WATER RESOURCES DEPARTMENT

MEMO Nov. 1 ,2016

TO: **Application G-** 18356

FROM: **GW:** M. Thoma
(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.

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

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date November 1, 2016

FROM: Groundwater Section Michael J Thoma
Reviewer's Name

SUBJECT: Application G- 18356 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: **Steve Nyseth** County: **Linn**

A1. Applicant(s) seek(s) 0.15 cfs from 2 well(s) in the Willamette Basin, Calapooia R. subbasin

A2. Proposed use Irrigation (12 ac) Seasonality: March – October (244 d)

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	Proposed	Well #1	Bedrock	0.15	14S/01W-16 NESW	3200'S, 1580'E of NW cor S 16
2	Proposed	Well #2	Bedrock	0.15	14S/01W-16 NESW	2780'S, 1640'E of NW cor S 16
3						
4						

* 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	550	*	*		< 300	0-18	0-40					
2	540	*	*		< 300	0-18	0-40					

Use data from application for proposed wells.

A4. **Comments:** *The applicant's wells are proposed and there are few other wells in the area so it the reviewer cannot confidently estimate *First Water* and *SWL*.*

A5. ☒ **Provisions of the** Willamette (OAR 690-502) 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: OAR 690-502-0100 places special restrictions on the Calapooia R and its tributaries. In the event that a finding of PSI is made in this review, these rules may become pertinent.

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 (7-yr SWL); 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 **Bedrock** groundwater reservoir between approximately **50** ft. and **1000** 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:** There are no Observation Well data in the area of the proposed POAs so groundwater over-appropriation cannot be determined. There are also no permitted groundwater rights in the area so injury to existing groundwater rights is unlikely. The applicant proposes a bedrock aquifer source for the proposed wells which, based on limited well log data, will likely be encountered at a depth of > 50 ft bls. Any resulting permit should be conditioned for the well to be continuously cased and sealed to a depth of no less than 50 ft to ensure production from the bedrock aquifer.

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	**Volcanoclastics of Little Butte Volcanics**	☒	☐
2	**Volcanoclastics of Little Butte Volcanics**	☒	☐
		☐	☐

Basis for aquifer confinement evaluation: The proposed aquifer typically exhibits confined aquifer conditions where well log and SWL data are available.

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	**Calapooia River**	**~530***	**485-515**	**2630**	☒	☐	☐	☐	☒
1	2	**Calapooia River**	**~520***	**485-515**	**2260**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: GW elevations are estimated to be above SW elevations suggesting groundwater is flowing towards and discharging to surface water. The finding of hydraulic connection includes the assumption that the well is cased and sealed into bedrock per Section B2.

*For the purpose of Section C the reviewer estimates final *SWL* to be approx. 20 ft bls.

Water Availability Basin the well(s) are located within: Calapooia R > Willamette R – AB Mouth (ID# 76)

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	☐	☐	**MF76A**	**20**	☐	**22.7**	☐	**< 1%**	☐
2	1	☐	☐	**MF76A**	**20**	☐	**22.7**	☐	**< 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: Interference @ 30 days was estimated using the Hunt (2003) stream-depletion model and aquifer property values in the range of what would be expected for materials in this area.

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		**No surface water sources beyond 1 mile were evaluated**											
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:

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:** The applicant's proposed wells would be producing from an aquifer that has been found to be hydraulically connected to surface water at a distance of < 1 mile. However, the reviewer is unable to find sufficient evidence to assume that the proposed use will have the Potential for Substantial Interference (PSI).

References Used:

Herrera, N. B., Burns, E. R., and T. D. Conlon. 2014. *Simulation of Groundwater Flow and the Interaction of Groundwater and Surface Water in the Willamette Basin and Central Willamette Subbasin*, Oregon. USGS Scientific Investigations Report 2014-5136.

Hunt, B. 2003. *Unsteady Stream Depletion when Pumping from a Semiconfined Aquifer*. Journal of Hydrologic Engineering. Vol 8(1), pp 12-19

McClaughry, J. D., T. J. Wiley, M. L. Ferns, and I. P Madin. 2010. *Digital Geologic Map of the Southern Willamette Valley, Benton, Lane, Linn, Marion, and Polk Counties, Oregon.* Oregon Dept. of Geology and Mineral Industries. Open File Report O-10-13.

