PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

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

FROM: Groundwater Section **Aurora C. Bouchier/Ivan Gall**
Reviewer's Name

SUBJECT: Application G- **18076** Supersedes review of **August 12 & 21, 2015**
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: **Meza** County: **Clackamas**

A1. Applicant(s) seek(s) **0.25** cfs (112 gpm) from **2** well(s) in the **Willamette** Basin, _____ subbasin

A2. Proposed use **Irrigation of 20 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 2150	1	Alluvium	0.25	T5S/R1W-14-NWSE	505' S, 100' E fr CENTER S 14
2	PROPOSED	2	Alluvium	0.25	T5S/R1W-14-NWSE	875' S, 80' E fr CNETER S 14
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	190	18	47	November 1972	89	0-32	0-89			35	27	Bailer
2	190				160(+/-)	0-40	160(+/-)		120-160			

Use data from application for proposed wells.

A4. **Comments:** For the proposed well, the application provides distances from the property corner rather than the center of the section. The application does not provide meets and bounds for the existing well. The meets and bounds provided in this review are estimated based on the information provided. There are some discrepancies between the well log for CLAC 2150 and this application. These include inconsistent quarter-quarters and a note on the well lot stating that the well is locate "20 ft from SE corner of house". Other well logs in the immediate area provide similar lithology.

For the purpose of this review, the full rate is evaluated at each well rather than being distributed between the wells.

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 applicant's wells are greater than ¼ mile from a perennial surface water body, so the pertinent 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: _____

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) **Please see notes in B3 w.r.t. surface water impacts; 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:**

Over 900 feet of alluvial sediments occur beneath land surface in the vicinity of the proposed POA. The water table occurs 30-60 feet below land surface in this region. Productive sand and gravel beds occur throughout the sequence separated layers of lower permeability silts and clay which progressively confine deeper water-bearing zones (Gannet and Caldwell, 1998, and Woodward et al., 1998).

Observation from nearby wells indicate relatively stable long-term trends for alluvial wells in the immediate vicinity of the proposed POA (see attached hydrograph), but increased groundwater development in the area indicates a need for additional water-level monitoring (7N) if this permit is issued. According to the Water Master Joel Plahn (personal communication, 8/12/2015) both Butte Creek and the Pudding River (which Butte Creek is tributary to), are currently regulated. Any additional withdrawals from the streams would be undesirable.

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

Basis for aquifer confinement evaluation: The well logs for nearby wells indicate static water levels above the water-bearing zones. Published maps of the groundwater table corroborate this (Woodward et al., 1998).

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	**Butte Creek**	~140	~105-120	2,220	☒	☐	☐	☐	☒
2	1	**Butte Creek**	~140	~105-120	2,030	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: : Published water-table maps indicate that groundwater in the alluvial aquifer flows toward, and discharges to, Butte Creek (Woodward et al., 1998).

Water Availability Basin the well(s) are located within: 69799 (BUTTE CR< PUDDING R- AT MOUTH)

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	☐	☐	**69799**	**12**	☒	**9.78**	☒	**12.6%**	☒
2	1	☐	☐	**69799**	**12**	☒	**9.78**	☒	**13.3%**	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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: Stream depletion was estimated using the Hunt 2003 model (see attached results). An aquifer saturated thickness value of 40 feet was used based upon published maps (Gannet and Caldwell, 1998). Butte Creek cuts through the Willamette Silt in this region. Therefore, stream clogging was modeled by using an aquitard thickness below stream value of 3 feet.

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:

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:

Gannett, Marshall W., and Caldwell, Rodney R., 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-A.

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

Woodward, Dennis BG., Gannett, Marshall W., and Vaccaro, John J., 1998 Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U. S. Geological Survey Professional Paper 1424-B.

Nearby well logs and water level data, especially well logs for: CLAC 2123, CLAC 2150, CLAC 2153, CLAC 2154, and water levels for: CLAC 2051, CLAC 2054, CLAC 2083, CLAC 2114, CLAC 2164, CLAC 2171, CLAC 2173, CLAC 2175, CLAC 2183, CLAC 2952, CLAC 55526, MARI 1756, MARI 1758, MARI 1936, MARI 1944, MARI 2004, MARI 54954, and MARI 58373.

