PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date **27 August 2007**

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

SUBJECT: Application G- **16828** 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**: **Melissa J. Ward & Louis P. Molt** **County:** **Harney**

A1. Applicant(s) seek(s) (449 gpm) **1.00*** cfs from **1** well(s) in the **Malheur Lake** Basin, **Silvies** subbasin Quad Map: **Poison Creek**

A2. Proposed use: **Irrigation (primary 56.30 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 106**	**Pon #20**	**Sand, Gravel, Rock**	**1.00***	**22S/31E-sec 33 BAA**	**230' S, 2180' E fr NW cor S 33**
2						
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	**4182**	**54**	**44.7**	**10/11/68**	**425**	**0 - 20**	**+1 - 21**	**none**	**none**	**1100**	**86**	**P**

Use data from application for proposed wells.

A4. **Comments:**

Proposed pumping rate of 1.0 cfs (449 gpm) is more than the rate allowed for 56.3 acres (0.70 cfs, 315 gpm).

The proposed aquifer is sediment and rock. The well site is mapped as near but beyond the basin fill and alluvium in northern Harney Valley. Piper and others (1939) show sedimentary beds and rhyolite (Td) for the site with water occurring in coarse sediments and fractured rhyolite. Greene and others (1972) show show terrace gravel (QTtg) and welded tuff (Tdo) for the site. Walker (1979) shows volcanic, pyroclastic, and sedimentary rock (Tvs) for the site with water occurring in lower sections of volcanic rocks and sand and gravel interbeds.

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), see PSI analyses, see ground water elevation versus surface water elevation comments.**

A6. ☐ **Well(s) #** **N.A.** , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area:
Comments: **Currently, no administrative area.**

Application:, G- 16828 continued Date: 27 August 2007

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 site (HARN 106, owner well Pon #20) is in northwest Harney Valley, northeast of Burns, in the vicinity of Poison Creek Slough. The well appears to be in an area receiving recharge from surface water perched above ground water. The well site is mapped as near but beyond the basin fill and alluvium in northern Harney Valley. Piper and others (1939) show sedimentary beds and rhyolite (Td) for the site with water occurring in coarse sediments and fractured rhyolite. Greene and others (1972) show show terrace gravel (QTtg) and welded tuff (Tdo) for the site. Walker (1979) shows volcanic, pyroclastic, and sedimentary rock (Tvs) for the site with water occurring in lower sections of volcanic rocks and sand and gravel interbeds.

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in Harney Valley 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 are wells HARN 463 in T23S/R31E-sec 16 (about 3.5 miles to the south), and HARN 547 in T23S/R32E-sec 07 (about 4.6 miles to the southeast). Well HARN 463 appears to be in a recharge area, well HARN 547 does not. Both are in basin fill sediments downgradient of the applicant's well. The ground water level data for both is from 1960 to 2006. The ground water level trend at each site show seasonal and climatic influences. A possible net decline of less than 5 feet may have occurred at HARN 547, but not at HARN 463. Interestingly, no recovery of the annual trend is apparent at HARN 547 from 1996 to 1999 (a generally wetter than average period in Oregon), but is apparent at HARN 463. Seasonal ground water level fluctuations range from 10 to 40 feet. 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	**Sediments and Rock**	☐	☒
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation:

The well site is mapped as near but beyond the basin fill and alluvium in northern Harney Valley. Piper and others (1939) show sedimentary beds and rhyolite (Td) for the site with water occurring in coarse sediments and fractured rhyolite. Greene and others (1972) show show terrace gravel (QTtg) and welded tuff (Tdo) for the site. Walker (1979) shows volcanic, pyroclastic, and sedimentary rock (Tvs) for the site with water occurring in lower sections of volcanic rocks and sand and gravel interbeds.

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in the basin 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.

The well site appears to be in an area receiving recharge from surface water perched above ground water.

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	1	**Poison Creek & Slough**	**4137**	**4155**	**3,250**	☒	☐	☐	☐	☒
1	2	**Silvies River & tributaries**	**4137**	**4155**	**12,100**	☒	☐	☐	☐	☒
1	3	**Malheur & Harney Lakes**	**4137**	**4098**	**102,000**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation:

Ground water elevation data for the vicinity found in Piper and others (1939), Leonard (1970), and water well reports (well logs) indicate ground water elevations from 4135 to 4150 feet over multiple decades with seasonal fluctuations. In the vicinity of the proposed well, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast.

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. The distance is to the 1983 shoreline. The shoreline location can significantly vary.

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

POISON CR SL > NINEMILE SL – AT MOUTH
W FK SILVIES R > MALHEUR L – 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?
1	1	☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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:

This section is not applicable.

The distance from the proposed well to the nearest reach of Poison Creek & Slough is less than 1 mile (3,250 feet). However in the vicinity of the proposed well, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast.

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

Non-Distributed Wells													
Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	1	4.64%	4.90%	0.00%	0.07%	0.31%	0.71%	1.21%	1.77%	2.37%	3.00%	3.63%	4.22%
Well Q as CFS		0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Interference CFS		0.046	0.049	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042

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													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(A) = Total Interf.	0.046	0.049	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042
(B) = 80 % Nat. Q	1.43	4.59	11.30	25.20	14.80	7.49	1.74	0.69	0.49	0.42	0.51	0.90
(C) = 1 % Nat. Q	0.014	0.046	0.113	0.252	0.148	0.075	0.017	0.007	0.005	0.004	0.005	0.009
(D) = (A) > (C)	Yes	Yes	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
(E) = (A / B) x 100	3.22%	1.07%	0.00%	0.00%	0.02%	0.09%	0.69%	2.61%	4.90%	7.14%	7.06%	4.67%

(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:

The distance from the proposed well to the nearest reach of Poison Creek & Slough is less than 1 mile (3,250 feet). However in the vicinity of the proposed well and the nearest reach, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast like Silvies River.

