

March 23, 2015

[illegible]

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date March 23, 2015

FROM: Groundwater Section Aurora C. Bouchier / Karl C. Wozniak
Reviewer's Name

SUBJECT: Application G- 17965 Supersedes review of _____
Date of Review(s)

PUBLIC INTEREST PRESUMPTION; GROUNDWATER

OAR 690-310-130 (1) *The Department shall presume that a proposed groundwater use will ensure the preservation of the public welfare, safety and health as described in ORS 537.525. Department staff review groundwater 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: Paul Kuschnick County: Marion

A1. Applicant(s) seek(s) 0.945 cfs (424 gpm) from 2 well(s) in the Willamette Basin,
Molalla-Pudding subbasin Quad Map: Silverton and Gervais

A2. Proposed use: Nursery irrigation of 37.8 acres Seasonality: November 1 – February 28/29

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	MARI 2881	1	Alluvium	0.780	T5S/R2W-36 NE-SE	2140' N, 990' W fr SE cor S 36
2	Proposed	2	Alluvium		T5S/R2W-36 NE-SE	2090' N, 990' W fr SE cor S 36
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	173		19	4/3/1952	123		0-123		111-123	350	75	
2	173				120-250					424		

Use data from application for proposed wells.

A4. **Comments:** MARI 2881 is an existing well. MARI 2881 is perforated from 111-123 ft below land surface. The application specifies a rate for the existing well. Rather than assign the remaining rate to the proposed well, this review evaluates the maximum rate against each well. The purpose of this application is to provide the applicant with water for nursery use between November and February, months not covered under GR-124.

A5. ☐ **Provisions of the Willamette** Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water ☐ are, or ☒ are not, activated by this application. (Not all basin rules contain such provisions.)
Comments: The wells are greater than ¼ mile from a surface water source, and will produce from a confined aquifer, so the pertinent rules (OAR 690-502-2040) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: _____
Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1. Based upon available data, I have determined that groundwater* 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 groundwater 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 groundwater 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 groundwater resource; or
- d. ☒ will, if properly conditioned, avoid injury to existing groundwater rights or to the groundwater resource:
 - i. ☒ The permit should contain condition #(s) 7C, Large water use reporting;
 - 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 groundwater production from no deeper than _____ ft. below land surface;
 - b. ☐ Condition to allow groundwater production from no shallower than _____ ft. below land surface;
 - c. ☒ Condition to allow groundwater production only from the alluvial aquifer groundwater 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 Groundwater 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. **Groundwater availability remarks:** The applicant's wells are located in an area that contains low-permeability saturated silt and clay from land surface to a depth of approximately 100 feet. A 60-80 feet thick package of sand and gravel underlies the low permeability silt. Underlying the sand and gravel is a >1000 feet thick sequence of mostly fine-grained alluvium with thin beds of sand and gravel (Gannett and Caldwell, 1998).

The existing well, MARI 2881, produces from layers of sand and gravel from 111-123.5 ft below land surface (bls), or 50-62 ft above mean sea level (amsl). This productive zone is below the elevation of the adjacent reach of Farmers Creek (~124-148 ft amsl), Sam Brown Creek (~123-155 ft amsl), and the Pudding River (~120-122 ft amsl).

Two nearby observation wells, MARI 3054 and MARI 2666, suggest that groundwater levels are reasonably stable in this area. Because of uncertainties about the stability of the resource, annual water level measurements are recommended (permit condition 7C) to assess the health of the ground-water system over time.

C. GROUNDWATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040**C1. 690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	Alluvium	☒	☐
2	Alluvium	☒	☐
		☐	☐

Basis for aquifer confinement evaluation: The aquifer is overlain by about 100 feet of saturated, fine-grained Willamette Silt (Gannett and Caldwell, 1998). This is consistent with the information on the well log for MARI 2881, which shows a static water level approximately 90 feet above the top of the first productive layer at 111 feet below ground surface.

C2. 690-09-040 (2) (3): Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected?			Potential for Subst. Interfer. Assumed?	
						YES	NO	ASSUMED	YES	NO
1	1	Farmers Creek	140	124-148	1980	☒	☐	☐	☐	☒
2	1	Farmers Creek	140	124-148	1930	☒	☐	☐	☐	☒
1	2	Pudding River	140	120-122	~7800	☒	☐	☐	☐	☒
2	2	Pudding River	140	120-122	~7800	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Published water-table maps indicate that groundwater in the alluvial aquifer flows toward, and discharges to, the Pudding River and its perennial tributaries (Woodward et al., 1998 Plate 1, and Conlon et al., 2005, Plate 1). Head data from MARI 2881 and nearby wells corroborate this. However, there is a thick layer of low permeability Willamette Silt between the aquifer and the bottom of the surface water bodies, so the connection is likely inefficient. Farmers Creek and Sam Brown Creek join together and enter the Pudding River as a single tributary, therefore they are treated as a single entity for this analysis.

