

Groundwater Application Review Summary Form

Application # G- 12444

GW Reviewer DENNIS DALOWSKI

Date Review Completed: 7/13/2017

Summary of GW Availability and Injury Review:

[] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

[] There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section
 FROM: Groundwater Section Dennis Orlowski
 SUBJECT: Application G- 18444 Supersedes review of
 Date 07/13/2017
 Reviewer's Name
 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: Thomas Postlewait County: Clackamas

A1. Applicant(s) seek(s) 0.350 cfs from one well(s) in the Willamette Basin,
Pudding River subbasin

A2. Proposed use Irrigation (supplemental: 17.0 acres) Seasonality: March 1 – October 31

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	CLAC 2391		Alluvium	0.350	T5S/R1E-8 SE-NE	1380' S, 500' W fr NE cor S8

* 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	200	124	55	1979	360	0-25	+1.5-360		60-360			

Use data from application for proposed wells.

A4. **Comments:** Well 1, CLAC 2391, is located in the Elliot Prairie region approximately 7 miles due east of Woodburn, Oregon.

Well 1 is the authorized POA for certificate 54678, which is for irrigation of 11.2 acres. This application proposes to use this same POA for supplemental irrigation of 17.0 acres.

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 proposed POA produces groundwater from a confined aquifer, so the pertinent Willamette Basin rules (OAR 690-502-0240) do not apply.

A6. ☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction. Name of administrative area: _____
 Comments: Not applicable.

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 (7-yr measurements), medium 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 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:** In the area of the proposed POA, CLAC 2391, approximately 40 to 60 feet of fine-grained Willamette Silt overlies 20-40 feet of sand and gravel deposits (cumulative) of the Willamette Aquifer. Beneath these units lies roughly 900-1000 feet of Willamette Confining Unit, consisting predominantly of clay and silt with thin lenses of sand and gravel (Conlon and others, 2005; Woodward and others, 1998; Gannett and Caldwell, 1998). The CLAC 2391 log and other nearby well logs indicate predominantly fine-grained material with occasional thin beds of water-bearing sands and gravels range from 5-15 feet thick from about 100-400 ft below land surface.

Groundwater levels from nearby wells in the Willamette Aquifer show generally stable trends, with slight increases in many wells over the past 10-12 years. It is unclear whether these trends are attributable to diminished pumping or to decadal-scale climatic fluctuations. There is not enough data available to determine possible over appropriation of the groundwater resource, especially given the long-term stability exhibited in many wells. Thus ongoing long-term groundwater monitoring is required.

Because this proposed POA is within a confined aquifer, the cone of depression created by pumping is expected to rapidly propagate outward towards aquifer boundaries; these cones of depression are typically areally extensive but thin (i.e., relatively low drawdown at various portions of the cone). Using Theis distance-drawdown methods (Theis, 1941) with a range of reasonable aquifer parameters, potential drawdown at ¼ mile from the proposed POA is estimated to be on the order of 4-5 feet after 240 days of continuous pumping at the proposed rate.

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 (Willamette Aquifer)	☒	☐

Basis for aquifer confinement evaluation: Static water levels in both the proposed POA and nearby wells rise above water-bearing zones. Also, approximately 40-60 feet of low-permeability Willamette Silt confines the Willamette Aquifer in this area (Conlon and others, 2005; Woodward and others, 1998). These factors indicate confined aquifer conditions at the proposed POA, CLAC 2391.

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	Unnamed tributary to Bear Creek	160-170	160-200	2700	☒	☐	☐	☐	☒
1	2	Rock Creek	160-170	120-130	4200	☒	☐	☐	☐	☒

Basis for aquifer hydraulic connection evaluation: Groundwater levels in nearby wells are above or coincident with levels of nearby perennial stream reaches. Furthermore, water table maps in the area indicate that groundwater in the alluvial aquifer system flows towards and discharges into local streams incised in the French Prairie plateau (Conlon and others, 2005; Gannett and Caldwell, 1998). These facts indicate that the alluvial aquifer and local streams are hydraulically connected.