Hunt (1999) was used to calculate the interference at Poison Creek & Slough. The values used for the calculations are for the nearby basin fill sediments, the geologic material where the ground water connection to surface water occurs. 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, 22, and 24 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 1870, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). The transmissivity derived from specific capacity data for the geologic material in the vicinity of the proposed well is similar. 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
1	2	4.64%	4.90%	0.00%	0.07%	0.31%	0.71%	1.21%	1.77%	2.37%	3.00%	3.63%	4.22%
Well Q as CFS		0.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00
Interference CFS		0.046	0.049	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042

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													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(A) = Total Interf.	0.046	0.049	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042
(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	0.15%	0.09%	0.00%	0.00%	0.00%	0.01%	0.03%	0.10%	0.18%	0.18%	0.14%	0.15%

(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:

The distance from the proposed well to the nearest reach of Silvies River is more than 1 mile (12,100 feet). However in the vicinity of the proposed well and nearest reach, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast like Poison Creek & Slough.

Hunt (1999) was used to calculate the interference at Silvies River. The values used for the calculations are for the nearby basin fill sediments, the geologic material where the ground water connection to surface water occurs. 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, 22, and 24 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 1870, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). The transmissivity derived from specific capacity data for the geologic material in the vicinity of the proposed well is similar. 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- 16828 continued   Date: 27 August 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
1	3	%	%	%	%	%	%	%	%	%	%	%	%
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 values used for the calculations are for the nearby basin fill sediments, the geologic material where the ground water connection to surface water occurs. 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, 22, and 24 (HARN 564, HARN 641, HARN 642, HARN 645, HARN 648, HARN 649, HARN 650, HARN 651, HARN 657, HARN 1870, HARN 50054, HARN 50491, HARN 50514, and HARN 51204). The transmissivity derived from specific capacity data for the geologic material in the vicinity of the proposed well is similar. Additionally, the calculation used an assumed intermediate storage coefficient (0.001). The estimated drawdown for continuous pumping at the full proposed rate ranged from less than 0.01 feet at the end of 90 days to about 0.10 feet at the end of 245 days. The estimated drawdown for continuous pumping at the full allowable rate ranged from less than 0.01 feet at the end of 90 days to about 0.07 feet at the end of 245 days. The estimated drawdown for a pro-rated pumping rate ranged from less than 0.01 feet at the end of 90 days to about 0.04 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.

The distance from the proposed well to the nearest reach of Poison Creek & Slough is less than 1 mile (3,250 feet). However in the vicinity of the proposed well and the nearest reach, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast like Silvies River.

The distance from the proposed well to the nearest reach of Silvies River is more than 1 mile (12,100 feet). However in the vicinity of the proposed well and nearest reach, surface water is perched above ground water. The ground water connection to surface water is not at the nearest reach, but about 14 miles southeast like Poison Creek & Slough.

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

The proposed well site (HARN 106, owner well Pon #20) is in northwest Harney Valley, northeast of Burns, in the vicinity of Poison Creek Slough. The well appears to be in an area receiving recharge from surface water perched above ground water. The well site is mapped as near but beyond the basin fill and alluvium in northern Harney Valley. Piper and others (1939) show sedimentary beds and rhyolite (Td) for the site with water occurring in coarse sediments and fractured rhyolite. Greene and others (1972) show show terrace gravel (QTtg) and welded tuff (Tdo) for the site. Walker (1979) shows volcanic, pyroclastic, and sedimentary rock (Tvs) for the site with water occurring in lower sections of volcanic rocks and sand and gravel interbeds.

Available data, including Piper and others (1939), Leonard (1970), and water well reports indicate ground water in the basin 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.

The well site appears to be in an area receiving recharge from surface water perched above ground water.

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 are wells HARN 463 in T23S/R31E-sec 16 (about 3.5 miles to the south), and HARN 547 in T23S/R32E-sec 07 (about 4.6 miles to the southeast). Well HARN 463 appears to be in a recharge area, well HARN 547 does not. Both are in basin fill sediments downgradient of the applicant's well. The ground water level data for both is from 1960 to 2006. The ground water level trend at each site show seasonal and climatic influences. A possible net decline of less than 5 feet may have occurred at HARN 547, but not at HARN 463. Interestingly, no recovery of the annual trend is apparent at HARN 547 from 1996 to 1999 (a generally wetter than average period in Oregon), but is apparent at HARN 463. Seasonal ground water level fluctuations range from 10 to 40 feet. 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.

Hunt, B., 1999, Unsteady stream depletion from ground water pumping: Ground Water, v. 37, no. 1, p. 98-102.