Water Availability Basin the well(s) are located within: 151 (Pudding R > Molalla R - ab Mill Cr).

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	☐	☐			☐	67.30	☒	<<25%	☒
2	1	☐	☐			☐	67.30	☒	<<25%	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: Due to the proximity of the wells (proposed at 50 feet from one another), it was determined that differences in model results are negligible. Therefore, the well closer to the streams (well 2) was modeled at the full rate. The stream depletion at 30 days was estimated using the Hunt 2003 model. The presence of low permeability Willamette Silt between the aquifer and the beds of the streams result in an inefficient connection between the aquifer and the streams. Therefore, the stream depletion at 30 days is << 25%.

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
2	2	0.15 %	0.16 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.15 %	0.15 %
Well Q as CFS		0.945	0.945	0	0	0	0	0	0	0	0	0.945	0.945
Interference CFS		0.001	0.001	0	0	0	0	0	0	0	0	0.001	0.001
(A) = Total Interf.		0.001	0.001	0	0	0	0	0	0	0	0	0.001	0.001
(B) = 80 % Nat. Q		1040	1180	1010	787	425	224	109	71	67.3	91.6	363	957
(C) = 1 % Nat. Q		10.4	11.8	10.1	7.87	4.25	2.24	1.09	0.71	0.673	0.916	3.63	9.57
(D) = (A) > (C)													
(E) = (A / B) x 100		.0001 %	.00008 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	.00028 %	.0001 %

(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: A simulation with the Hunt 2003 model indicates that monthly interference during the first year of pumping will be much less than 1% of the 80% exceedance flows of the Pudding River in all months.

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 groundwater use under this permit can be regulated if it is found to substantially interfere with surface water:

- ☐ The permit should contain condition #(s) _____;
- ☐ The permit should contain special condition(s) as indicated in "Remarks" below;

C6. **SW / GW Remarks and Conditions** In the area surrounding the wells, about 100 feet of Willamette Silt overly the alluvium aquifer (Gannett and Caldwell, 1998). The Pudding River and other small streams are not completely incised through the Willamette Silt. In general, the silt has a low vertical hydraulic conductivity that will lower the efficiency the interchange of water between these streams and the alluvial aquifer.

References Used:

Conlon, T. D., Wozniak, K. C., Woodcock, D., Herrera, N.B., Fischer, B.J. Morgan, D.S., Lee, K.K., and Hinkle, S.R., 2005, Ground-Water Hydrology of the Willamette Basin, Oregon: U. S. Geological Survey Scientific Investigations Report 2005-5168.

Gannett, Marshall W., and Caldwell, Rodney R., 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-A.

Herra, N. B., Burns, E. R., and Conlon, T. D, 2014, Simulation of groundwater flow and the interaction of groundwater and surface water in the Willamette Basin and Central Willamette subbasin, Oregon: U.S. Geological Survey Scientific Investigations Report 2014-5136, 152 p., <http://dx.doi.org/10.3133/sir20155136>.

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

Woodward, Dennis B.G., Gannett, Marshall W., and Vaccaro, John J., 1998 Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-B.

Nearby well logs and water level data, especially MARI 2881, MARI 18128, MARI 3054, MARI 2666 and MARI 19059.

D. WELL CONSTRUCTION, OAR 690-200

D1. Well #: 1 Logid: MARI 2881

D2. **THE WELL does not appear to 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 or other comment is described as follows:** No seal evident in the well log.

D4. ☒ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

STATE ENGINEER
Salem, Oregon

2881
MAR1.....

Well Record

STATE WELL NO. 5/2W-36J(1)
COUNTY Marion
APPLICATION NO. GR-124

OWNER: Peter Pranti MAILING ADDRESS:

LOCATION OF WELL: Owner's No. 1 CITY AND STATE: Gervais, Oregon

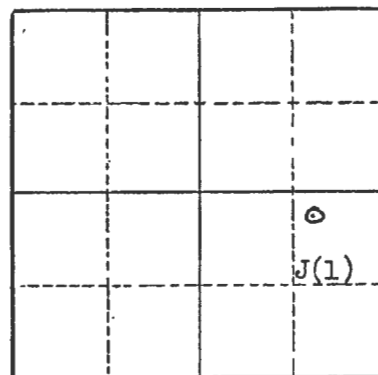
NE 1/4 SE 1/4 Sec. 36 T. 5 N. S. R. 2 E. W. M.