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

BUTTE CR > PUDDING R - AT MOUTH
Watershed ID #: 69799 Basin: WILLAMETTE Exceedance Level: 80
Time: 12:21 PM Date: 08/11/2015

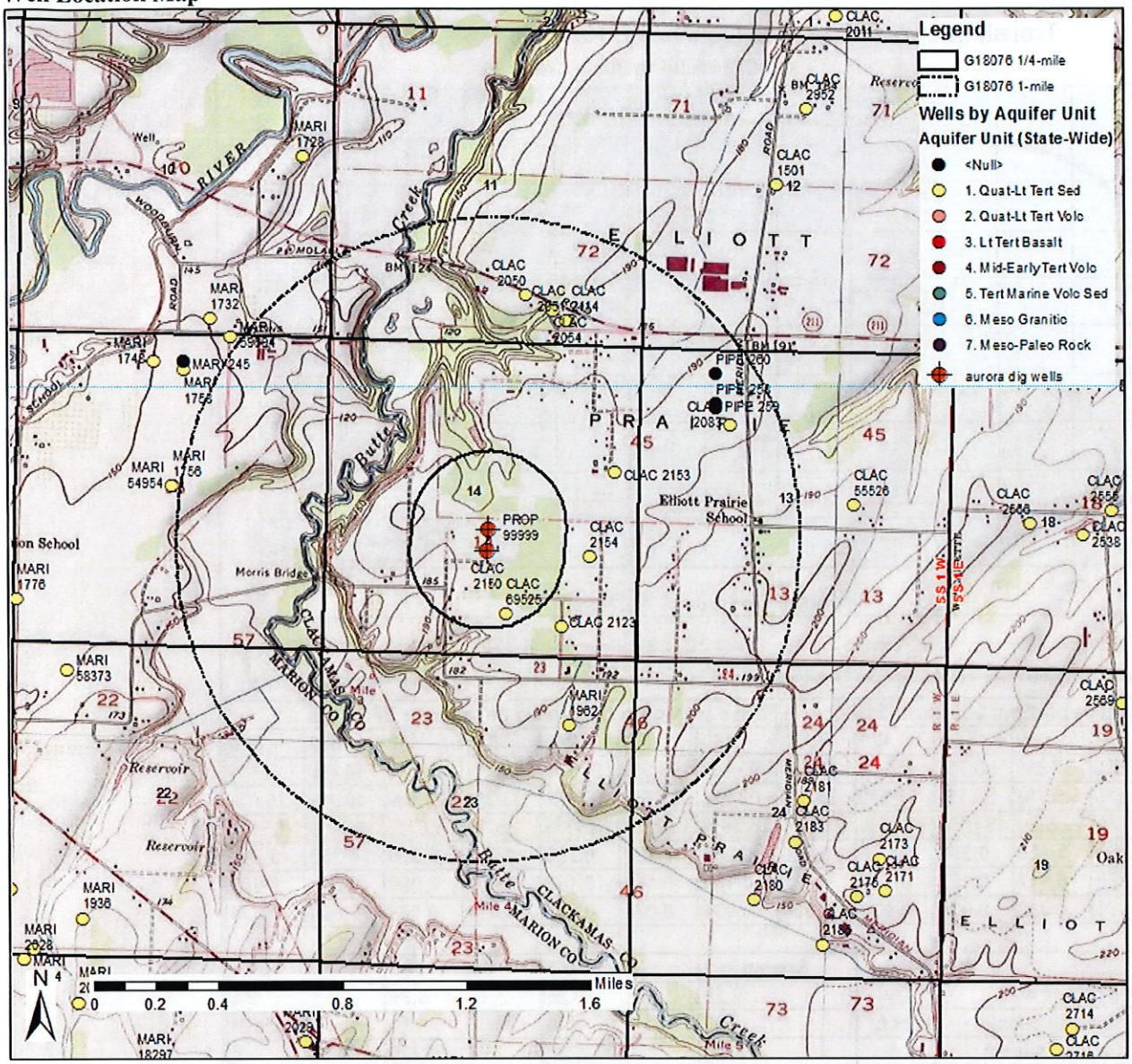
Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net Water Available
	Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.					
JAN	169.00	3.93	165.00	0.00	75.00	90.10
FEB	181.00	3.76	177.00	0.00	75.00	102.00
MAR	172.00	2.82	169.00	0.00	75.00	94.20
APR	142.00	2.34	140.00	0.00	75.00	64.70
MAY	89.20	5.61	83.60	0.00	75.00	8.59
JUN	39.00	10.30	28.70	0.00	75.00	-46.30
JUL	15.10	17.00	-1.87	0.00	25.00	-26.90
AUG	9.90	13.60	-3.70	0.00	12.00	-15.70
SEP	9.78	6.97	2.81	0.00	20.00	-17.20
OCT	15.10	1.00	14.10	0.00	75.00	-60.90
NOV	66.00	1.90	64.10	0.00	75.00	-10.90
DEC	170.00	4.09	166.00	0.00	75.00	90.90
ANN	121,000	4,440	117,000	0	44,100	78,900

