

MEMO

Oct 31, 2016

FROM: GW: M. Thoma
(Reviewer's Name)

☐ YES☐ YES

☐ 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.

DISTRIBUTION OF INTERFERENCE

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 Date October 31, 2016
 FROM: Groundwater Section Michael J Thoma
 SUBJECT: Application G- 18355 Reviewer's Name
 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: Chris Meyer / Meyer Field and Farm
 County: Linn

- A1. Applicant(s) seek(s) 0.20 cfs from 1 well(s) in the Willamette Basin,
Calapooia River subbasin
- A2. Proposed use Irrigation (20.2 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	1	Alluvium	0.20	12S/04W-12 NWNE	580'S, 3025'E of NW cor S 12
2						
3						

* 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	242		0-20*		100-150	0-18†	0-18†	-	-			

Use data from application for proposed wells.

- A4. **Comments:** *The applicant's well is proposed; based on other well logs for the area it is likely that SWL for the proposed well will be between 0 and 20 ft BLS.
†The application does not list a proposed casing or seal depth so the reviewer assumes a minimum 18 ft case and seal depth.

- A5. ☒ **Provisions of the Willamette (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: _____

- 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 _____ 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:** There is insufficient observation well SWL data in the area to determine over-appropriation but well logs report SWLs consistently between approx. 0 and 20 ft for the period of record 1967-2014 suggesting that groundwater is not over-appropriated in the alluvial aquifer in the area.

Despite that there are a few other groundwater POAs within 1 mile of the proposed POA (including GR 3214 which is within 400 ft), the aquifer characteristics (e.g., high storage, high transmissivity, high yield) are such that interference with nearby groundwater users will not likely rise to the level of injury (i.e., interference in terms of drawdown in adjacent wells will be minor in relation to the thickness of the aquifer, which is estimated at 120-140 ft by Gannett and Caldwell [1998])

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 of Willamette Aquifer	☒	☐
		☐	☐

Basis for aquifer confinement evaluation: Many well logs for the area report 10-20 ft of brown clay in near the land surface. A well completed with a minimum case and seal depth of 18 ft will likely encounter 'first water' below a surface clay layer and SWL rising above 'first water' – hence confined aquifer conditions

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	Calapooia R.	~232	210-220	7400	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: GW Elevation is above SW Elevation suggesting that groundwater is flowing toward and discharging to surface water. Additionally, Water Table Elevation maps by Gannett and Caldwell (1998) show that groundwater is flowing towards the Calapooia River.

NOTE: Lake Cr is a mapped intermittent stream between the proposed POA and the Calapooia River. However, given that it is mapped as intermittent and that there are no surface water PODs on the creek until a wider section farther downstream (which is likely an old meander scar connected to groundwater), it was not evaluated for PSI.

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?
		☐	☐			☐		☐		☐

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: _____

- 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	%	%	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %	< 1 %
Well Q as CFS				0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0	0
Interference CFS				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
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.				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
(B) = 80 % Nat. Q				575	423	234	111	49	26	22.7	29.6	133	499
(C) = 1 % Nat. Q				5.75	4.23	2.34	1.11	0.49	0.26	0.23	0.30	1.33	4.99
(D) = (A) > (C)		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(E) = (A / B) x 100		%	%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%	<< 1%

(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 Hunt (2003) stream-depletion model was used, along with aquifer parameters from Herrera et al. (2014) and Gannett and Caldwell (1998), to estimate stream-depletion resulting from pumping at the maximum proposed rate for the period from March through October. Under these conditions, estimated stream-depletion would not result in substantial interference (> 1% of 80%-exceedance flow) with surface water.

- 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:** The applicant's proposed well 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 department is unable to find sufficient evidence that the proposed use will have the Potential for Substantial Interference per the methods of this review.

References Used:

Gannett, M. W. and R. R. Caldwell. 1998. *Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington*. USGS Professional Paper 1424-A.