The depletion of local streams by proposed Well 1 will be attenuated, but not eliminated, by the low vertical hydraulic conductivity (permeability) of the Willamette Silt and other clays and silts that lie between the deeper sands and gravels and the stream beds. Net impacts will be small at the onset of pumping, but will increase with time until a new equilibrium between local recharge and discharge is reached. At that time depletion is expected to be relatively constant throughout the year.

Water Availability Basin the well(s) are located within: Pudding River > Molalla River – above Mill Creek (WID 151).

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	☐	☐	N/A	N/A	☐	67.30	☐	<<25%	☐
1	2	☐	☐	N/A	N/A	☐	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: C3a: Stream depletion estimates using the Hunt 2003 analytical model (Hunt, 2003) indicate interference at 30 days will be much less than 25% of the well's discharge (see attached Hunt model results).

C4a: not applicable.

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													
(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: _____

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:** _____

References Used:

Application G-18444 file

Conlon and others, 2005, Ground-water hydrology of the Willamette Basin, Oregon: U.S Geological Survey Scientific Investigations Report 2005-5168.

Gannett and Caldwell, 1998, Geologic framework of the Willamette lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A,

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

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

Jenkins, C.T., 1970, Computation of rate and volume of stream depletion by wells: U.S. Geol. Survey Techniques of Water-Resources Investigations of the Unites States Geological Survey, Chapter D1, Book 4,17 p.

Theis, C.V., 1941, The effect of a well on the flow of a nearby stream: Am. Geophys. Union Trans., v. 22, pt.3, p. 734-738.

Woodward and others, 1998, Hydrogeologic framework of the Willamette lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B,

D. WELL CONSTRUCTION, OAR 690-200

- D1. Well #: _____ Logid: _____
- 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:** _____
- _____
- _____
- _____
- D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**
- _____
- _____

Water Availability Tables



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PUDDING R > MOLALLA R - AB MILL CR
WILLAMETTE BASIN

Water Availability as of 7/12/2017

Watershed ID #: 151 [\(Map\)](#)