DETAILED REPORT OF INSTREAM REQUIREMENTS

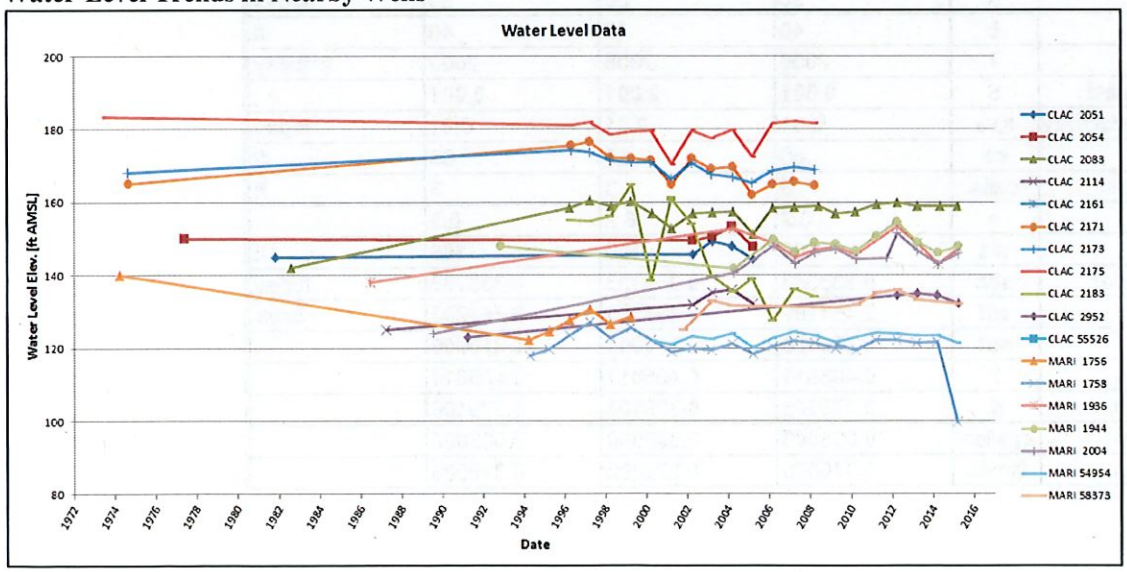
BUTTE CR > PUDDING R - AT MOUTH
Watershed ID #: 69799 Basin: WILLAMETTE
Time: 12:24 PM Date: 08/11/2015

Application Number	Status	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
		Monthly values are in cfs.											
IS69799A	CERTIFICATE	75.0	75.0	75.0	75.0	75.0	75.0	25.0	12.0	20.0	75.0	75.00	75.0
MAXIMUM		75.0	75.0	75.0	75.0	75.0	75.0	25.0	12.0	20.0	75.0	75.0	75.0