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

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 hydrographs: HARN 463 and HARN 547

OWRD water well reports: HARN 51204, HARN 650, HARN 649, HARN 648, HARN 564, HARN 651, HARN 50054, HARN 50514, HARN 657, HARN 106, HARN 121, HARN 126, HARN 50509, HARN 123, HARN 127, HARN 51140, HARN 51178, HARN 51179, HARN 51235, HARN 51236, HARN 51278, HARN 51279, HARN 120, HARN 119, HARN 122, HARN 128, HARN 50380, HARN 51144, HARN 129, HARN 51264, HARN 118, HARN 124, HARN 125, HARN 641, HARN 642, HARN 645, HARN 1870, HARN 50491, and HARN 51204

Application: G- 16828 continued Date: 27 August 2007

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 1 (Pon #20) **Logid:** HARN 106

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 July 13, 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

RECEIVED
NOV 20 1962
STATE ENGINEER
SALEM, OREGON

Warm 106

22/31-28

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM 10, OREGON within 30 days from the date of well completion.

WATER WELL REPORT
STATE OF OREGON
(Please type or print)

State Well No. .....
State Permit No. .....

(1) OWNER:
Name HARRY PON
Address BURNS OREGON

(2) LOCATION OF WELL:
Owners # 20
County HARNEY Driller's well number
Owners # Section 28 T. 23S R. 31E W.M.
Bearing and distance from section or subdivision corner
500 Yds West of BURNS JOHN DAY HIGHWAY

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(6) CASING INSTALLED:
Threaded ☐ Welded ☒
12 " Diam. from -1 ft. to 21' ft. Gage 1/4
" Diam. from ..... ft. to ..... ft. Gage .....
" Diam. from ..... ft. to ..... ft. Gage .....

(7) PERFORATIONS:
Perforated? ☐ Yes ☒ No
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from None ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(8) SCREENS:
Well screen installed ☐ Yes ☒ No
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(9) CONSTRUCTION:
Well seal—Material used in seal Set in Rock Clay
Depth of seal 20' ft. Was a packer used? ☒ No
Diameter of well bore to bottom of seal 20 in.
Were any loose strata cemented off? ☐ Yes ☒ No Depth .....
Was a drive shoe used? ☒ Yes ☐ No
Was well gravel packed? ☐ Yes ☒ No Size of gravel: .....
Gravel placed from ft. to ft.
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? Depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 54 ft. below land surface Date 10-22-62
Artesian pressure lbs. per square inch Date

(11) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? DRILLER
Yield: 1100 gal./min. with 86 ft. drawdown after 8 hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 60° Was a chemical analysis made? ☐ Yes ☒ No

(12) WELL LOG:
Diameter of well below casing 11 3/4
Depth drilled 425 ft. Depth of completed well 420 ft.
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
SANDY LOAM	0	6
CLAY	6	19
ROCK BLACK HARD	19	44
CLAY	44	54
GRAVEL + SAND some WATER	54	58
CLAY BROWN	58	360
ROCK HARD + BLACK	360	388
ROCK RED PORCUS	388	393
ROCK HARD BLACK	393	420
ROCK CREVICE LOOSE ROCK	420	425

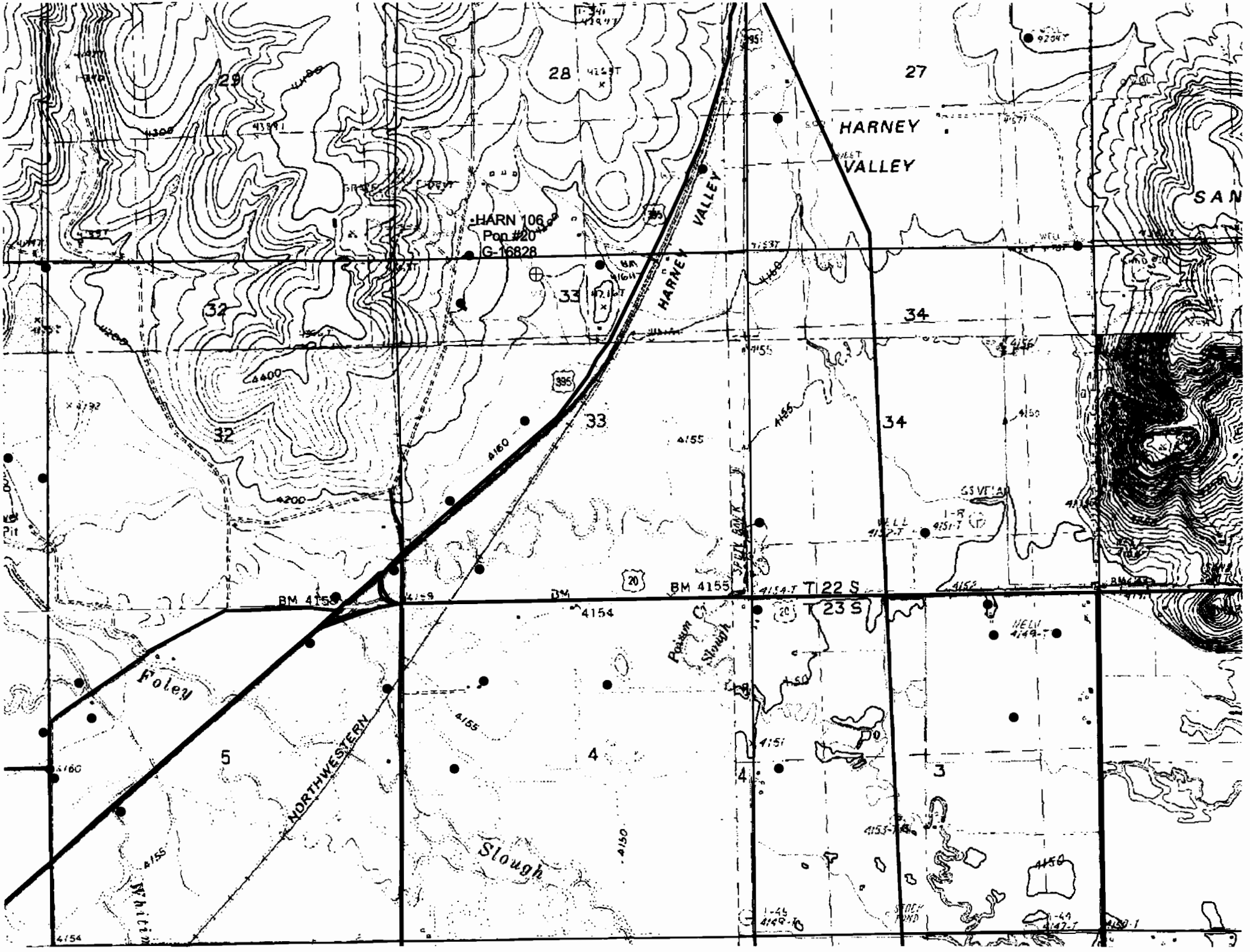
Work started 9-30 19 62 Completed 10-22 19 62
Date well drilling machine moved off of well 10-22 19 62