Bearing and distance from section or subdivision corner 787' N. & 383' E. from SE cor. of NE 1/4 SE 1/4

Altitude at well 170' Interpolated

TYPE OF WELL: Drilled Date Constructed 3/1/52

Depth drilled 123 Depth cased 123



Section 36

CASING RECORD:

10 inch casing set from 0 to 123 feet

FINISH:

8 perforations to the row 8" apart from 111 to 123 feet

AQUIFERS:

Sand and gravel from 111 to 123 feet

WATER LEVEL:

19 feet below land surface 4/3/52

PUMPING EQUIPMENT: Type Peerless turbine H.P. 15
Capacity 300 G.P.M.

WELL TESTS:

Drawdown 49 ft. after 250 hours G.P.M.
Drawdown 75 ft. after 350 hours G.P.M.

USE OF WATER Irrigation 63 acres Temp. °F. 19

SOURCE OF INFORMATION Registration Statement GR-124

DRILLER or DIGGER

ADDITIONAL DATA:

Log ☒ Water Level Measurements ☐ Chemical Analysis ☐ Aquifer Test ☐

REMARKS:

STATE ENGINEER
Salem, Oregon

State Well No. 5/2W-36J(1)
County Marion
Application No. GR-124

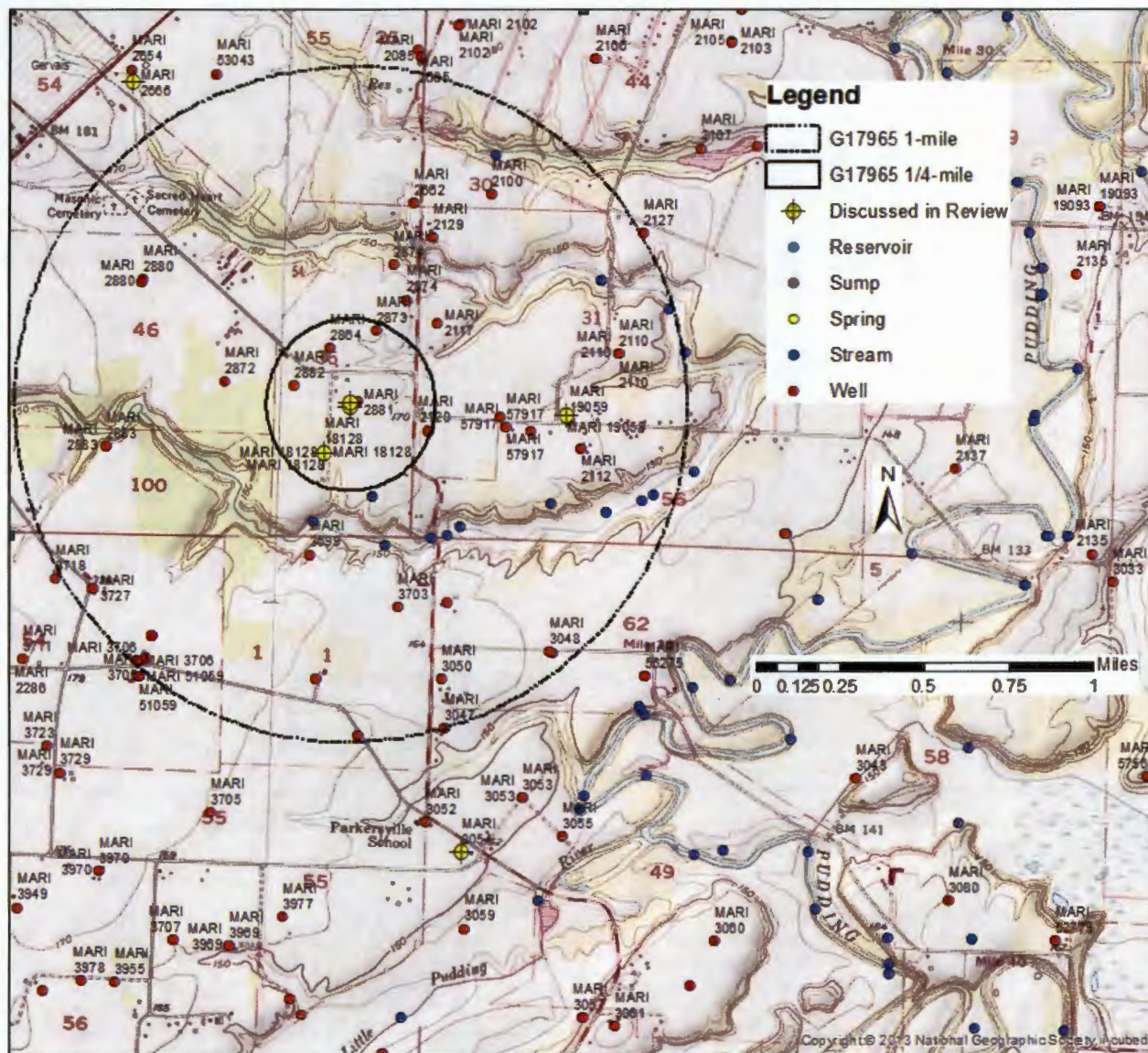
Well Log

Owner: Peter Prantl Owner's No. 1

Driller: Roy Perkins Date Drilled 3/1/52

[illegible]