Date: 7/12/2017

Exceedance Level: ☒ 80%

Time: 2:01 PM

Water Availability Calculation

Consumptive Uses and Storages

Instream Flow Requirements

Reservations

Water Rights

Watershed Characteristics

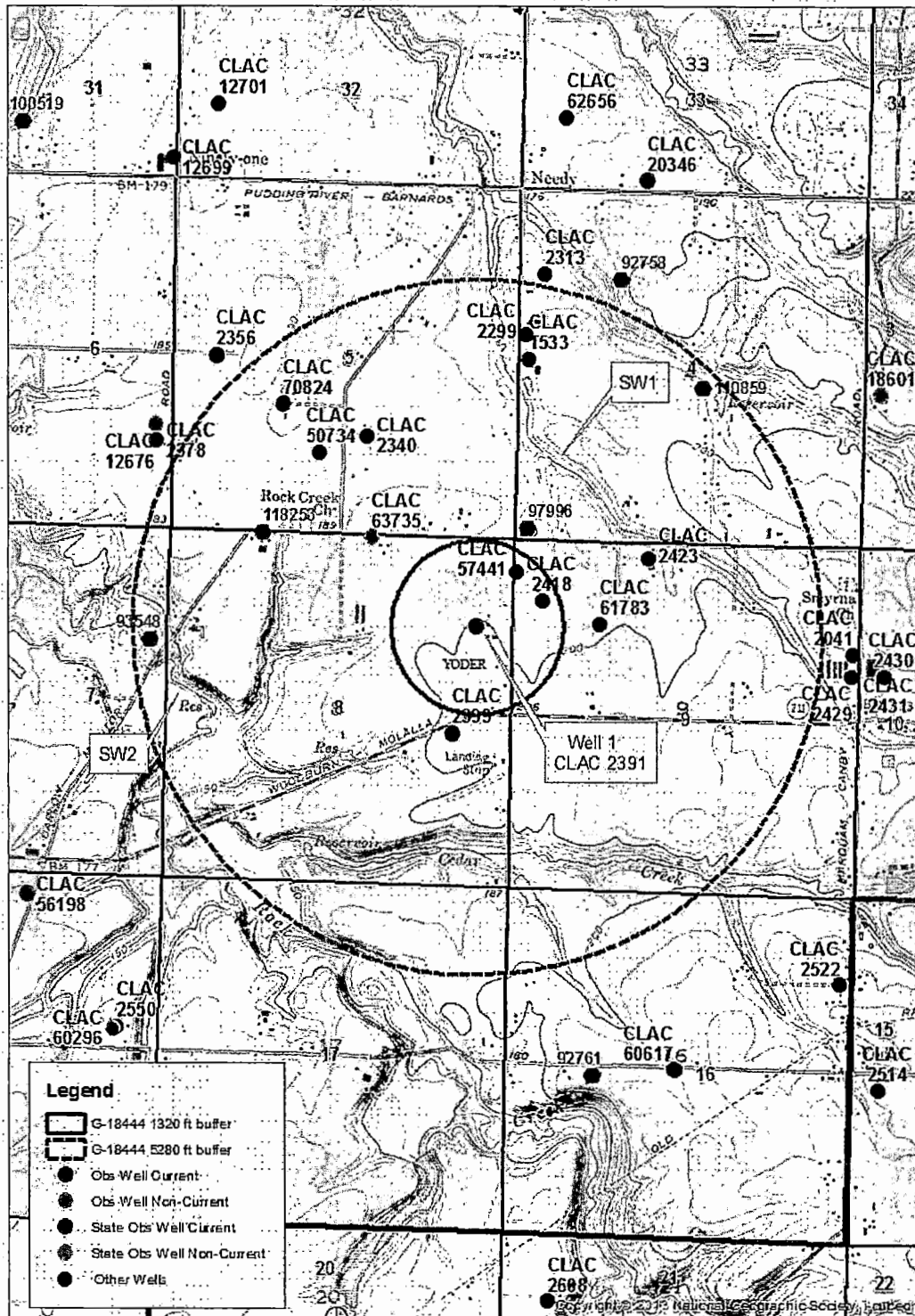
Water Availability Calculation

Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

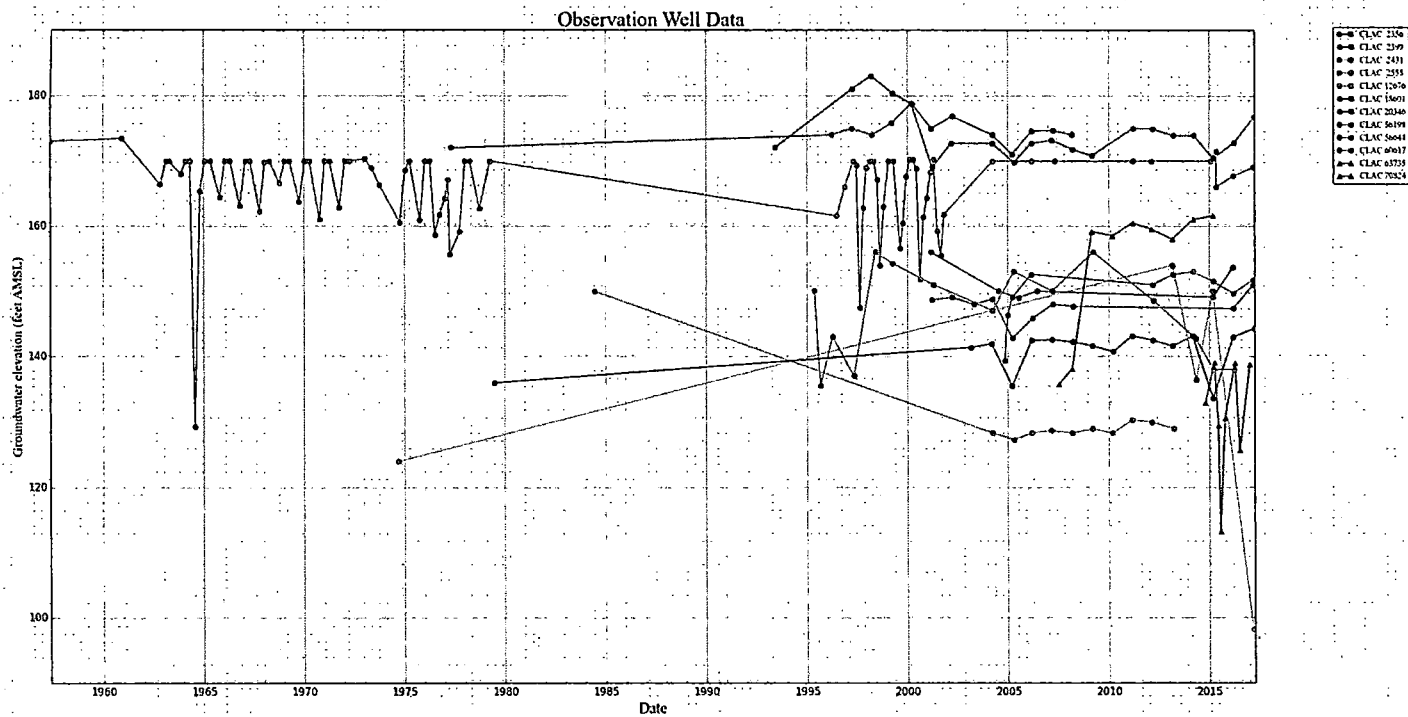
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,040.00	124.00	916.00	0.00	36.00	880.00
FEB	1,180.00	114.00	1,070.00	0.00	36.00	1,030.00
MAR	1,010.00	75.70	934.00	0.00	36.00	898.00
APR	787.00	51.50	735.00	0.00	36.00	699.00
MAY	425.00	48.90	376.00	0.00	36.00	340.00
JUN	224.00	69.90	154.00	0.00	36.00	118.00
JUL	109.00	110.00	-0.97	0.00	36.00	-37.00
AUG	71.00	90.20	-19.20	0.00	36.00	-55.20
SEP	67.30	51.40	15.90	0.00	36.00	-20.10
OCT	91.60	11.00	80.60	0.00	36.00	44.60
NOV	363.00	48.30	315.00	0.00	36.00	279.00
DEC	957.00	118.00	839.00	0.00	36.00	803.00
ANN	706,000.00	55,100.00	651,000.00	0.00	26,100.00	627,000.00

