PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date **November 24, 2015**

FROM: Groundwater Section **Michael J. Thoma**
Reviewer's Name

SUBJECT: Application G- **18151** 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: **Myron Kuenzi** County: **Marion**

A1. Applicant(s) seek(s) **0.51** cfs from **2** well(s) in the **Willamette** Basin, **Little Pudding River** subbasin

A2. Proposed use **Irrigation** Seasonality: **March 1 – October 31 (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	MARI 54600	1	Basalt	0.51	07S/02W-34 NENE	1135'S, 750'W of NE cor S34
2	MARI 62761	2	Alluvium[A]	0.51	07S/02W-27 SESW	690'N, 2360'E of SW cor S27
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	250	8	67.17[B]	3/31/2015	400	0-112	0-112	+1-400	295-395	450		A
2	230	19	53	11/05/2009	220	0-38	+2-201		150-170; 180-190	300		A

Use data from application for proposed wells.

A4. **Comments:** [A]Well #2 is proposed by the applicant as a basalt source well but the driller's log shows that it is only drilled into ~20 ft of basalt at the bottom of the hole and perforated within the overlying alluvial material. Additionally, a previous transfer (T-10980) transferred rights from an alluvial well (MARI 8111 – 100 ft total depth) to Well #2 under the determination that Well #2 was producing from the same alluvium source. Well #2 therefore will be treated as an alluvial well in this application. Well #1 is cased and sealed into basalt and producing from a basalt source.
[B]Well #1 is a currently being monitored as part of a permit condition. SWL is taken from most recent reported value.

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: Neither of the proposed POAs are within ¼ mile from surface water nor are they within a groundwater limited area.

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 (annual SWL); "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 Well #2** to allow groundwater production only from the **Alluvium** groundwater reservoir < 220 ft below land surface (i.e., the well cannot be deepened to produce from deeper basalt zones). ~~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 application proposes groundwater production from two separate aquifer systems on the same permit with the maximum rate to be produced from either well. This scenario creates issues with determining future sustainability of the aquifers and capacity of the resource and can lead to significant difficulty and impairment with future transfers and/or permit amendments. It is recommended that the applicant propose two separate applications: one for the alluvial aquifer system and one for the basalt aquifer system.

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	**Basalt**	☒	☐
2	**Alluvium**	☒	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Well #1 produces from interflow zones within competent basalt bedrock where SWLs are higher than water-bearing zones. Additionally, test data from a recent aquifer test conducted nearby (MARI 61370 – producing from basalt) was used to estimate a storativity value of 2E-4, which is interpreted as confined aquifer conditions.

Well #2 produces from the alluvial material with thick clay and fine-grained sediments near the surface identified on driller's logs and in published reports (Gannett and Caldwell 1998) and separate heads in sediments above and below the fine-grained layers.

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	**Little Pudding River**	**180**	**190-210**	**1700**	☐	☒	☐	☐	☐
2	1	**Little Pudding River**	**180**	**180-200**	**2750**	☒	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Well #1 is producing from zones within basalt layers that are far below the elevation of incision of the Little Pudding River nearby and is determined not to be efficiently hydraulically connected to surface water at any practical distance.
Well #2 is determined to be hydraulically connected because it is producing from alluvial material and has similar SWL elevations as the river.

Water Availability Basin the well(s) are located within: Pudding River > Molalla R – AB Mill Cr (ID# 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?
2	1	☐	☐	**IS73532**	**36**	☒	**67.3**	☐	**< 1%**	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

Comments: Results of running an analytical stream-depletion model (Hunt 2003) suggest that impacts to flows in the Little Pudding River by pumping Well #2 will be < 1% of the pumping rate after 30 days. Aquifer parameters were taken from Herrera (2014).

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
		%	%	%	%	%	%	%	%	%	%	%	%
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													
(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:** Well #2 is also listed as a POA for GR 990 with a permitted rate of 0.25 cfs. This rate should be accounted for when determining PSI under OAR 690-009-0040. The proposed rate for this application of 0.51 cfs exceeds 1% of instream right IS73532 by itself, but consideration should be given to the total appropriation from that well which is 0.51 + 0.25 = 0.76 cfs – which is also > 1% of IS73532. Appropriation from Well #2 should not be permitted since it has the potential for substantial interference under OAR 690-009. If the applicant proposes a reduced, well-specific rate from Well #2 then the existing rate under GR 990 must be considered such that the total maximum rate under all permitted use be < 1% of IS73532 or < 0.36 cfs to avoid PSI.

Well #1 (MARI 54600) was determined not to be hydraulically connected to surface water within any practical distance so OAR 690-009 rules do not apply and the full rate of 0.51 cfs can be appropriated from that well.

