

Groundwater Review Summary Form

Application # G- 18324

GW Reviewer PKO Marcy

Date Review Completed: 12/20/2016

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).

MEMO

Dec 20, 2016

FROM: GW: W. Marcy
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☒ YES

The source of appropriation is within or above a Scenic Waterway

☐ NO☒ YES

Use the Scenic Waterway condition (Condition 7J)

☐ NO

☐ Per ORS 390.835, the Groundwater 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 Groundwater 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.

[illegible]

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section
 FROM: Groundwater Section Phillip I. Marcy
 SUBJECT: Application G- 18324 Supersedes review of
 Date 12/20/2016
 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: Kim Trehwella County: Clackamas

A1. Applicant(s) seek(s) 0.12 cfs from 1 well(s) in the Willamette Basin,
Clackamas River subbasin

A2. Proposed use Nursery Seasonality: Year-round (365 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	PROP 999999	1	Alluvium	0.12	3S/3E-14 NE-NE	165'S, 750'W fr NE cor S 14
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	644	NA	NA	NA	150-300	0-18	0-150	Unknown	Unknown	NA	NA	NA

Use data from application for proposed wells.

A4. **Comments:** The proposed POA well is likely to produce from sandstones and conglomerates of the Troutdale Formation, which here overlie the finer-grained Sandy River Mudstone.

A5. ☒ **Provisions of the** Willamette (690-502-0140) 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: As per OAR 690-502-0140 (2), (5e), the proposed POA location is within one mile of a reach of the Clackamas River designated as a scenic waterway, limiting surface water use to 0.01 cfs for domestic purposes, and potentially limiting groundwater withdrawal when the source is hydraulically connected to surface water.

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) 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 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 _____ 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 location of the applicant's proposed POA well is underlain by a 10-30' thick stratum of cemented gravels, in turn overlying about 250' of Troutdale Formation sandstone and greater than 150' of fine-grained Sandy River Mudstone. These lithologies are exposed in the steep wall of the canyon incised by Clackamas River located less than one-half mile from the proposed POA location. Area wells are typically constructed to produce from the relatively thin gravel deposits overlying finer-grained materials. Little groundwater level data is available in the area concerning alluvial aquifers. CLAC 2006, located roughly 2 miles south of the proposed POA location, is completed into fractured black rock (presumably basalt) reported at about 130' above sea level, and shows little decline during the two decades for which measurements exist (see attached hydrograph).
- _____
- _____
- _____
- _____

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	Troutdale Fmn. Sandstone (Tts of Madin, 2004)	☐	☒
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Based upon the proposed well construction, it is most likely that the POA well will produce from either sandstone of the Troutdale Formation, or the overlying gravels. In either case, there is no overlying barrier to groundwater movement, in addition to local geography, in which these units are truncated less than one-half mile to the east by the steep canyon which drains the Clackamas River.

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	Clackamas River	~590	240	2370	☒	☐	☐	☐	☒
1	2	Unnamed Trib to Clear Creek	~590	400-500	4600	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Water-level elevations in the shallow groundwater system are above the elevations of local stream reaches. This indicates groundwater flow toward local creeks and suggests hydraulic connection. The headwaters of many of the small tributary streams in the area emerge as the land surface slopes away from the topographic high that the proposed POA location sits upon. Groundwater pumped from alluvium here is likely to decrease the volume of water discharged to springs and seeps feeding local streams, particularly during the dry summer months.

Water Availability Basin the well(s) are located within: CLEAR CR > CLACKAMAS R- AT MOUTH (ID #82);
CLACKAMAS R > WILLAMETTE R - AT MOUTH (ID #80)

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	☐	☐			☐	822	☐	**	☐
1	2	☐	☐			☐	5.65	☒	0.0	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: Interference due to pumping from the proposed POA location at the unnamed tributary at 30 days was calculated using the analytical model of Jenkins (1970). Parameters were derived from local pump tests in similar geologic settings.

**Interference @ 30 days could not be estimated for the Clackamas River because the terrain (high-relief slopes) and geology (multiple lithologies between pumping well and surface water) do not meet model assumptions of the widely accepted techniques for determining stream depletion (e.g., Jenkins, 1970).

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 section does not apply.

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:

- 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:

References Used:

Application file: G-18321, and nearby G-16080 and G-16090, local pump tests.

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 United States Geological Survey, Chapter D1, Book 4, 17 p.