Well Location Map

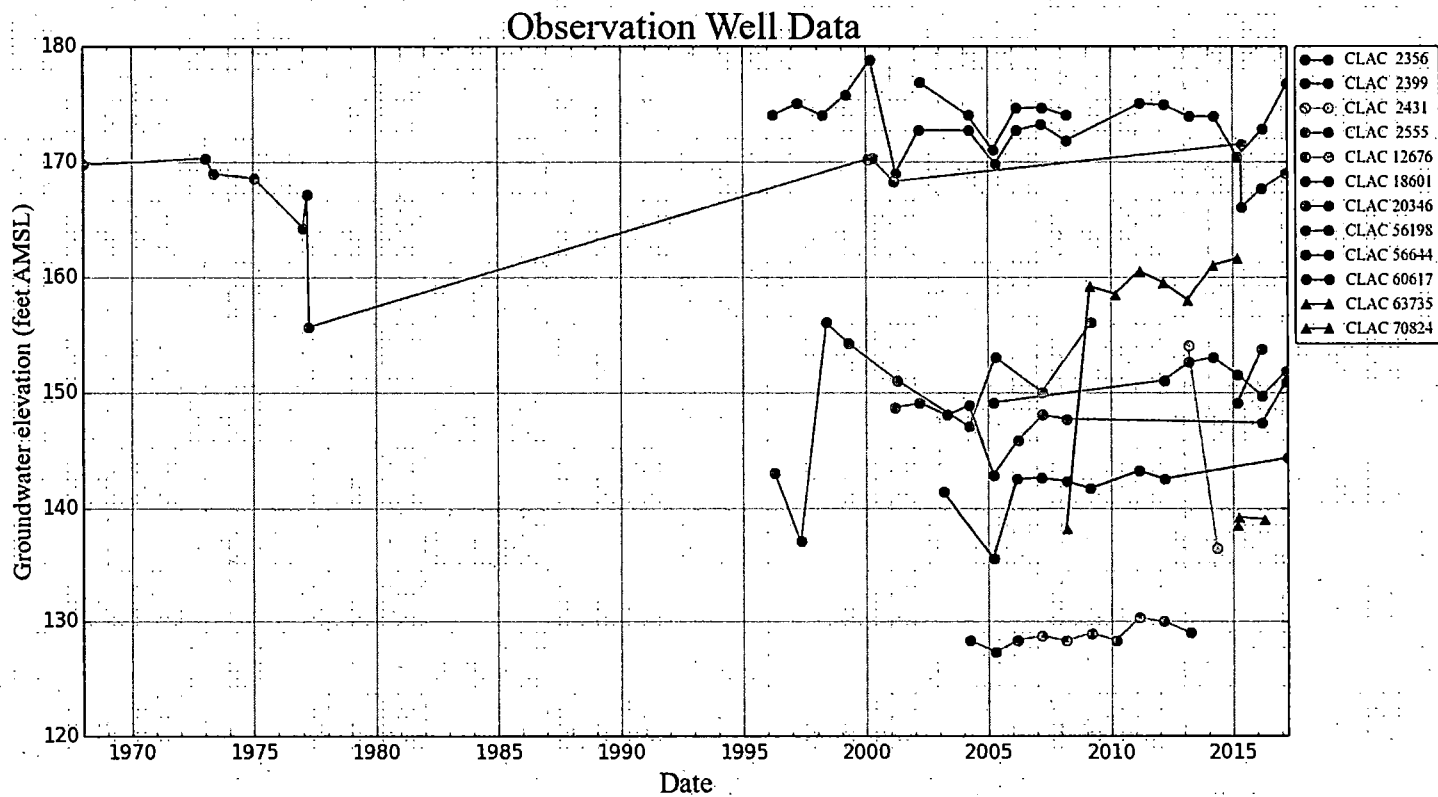
**G-18444 Postlewait
T5S/R1E-Section 8**