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

CALAPOOIA R > WILLAMETTE R - AB MOUTH
WILLAMETTE BASIN

Water Availability as of 11/1/2016

Watershed ID #: 76 (Map) Exceedance Level: 80%

Date: 11/1/2016 Time: 12:09 PM

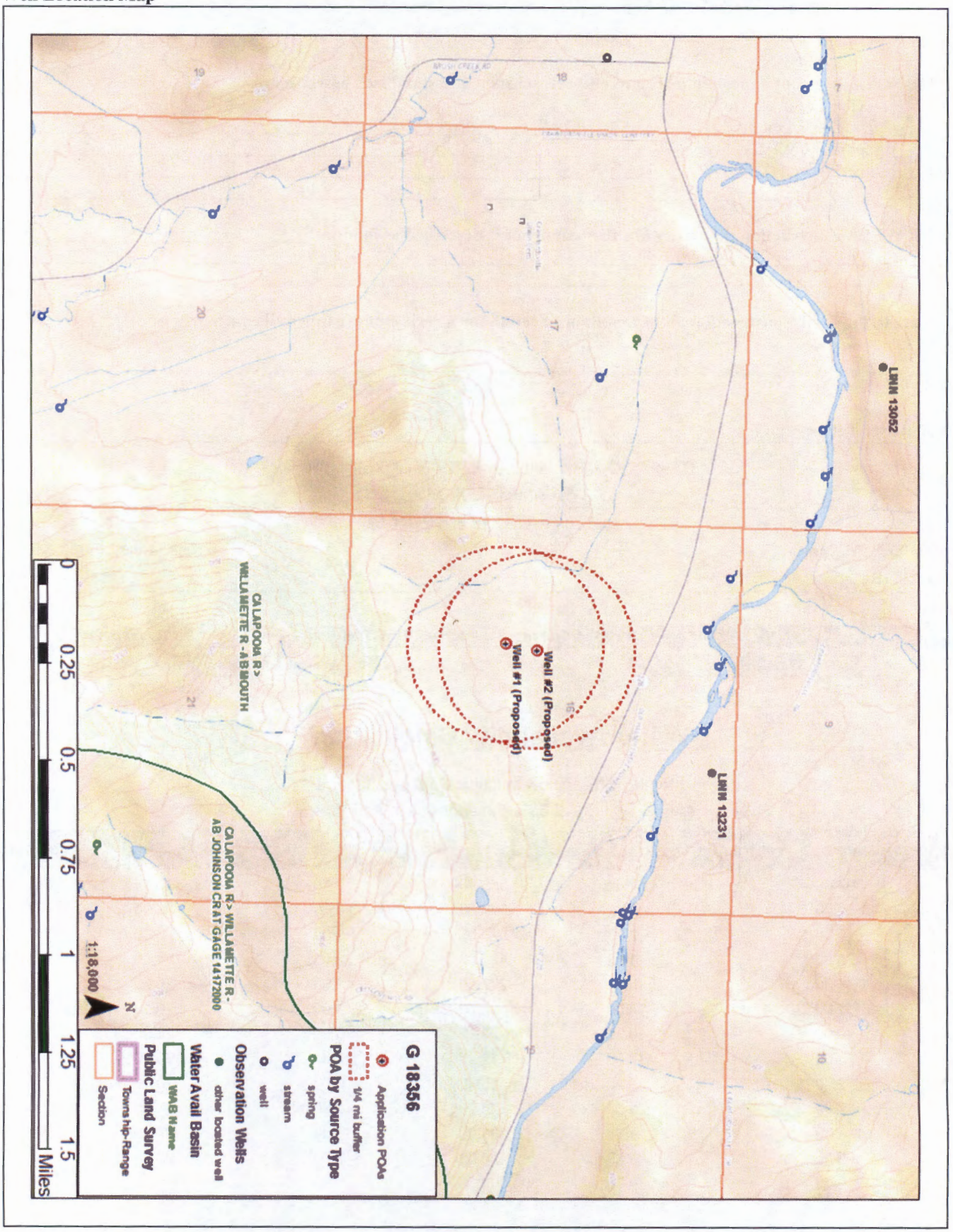
Water Availability Calculation | Consumptive Uses and Storages | Instream Flow Requirements | Reservations | Water Rights | Watershed Characteristics