Trimble, Donald E., *Geology of Portland, Oregon and Adjacent Areas*, Geological Survey Bulletin 1119, 119 p., 1 pl. (1963)

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**

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

Watershed ID #: 82
Time: 2:41 PMCLEAR CR > CLACKAMAS R - AT MOUTH
Basin: WILLAMETTEExceedance Level: 80
Date: 12/20/2016

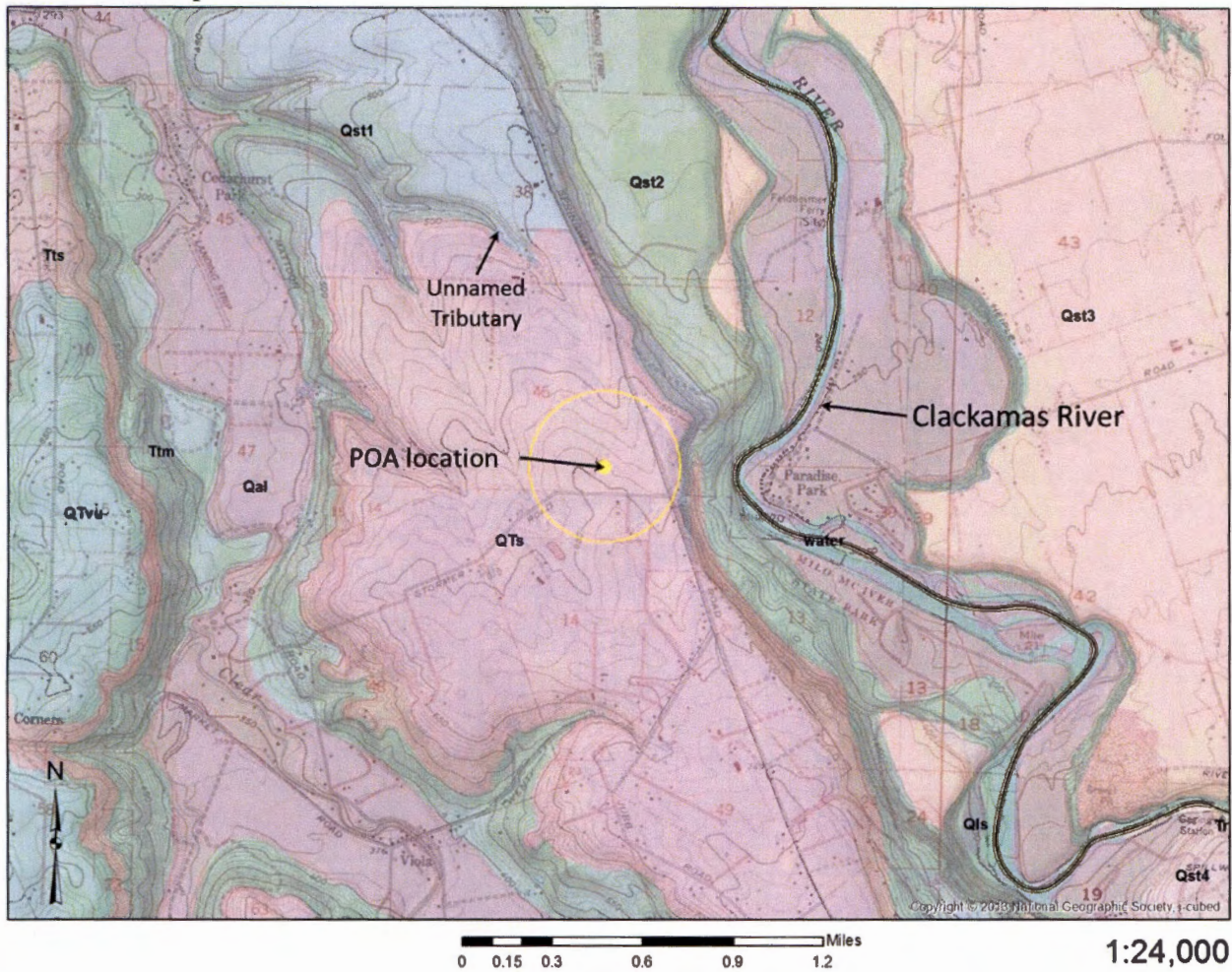
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	126.00	1.29	125.00	0.00	0.00	125.00
FEB	128.00	1.19	127.00	0.00	0.00	127.00
MAR	128.00	0.79	127.00	0.00	0.00	127.00
APR	131.00	0.93	130.00	0.00	0.00	130.00
MAY	111.00	2.64	108.00	0.00	0.00	108.00
JUN	48.10	3.69	44.40	0.00	40.00	4.41
JUL	19.00	6.40	12.60	0.00	40.00	-27.40
AUG	8.02	5.22	2.80	0.00	20.00	-17.20
SEP	5.65	2.22	3.43	0.00	20.00	-16.60
OCT	6.23	0.86	5.37	0.00	0.00	5.37
NOV	21.50	0.85	20.60	0.00	0.00	20.60
DEC	103.00	1.36	102.00	0.00	0.00	102.00
ANN	99,100	1,670	97,400	0	7,260	93,300