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

O'Conner, J. E., A. Sarna-Wojcicki, K. C. Wozniak, D. J. Polette, and R. J. Fleck. *Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon*. USGS Professional Paper 1620

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 10/31/2016

Watershed ID #: 76 ([Map](#))

Exceedance Level: 80% ▾

Date: 10/31/2016

Time: 12:02 PM

Water Availability Calculation

Consumptive Uses and Storages

Instream Flow Requirements

Reservations

Water Rights

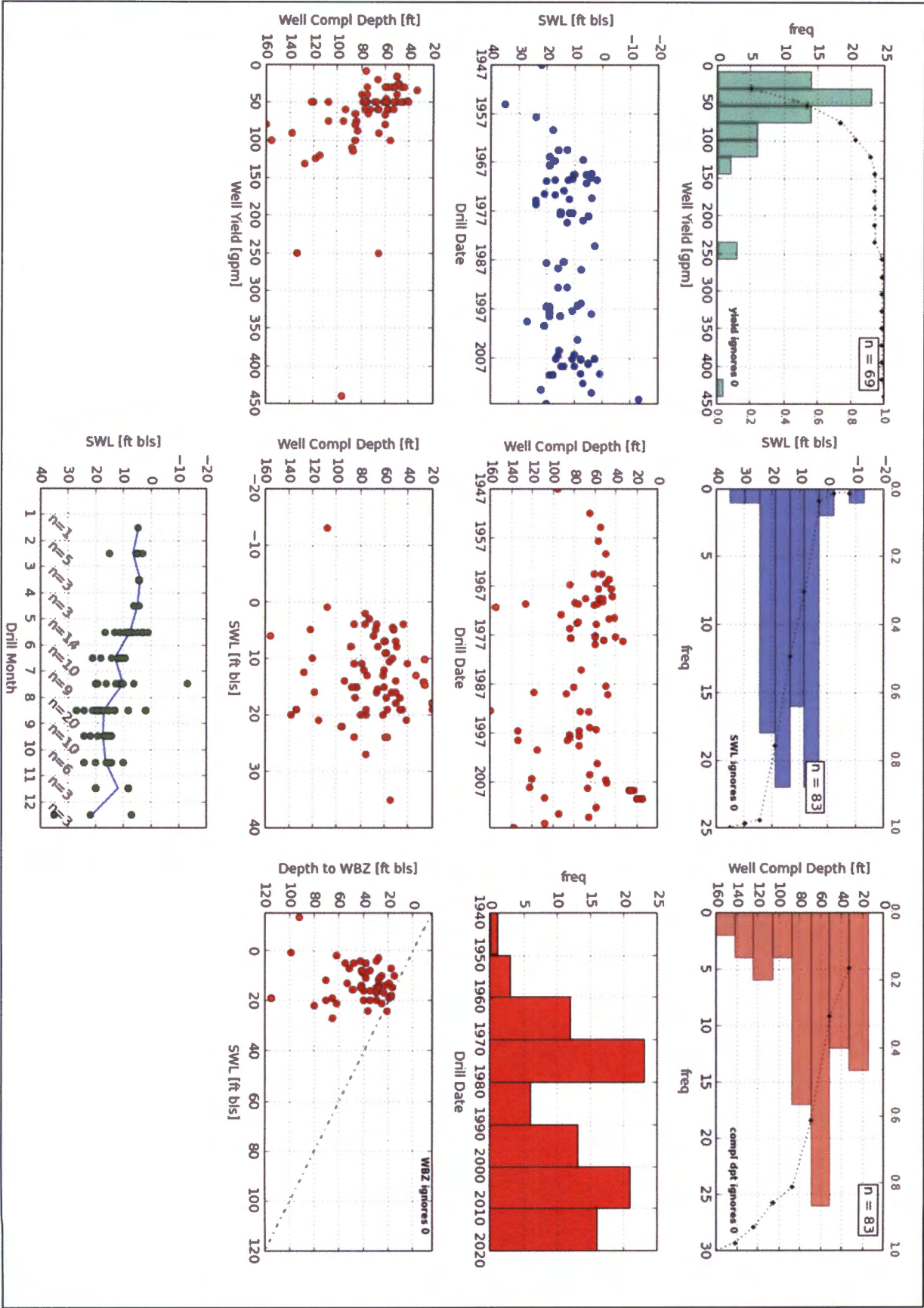
Watershed Characteristics

Water Availability Calculation

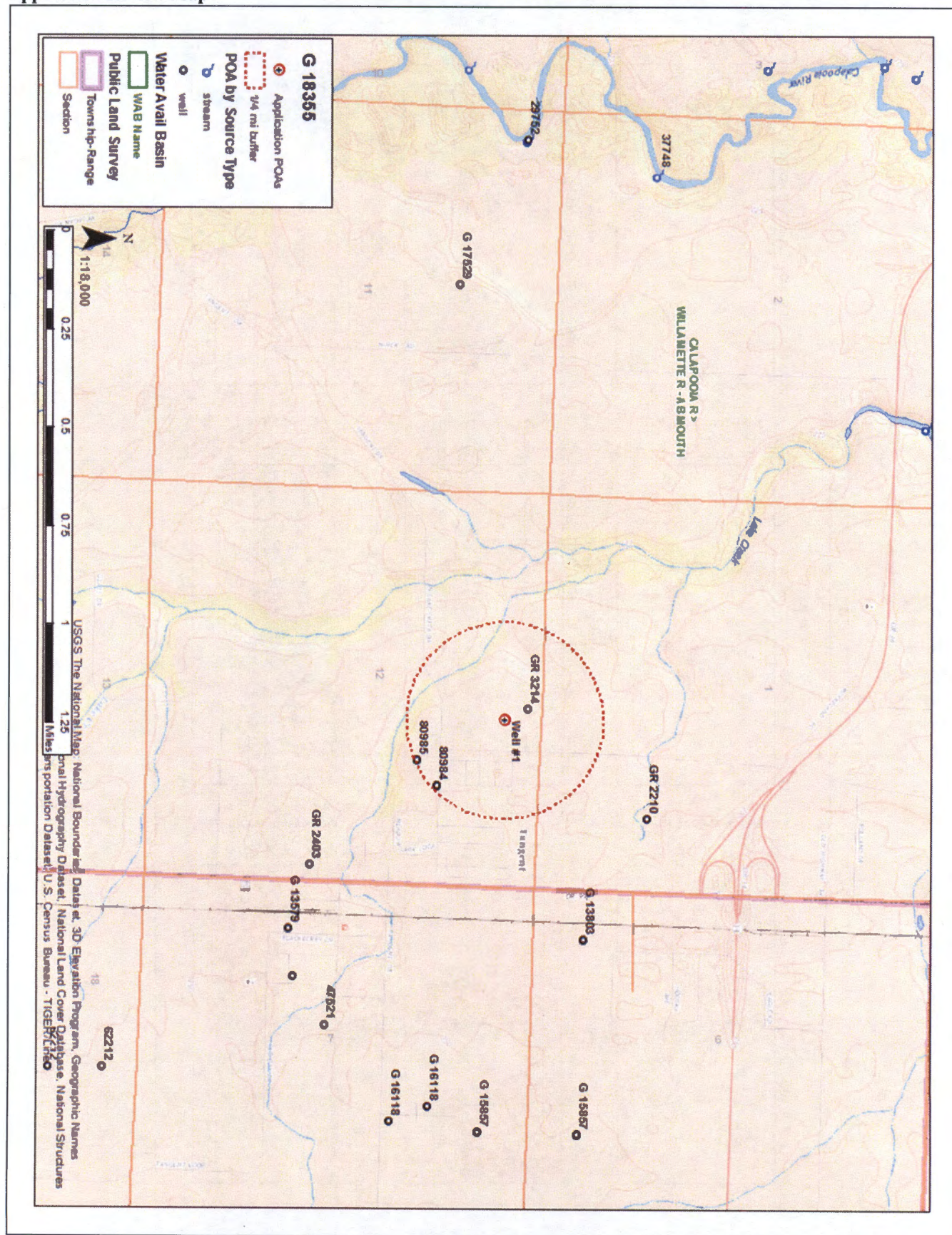
Monthly Streamflow in Cubic Feet per Second
 Annual Volume at 50% Exceedance in Acre-Feet

