

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 9-23-2014

FROM: Groundwater Section Michael Thoma / Karl Wozniak
Reviewer's Name

SUBJECT: Application G- 17829 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: David Birky County: Linn

A1. Applicant(s) seek(s) 0.847 cfs from 2 well(s) in the Willamette Basin,
Muddy Cr. subbasin Quad Map: Harrisburg

A2. Proposed use Irrigation 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	LINN 50541	1	Alluvium	0.089	14S/04W-15 SWSW	300'N, 730'E from SW cor S15
2	PROP*	2	Alluvium	0.740	14S/04W-15 SWSW	770'N, 610'E from SW cor S15
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	293	35	13	08/16/1996	60	0-18	+1-49		40-49	48	15	B
2*	293											

Use data from application for proposed wells.

A4. **Comments:** Well #2 is proposed with an 8 in casing and unknown depth. It was clarified by Walt Trimmer that the full rate of 0.847 cfs is to be divided up between the two wells in the amounts indicated in A3.

A5. ☐ **Provisions of the Willamette (690-502-0240)** 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 well produces from a confined aquifer so the pertinent rules 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) 7C, 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 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 area near the proposed wells is underlain by about 10-20 feet of Willamette Silt which is underlain by 20-40 feet of water-bearing sand and gravel. The water table is generally within 10-20 feet of land surface. Muddy Creek is incised into the Willamette Silt but probably does not completely penetrate to the underlying aquifer. The streambed of Muddy Creek is likely to contain a significant fraction of silt and clay because of the low stream gradient and low streamflow. This should lower the efficiency of the hydraulic connection between the creek and the aquifer but does not dismiss hydraulic connection.

Water-level data in the surrounding area show stable water levels over the past several decades. Additionally there are few permitted groundwater uses within a one-mile radius and residential well density is very low. Therefore the groundwater resource is not likely to be over appropriated and the amount requested should be within the capacity of the resource without injury to existing users.

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: There is an estimated 10 – 20 ft thick package of Willamette Silt overlying the alluvial aquifer in this area which acts as a confining layer. Also wells completed below this silt layer show higher water levels than the depth of the water bearing zones indicating confined to semi-confined 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	Muddy Cr.	270-280	265-280	5000	☒	☐	☐	☐	☒
2	1	Muddy Cr.	270-280	265-280	5300	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Published water table maps show that groundwater flows toward and discharges to Muddy Cr. Water levels in Well #1 and nearby wells are near the same elevation as nearby reaches of the creek. These facts indicate that the aquifer and Muddy Cr. are hydraulically connected

Water Availability Basin the well(s) are located within: WAB 30200303: Muddy Cr > E Channel – 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	☐	☐			☐	14.9	☐	< 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: _____

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
2	1	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS				0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		
Interference CFS				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
		%	%	%	%	%	%	%	%	%	%	%	%
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.				< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01		
(B) = 80 % Nat. Q		178	203	174	91.3	52.5	35.3	26.1	20.3	14.9	15.2	29	113
(C) = 1 % Nat. Q		1.78	2.03	1.74	0.91	0.53	0.35	0.26	0.20	0.15	0.15	0.29	1.13
(D) = (A) > (C)													
(E) = (A / B) x 100		%	%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%	<0.1%

(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: Well #1 is within 1 mi of Muddy Cr. but the proposed rate is < 1% of the 80% exceedance minimum flow and interference based on modeling with the Hunt 2003 analytical model predicts < 1% interference after 30 days of pumping. Model results from the Hunt 2003 model are shown below.

Well #2 is > 1 mi from Muddy Cr. and hydraulically connected and evaluated in C4a with the Hunt 2003 model. The rate evaluated on was 0.38 cfs instead of the proposed maximum rate of 0.740 cfs since the allowed duty is only 180.75 ac-ft (2.5 ac-ft x 72.3 ac) over 240 days which corresponds to a maximum constant pumping rate of 0.38 cfs. Interference was << 1% after 1 yr.

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 _____

References Used:

Conlon, T. D., K. C. Wozniak, D. Woodcock, N. B. Herrera, B. J. Fisher, D. S. Morgan, K. K. Lee, and S. R. Hinkle. 2005. Ground-water hydrology of the Willamette Basin, Oregon. U.S. Geological Survey Scientific Investigations report 2005-5168.

Hunt, B. 2003. Unsteady stream depletion when pumping from a semiconfined aquifer. Journal of Hydrologic Engineering 8(1). 12-19.

