐	☒
2		Silvies River	4090	4100	7,100	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
1		Ninemile Slough	4090	4110	15,300	☒	☐	☐	☐	☒
2		Ninemile Slough	4090	4110	16,200	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
1		Malheur & Harney Lakes	4090	4098	26,200	☒	☐	☐	☐	☒
2		Malheur & Harney Lakes	4090	4098	25,300	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation:

Ground water elevation data for the nearest reach of the Silvies River found in Piper and others (1939), Leonard (1970), and water well reports (well logs) indicate ground water elevations from 4085 to 4095 feet over multiple decades with seasonal fluctuations. The nearest reach appears perched above ground water. The ground water connection to the river is not at the nearest reach, but upgradient about 7.5 miles to the northwest and likely downgradient near Malheur Lake.

Ground water elevation data for the nearest reach of Ninemile Slough (upgradient of the wells) found in Piper and others (1939), Leonard (1970) show ground water elevations from 4100 to 4110 feet over multiple decades with seasonal fluctuations. The water well reports (well logs) for wells near the reach indicate ground water elevations from 4105 to 4115. A ground water connection to the nearest and downgradient reaches is likely.

Malheur Lake is the basin outlet for ground water flow (through evaporation). The lake elevation above is for 1983 derived from USGS 1:24,000 quadrangle maps. Maps inGreene and others (1972) and Leonard (1979) show a lake elevation of 4085 feet. The distance is to the 1983 shoreline. The shoreline location can significantly vary.

Water Availability Basin the well(s) are located within: W FK SILVIES R > MALHEUR L - AT MOUTH
NINEMILE SL > MALHEUR SL - AT MOUTH
No WAB for Harney & Malheur Lakes

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:

The distance from the proposed wells to Silvies River is more than 1 mile.

The distance from the proposed wells to Ninemile Slough is more than 1 mile.

The distance from the proposed wells to Malheur and Harney Lakes is more than 1 mile.

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
1	1	8.84%	8.40%	0.26%	1.31%	2.58%	3.87%	5.10%	6.26%	7.36%	8.40%	9.24%	9.21%
Well Q as CFS		0.00	0.00	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.00	0.00
Interference CFS		0.059	0.056	0.002	0.009	0.017	0.026	0.034	0.042	0.049	0.056	0.062	0.062
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
2	1	8.84%	8.40%	0.26%	1.31%	2.58%	3.87%	5.10%	6.26%	7.36%	8.40%	9.24%	9.21%
Well Q as CFS		0.00	0.00	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.00	0.00
Interference CFS		0.090	0.086	0.003	0.013	0.026	0.039	0.052	0.064	0.075	0.086	0.094	0.094
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.		0.149	0.142	0.005	0.022	0.043	0.065	0.086	0.106	0.124	0.142	0.156	0.156
(B) = 80 % Nat. Q		31.50	53.00	132.00	343.00	235.00	124.00	38.60	17.30	13.30	16.90	25.20	27.40
(C) = 1 % Nat. Q		0.315	0.530	1.320	3.430	2.350	1.240	0.386	0.173	0.133	0.169	0.252	0.274
(D) = (A) > (C)		No	No	No	No	No	No	No	No	No	No	No	No
(E) = (A / B) x 100		0.47%	0.27%	0.00%	0.01%	0.02%	0.05%	0.22%	0.61%	0.93%	0.84%	0.62%	0.57%

(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:

Both well sites are more than 1 mile from the nearest reach of the Silvies River (8,100 to 7,100 feet, 1.5 to 1.3 miles) and where ground water is like connected to the river (about 39,600 feet, 7.5 miles). This analysis used both proposed wells given the proposed pumping is distributed.

Hunt (1999) was used to calculate the interference at Silvies River given the well will likely not penetrate the basin fill sediments. The values used for the calculations are conservative and appropriate until better values become available. The calculations used a transmissivity of 7,500 ft2/day which is consistent for Eastern Oregon basin fill transmissivities noted by Gonthier (1985) and transmissivity values derived from specific capacity data from wells in T23S/R32.57E-sec 10, 13, 14, 15, 16, 22, 24, 30, and 31 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 955, HARN 958, HARN 959, HARN 968, HARN 1861, HARN 1870, HARN 2039, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). Additionally, the calculation used an assumed intermediate storage coefficient (0.001). The hydraulic conductivity assigned to the bed of the tributary is 0.20 feet/day.

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
1	2	10.8%	9.74%	2.95%	5.74%	7.95%	9.80%	11.4%	12.8%	14.1%	15.3%	14.0%	12.1%
Well Q as CFS		0.00	0.00	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.00	0.00
Interference CFS		0.072	0.065	0.020	0.038	0.053	0.066	0.076	0.086	0.095	0.103	0.094	0.081
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
2	2	10.7%	9.72%	2.75%	5.48%	7.67%	9.51%	11.1%	12.5%	13.8%	15.0%	13.9%	12.0%
Well Q as CFS		0.00	0.00	1.02	1.02	1.02	1.02	1.02	1.02	1.02	1.02	0.00	0.00
Interference CFS		0.109	0.099	0.028	0.056	0.078	0.097	0.113	0.128	0.141	0.153	0.142	0.123
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.		0.181	0.164	0.048	0.094	0.131	0.163	0.189	0.214	0.236	0.256	0.236	0.204
(B) = 80 % Nat. Q		4.07	13.00	31.50	66.80	27.60	13.90	3.31	1.33	1.03	0.85	1.55	2.67
(C) = 1 % Nat. Q		0.041	0.130	0.315	0.668	0.276	0.139	0.033	0.013	0.010	0.009	0.016	0.027
(D) = (A) > (C)		Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
(E) = (A / B) x 100		4.45%	1.26%	0.15%	0.14%	0.47%	1.17%	5.71%	16.1%	22.9%	30.1%	15.2%	7.64%

(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:

Both well sites are more than 1 mile from Ninemile Slough (15,300 to 16,200 feet, 2.9 to 3.1 miles). This analysis used both proposed wells given the proposed pumping is distributed.

Hunt (1999) was used to calculate the interference at Ninemile Slough and tributaries given the well will likely not penetrate the basin fill sediments. The values used for the calculations are conservative and appropriate until better values become available. The calculations used a transmissivity of 7,500 ft2/day which is consistent for Eastern Oregon basin fill transmissivities noted by Gonthier (1985) and transmissivity values derived from specific capacity data from wells in T23S/R32.57E-sec 10, 13, 14, 15, 16, 22, 24, 30, and 31 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 955, HARN 958, HARN 959, HARN 968, HARN 1861, HARN 1870, HARN 2039, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). Additionally, the calculation used an assumed intermediate storage coefficient (0.001). The hydraulic conductivity assigned to the bed of the tributary is 0.20 feet/day.

Application: G- 16908 continued Date: 13 September 2007

C4a. **690-09-040 (5):** Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													

Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
(A) = Total Interf.													
(B) = 80 % Nat. Q													
(C) = 1 % Nat. Q													
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	%	%	%	%	%	%	%	%	%	%

(A) = total interference as CFS; (B) = WAB calculated natural flow at 80% exceed. as CFS; (C) = 1% of calculated natural flow at 80% exceed. as CFS; (D) = highlight the checkmark for each month where (A) is greater than (C); (E) = total interference divided by 80% flow as percentage.

Basis for impact evaluation:

***** This analysis was not done given there is no WAB for Malheur and Harney Lakes.**

Drawdown at Malheur and Harney Lakes was estimated using the Theis drawdown equation. The calculations used a transmissivity of 7,500 ft2/day which is consistent for Eastern Oregon basin fill transmissivities noted by Gonthier (1985) and transmissivity values derived from specific capacity data from wells in T23S/R32.57E-sec 10, 13, 14, 15, 16, 22, 24, 30, and 31 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 955, HARN 958, HARN 959, HARN 968, HARN 1861, HARN 1870, HARN 2039, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). Additionally, the calculation used an assumed intermediate storage coefficient (0.001).

The drawdowns were calculated for well 1 and well 2 combined given the proposed pumping is distributed. The estimated drawdown for continuous pumping at the full proposed rate ranged from about 0.55 feet at the end of 30 days to about 2.98 feet at the end of 245 days. The estimated drawdown for a lower pro-rated pumping rate ranged from about 0.27 feet at the end of 30 days to about 1.45 feet at the end of 245 days.

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:**

Recommend conditions 7B, 7F, and 7N if a permit is issued.

Well 1 on the application is owner well 3 and HARN 51322. Well 2 on the application is owner well2 and may or may not be HARN 967 & HARN 1725 (this review assumes it is).

The proposed well sites are located within Harney Valley in an area southeast of Burns and north of Malheur Lake, within the Silvies River sub-basin but near the boundary with the Harney-Malheur Lakes sub-basin. The area is surficially mapped as Qal by Piper and others (1939), Qal by Leonard (1970), and Qs by Greene and others (1972). Water well reports for the proposed wells show basin fill sediment including gravel, sand, silt, and clay.

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in the basin fill is generally unconfined and hydraulically connected to Malheur and Harney Lakes. Some local confinement can occur where discontinuous low permeability layers are present. Leonard (1970) indicates confined ground water occurs at depth in the basin in deep basin fill sediments and underlying Tertiary volcanic and sedimentary rocks. Hubbard (1975) indicates the ground water contribution to flow into Malheur Lake is small with the lake perched above ground water in most areas.

There is a general and increasing local concern about ground water availability in the Harney Valley.