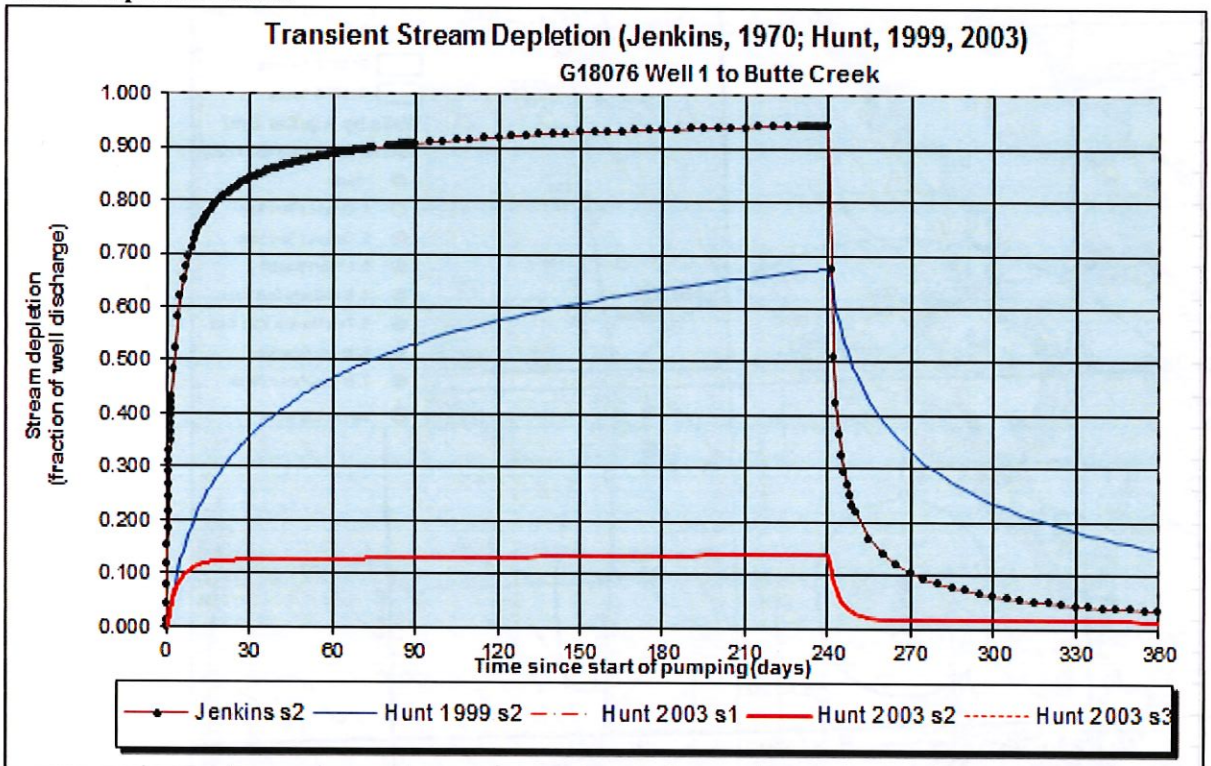
Well Location Map



Water-Level Trends in Nearby Wells

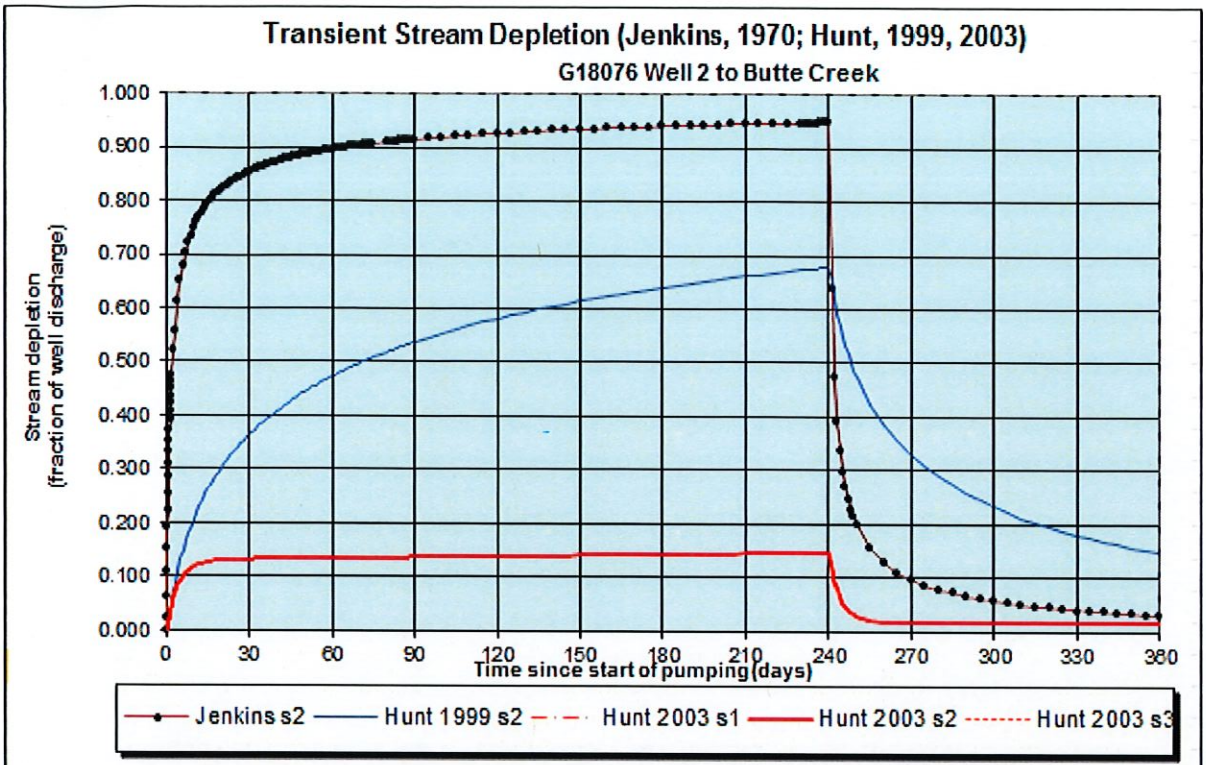


Stream Depletion Results



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	83.9%	88.6%	90.7%	91.9%	92.8%	93.4%	93.9%	94.3%	10.7%	6.3%	4.4%	3.4%
H SD 1999	35.6%	46.7%	53.1%	57.5%	60.9%	63.5%	65.6%	67.4%	33.3%	23.6%	18.4%	15.0%
H SD 2003	12.59%	12.82%	13.01%	13.21%	13.40%	13.59%	13.78%	13.97%	1.57%	1.53%	1.52%	1.51%
Qw, cfs	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
H SD 99, cfs	0.089	0.117	0.133	0.144	0.152	0.159	0.164	0.169	0.083	0.059	0.046	0.037
H SD 03, cfs	0.031	0.032	0.033	0.033	0.034	0.034	0.034	0.035	0.004	0.004	0.004	0.004

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.25	0.25	0.25	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2220	2220	2220	ft
Well depth	d	89	89	89	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	2000	2000	2000	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	65	65	65	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	100	100	100	ft
Streambed conductance (lambda)	sbc	0.333333	0.333333	0.333333	ft/day
Stream depletion factor	sdf	2.464200	2.464200	2.464200	days
Streambed factor	sbf	0.370000	0.370000	0.370000	
input #1 for Hunt's Q_4 function	t'	0.405811	0.405811	0.405811	
input #2 for Hunt's Q_4 function	K'	0.379108	0.379108	0.379108	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.370000	0.370000	0.370000	