(13) PUMP:
Manufacturer's Name .....
Type: ..... H.P. .....

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

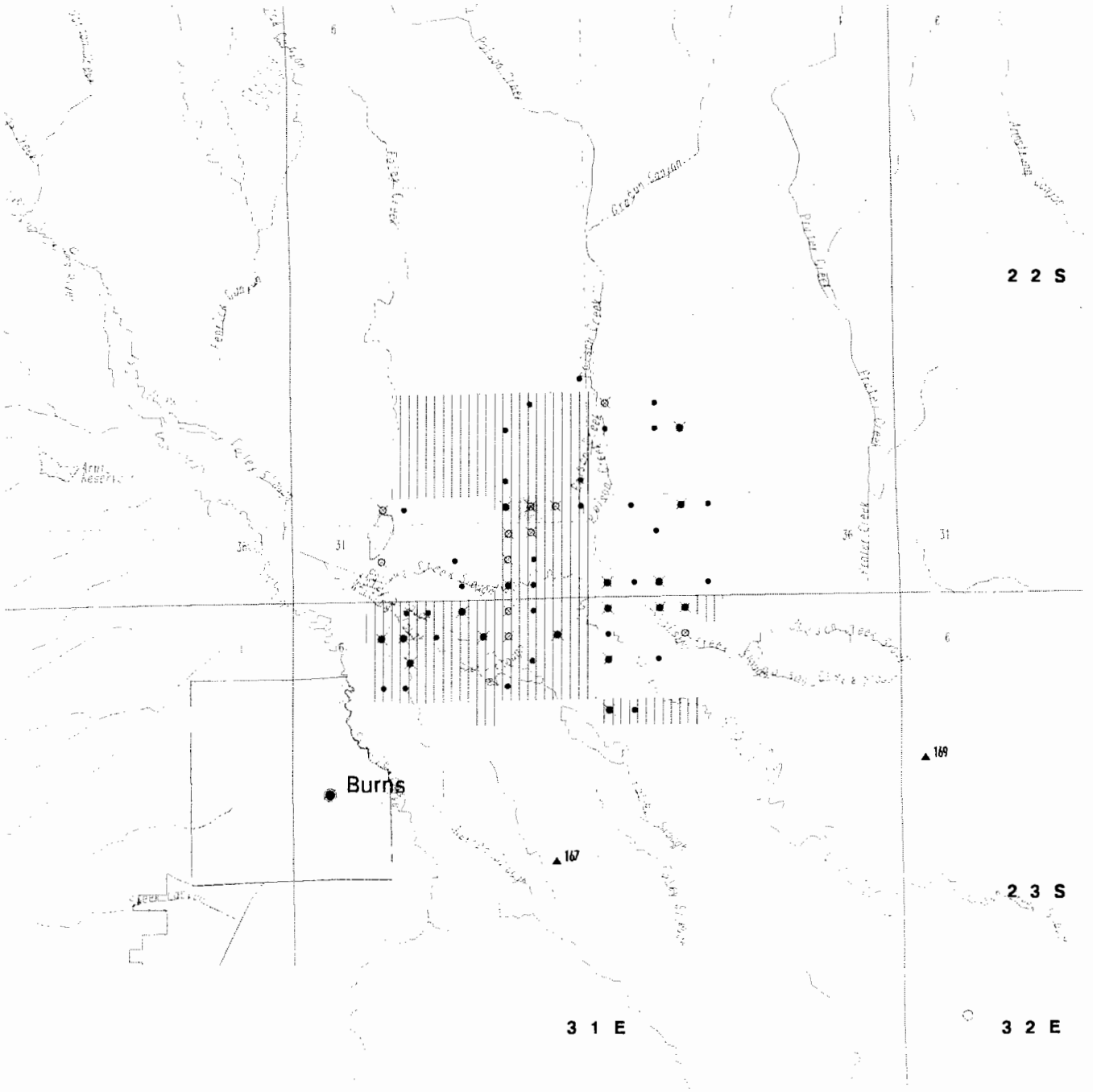
NAME Holloway Drilling Co
(Person, firm or corporation) (Type or print)
Address ONTARIO ORE
Drilling Machine Operator's License No. 100
[Signed] Max Holloway
(Water Well Contractor)
Contractor's License No. 16 Date 11-17, 1962