References Used:

Gannet, 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 semi-confined aquifer*. Journal of Hydrologic Engineering. Vol 8(1). pp 12-19.

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

PUDDING R > MOLALLA R - AB MILL CR
WILLAMETTE BASIN

Water Availability as of 11/24/2015

Watershed ID #: 151 (Map) Exceedance Level: 80%

Date: 11/24/2015 Time: 1:10 PM

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

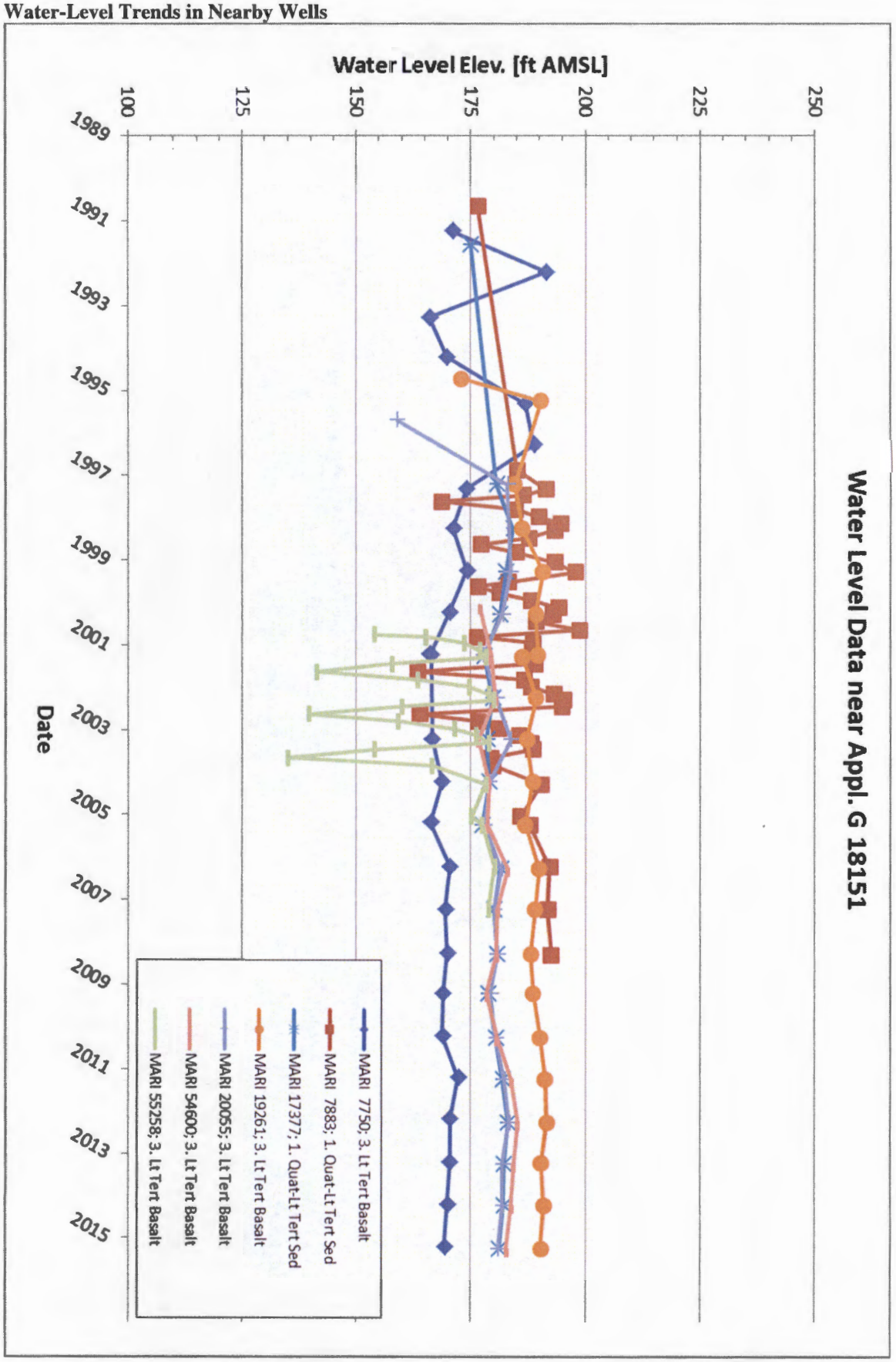
Water Availability Calculation

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

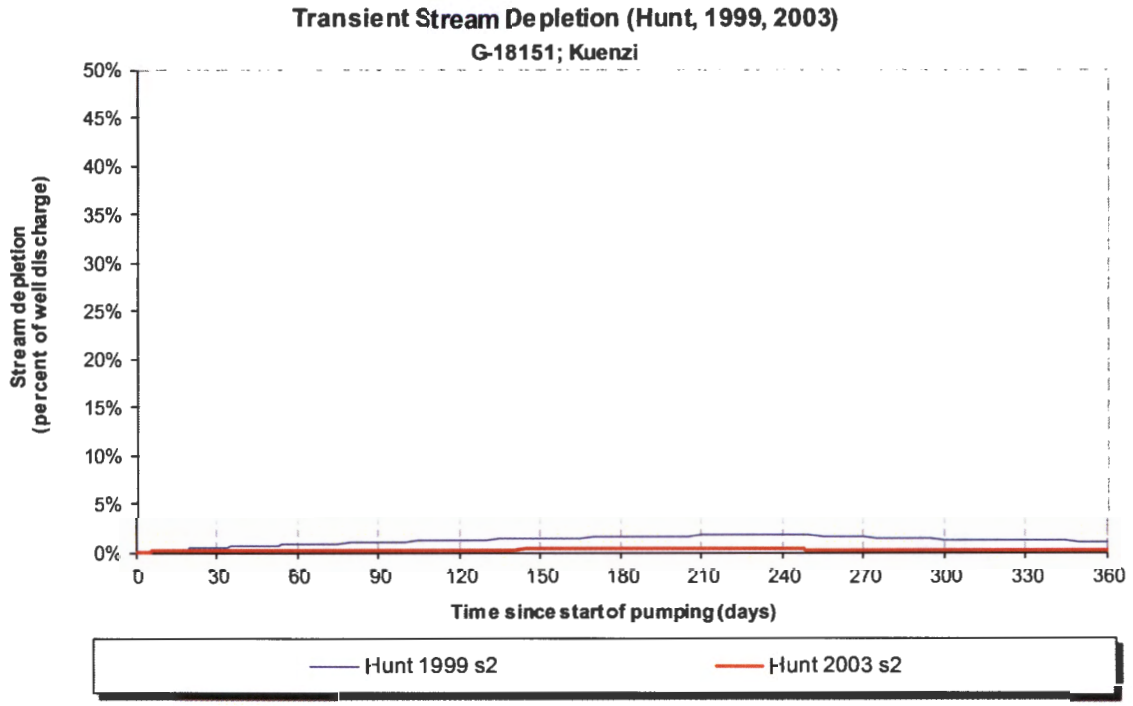
Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,040.00	125.00	915.00	0.00	36.00	879.00
FEB	1,180.00	115.00	1,060.00	0.00	36.00	1,030.00
MAR	1,010.00	80.10	930.00	0.00	36.00	894.00
APR	787.00	55.90	731.00	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	54.50	12.80	0.00	36.00	-23.20
OCT	91.60	14.00	77.60	0.00	36.00	41.60
NOV	363.00	49.10	314.00	0.00	36.00	278.00
DEC	957.00	119.00	838.00	0.00	36.00	802.00
ANN	706,000.00	57,000.00	649,000.00	0.00	26,100.00	625,000.00

Well Location Map

Water-Level Trends in Nearby Wells



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	77.2%	83.8%	86.7%	88.5%	89.7%	90.6%	91.3%	91.8%	16.8%	9.5%	6.6%	5.1%