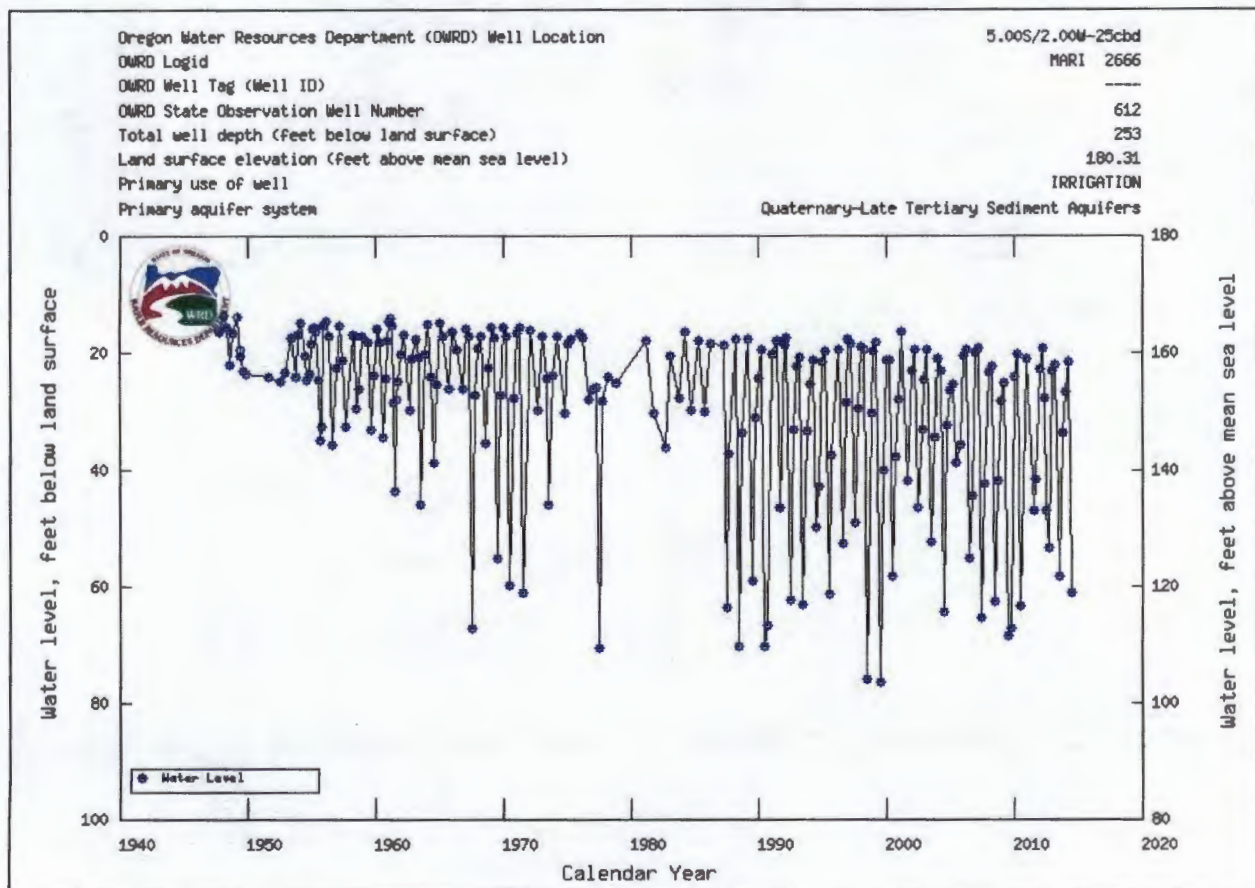
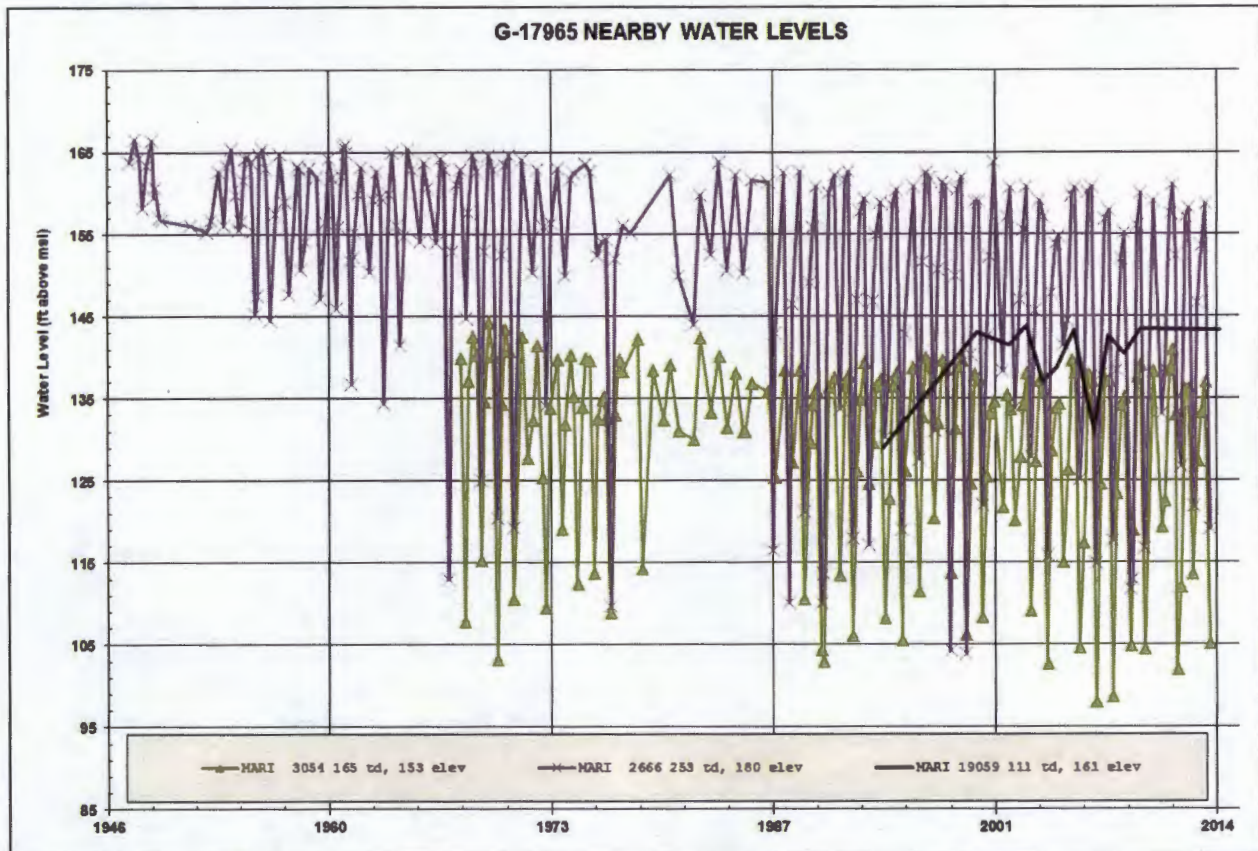
Location Map