Water-Level Trends in Nearby Wells – All Data



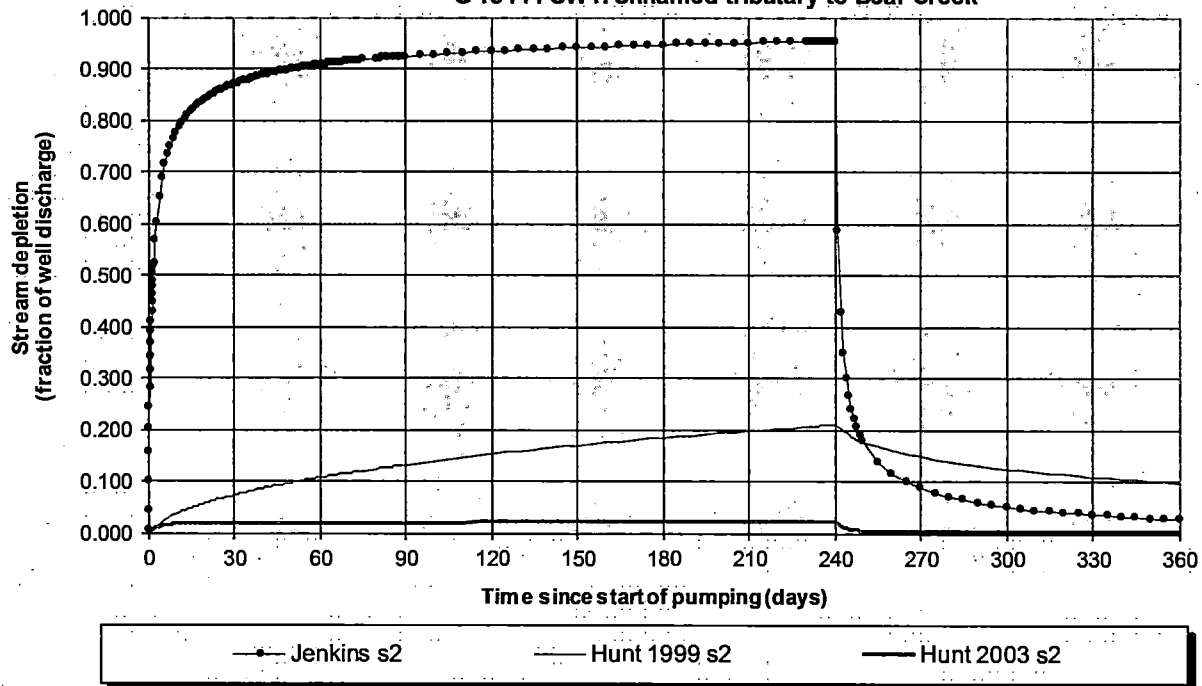
Water-Level Trends in Nearby Wells – Static Water Levels Only (Jan-May)