(USE ADDITIONAL SHEETS IF NECESSARY)


HARN 106
Pop #20
G-16828
HARNEY VALLEY
HARNEY VALLEY
SAN
28
27
29
32
33
34
5
4
3
T 22 S
T 23 S
BM 4155
BM 4154
Foley
NORTHWESTERN
Slough
Poison Cr.
Slough
Whitin
395
20

Wells in the vicinity of application G 16828

- 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 16828

ABANDON:	0
RECONDITIONED:	7
REPAIRED:	0
CONVERSION:	0
DEEPENINGS:	3
NEW CONSTRUCT:	107

COMMUNITY USE:	0
DOMESTIC USE:	55
INDUSTRIAL USE:	0
INJECTION USE:	0
IRRIGATION USE:	42
THERMAL USE:	0
LIVESTOCK USE:	12

****

PERMITTED WELLS WITHIN 1 MILE OF APPLICATION G 16828

$RECNO	APPLICATION	PERMIT	CLAIM		LOC-QQ	USE_CODE
1					22.00S31.00E27NWNW	
2					22.00S31.00E27SENE	
3					22.00S31.00E34NENE	
4					22.00S31.00E33NWNE	
5	G 16828		0	0	22.00S31.00E33NENW	IR
6					22.00S31.00E33NWNW	
7					22.00S31.00E31NENE	
8					22.00S31.00E33SENW	
9					22.00S31.00E33SWNW	
10					22.00S31.00E33NWSW	
11					22.00S31.00E31NESE	
12					22.00S31.00E34SWSE	
13					22.00S31.00E34SWSW	
14					22.00S31.00E33SWSW	
15					23.00S31.00E 3NENE	
16					23.00S31.00E 3NWNE	
17					23.00S31.00E 3NWNW	
18					23.00S31.00E 4NWNW	
19					23.00S31.00E 5NWNE	
20					23.00S31.00E 3SENE	
21					23.00S31.00E 4SWNE	
22					23.00S31.00E 4SWNW	
23					23.00S31.00E 5SENE	
24					23.00S31.00E 5SWNW	
25					23.00S31.00E 6SENE	
26					23.00S31.00E 3NWSW	
27					23.00S31.00E 5NWSW	
28					23.00S31.00E10NWNW	

****

CONDITIONED WELLS WITHIN 5 MILES OF APPLICATION G 16828

$RECNO	APPLICATION	PERMIT	LOC-QQ	CONDITION-CODE
1	G 13201	G 11830	23.00S32.00E30NWNE	4IG
1	G 13201	G 11830	23.00S32.00E30NWNE	4IR

****

APPLICATION G 16828 FALLS WITHIN THESE QUAD(S)

POISON CREEK
****

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	4143
Primary use of well	not determined