The closest wells with ground water level trend data in the Silvies River sub-basin is well HARN 463 in T23S/R31E-sec 16 (about 13.1 miles to the northwest) and in the Harney-Malheur Lakes sub-basin are wells HARN 547 in T23S/R32E-sec 07 (about 11.5 miles to the northwest) and HARN 741 in T23S/R34E-sec 31 (about 13.0 miles to the northeast). All are completed in sediments. All three are in basin fill sediments upgradient of the applicant's wells. Well HARN 463 appears to be in a recharge area, wells HARN 547 and HARN 741 do not. The ground water level data for HARN 463 and HARN 547 is from 1960 to 2006 and for HARN 741 is from 1974 to 2006. The ground water level trend for the three sites show seasonal and climatic influences. No decline is apparent at HARN 463, but a possible net decline of less than 5 feet may have occurred at both HARN 547 and HARN 741 sites. Interestingly, no recovery of the annual trend is apparent at HARN 547 and HARN 741 from 1996 to 1999, a generally wetter than average period in Oregon. Seasonal ground water level fluctuations range from 5 to 15 feet at HARN 463 and 10 to 40 feet at HARN 547 and HARN 741. This could adversely impact the use of shallow wells, but likely not adversely impact the use of deeper wells.

References Used:

Oregon Administrative Rules: OAR 690-512

Piper, A.M., Robison, T.W., and Park C.F. 1939. Geology and Ground Water Resources of the Harney Basin, Oregon. USGS Water Supply Paper 841.

Leonard, A.R. 1970. Ground-Water Resources in Harney Valley, Harney County, Oregon. Ground Water Report 16, Oregon Water Resources Department, Salem, Oregon.

Greene, R.C., Walker, G.W., and Corcoran, R.E. 1972. Geologic Map of the Burns Quadrangle, Oregon. USGS Miscellaneous Geologic Investigations Map I-680.

Hubbard, Larry. L. 1975. Hydrology of Malheur Lake, Harney County, Southeastern Oregon. USGS Water Resources Investigation 21-75.

Walker, G.W. 1979. Revisions to the Cenozoic Stratigraphy of Harney Basin, Southeastern Oregon. USGS Bulletin 1475.

Gonthier, J.B. 1985. A Description of Aquifer Units in Eastern Oregon. USGS Water Resources Investigations Report 84-4095.

OWRD water well reports and/or hydrographs: HARN 463, HARN 547, HARN 741, HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 955, HARN 958, HARN 959, HARN 968, HARN 1861, HARN 1870, HARN 2039, HARN 50054, HARN 50491, HARN 50514, and HARN 51204

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 **Logid:** HARN 51322

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.

Remark: **Route to the Enforcement Section.** I recommend withholding issuance of the permit until the Enforcement Section and the Ground Water Section approve the current well construction or any necessary reconstruction.

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).**

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 2 **Logid:** HARN 967 (?) & HARN 1725 (?)

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.

Remark: **Route to the Enforcement Section.** I recommend withholding issuance of the permit until the Enforcement Section and the Ground Water Section approve the current well construction or any necessary reconstruction.

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).**

The Oregon Administrative Rules contain OARs filed through August 15, 2007

WATER RESOURCES DEPARTMENT

DIVISION 512

MALHEUR LAKE BASIN PROGRAM PROVISION

690-512-0040

Water Availability

(1) Except as provided in section (3) of this rule, the Department shall not accept an application for permit, or issue a permit, for any use of surface water, or of groundwater the use of which has the potential to substantially interfere with surface water, in the Malheur Lake Basin unless the applicant shows, by a preponderance of evidence, that unappropriated water is available to supply the proposed use at the times and in the amounts requested. The evidence provided shall be prepared by a qualified hydrologist or other water resources specialist and shall include:

(a) Streamflow measurements of gage records from the source or, for use of groundwater, the stream in hydraulic connection with the source; or

(b) An estimate of water availability from the source or, for use of groundwater, the stream in hydraulic connection with the source which includes correlations with streamflow measure-ments or gage records on other, similar streams and considers current demands for water affecting the streamflows.

(2) The criteria used in determining if the use of groundwater has the potential to substantially interfere with surface water shall be those established in OAR Chapter 690, Division 9.

(3) This rule shall not apply to issuance of:

(a) Instream water rights;

(b) Permits for storage of water between March 1 and May 31 if the application is not required to be referred to the Commission under OAR 690-011-0080(2)(a)(C); or

(c) Permits for use of water legally stored.

Stat. Auth.: ORS 536.300 & ORS 536.340

Stats. Implemented:
Hist.: WRD 3-1985, f. & cert. ef. 3-28-85; WRD 23-1990, f. & cert. ef. 12-14-90; Administrative Renumbering 1-1993, Renumbered from 690-080-0120