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	85.3%	89.6%	91.5%	92.6%	93.4%	94.0%	94.4%	94.8%	9.8%	5.8%	4.1%	3.1%
H SD 1999	36.4%	47.3%	53.7%	58.1%	61.4%	64.0%	66.1%	67.9%	33.0%	23.4%	18.1%	14.8%
H SD 2003	13.27%	13.50%	13.70%	13.89%	14.09%	14.28%	14.48%	14.67%	1.59%	1.55%	1.54%	1.53%
Qw, cfs	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.250
H SD 99, cfs	0.091	0.118	0.134	0.145	0.153	0.160	0.165	0.170	0.082	0.058	0.045	0.037
H SD 03, cfs	0.033	0.034	0.034	0.035	0.035	0.036	0.036	0.037	0.004	0.004	0.004	0.004

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.25	0.25	0.25	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2030	2030	2030	ft
Well depth	d	160	160	160	ft
Aquifer hydraulic conductivity	K	50	50	50	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	2000	2000	2000	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	65	65	65	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	100	100	100	ft
Streambed conductance (lambda)	sbc	0.333333	0.333333	0.333333	ft/day
Stream depletion factor	sdf	2.060450	2.060450	2.060450	days
Streambed factor	sbf	0.338333	0.338333	0.338333	
input #1 for Hunt's Q_4 function	t'	0.485331	0.485331	0.485331	
input #2 for Hunt's Q_4 function	K'	0.316992	0.316992	0.316992	
input #3 for Hunt's Q_4 function	epsilon'	0.005000	0.005000	0.005000	
input #4 for Hunt's Q_4 function	lamda'	0.338333	0.338333	0.338333	