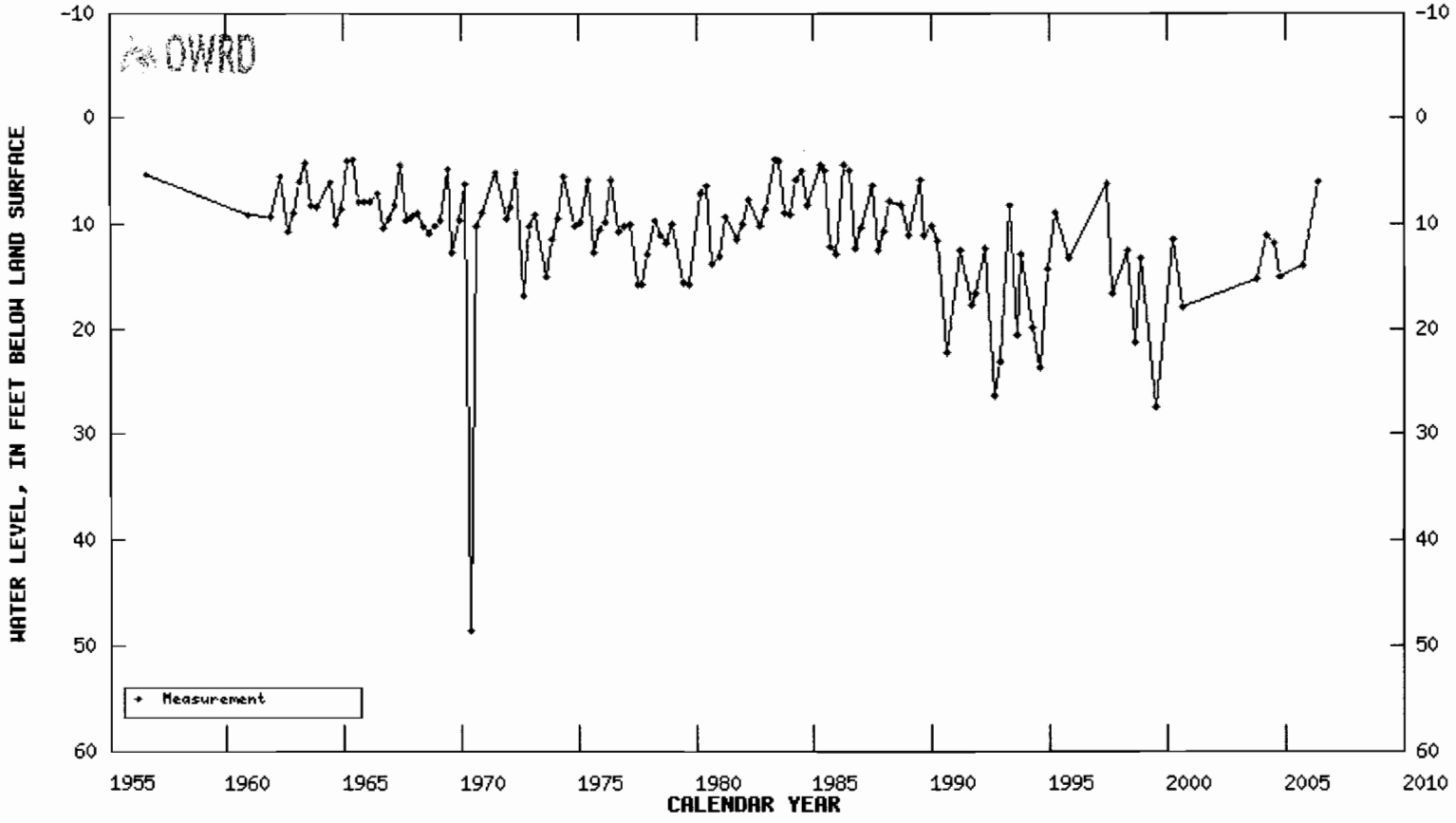


Table showing water-level data for State Well HARN 463, State Observation Well # 167

Well Location	23.00S32.00E7CAB