O' Conner, J. E., A. Sarna-Wojcicki, K. C. Wozniak, D. J. Polette, and R. J. Fleck. 2001. Origin, extent, and thickness of Quaternary geologic units in the Willamette Valley, Oregon. U.S. Geological Survey 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:**

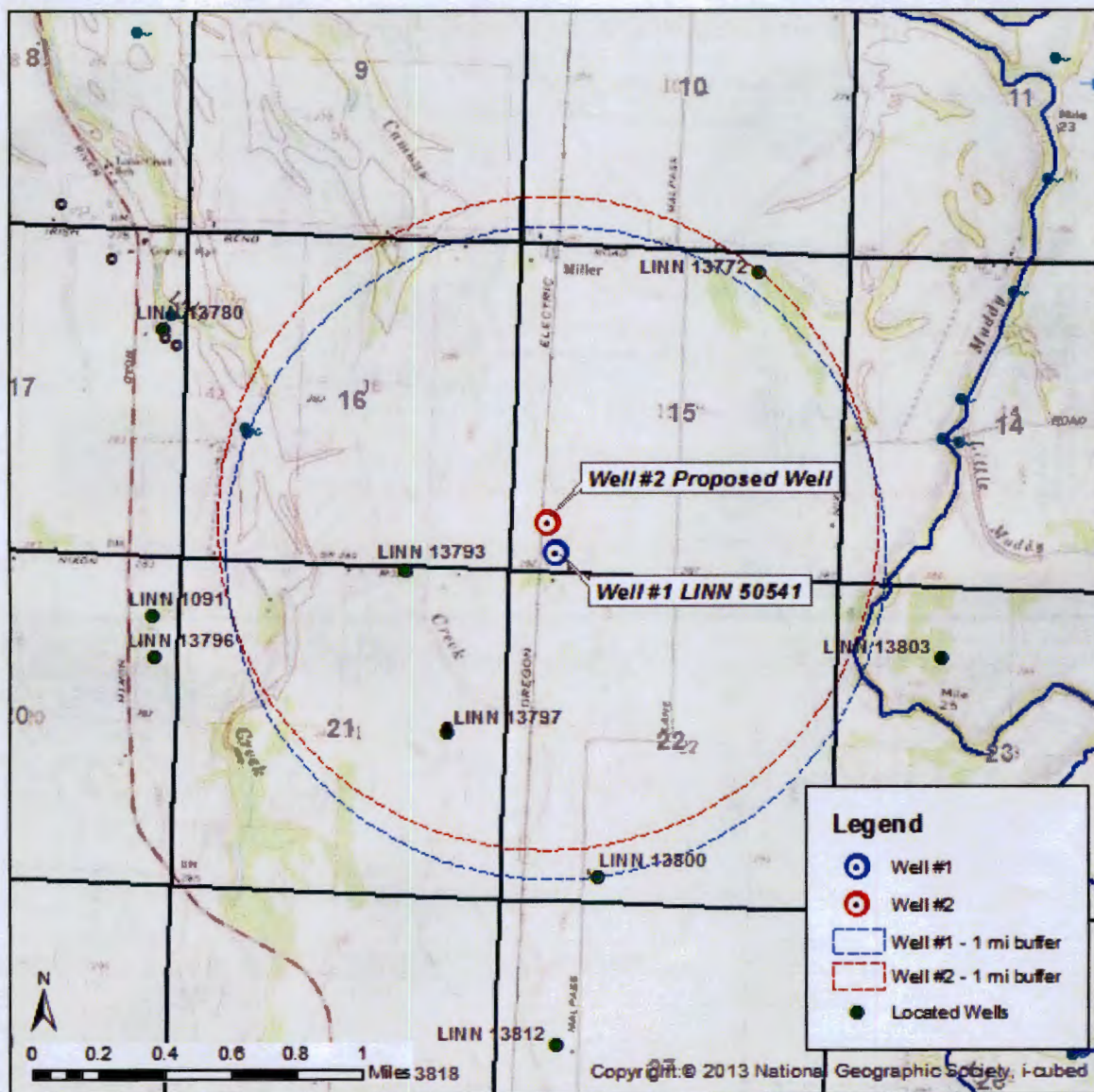
- a. ☐ review of the well log;
 b. ☐ field inspection by _____;
 c. ☐ report of CWRE _____;
 d. ☐ other: (specify) _____