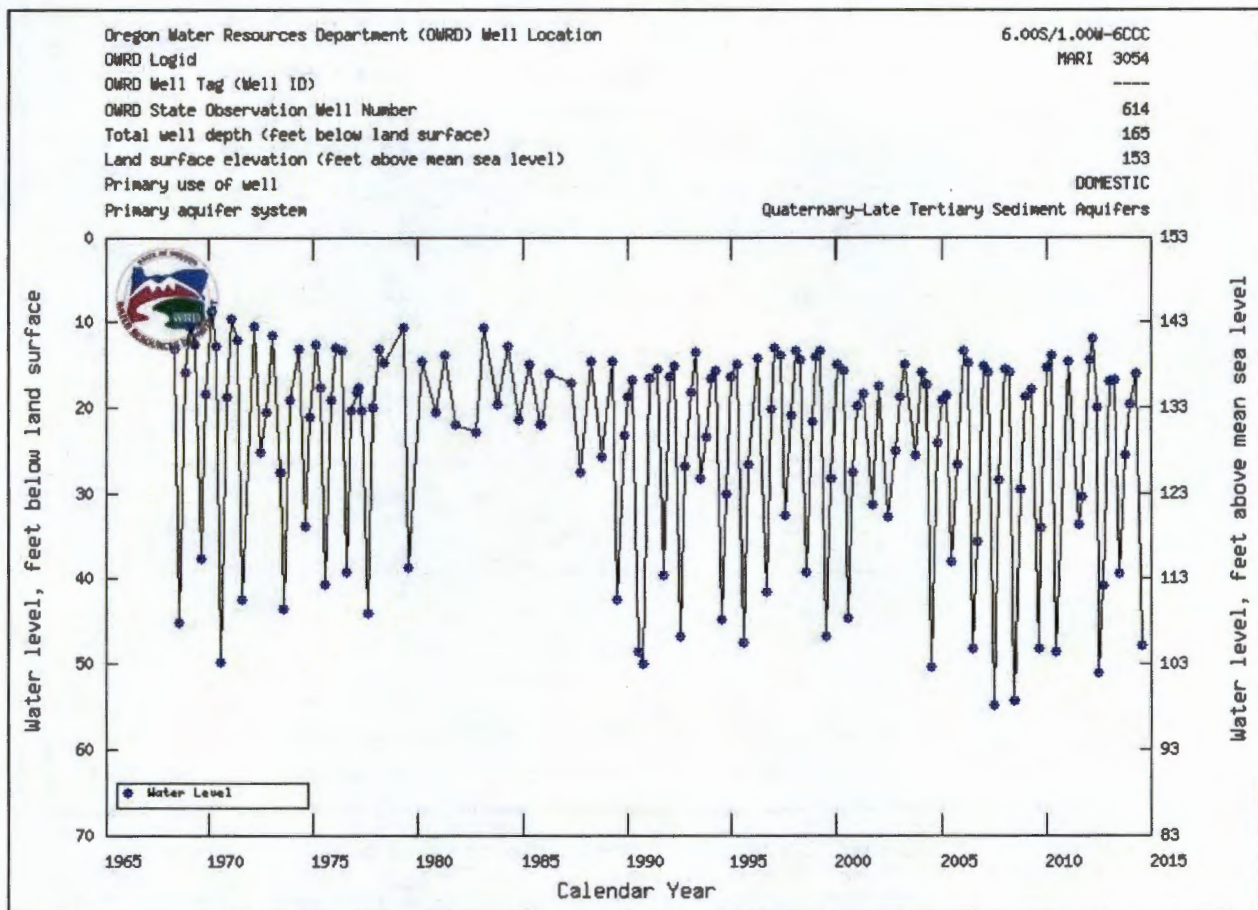


Water Availability Tables

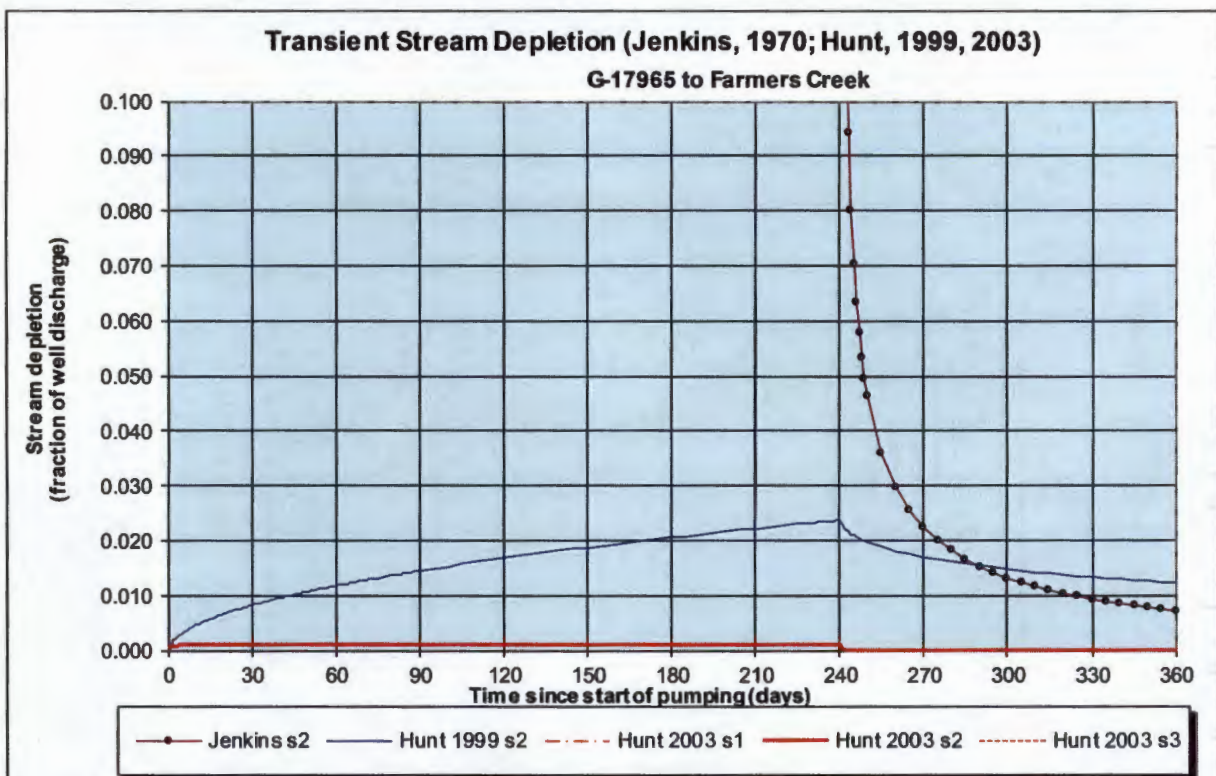
DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION						
Watershed ID #: 151		PUDDING R > MOLALLA R - AB MILL CR			Exceedance Level: 80	
Time: 10:15 AM		Basin: WILLAMETTE			Date: 03/20/2015	
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	1,040.00	125.00	915.00	0.00	36.00	879.00
FEB	1,180.00	115.00	1,070.00	0.00	36.00	1,030.00
MAR	1,010.00	79.90	930.00	0.00	36.00	894.00
APR	787.00	55.70	731.00	0.00	36.00	695.00
MAY	425.00	52.70	372.00	0.00	36.00	336.00
JUN	224.00	72.90	151.00	0.00	36.00	115.00
JUL	109.00	113.00	-4.01	0.00	36.00	-40.00
AUG	71.00	93.30	-22.30	0.00	36.00	-58.30
SEP	67.30	54.30	12.80	0.00	36.00	-23.20
OCT	91.60	14.00	77.60	0.00	36.00	41.60
NOV	363.00	48.60	314.00	0.00	36.00	278.00
DEC	957.00	119.00	838.00	0.00	36.00	802.00
ANN	706,000	56,900	649,000	0	26,100	625,000