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	4134
Primary use of well	not determined

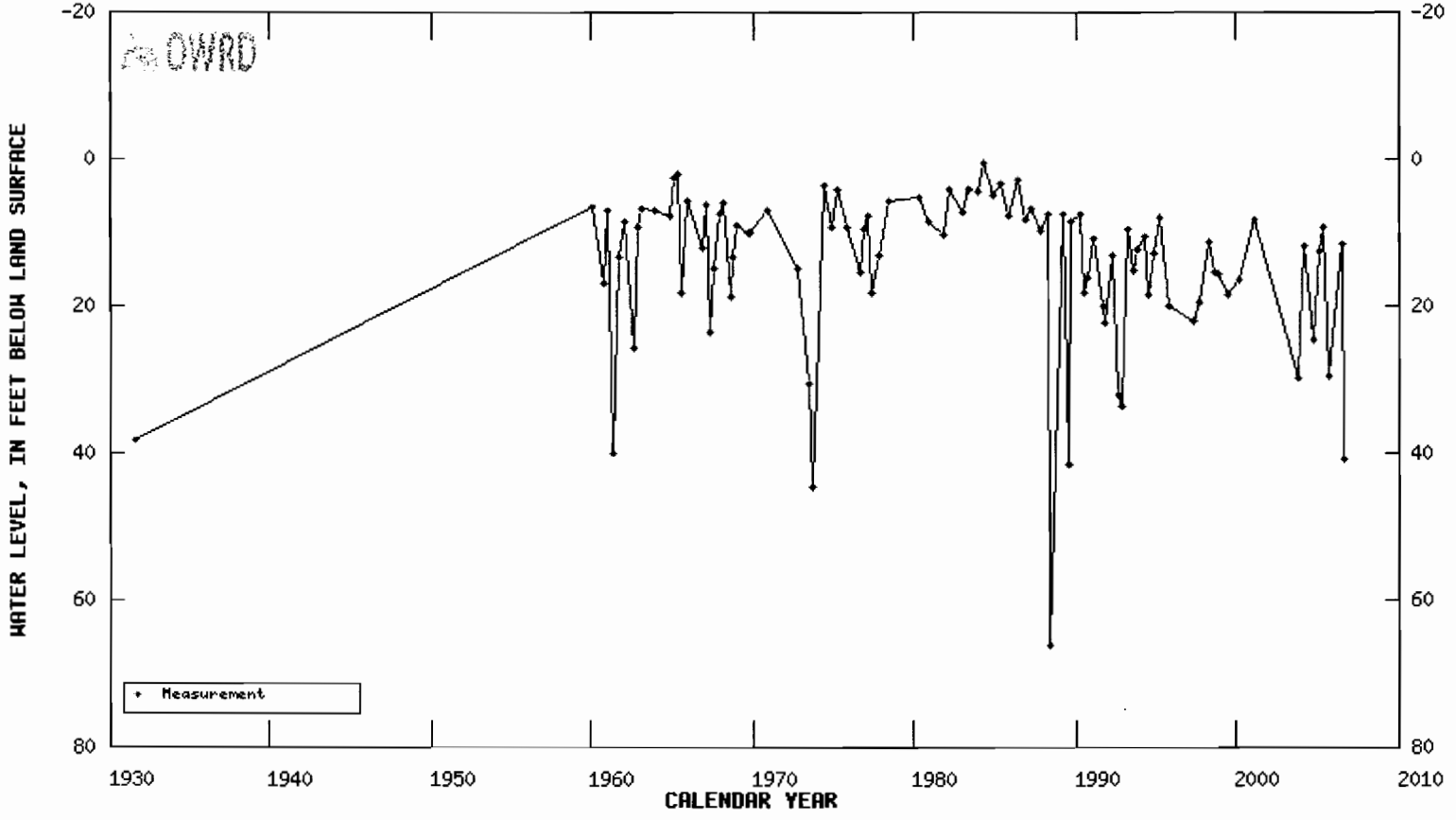
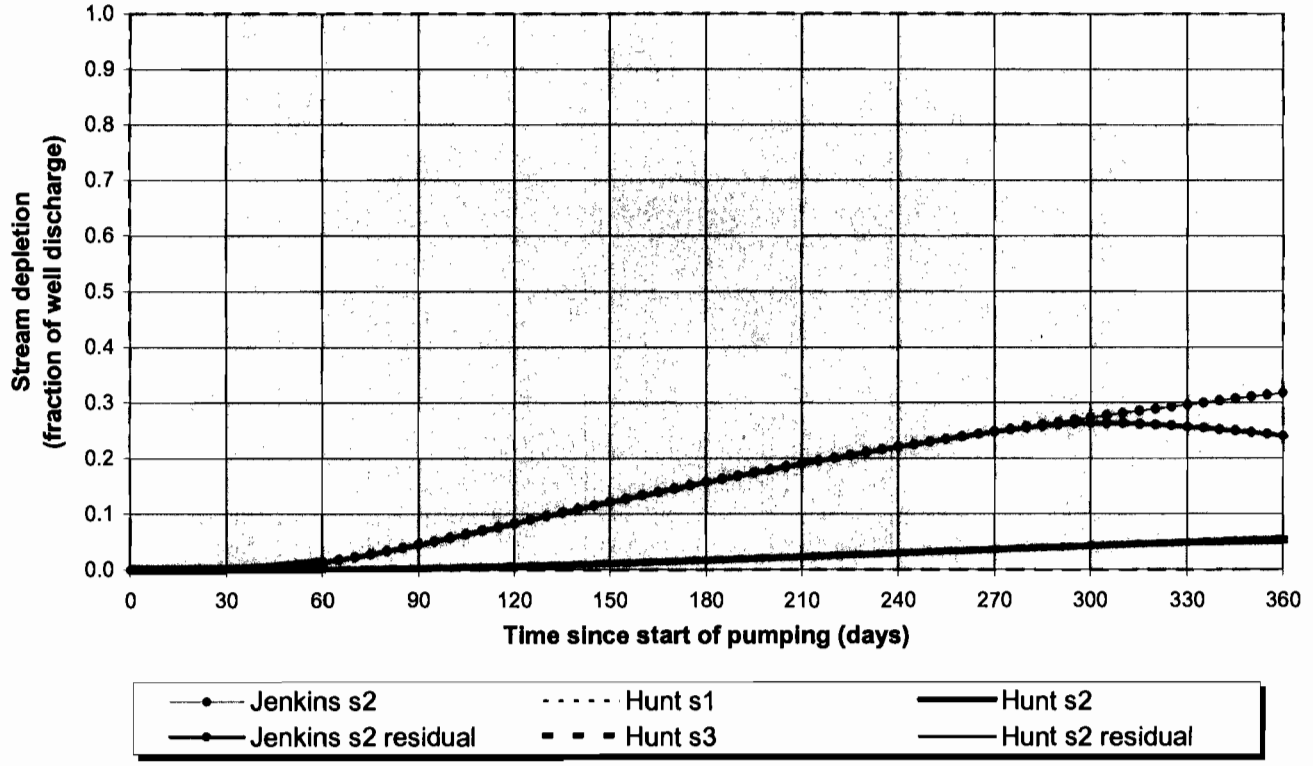