Alphabetical Index by Agency Name

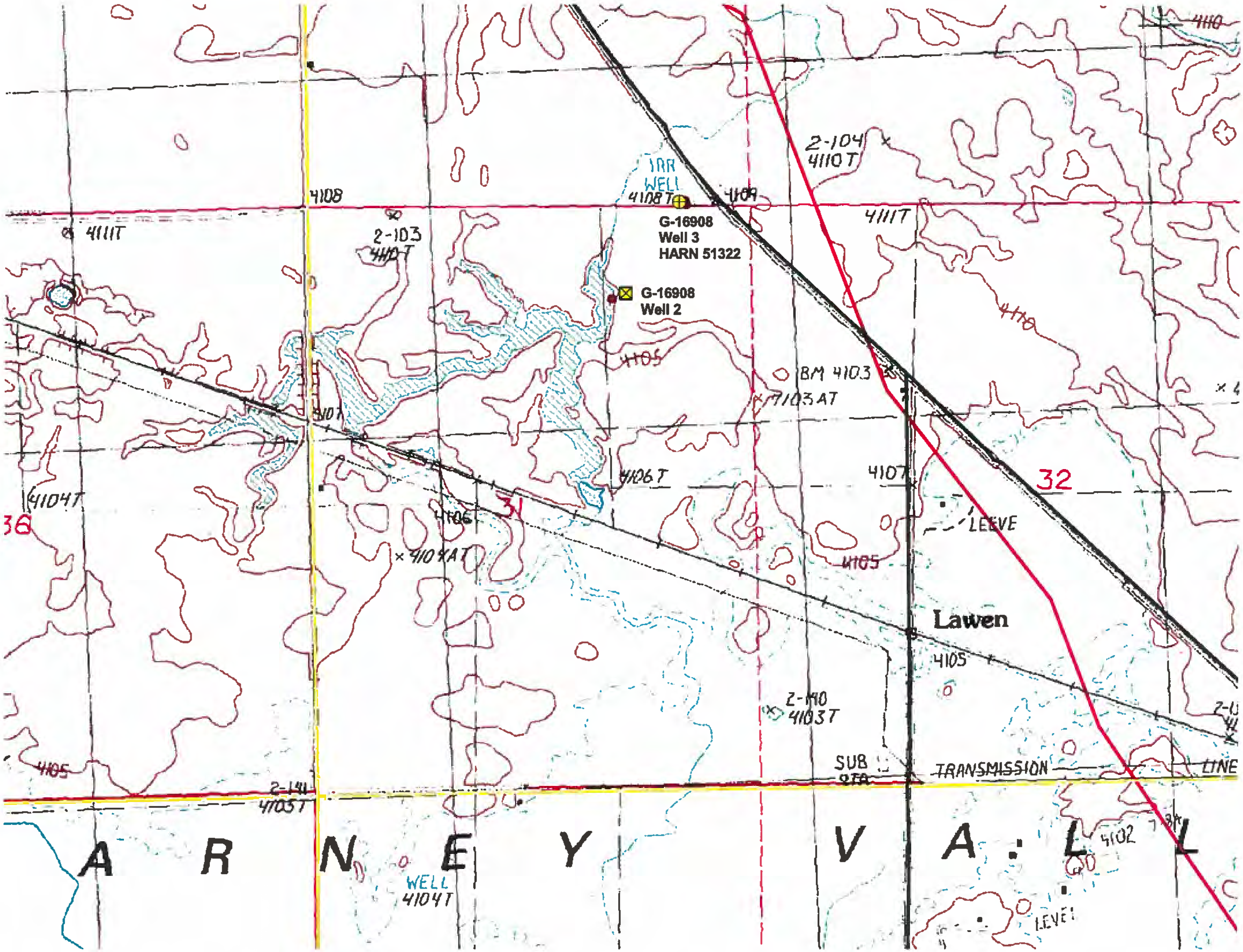
Numerical Index by OAR Chapter Number

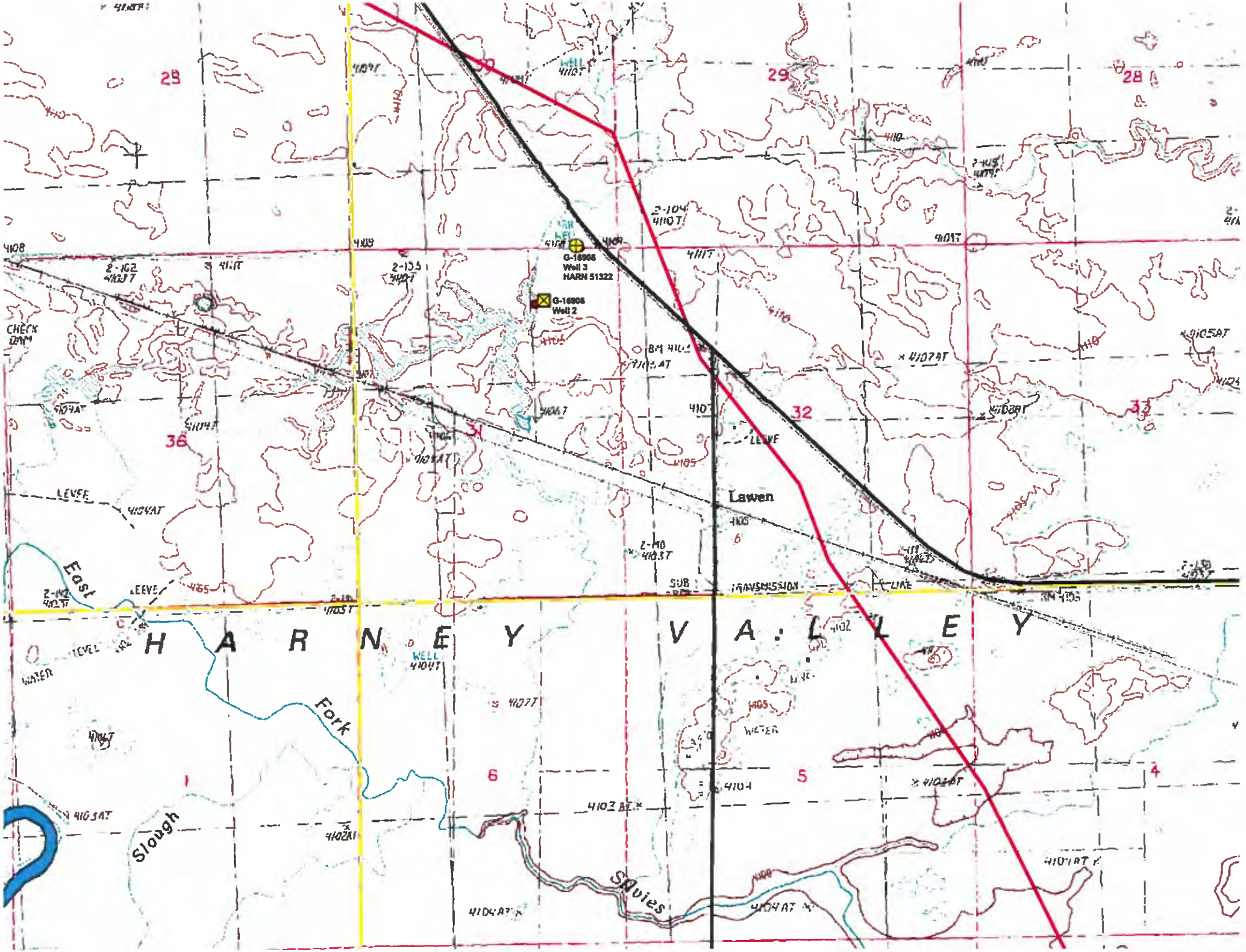
Search the Text of the OARs

Questions about Administrative Rules?

Link to the Oregon Revised Statutes (ORS)

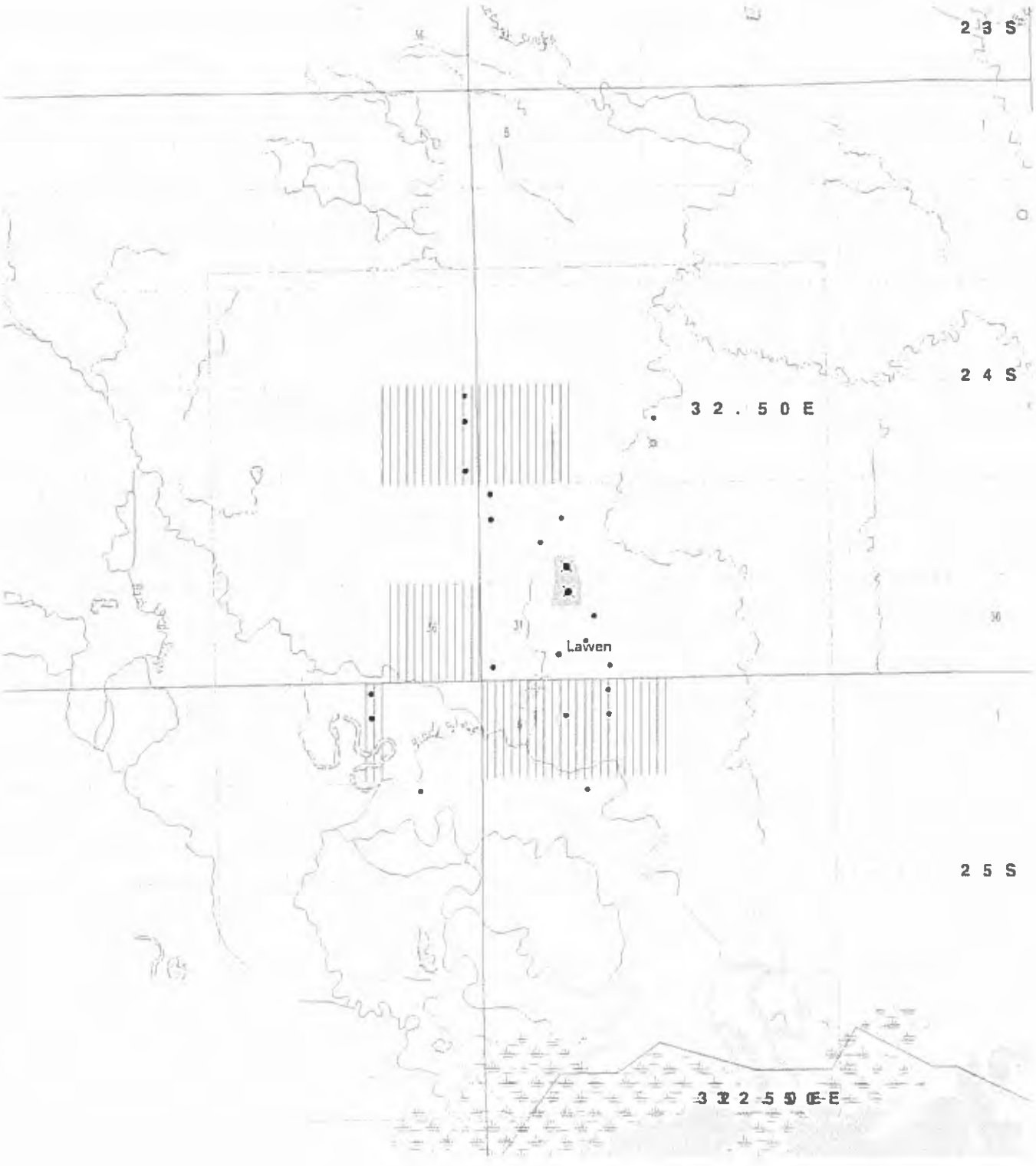
Return to Oregon State Archives Home Page


G-16908
Well 3
HARN 51322
G-16908
Well 2
IRR
WELL
4108T
2-104
4110T
2-103
4111T
BM 4103
Lawen
TRANSMISSION
LINE
SUB
LEEVE
2-110
4103T
2-141
4103T
WELL
4104T
32
31
36
ARNEY VALL


HARNEY VALLEY
East Fork
Slough
Davies
Lawen
LEVEE
TRANSMISSION LINE
WATER
WELL
CHECK DAM
G-16906
Well 3
HARN 51322
G-16906
Well 2
25
30
29
28
36
31
32
33
6
5
4
1

Wells in the vicinity of application G 16908

- Application well(s) in this 1/4 1/4 section
- Well(s) identified in this section from OWRD's well log database within 1 mi. radius of application well(s)
- Well(s) identified in this 1/4 1/4 section from OWRD's well log database within 1 mi. radius of application well(s)
- Permitted well(s) in this 1/4 1/4 section within 1 mi. radius of application well(s)
- Conditioned, permitted well(s) in this 1/4-1/4 section within 5 mi. radius of application well(s)
- OWRD Observation well and well id within 5 mi. radius of application well(s)
- Critical GW Area
- Regulated GW Area



WELL LOGS WITHIN 1 MILE OF APPLICATION G 16908

ABANDON:	1
RECONDITIONED:	1
REPAIRED:	0
CONVERSION:	0
DEEPENINGS:	0
NEW CONSTRUCT:	43
COMMUNITY USE:	0
DOMESTIC USE:	22
INDUSTRIAL USE:	0
INJECTION USE:	0
IRRIGATION USE:	8
THERMAL USE:	0
LIVESTOCK USE:	9

****

PERMITTED WELLS WITHIN 1 MILE OF APPLICATION G 16908

$RECNO	APPLICATION	PERMIT	CLAIM		LOC-QQ	USE_CODE
1					24.00S32.50E20NESE	
2	G 16908		0	0	24.00S32.50E30SESE	IR
3	G 16908		0	0	24.00S32.50E31NENE	IR

****

CONDITIONED WELLS WITHIN 5 MILES OF APPLICATION G 16908

$RECNO	APPLICATION	PERMIT	LOC-QQ	CONDITION-CODE
1	G 8800	G 8241	24.00S32.50E12SENE	
1	G 12602	G 11765	24.00S32.50E12SENE	4KG

****

APPLICATION G 16908 FALLS WITHIN THESE QUAD(S)

LAWEN

****

owner well #3

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

HARN 51322
01-24-2007

WELL LABEL # L 86796

START CARD # 1000433

(1) LAND OWNER
Owner Well I.D. _____
First Name JETT Last Name BLACKBURN
Company _____
Address 707 PONDEROSA VILLAGE
City BURNS State OR Zip 97720

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Conversion ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☐ Auger ☐ Cable Mud ☐ Reverse Rotary ☐ Other _____

(4) PROPOSED USE
☐ Domestic ☒ Irrigation ☐ Community ☐ Industrial/ Commericial ☐ Livestock ☐ Dewatering ☐ Thermal ☐ Injection ☐ Other _____

(5) BORE HOLE CONSTRUCTION
Special Standard ☐ Attach copy
Depth of Completed Well 227.00 ft.