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**

Watershed ID	Exceedance Level	Month	Natural Stream Flow	Consumptive Use	Expected Stream Flow	Reserved Stream Flow	Instream Requirement	Net Water Avail
30200303	80	JAN	178	0.434	178	0	0	178
30200303	80	FEB	203	0.391	203	0	0	203
30200303	80	MAR	174	0.317	174	0	0	174
30200303	80	APR	91.3	0.325	91	0	0	91
30200303	80	MAY	52.5	1.17	51.3	0	0	51.3
30200303	80	JUN	35.3	2.18	33.1	0	0	33.1
30200303	80	JUL	26.1	2.29	23.8	0	0	23.8
30200303	80	AUG	20.3	1.83	18.5	0	0	18.5
30200303	80	SEP	14.9	1.27	13.6	0	0	13.6
30200303	80	OCT	15.2	0.207	15	0	0	15
30200303	80	NOV	29	0.139	28.9	0	0	28.9
30200303	80	DEC	113	0.389	113	0	0	113
30200303	80	ANN	114000	663	113000	0	0	113000

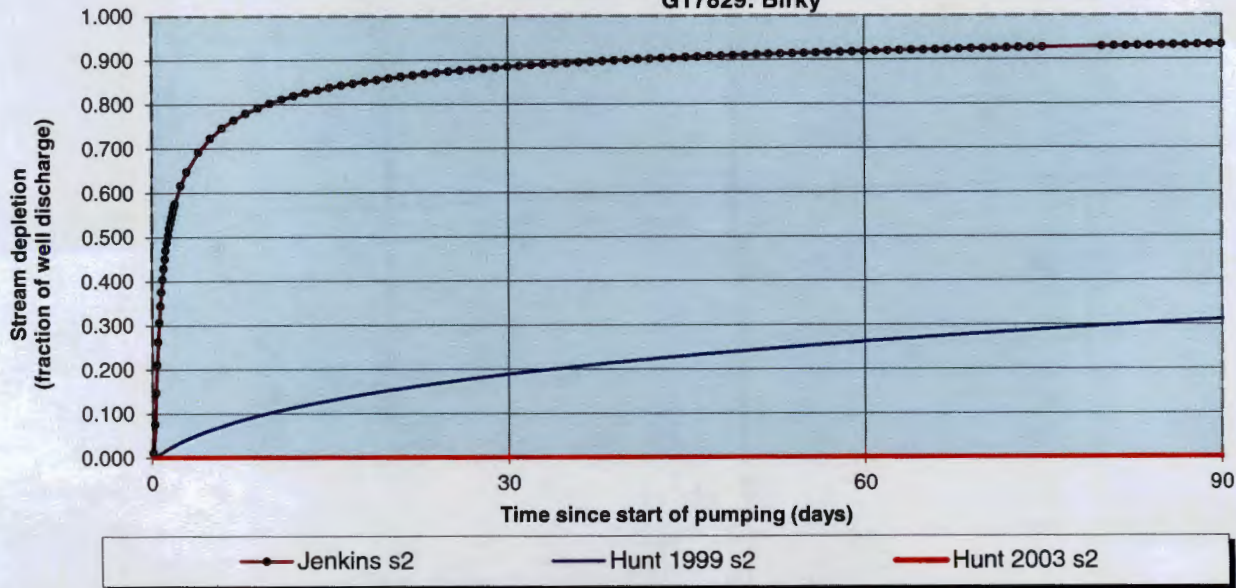
Application Area Map



Hunt 2003 Model results for Well #1 (30 d Pumping)