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

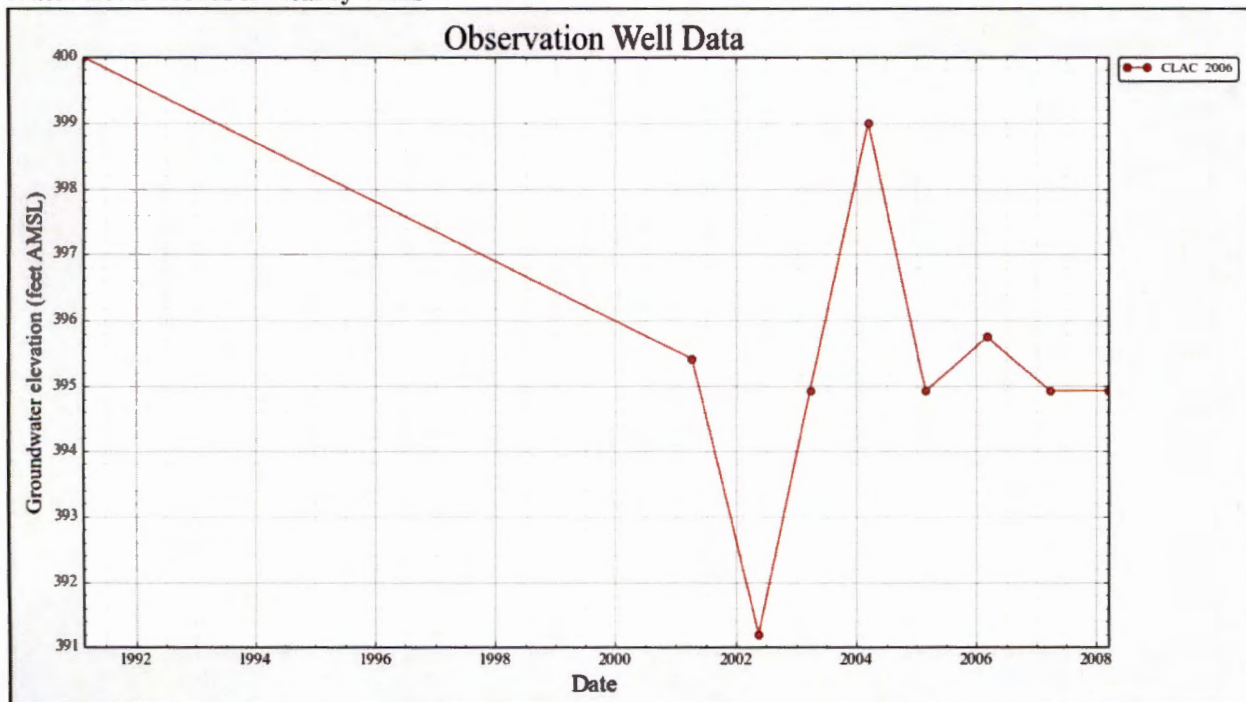
Watershed ID #: 80
Time: 2:45 PMCLACKAMAS R > WILLAMETTE R - AT MOUTH
Basin: WILLAMETTEExceedance Level: 80
Date: 12/20/2016