BORE HOLE Dia	From	To	SEAL Material	From	To	Amt	sacks/ lbs
26	0	18	Bentonite	0	18	40	S
22	18	227					

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☒ Other poured dry and tam
Backfill placed from _____ ft. to _____ ft. Material _____
Filter pack from 0 ft. to 227 ft. Material pea gravel Size 3/8
Explosives used: ☐ Yes Type _____ Amount _____

(6) CASING/LINER

Casing	Liner	Dia	+	From	To	Gauge	Stl	Plstc	Wld	Thrd
◉	○	22	☒	1	20	.250	◉	○	☒	☐
○	◉	14	☒	2	227	.250	◉	○	☒	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐
○	○		☐				○	○	☐	☐

Shoe ☐ Inside ☐ Outside ☐ Other Location of shoe(s) _____
Temp casing ☐ Yes Dia _____ From _____ To _____

(7) PERFORATIONS/SCREENS
Perforations Method _____
Screens Type roscoe moss Material stainless steel

Perf/ Screen	Casing/ Screen Liner	Dia	From	To	Scrn/slot width	Slot length	# of slots	Tele/ pipe size
Screen	Liner	14	115	215	.1			

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

Yield gal/min	Drawdown	Drill stem/Pump depth	Duration (hr)
100	10		

Temperature 55 °F Lab analysis ☐ Yes By _____
Water quality concerns? ☐ Yes (describe below)

From	To	Description	Amount	Units

(9) LOCATION OF WELL (legal description)
County Harney Twp 24.00 S N/S Range 32.50 E E/W WM
Sec 30 SE 1/4 of the SE 1/4 Tax Lot 600
Tax Map Number _____ Lot _____
Lat ° 0 ' " or _____ DMS or DD
Long ° 0 ' " or _____ DMS or DD
○ Street address of well ○ Nearest address
64040 HWY 78

(10) STATIC WATER LEVEL

	Date	SWL(psi)	+	SWL(ft)
Existing Well / Predeepening				
Completed Well	01-22-2007			17

Flowing Artesian? ☐ Dry Hole? ☐

WATER BEARING ZONES Depth water was first found 17

SWL Date	From	To	Est Flow	SWL(psi)	+	SWL(ft)
01-22-2007	17	218	1,000			17

(11) WELL LOG
Ground Elevation _____

Material	From	To
sandy loom topsoil	0	1
clay brn	1	35
clay grey	35	55
silt grey	55	110
sand gray	110	125
silt green	125	150
clay grey sticky	150	180
gravel clay	180	189
clay grey	189	208
gravel sand	208	218
clay green	218	227

Date Started 01-04-2007 Completed 01-22-2007

(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 _____
Electronically Filed
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 1424 Date 01-24-2007
Electronically Filed
Signed TIMOTHY K RILEY (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: 0.88

Owner well 2 ??

RECEIVED

AUG 23 1988

WATER RESOURCES DEPT
SALEM, OREGON

24S/32½E/31CC

STATE OF OREGON
WATER WELL REPORT
(as required by ORS 537.765)

Harn, 967

(1) OWNER: Well Number:
Name Coldstream Ranch
Address 4268 Launel Ridge
City Allison Park State P.A. Zip 15101-2132

(2) TYPE OF WORK:
☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD
☐ Rotary Air ☐ Rotary Mud ☒ Cable
☐ Other

(4) PROPOSED USE:
☐ Domestic ☐ Community ☐ Industrial ☒ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes ☐ No ☒ Depth of Completed Well 300 ft.
Explosives used Yes ☐ No ☒ Type ______ Amount ______

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
24"	0	300	Cement	0	20'	~~4 yds~~ 9½ yds

How was seal placed: Method
☐ Other
Backfill placed from
Gravel placed from 20

(6) CASING/LINER:

	Diameter	From
Casing:	14"	1.8
Liner:	14"	3

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☒ Perforations
☐ Screens

From	To	Slot size	
30	300'	¼ x 3	14 3/4

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

Yield gal/min	Drawdown	Drill stem at	Time
692	50'		

Temperature of water 52 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Harney Latitude ______ Longitude ______
Township 24S N or S, Range 32½E E or W, WM.
Section 31 SW¼ SW¼ ¼
Tax Lot 8500 Lot ______ Block ______ Subdivision ______
Street Address of Well (or nearest address) Hwy 78 + Sodley Rd

(10) STATIC WATER LEVEL:
30 ft. below land surface. Date 7 14 88
Artesian pressure ______ lb. per square inch. Date ______

(11) WATER BEARING ZONES:
Depth at which water was first found 30'

From	To	Estimated Flow Rate	SWL
30	35	300	30
155	165	50	30
225	250	300	30

(12) WELL LOG: Ground elevation

Material	From	To	SWL
Top soil (Sandy)	0	5	
Clay Brown	5	25	
Clay Gray	25	50	30
Clay Stone	50	55	
Clay Gray	55	105	
Clay Gray	105	155	30
Clay soft Gray	155	165	
Clay Dry Gray	165	195	
Clay Gray + Sand	195	225	30
Clay + Sand	225	250	
Clay Green	250	270	
Clay Gray	270	300	

...July 19 1988

(unbonded) Water Well Constructor Certification:
...construction, alteration, or ...Oregon well construction ... above are true to my best ...
WWC Number ______
Date ______

(bonded) Water Well Constructor Certification:
...n, alteration, or abandonment ...uction dates reported above. all work ... compliance with Oregon well construction ... to the best of my knowledge and belief.
WWC Number 1435
Signed Joe Valen... Date July 19 1988

Sticky note 1:
existing well was
well #2
well #3
gravel packed well.
14" casing. gravel shute
all the way around
Cement it ...

Sticky note 2:
" casing inside of
gravel is fed - okay
at the top.

WHITE COPIES - WATER RESOURCES DEPARTMENT YELLOW COPY - CONSTRUCTOR PINK COPY - CUSTOMER 9809C 10/86

JUL - 3 1990 owner well 2 continued ?? 24S/32½E/31C

WATER RESOURCES DEPT. SALEM OREGON (START CARD) # 14808

STATE OF OREGON WATER WELL REPORT
(as required by ORS 537.765)

1725 HARN

(1) OWNER:
Well Number: 2
Name Caldstream Ranch
Address 4268 Laurel Ridge Drive
City Allison Park State PA. Zip 15101-2132

(2) TYPE OF WORK:
☐ New Well ☐ Deepen ☒ Recondition ☐ Abandon

(3) DRILL METHOD
☐ Rotary Air ☐ Rotary Mud ☒ Cable
☐ Other

(4) PROPOSED USE:
☐ Domestic ☐ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval Yes ☐ No ☐ Depth of Completed Well ____ ft.
Explosives used Yes ☐ No ☐ Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds

How was seal placed: Method ☐ A ☐ B ☐ C ☐ D ☐ E
☐ Other
Backfill placed from ____ ft. to ____ ft. Material
Gravel placed from ____ ft. to ____ ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☐ Screens Type Material

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

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

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.

Temperature of water Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Harney Latitude ____ Longitude ____
Township 24S N or S, Range 32½ E E or W, WM.
Section 31 ~~NE~~ ~~NW~~ ¼ ~~SE~~ ~~SW~~ ¼
Tax Lot ____ Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) Hwy 78 + Sealey Rd

(10) STATIC WATER LEVEL:
____ ft. below land surface. Date
Artesian pressure ____ lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found

From	To	Estimated Flow Rate	SWL

(12) WELL LOG:
Ground elevation

Material	From	To	SWL
Well Would not Take Gravel So a 8" Diameter Gravel Shute was placed at 3' From old shute as Diagram At.			
Well Log at Water Resources in Salem			

Date started Completed

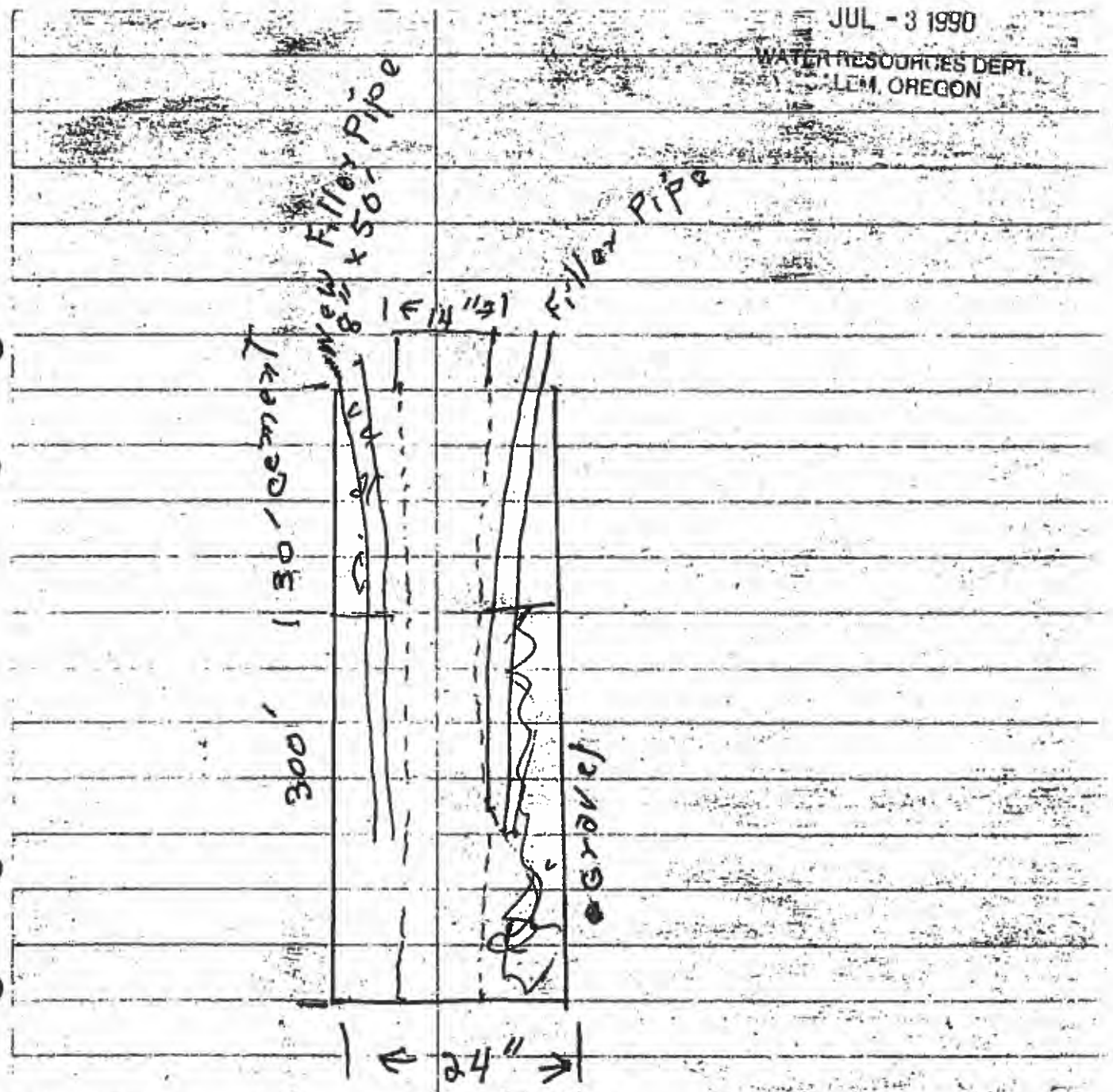
(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number
Signed Date