Stream Depletion Model Results

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

G-18444 SW1: Unnamed tributary to Bear Creek

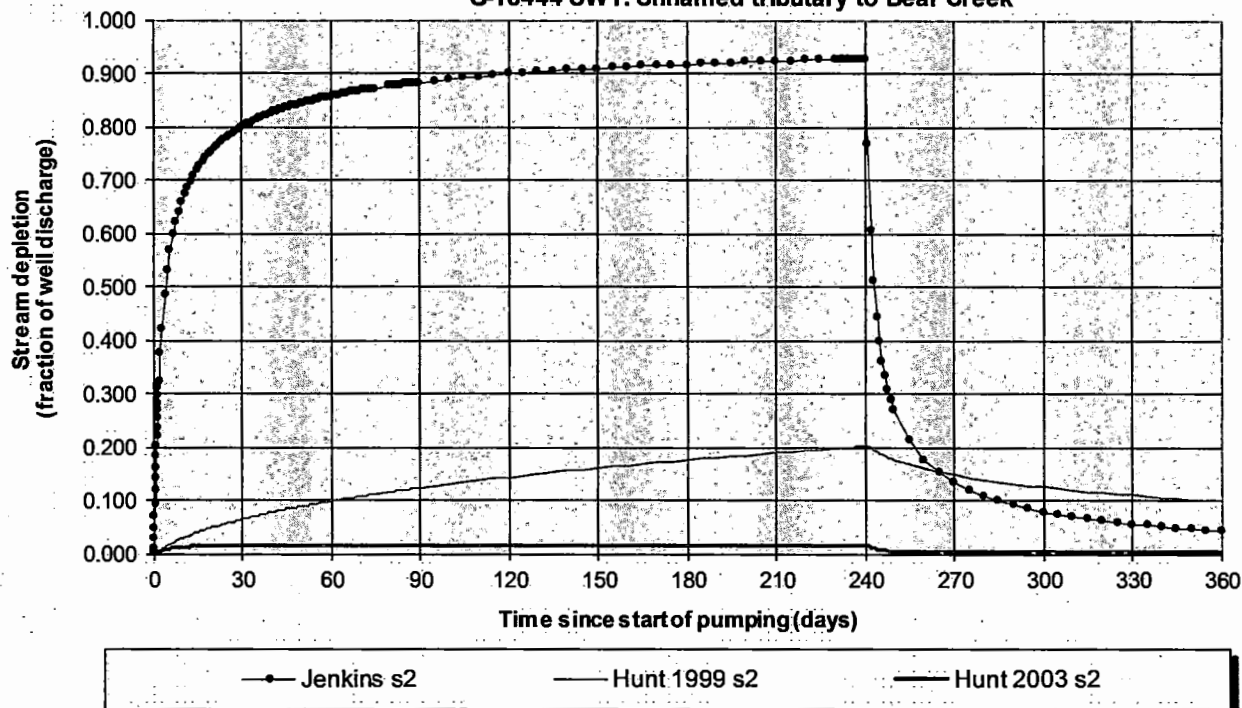


Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 240 days							
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	86.9%	90.8%	92.4%	93.5%	94.1%	94.7%	95.0%	95.4%	8.7%	5.1%	3.6%	2.8%	
H SD 1999	7.3%	10.7%	13.2%	15.2%	16.9%	18.4%	19.7%	21.0%	14.8%	12.4%	10.9%	9.8%	
H SD 2003	1.95%	2.00%	2.04%	2.08%	2.13%	2.17%	2.21%	2.25%	0.34%	0.34%	0.34%	0.34%	
Qw, cfs	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	
H SD 99, cfs	0.026	0.037	0.046	0.053	0.059	0.064	0.069	0.073	0.052	0.043	0.038	0.034	
H SD 03, cfs	0.007	0.007	0.007	0.007	0.007	0.008	0.008	0.008	0.001	0.001	0.001	0.001	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.35	0.35	0.35	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2700	2700	2700	ft
Well depth	d	360	360	360	ft
Aquifer hydraulic conductivity	K	25	50	100	ft/day
Aquifer saturated thickness	b	90	90	90	ft
Aquifer transmissivity	T	2250	4500	9000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	50	50	50	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.066667	0.066667	0.066667	ft/day
Stream depletion factor	sdf	3.240000	1.620000	0.810000	days
Streambed factor	sbf	0.080000	0.040000	0.020000	
input #1 for Hunt's Q_4 function	t'	0.308642	0.617284	1.234568	
input #2 for Hunt's Q_4 function	K'	0.648000	0.324000	0.162000	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.080000	0.040000	0.020000	

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

G-18444 SW1: Unnamed tributary to Bear Creek



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	79.8%	85.7%	88.3%	89.8%	90.9%	91.7%	92.3%	92.8%	13.4%	7.9%	5.6%	4.3%	
H SD 1999	6.5%	9.8%	12.3%	14.3%	16.1%	17.6%	18.9%	20.1%	14.8%	12.5%	11.0%	9.8%	
H SD 2003	1.43%	1.47%	1.51%	1.54%	1.58%	1.62%	1.66%	1.69%	0.30%	0.30%	0.30%	0.30%	
Qw, cfs	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	0.350	
H SD 99, cfs	0.023	0.034	0.043	0.050	0.056	0.061	0.066	0.070	0.052	0.044	0.038	0.034	
H SD 03, cfs	0.005	0.005	0.005	0.005	0.006	0.006	0.006	0.006	0.001	0.001	0.001	0.001	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.35	0.35	0.35	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	4200	4200	4200	ft
Well depth	d	360	360	360	ft
Aquifer hydraulic conductivity	K	25	50	100	ft/day
Aquifer saturated thickness	b	90	90	90	ft
Aquifer transmissivity	T	2250	4500	9000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	50	50	50	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.066667	0.066667	0.066667	ft/day
Stream depletion factor	sdf	7.840000	3.920000	1.960000	days
Streambed factor	sbfb	0.124444	0.062222	0.031111	
input #1 for Hunt's Q_4 function	t'	0.127551	0.255102	0.510204	
input #2 for Hunt's Q_4 function	K'	1.568000	0.784000	0.392000	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.124444	0.062222	0.031111	