Water Level Trends





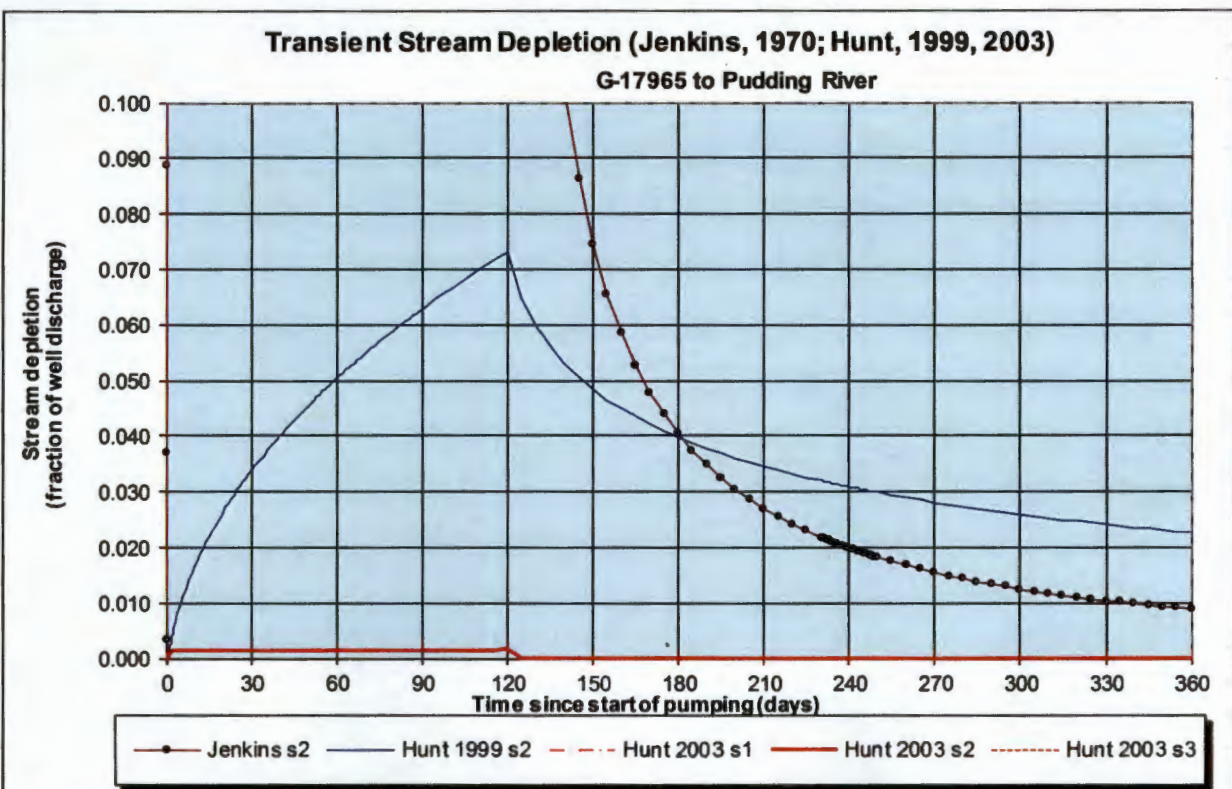
Stream Depletion Model Result

**Output for Stream Depletion, Scenerio 2 (s2):**

Time pump on (pumping duration) = 240 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	96.6%	97.6%	98.1%	98.3%	98.5%	98.6%	98.7%	98.8%	2.2%	1.3%	0.9%	0.7%
H SD 1999	0.8%	1.2%	1.4%	1.7%	1.9%	2.1%	2.2%	2.4%	1.7%	1.5%	1.3%	1.2%
H SD 2003	0.09%	0.09%	0.09%	0.09%	0.09%	0.09%	0.10%	0.10%	0.01%	0.01%	0.01%	0.01%
Qw, cfs	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945
H SD 99, cfs	0.008	0.011	0.014	0.016	0.018	0.019	0.021	0.022	0.016	0.014	0.013	0.012
H SD 03, cfs	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	424.00	424.00	424.00	gpm
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	1930	1930	1930	ft
Well depth	d	123.5	123.5	123.5	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	70	70	70	ft
Aquifer transmissivity	T	3500	3500	3500	ft ² /day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	80	80	80	ft
Aquitard thickness below stream	babs	60	60	60	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	10	10	10	ft
Streambed conductance (lambda)	sbc	0.001667	0.001667	0.001667	ft/day
Stream depletion factor	sdf	0.106426	0.106426	0.106426	days
Streambed factor	sbf	0.000919	0.000919	0.000919	
input #1 for Hunt's Q_4 function	t'	9.396225	9.396225	9.396225	
input #2 for Hunt's Q_4 function	K'	0.133032	0.133032	0.133032	
input #3 for Hunt's Q_4 function	epsilon'	0.000500	0.000500	0.000500	
input #4 for Hunt's Q_4 function	lamda'	0.000919	0.000919	0.000919	



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 120 days							
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	86.5%	90.4%	92.2%	93.2%	7.4%	4.0%	2.7%	2.0%	1.5%	1.2%	1.0%	0.9%	