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, 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 well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 1435
Signed Joe Valentine Date

ORIGINAL & FIRST COPY - WATER RESOURCES DEPARTMENT SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 3/88



Well Location	23.00S31.00E16DBB
Oregon Water Resources Department Well Log ID	HARN 463
Oregon Water Resources Department State Observation Well Number	167
Well depth, in feet below land surface	300
Land surface elevation, in feet above mean sea level	
Primary use of well	not determined

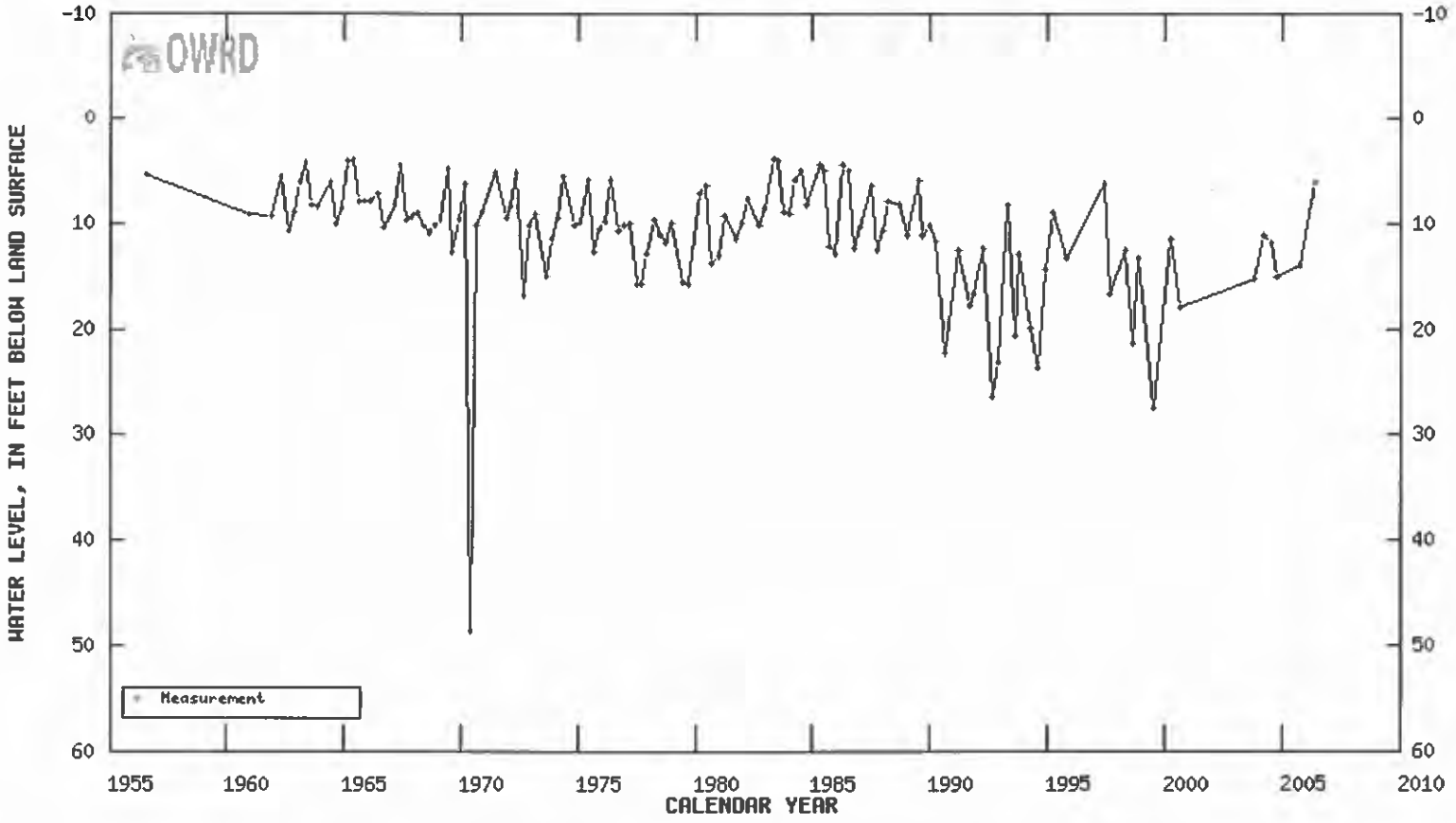


Table showing water-level data for State Well HARN 463, State Observation Well # 167

Well Location	23.08S32.08E7CAB
Oregon Water Resources Department Well Log ID	HARN 547
Oregon Water Resources Department State Observation Well Number	169
Well depth, in feet below land surface	93
Land surface elevation, in feet above mean sea level	
Primary use of well	not determined

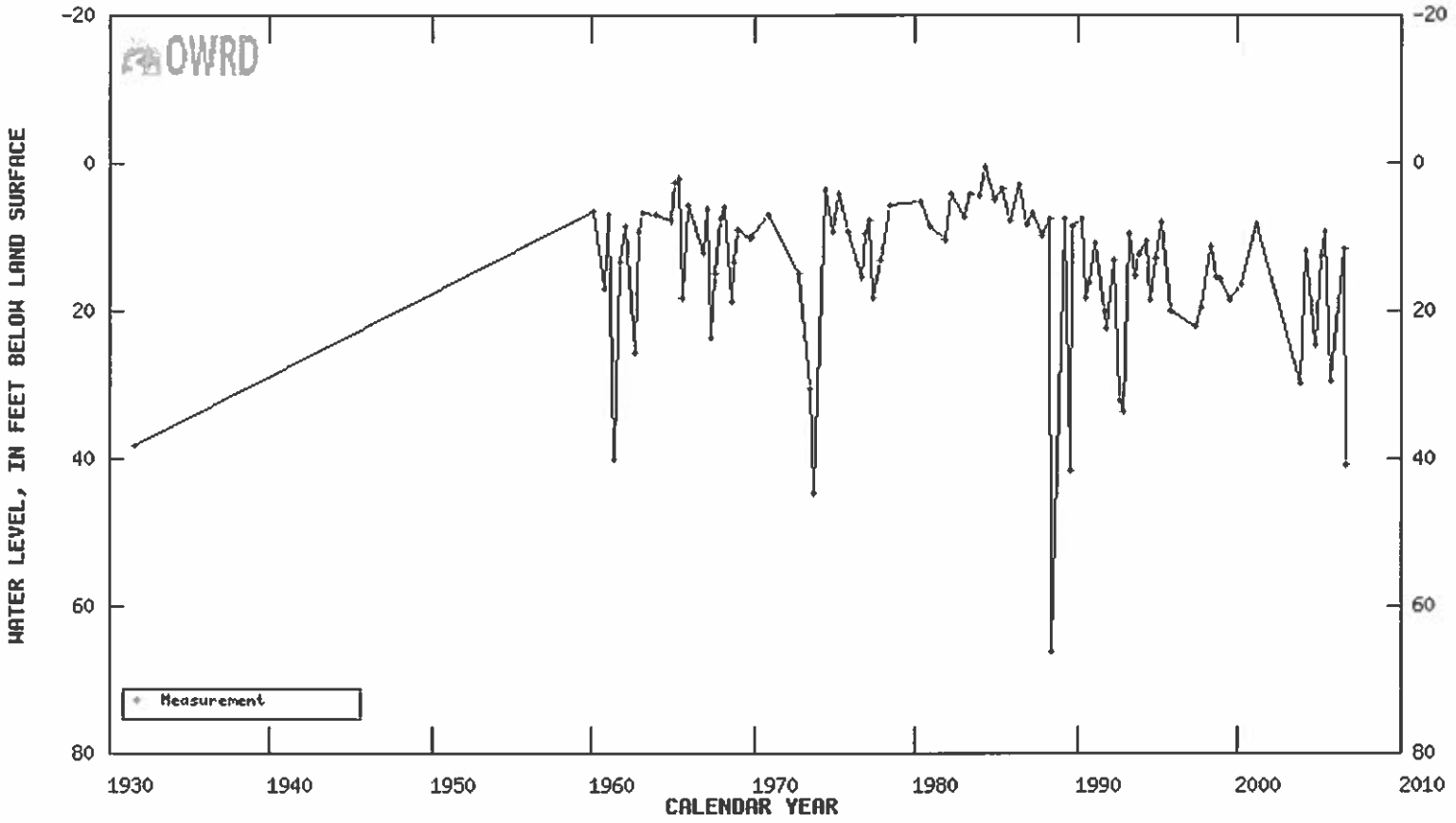


Table showing water-level data for State Well HARN 547, State Observation Well # 169

Well Location	23.00S34.00E31ADD
Oregon Water Resources Department Well Log ID	HARN 741
Oregon Water Resources Department State Observation Well Number	172
Well depth, in feet below land surface	207
Land surface elevation, in feet above mean sea level	
Primary use of well	not determined