H SD 1999	0.5%	0.8%	1.0%	1.2%	1.4%	1.6%	1.7%	1.8%	1.5%	1.3%	1.2%	1.1%
H SD 2003	**0.20%**	**0.22%**	**0.25%**	**0.27%**	**0.29%**	**0.31%**	**0.33%**	**0.35%**	**0.18%**	**0.17%**	**0.16%**	**0.16%**
Qw, cfs	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510	0.510
H SD 99, cfs	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.009	0.008	0.007	0.006	0.006
H SD 03, cfs	0.001	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001	0.001	0.001	0.001

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.51	**0.51**	0.51	cfs
Time pump on (pumping duration)	tpon	244	**244**	244	days
Perpendicular from well to stream	a	2750	**2750**	2750	ft
Well depth	d	200	**200**	200	ft
Aquifer hydraulic conductivity	K	50	**100**	500	ft/day
Aquifer saturated thickness	b	150	**150**	150	ft
Aquifer transmissivity	T	7500	**15000**	75000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	**0.01**	0.01	
Aquitard vertical hydraulic conductivity	Kva	0.035	**0.01**	0.035	ft/day
Aquitard saturated thickness	ba	10	**10**	10	ft
Aquitard thickness below stream	babs	5	**5**	5	ft
Aquitard porosity	n	0.2	**0.2**	0.2	
Stream width	ws	15	**15**	15	ft
Streambed conductance (lambda)	sbc	0.11	**0.03**	0.11	ft/day
Stream depletion factor	sdf	10.08	**5.04**	1.01	days
Streambed factor	sbf	0.04	**0.01**	0.00	