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

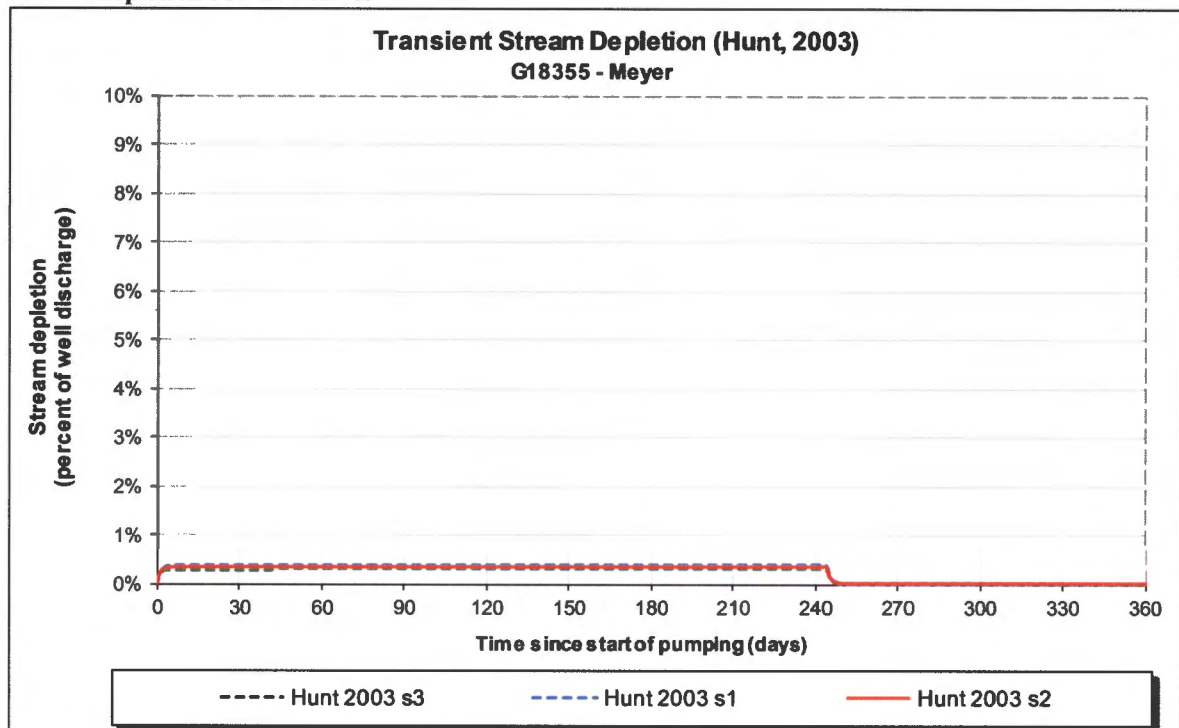
Well-Log Database Well Statistics (for 12S/04W Sections 1, 12)



Application Review 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	92.4%	94.6%	95.6%	96.2%	96.6%	96.9%	97.1%	97.3%	5.6%	3.2%	2.2%	1.7%	
H SD 1999	2.7%	3.9%	4.8%	5.6%	6.2%	6.8%	7.3%	7.8%	5.8%	5.0%	4.5%	4.1%	
H SD 2003	0.33%	0.34%	0.34%	0.34%	0.34%	0.34%	0.34%	0.35%	0.01%	0.01%	0.01%	0.01%	
Qw, cfs	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	
H SD 99, cfs	0.005	0.008	0.010	0.011	0.012	0.014	0.015	0.016	0.012	0.010	0.009	0.008	
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	0.20	0.20	0.20	cfs
Time pump on (pumping duration)	tpon	244	244	244	days
Perpendicular from well to stream	a	7400	7400	7400	ft
Well depth	d	125	125	125	ft
Aquifer hydraulic conductivity	K	50	100	200	ft/day
Aquifer saturated thickness	b	100	100	100	ft
Aquifer transmissivity	T	5000	10000	20000	ft*ft/day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.001	0.001	ft/day
Aquitard saturated thickness	ba	15	15	15	ft
Aquitard thickness below stream	babs	10	10	10	ft
Aquitard porosity	n	0.3	0.3	0.3	
Stream width	ws	100	100	100	ft
Streambed conductance (lambda)	sbc	0.010	0.010	0.010	ft/day
Stream depletion factor	sdf	1.095	0.548	0.274	days
Streambed factor	sbf	0.015	0.007	0.004	
input #1 for Hunt's Q_4 function	ι'	9.13E-01	1.83E+00	3.65E+00	
input #2 for Hunt's Q_4 function	K'	7.30E-01	3.65E-01	1.83E-01	
input #3 for Hunt's Q_4 function	epsilon'	3.33E-04	3.33E-04	3.33E-04	
input #4 for Hunt's Q_4 function	lamda'	1.48E-02	7.40E-03	3.70E-03	