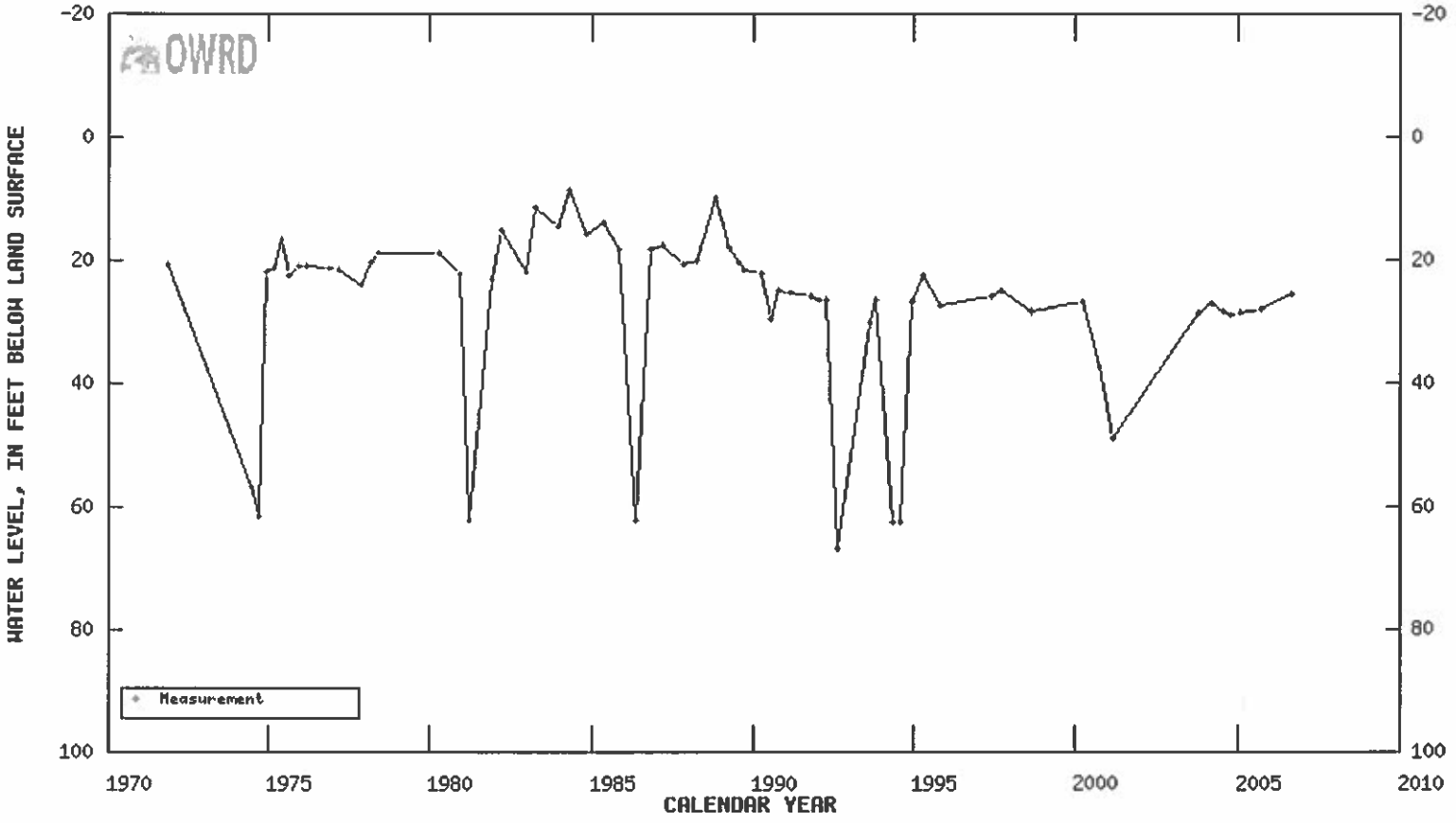
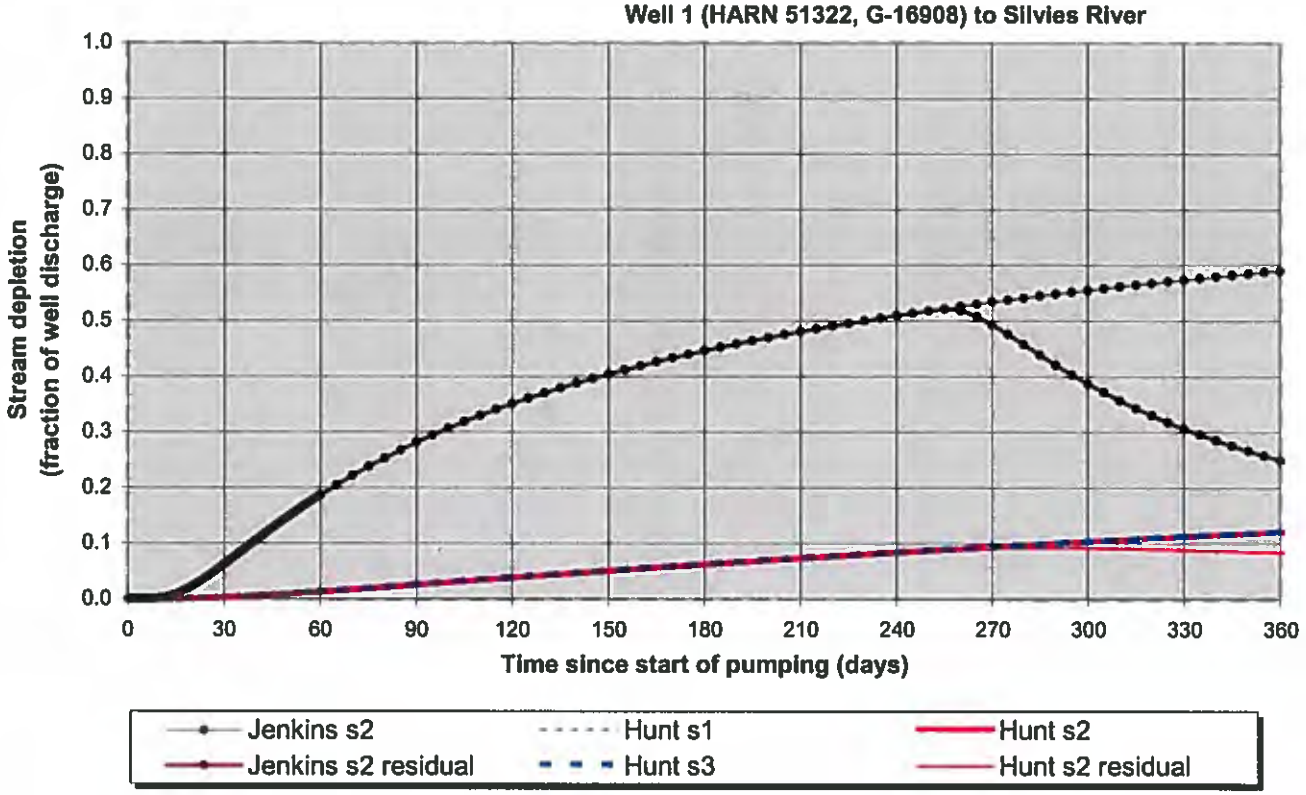


Table showing water-level data for State Well HARN 741, State Observation Well # 172

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

Well 1 (HARN 51322, G-16908) to Silvies River



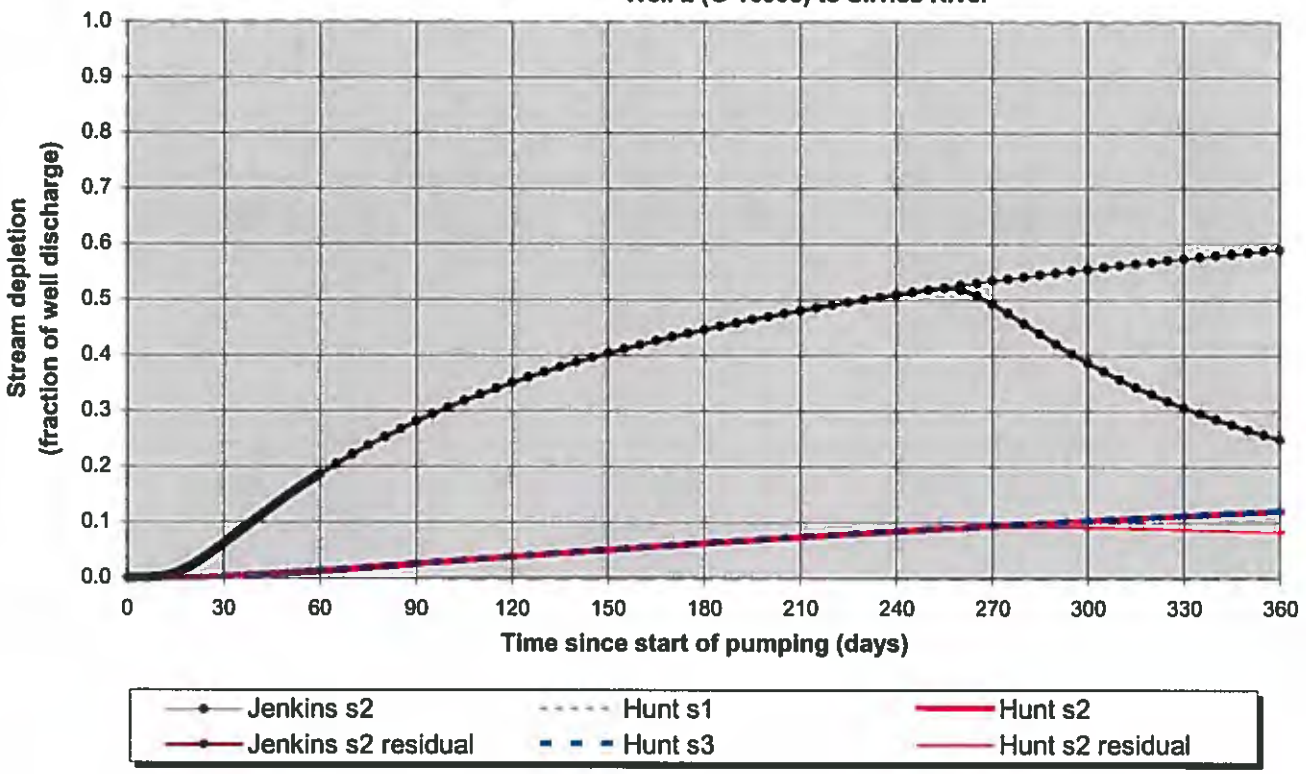
Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 245 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.0026	0.0131	0.0258	0.0387	0.0510	0.0626	0.0736	0.0840	0.0924	0.0921	0.0884	0.0840
Qw, cfs	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670
H SD s2, cfs	0.002	0.009	0.017	0.026	0.034	0.042	0.049	0.056	0.062	0.062	0.059	0.056