Water Availability Calculation

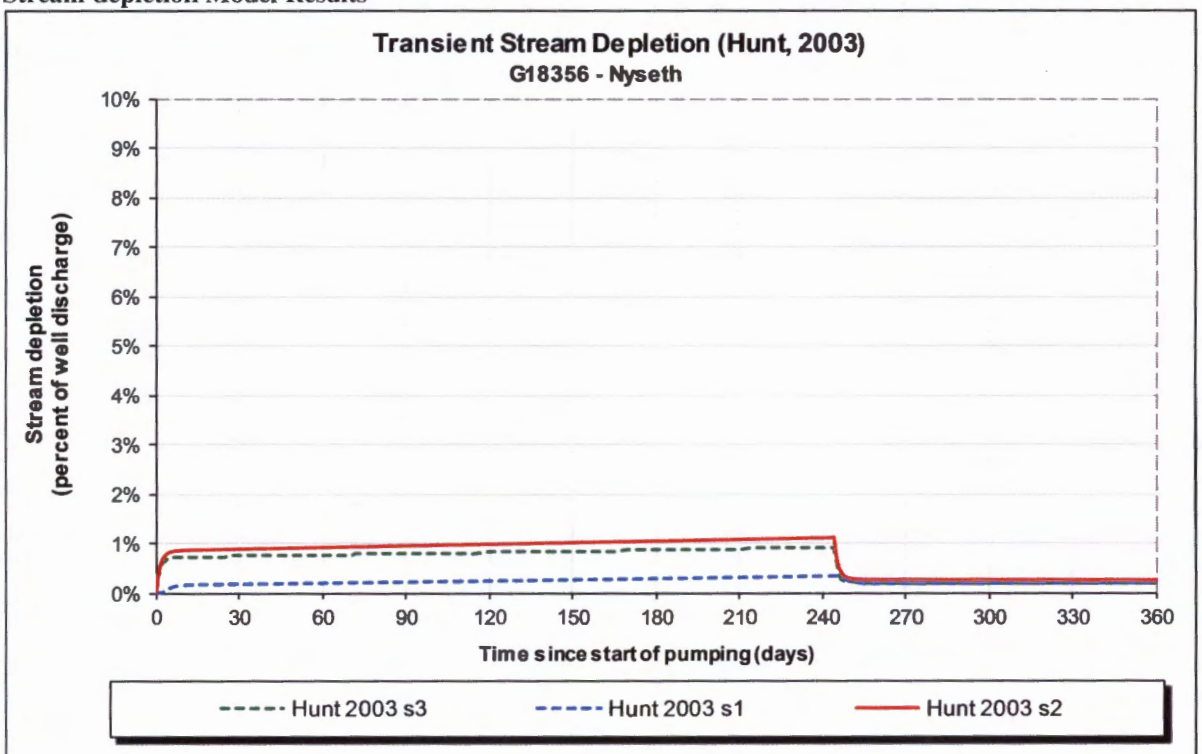
Monthly Streamflow in Cubic Feet per Second
Annual Volume at 50% Exceedance in Acre-Feet

Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	592.00	2.87	589.00	0.00	20.00	569.00
FEB	650.00	2.82	647.00	0.00	20.00	627.00
MAR	575.00	2.13	573.00	0.00	20.00	553.00
APR	423.00	1.82	421.00	0.00	20.00	401.00
MAY	234.00	6.83	227.00	0.00	20.00	207.00
JUN	111.00	12.50	98.50	0.00	20.00	78.50
JUL	49.00	19.30	29.70	0.00	20.00	9.69
AUG	26.00	13.80	12.20	0.00	20.00	-7.82
SEP	22.70	7.25	15.40	0.00	20.00	-4.55
OCT	29.60	1.38	28.20	0.00	20.00	8.22
NOV	133.00	1.88	131.00	0.00	20.00	111.00
DEC	499.00	2.83	496.00	0.00	20.00	476.00
ANN	404,000.00	4,570.00	399,000.00	0.00	14,500.00	385,000.00

Well Location Map



Stream-depletion Model Results



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 244 days						
Days	**30**	60	90	120	150	180	210	240	270	300	330	360
J SD	91.5%	94.0%	95.1%	95.8%	96.2%	96.5%	96.8%	97.0%	6.3%	3.5%	2.5%	1.9%
H SD 1999	5.6%	8.1%	9.9%	11.4%	12.7%	13.9%	14.9%	15.9%	11.5%	9.7%	8.6%	7.8%
H SD 2003	**0.88%**	**0.91%**	**0.95%**	**0.98%**	**1.01%**	**1.04%**	**1.07%**	**1.10%**	**0.26%**	**0.26%**	**0.25%**	**0.25%**
Qw, cfs	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150	0.150
H SD 99, cfs	0.008	0.012	0.015	0.017	0.019	0.021	0.022	0.024	0.017	0.015	0.013	0.012
H SD 03, cfs	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate of well	Qw	0.15	**0.15**	0.15	cfs
Time pump on (pumping duration)	tpon	244	**244**	244	days
Perpendicular from well to stream	a	2260	**2260**	2260	ft
Well depth	d	300	**300**	300	ft
Aquifer hydraulic conductivity	K	1	**50**	100	ft/day
Aquifer saturated thickness	b	150	**150**	150	ft
Aquifer transmissivity	T	150	**7500**	15000	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	20	**20**	20	ft
Aquitard thickness below stream	babs	15	**15**	15	ft
Aquitard porosity	n	0.3	**0.3**	0.3	
Stream width	ws	90	**90**	90	ft
Streambed conductance (lambda)	sbc	0.060	**0.060**	0.060	ft/day
Stream depletion factor	sdf	34.051	**0.681**	0.341	days
Streambed factor	sbf	0.904	**0.018**	0.009	
input #1 for Hunt's Q_4 function	t'	2.94E-02	**1.47E+00**	2.94E+00	
input #2 for Hunt's Q_4 function	K'	1.70E+01	**3.41E-01**	1.70E-01	
input #3 for Hunt's Q_4 function	epsilon'	3.33E-03	**3.33E-03**	3.33E-03	
input #4 for Hunt's Q_4 function	lamda'	9.04E-01	**1.81E-02**	9.04E-03	