H SD 1999	3.4%	5.0%	6.3%	7.3%	4.8%	4.0%	3.5%	3.1%	2.8%	2.6%	2.4%	2.3%	
H SD 2003	0.15%	0.15%	0.15%	0.16%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	
Qw, cfs	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	0.945	
H SD 99, cfs	0.032	0.048	0.059	0.069	0.046	0.038	0.033	0.029	0.027	0.024	0.023	0.021	
H SD 03, cfs	0.001	0.001	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	424.00	424.00	424.00	gpm
Time pump on (pumping duration)	tpon	120	120	120	days
Perpendicular from well to stream	a	7800	7800	7800	ft
Well depth	d	250	250	250	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	70	70	70	ft
Aquifer transmissivity	T	3500	3500	3500	ft ² /day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	80	80	80	ft
Aquitard thickness below stream	babs	60	60	60	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	50	50	50	ft
Streambed conductance (lambda)	sbc	0.008333	0.008333	0.008333	ft/day
Stream depletion factor	sdf	1.738286	1.738286	1.738286	days
Streambed factor	sbf	0.018571	0.018571	0.018571	
input #1 for Hunt's Q_4 function	t'	0.575279	0.575279	0.575279	
input #2 for Hunt's Q_4 function	K'	2.172857	2.172857	2.172857	
input #3 for Hunt's Q_4 function	epsilon'	0.000500	0.000500	0.000500	
input #4 for Hunt's Q_4 function	lamda'	0.018571	0.018571	0.018571	

G-17965 Kuschnick

R2W R1W
26 25 30
35 30 31
2 6

FARMERS CR ~1980
SAM BROWN CR. ~2470
PUDDING R. ~7800

SW ELEVATION
12'-148
123-155
120-122

WIDTH
10
10
50

TSS TOS

RELATIVE ELEVATION PROFILES

Elevation, mean sea level (Ft)

150 -
100 -
50 -

"Top Sol"
"Shale"
Silt/Gl
"Shale"
GR
SA+GR
GR "light"

WATER BEARING

FARMERS CREEK
SAM BROWN CREEK
PUDDING RIVER

Region 1

Silt

Aquifer