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	0.67	0.67	0.67	cfs
Distance to stream	a	39600	39600	39600	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	150	150	150	ft
Aquifer transmissivity	T	7500	7500	7500	ft*ft/day
Aquifer storage coefficient	S	0.001	0.001	0.001	
Stream width	ws	10	10	10	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	25	25	25	ft
Streambed conductance	sbc	0.08	0.08	0.08	ft/day
Stream depletion factor (Jenkins)	sdf	209.088	209.088	209.088	days
Streambed factor (Hunt)	sbf	0.4224	0.4224	0.4224	

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

Well 2 (G-16908) to Silvies River



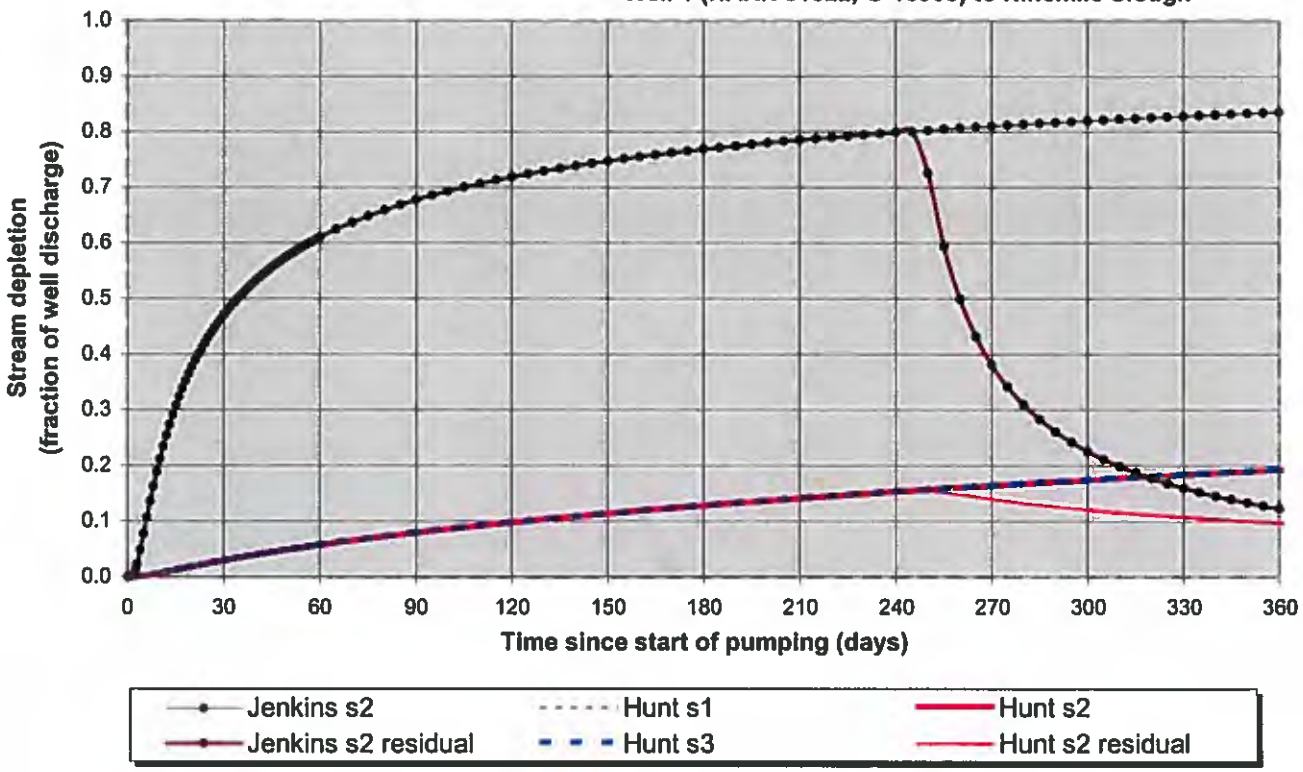
Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 245 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.0026	0.0131	0.0258	0.0387	0.0510	0.0626	0.0736	0.0840	0.0924	0.0921	0.0884	0.0840
Qw, cfs	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020
H SD s2, cfs	0.003	0.013	0.026	0.039	0.052	0.064	0.075	0.086	0.094	0.094	0.090	0.086

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	1.02	1.02	1.02	cfs
Distance to stream	a	39600	39600	39600	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	150	150	150	ft
Aquifer transmissivity	T	7500	7500	7500	ft*ft/day
Aquifer storage coefficient	S	0.001	0.001	0.001	
Stream width	ws	10	10	10	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	25	25	25	ft
Streambed conductance	sbc	0.08	0.08	0.08	ft/day
Stream depletion factor (Jenkins)	sdf	209.088	209.088	209.088	days
Streambed factor (Hunt)	sbf	0.4224	0.4224	0.4224	

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

Well 1 (HARN 51322, G-16908) to Ninemile Slough

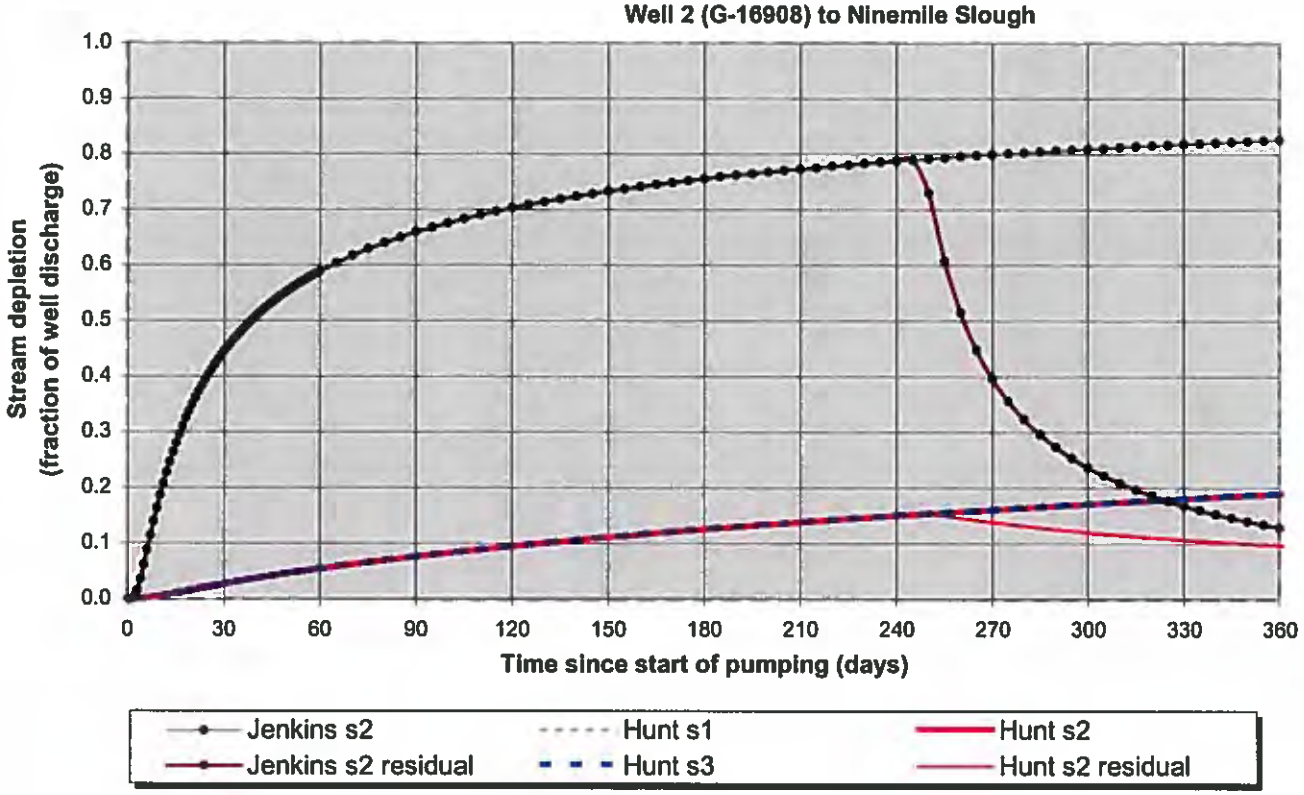


Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 245 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.0295	0.0574	0.0795	0.0980	0.1141	0.1284	0.1413	0.1531	0.1400	0.1209	0.1075	0.0974
Qw, cfs	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670	0.670
H SD s2, cfs	0.020	0.038	0.053	0.066	0.076	0.086	0.095	0.103	0.094	0.081	0.072	0.065