Table showing water-level data for State Well HARN 547, State Observation Well # 169

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

Proposed Well (G-16828) to Poison Creek & Slough



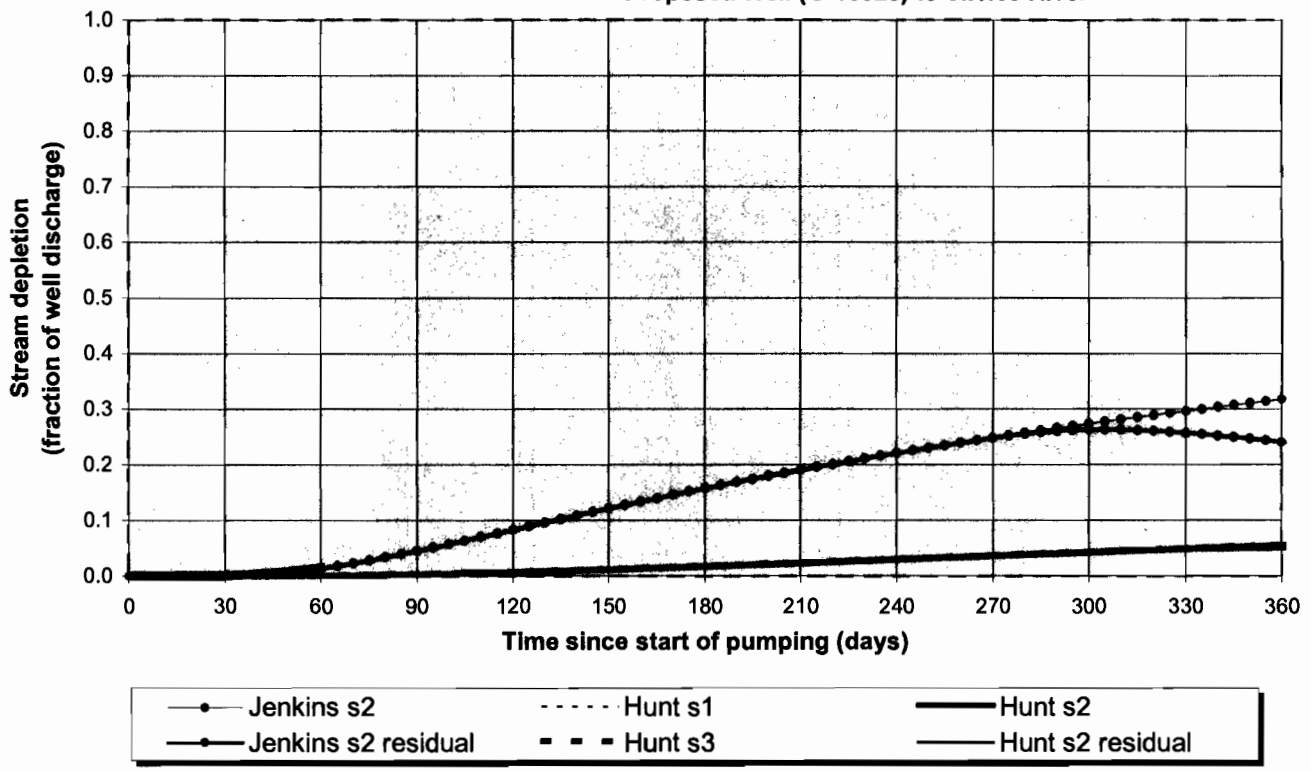
Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 245 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.0000	0.0007	0.0031	0.0071	0.0121	0.0177	0.0237	0.0300	0.0363	0.0422	0.0464	0.0490
Qw, cfs	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
H SD s2, cfs	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042	0.046	0.049

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	1	1	1	cfs
Distance to stream	a	73500	73500	73500	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	720.3	720.3	720.3	days
Streambed factor (Hunt)	sbf	0.784	0.784	0.784	

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

Proposed Well (G-16828) 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	0.0000	0.0007	0.0031	0.0071	0.0121	0.0177	0.0237	0.0300	0.0363	0.0422	0.0464	0.0490
Qw, cfs	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
H SD s2, cfs	0.000	0.001	0.003	0.007	0.012	0.018	0.024	0.030	0.036	0.042	0.046	0.049

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	1	1	1	cfs
Distance to stream	a	73500	73500	73500	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	720.3	720.3	720.3	days
Streambed factor (Hunt)	sbf	0.784	0.784	0.784	

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-16828 owner well Pon #20 (HARN 106) to Malheur and Harney Lakes												
56,103.90	7,500.00	0.00100	448.83	1.00	30.00	102,000.00	3.14	11.5600	-12.9689	-11.8890	Continuous Pumping at Proposed Full Rate	u limit exceeded
56,103.90	7,500.00	0.00100	448.83	1.00	60.00	102,000.00	3.14	5.7800	0.0005	0.0004	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	90.00	102,000.00	3.14	3.8533	0.0045	0.0041	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	120.00	102,000.00	3.14	2.8900	0.0150	0.0138	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	150.00	102,000.00	3.14	2.3120	0.0320	0.0293	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	180.00	102,000.00	3.14	1.9267	0.0541	0.0496	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	210.00	102,000.00	3.14	1.6514	0.0801	0.0734	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	240.00	102,000.00	3.14	1.4450	0.1086	0.0995	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	448.83	1.00	245.00	102,000.00	3.14	1.4155	0.1135	0.1041	Continuous Pumping at Proposed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	30.00	102,000.00	3.14	11.5600	-12.9689	-8.3668	Continuous Pumping at Allowed Full Rate	u limit exceeded
56,103.90	7,500.00	0.00100	315.86	0.70	60.00	102,000.00	3.14	5.7800	0.0005	0.0003	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	90.00	102,000.00	3.14	3.8533	0.0045	0.0029	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	120.00	102,000.00	3.14	2.8900	0.0150	0.0097	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	150.00	102,000.00	3.14	2.3120	0.0320	0.0206	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	180.00	102,000.00	3.14	1.9267	0.0541	0.0349	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	210.00	102,000.00	3.14	1.6514	0.0801	0.0517	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	240.00	102,000.00	3.14	1.4450	0.1086	0.0701	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	315.86	0.70	245.00	102,000.00	3.14	1.4155	0.1135	0.0732	Continuous Pumping at Allowed Full Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	30.00	102,000.00	3.14	11.5600	-12.9689	-4.1323	Pro-Rated Pumping Rate	u limit exceeded
56,103.90	7,500.00	0.00100	156.00	0.35	60.00	102,000.00	3.14	5.7800	0.0005	0.0001	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	90.00	102,000.00	3.14	3.8533	0.0045	0.0014	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	120.00	102,000.00	3.14	2.8900	0.0150	0.0048	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	150.00	102,000.00	3.14	2.3120	0.0320	0.0102	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	180.00	102,000.00	3.14	1.9267	0.0541	0.0173	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	210.00	102,000.00	3.14	1.6514	0.0801	0.0255	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	240.00	102,000.00	3.14	1.4450	0.1086	0.0346	Pro-Rated Pumping Rate	
56,103.90	7,500.00	0.00100	156.00	0.35	245.00	102,000.00	3.14	1.4155	0.1135	0.0362	Pro-Rated Pumping Rate	