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

G17829: Birky



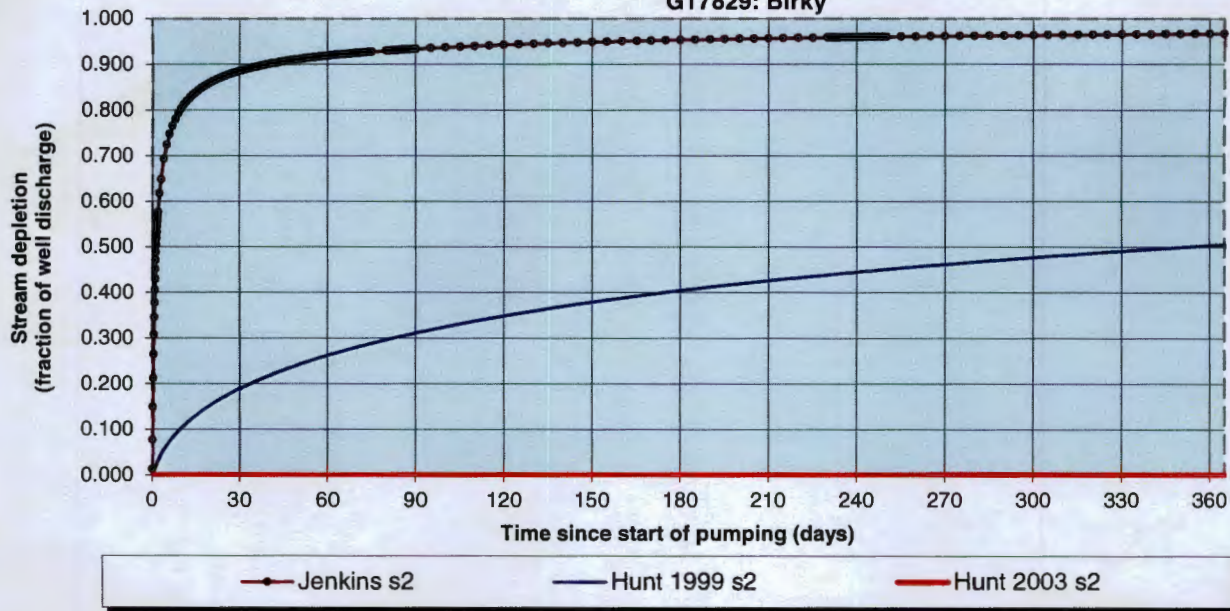
Output for Stream Depletion, Scenario 2 (s2):						Time pump on (pumping duration) = 30 days							
Days	30	60	90	120	150	180	210	240	270	300	330	360	
J SD	88.5%	3.3%	1.5%	0.9%	0.6%	0.4%	0.3%	0.3%	0.2%	0.2%	0.2%	0.1%	
H SD 1999	18.9%	7.3%	4.9%	3.7%	3.0%	2.5%	2.2%	1.9%	1.7%	1.5%	1.4%	1.3%	
H SD 2003	0.05%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	
Qw, cfs	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	
H SD 99, cfs	0.021	0.008	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.002	0.001	
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.11	0.11	0.11	cfs
Time pump on (pumping duration)	tpon	30	30	30	days
Perpendicular from well to stream	a	5000	5000	5000	ft
Well depth	d	40	40	40	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 ² /day
Aquifer storativity or specific yield	S	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	10	10	10	ft
Aquitard thickness below stream	babs	5	5	5	ft
Aquitard porosity	n	0.3	0.3	0.3	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.040	0.040	0.040	ft/day
Stream depletion factor	sdf	1.250	1.250	1.250	days
Streambed factor	sbfb	0.100	0.100	0.100	
input #1 for Hunt's Q_4 function	t'	0.800	0.800	0.800	
input #2 for Hunt's Q_4 function	K'	12.500	12.500	12.500	
input #3 for Hunt's Q_4 function	epsilon'	0.000	0.000	0.000	
input #4 for Hunt's Q_4 function	lamda'	0.100	0.100	0.100	

Hunt 2003 Model results for Well #2 (365 d Pumping)

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)

G17829: Birky



Output for Stream Depletion, Scenario 2 (s2):						Time pump on (pumping duration) = 365 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	88.5%	91.9%	93.4%	94.2%	94.9%	95.3%	95.6%	95.9%	96.2%	96.4%	96.5%	96.7%
H SD 1999	18.9%	26.2%	31.1%	34.9%	37.9%	40.4%	42.6%	44.5%	46.2%	47.7%	49.1%	50.4%
H SD 2003	0.05%	0.06%	0.07%	0.08%	0.09%	0.10%	0.11%	0.13%	0.14%	0.15%	0.16%	0.18%
Qw, cfs	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380	0.380
H SD 99, cfs	0.072	0.100	0.118	0.133	0.144	0.154	0.162	0.169	0.176	0.181	0.187	0.191
H SD 03, cfs	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.001	0.001	0.001

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.38	0.38	0.38	cfs
Time pump on (pumping duration)	tpon	365	365	365	days
Perpendicular from well to stream	a	5300	5300	5300	ft
Well depth	d	40	40	40	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	0.0001	0.0001	0.0001	
Aquitard vertical hydraulic conductivity	Kva	0.01	0.01	0.01	ft/day
Aquitard saturated thickness	ba	10	10	10	ft
Aquitard thickness below stream	babs	5	5	5	ft
Aquitard porosity	n	0.3	0.3	0.3	
Stream width	ws	20	20	20	ft
Streambed conductance (lambda)	sbc	0.040	0.040	0.040	ft/day
Stream depletion factor	sdf	1.250	1.250	1.250	days
Streambed factor	sbfb	0.100	0.100	0.100	
input #1 for Hunt's Q_4 function	t'	0.800	0.800	0.800	
input #2 for Hunt's Q_4 function	K'	12.500	12.500	12.500	
input #3 for Hunt's Q_4 function	epsilon'	0.000	0.000	0.000	
input #4 for Hunt's Q_4 function	lamda'	0.100	0.100	0.100	