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.67	0.67	0.67	cfs
Distance to stream	a	15300	15300	15300	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	150	150	150	ft
Aquifer transmissivity	T	7500	7500	7500	ft*ft/day
Aquifer storage coefficient	S	0.001	0.001	0.001	
Stream width	ws	10	10	10	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	25	25	25	ft
Streambed conductance	sbc	0.08	0.08	0.08	ft/day
Stream depletion factor (Jenkins)	sdf	31.212	31.212	31.212	days
Streambed factor (Hunt)	sbf	0.1632	0.1632	0.1632	

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



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 245 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.0275	0.0548	0.0767	0.0951	0.1111	0.1254	0.1383	0.1501	0.1388	0.1204	0.1072	0.0972
Qw, cfs	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020	1.020
H SD s2, cfs	0.028	0.056	0.078	0.097	0.113	0.128	0.141	0.153	0.142	0.123	0.109	0.099

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	1.02	1.02	1.02	cfs
Distance to stream	a	16200	16200	16200	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer thickness	b	150	150	150	ft
Aquifer transmissivity	T	7500	7500	7500	ft*ft/day
Aquifer storage coefficient	S	0.001	0.001	0.001	
Stream width	ws	10	10	10	ft
Streambed hydraulic conductivity	Ks	0.2	0.2	0.2	ft/day
Streambed thickness	bs	25	25	25	ft
Streambed conductance	sbc	0.08	0.08	0.08	ft/day
Stream depletion factor (Jenkins)	sdf	34.992	34.992	34.992	days
Streambed factor (Hunt)	sbf	0.1728	0.1728	0.1728	

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)	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	
Application G-16908 owner proposed well 1 (HARN 51322) to Malheur and Harney Lakes												
56,103.90	7,500.00	0.00100	300.72	0.67	30.00	26,200.00	3.14	0.7627	0.3325	0.2042	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	60.00	26,200.00	3.14	0.3814	0.7347	0.4513	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	90.00	26,200.00	3.14	0.2542	1.0312	0.6334	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	120.00	26,200.00	3.14	0.1907	1.2619	0.7751	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	150.00	26,200.00	3.14	0.1525	1.4500	0.8906	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	180.00	26,200.00	3.14	0.1271	1.6086	0.9880	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	210.00	26,200.00	3.14	0.1090	1.7456	1.0722	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	240.00	26,200.00	3.14	0.0953	1.8662	1.1463	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	300.72	0.67	245.00	26,200.00	3.14	0.0934	1.8850	1.1578	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	30.00	26,200.00	3.14	0.7627	0.3325	0.0994	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	60.00	26,200.00	3.14	0.3814	0.7347	0.2196	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	90.00	26,200.00	3.14	0.2542	1.0312	0.3082	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	120.00	26,200.00	3.14	0.1907	1.2619	0.3771	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	150.00	26,200.00	3.14	0.1525	1.4500	0.4333	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	180.00	26,200.00	3.14	0.1271	1.6086	0.4807	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	210.00	26,200.00	3.14	0.1090	1.7456	0.5217	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	240.00	26,200.00	3.14	0.0953	1.8662	0.5577	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	146.32	0.33	245.00	26,200.00	3.14	0.0934	1.8850	0.5633	Pro-Rated Pumping Rate	
Application G-16908 owner proposed well 2 to Malheur and Harney Lakes												Total Wells 1 & 2
56,103.90	7,500.00	0.00100	457.81	1.02	30.00	25,300.00	3.14	0.7112	0.3659	0.3422	Continuous Pumping at Proposed Full Rate	0.5464
56,103.90	7,500.00	0.00100	457.81	1.02	60.00	25,300.00	3.14	0.3556	0.7830	0.7322	Continuous Pumping at Proposed Full Rate	1.1835
56,103.90	7,500.00	0.00100	457.81	1.02	90.00	25,300.00	3.14	0.2371	1.0859	1.0154	Continuous Pumping at Proposed Full Rate	1.6488
56,103.90	7,500.00	0.00100	457.81	1.02	120.00	25,300.00	3.14	0.1778	1.3201	1.2344	Continuous Pumping at Proposed Full Rate	2.0094
56,103.90	7,500.00	0.00100	457.81	1.02	150.00	25,300.00	3.14	0.1422	1.5103	1.4123	Continuous Pumping at Proposed Full Rate	2.3029
56,103.90	7,500.00	0.00100	457.81	1.02	180.00	25,300.00	3.14	0.1185	1.6704	1.5620	Continuous Pumping at Proposed Full Rate	2.5500
56,103.90	7,500.00	0.00100	457.81	1.02	210.00	25,300.00	3.14	0.1016	1.8086	1.6911	Continuous Pumping at Proposed Full Rate	2.7633
56,103.90	7,500.00	0.00100	457.81	1.02	240.00	25,300.00	3.14	0.0889	1.9300	1.8047	Continuous Pumping at Proposed Full Rate	2.9509
56,103.90	7,500.00	0.00100	457.81	1.02	245.00	25,300.00	3.14	0.0871	1.9489	1.8223	Continuous Pumping at Proposed Full Rate	2.9801
56,103.90	7,500.00	0.00100	222.76	0.50	30.00	25,300.00	3.14	0.7112	0.3659	0.1665	Pro-Rated Pumping Rate	0.2658
56,103.90	7,500.00	0.00100	222.76	0.50	60.00	25,300.00	3.14	0.3556	0.7830	0.3563	Pro-Rated Pumping Rate	0.5758
56,103.90	7,500.00	0.00100	222.76	0.50	90.00	25,300.00	3.14	0.2371	1.0859	0.4941	Pro-Rated Pumping Rate	0.8023
56,103.90	7,500.00	0.00100	222.76	0.50	120.00	25,300.00	3.14	0.1778	1.3201	0.6006	Pro-Rated Pumping Rate	0.9777
56,103.90	7,500.00	0.00100	222.76	0.50	150.00	25,300.00	3.14	0.1422	1.5103	0.6872	Pro-Rated Pumping Rate	1.1205
56,103.90	7,500.00	0.00100	222.76	0.50	180.00	25,300.00	3.14	0.1185	1.6704	0.7600	Pro-Rated Pumping Rate	1.2408
56,103.90	7,500.00	0.00100	222.76	0.50	210.00	25,300.00	3.14	0.1016	1.8086	0.8229	Pro-Rated Pumping Rate	1.3446
56,103.90	7,500.00	0.00100	222.76	0.50	240.00	25,300.00	3.14	0.0889	1.9300	0.8781	Pro-Rated Pumping Rate	1.4358
56,103.90	7,500.00	0.00100	222.76	0.50	245.00	25,300.00	3.14	0.0871	1.9489	0.8867	Pro-Rated Pumping Rate	1.4500

Application: G-16908 (Blackburn)

Log_County	Log_Num	Transmissivity (T) (feet2/day)	Open Interval (feet)	H_Conductivity (K) (feet/day)	Township	Range	Section
HARN	1861	2,231.78	138.00	16.17	T24S	R32.5E	30
HARN	2039	207.92	230.00	0.90	T24S	R32.5E	30
HARN	968	548.06	10.00	54.81	T24S	R32.5E	31
		995.92	Average	23.96			
		548.06	Median	16.17			

Assessment for Nearby Water Rights

Application: G-16843 (Ahart)

Log_County	Log_Num	Transmissivity (T) (feet2/day)	Open Interval (feet)	H_Conductivity (K) (feet/day)	Township	Range	Section
HARN	958	2,903.94	347.00	8.37	T24S	R32.5E	16
HARN	959	2,427.10	259.00	9.37	T24S	R32.5E	16
HARN	955	5,407.29	160.00	33.80	T24S	R32.5E	16
		3,579.44	Average	17.18			
		2,903.94	Median	9.37			

Application: G-16819 (Jones)

Log_County	Log_Num	Transmissivity (T) (feet2/day)	Open Interval (feet)	H_Conductivity (K) (feet/day)	Township	Range	Section
HARN	651	3,622.52	200.00	18.11	T23S	R32.5E	14
HARN	50054	1,659.01	55.00	30.16	T23S	R32.5E	14
HARN	50514	2,156.94	32.00	67.40	T23S	R32.5E	14
HARN	50491	381.28	67.00	5.69	T23S	R32.5E	15
HARN	1870	256.96	22.00	11.68	T23S	R32.5E	22
		1,615.34	Average	26.61			
		1,659.01	Median	18.11			

Application: G-16826 (Wilkinson)

Log_County	Log_Num	Transmissivity (T) (feet2/day)	Open Interval (feet)	H_Conductivity (K) (feet/day)	Township	Range	Section
HARN	51204	900.91	63.00	14.30	T23S	R32.5E	13
HARN	650	5,878.09	33.00	178.12	T23S	R32.5E	13
HARN	649	4,035.70	198.00	20.38	T23S	R32.5E	13
HARN	648	233,381.28	199.00	1,172.77	T23S	R32.5E	13
HARN	564	5,487.71	35.00	156.79	T23S	R32.5E	13
HARN	651	3,622.52	200.00	18.11	T23S	R32.5E	14
HARN	50054	1,659.01	60.00	27.65	T23S	R32.5E	14
HARN	50514	2,156.94	32.00	67.40	T23S	R32.5E	14
HARN	657	5,010.39	253.00	19.80	T23S	R32.5E	24
		29,125.84	Average	186.15			
		3,593.91	Adjusted Average	62.82	HARN 648 is excluded from the average		
		4,035.70	Median	27.65			

Application: G-16820 (Nienke)

Log_County	Log_Num	Transmissivity (T) (feet2/day)	Open Interval (feet)	H_Conductivity (K) (feet/day)	Township	Range	Section
HARN	645	8,330.29	115.00	72.44	T23S	R32.5E	10
HARN	642	6,305.96	120.00	52.55	T23S	R32.5E	10
HARN	641	137.01	82.00	1.67	T23S	R32.5E	10
HARN	50491	381.29	7.00	54.47	T23S	R32.5E	15
		3,788.64	Average	45.28			
		5,005.85	Adjusted Average	59.82	HARN 641 is excluded from the average		
		3,343.63	Median	53.51			