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	2,670.00	326.00	2,340.00	0.00	1,000.00	1,340.00
FEB	2,900.00	361.00	2,540.00	0.00	1,000.00	1,540.00
MAR	2,800.00	330.00	2,470.00	0.00	1,000.00	1,470.00
APR	3,010.00	399.00	2,610.00	0.00	1,000.00	1,610.00
MAY	2,740.00	397.00	2,340.00	0.00	1,000.00	1,340.00
JUN	1,620.00	309.00	1,310.00	0.00	1,000.00	311.00
JUL	980.00	309.00	671.00	0.00	1,000.00	-329.00
AUG	822.00	294.00	528.00	0.00	890.00	-362.00
SEP	833.00	282.00	551.00	0.00	890.00	-339.00
OCT	882.00	276.00	606.00	0.00	1,000.00	-394.00
NOV	1,630.00	323.00	1,310.00	0.00	1,000.00	307.00
DEC	2,650.00	328.00	2,320.00	0.00	1,000.00	1,320.00
ANN	2,110,000	237,000	1,870,000	0	711,000	1,200,000

Well Location Map

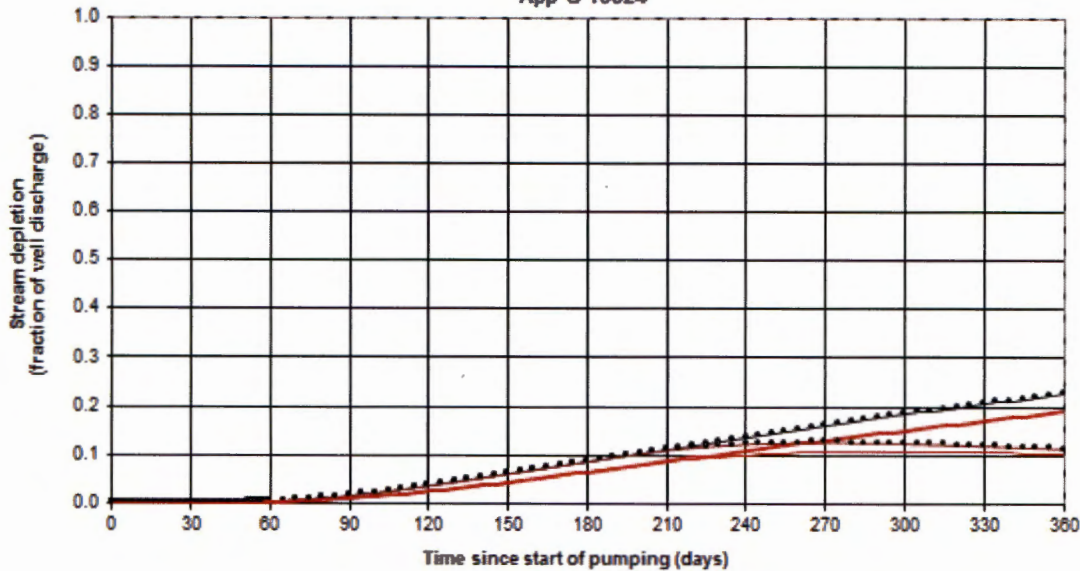


Water-Level Trends in Nearby Wells



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

App G 18324



—•— Jenkins s2 — Hunt s2 —•— Jenkins s2 residual — Hunt s2 residual

Output for Hunt Stream Depletion, Scenario 2 (s2 Time pump on = 150 days)

Days	30	60	90	120	150	180	210	240	270	300	330	360
Qw, cfs	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Jenk SD s2 %	0.00	0.30	1.53	3.58	6.04	8.64	10.95	12.23	12.58	12.38	11.90	11.30
Jen SD s2 cfs	0.000	0.000	0.002	0.004	0.007	0.010	0.013	0.015	0.015	0.015	0.014	0.014
Hunt SD s2 %	0.00	0.16	0.96	2.43	4.35	6.50	8.56	9.97	10.64	10.79	10.62	10.28
Hunt SD s2 cfs	0.000	0.000	0.001	0.003	0.005	0.008	0.010	0.012	0.013	0.013	0.013	0.012

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	0.12	0.12	0.12	cfs
Distance to stream	a	4600	4600	4600	ft
Aquifer hydraulic conductivity	K	10	20	30	ft/day
Aquifer thickness	b	100	100	100	ft
Aquifer transmissivity	T	1000	2000	3000	ft ² /day
Aquifer storage coefficient	S	0.1	0.1	0.1	
Stream width	ws	5	5	5	ft
Streambed hydraulic conductivity	Ks	1	1	1	ft/day
Streambed thickness	bs	0.5	0.5	0.5	ft
Streambed conductance	sbc	10	10	10	ft/day
Stream depletion factor (Jenkins)	sdf	2116	1058	705.3333333	days
Streambed factor (Hunt)	sbf	46	23	15.33333333	