Groundwater Application Review Summary Form

Application # G- _17043, review_

GW Reviewer _J.Woody_   Date Review Completed: _10-4-2017_

Summary of GW Availability and Injury Review:

[ ] Groundwater for the proposed use is either over appropriated, will not likely be available in the amounts requested without injury to prior water rights, OR will not likely be available within the capacity of the groundwater resource per Section B of the attached review form.

Summary of Potential for Substantial Interference Review:

[X] There is the potential for substantial interference per Section C of the attached review form.

Summary of Well Construction Assessment:

[ ] The well does not appear to meet current well construction standards per Section D of the attached review form. Route through Well Construction and Compliance Section.

This is only a summary. Documentation is attached and should be read thoroughly to understand the basis for determinations and for conditions that may be necessary for a permit (if one is issued).

WATER RESOURCES DEPARTMENT

MEMO _9-26_ ,20_17_

TO: Application G-_17043_

FROM: GW: _J. Woody_
(Reviewer's Name)

SUBJECT: Scenic Waterway Interference Evaluation

☐ YES

☒ NO   The source of appropriation is within or above a Scenic Waterway

☐ YES

☒ NO   Use the Scenic Waterway condition (Condition 7J)

☐ 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   10/04/2017

FROM: Groundwater Section   Jen Woody

                                                   Reviewer's Name

SUBJECT: Application G- 17043   Supersedes review of _7/07/2008_

                                                           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: __**Timothy and Suzanne Kreder**__   County: **Yamhill**

A1.   Applicant(s) seek(s) _1.20_ cfs from __1__ well(s) in the ___Willamette___ Basin,

        ___Yamhill River___ subbasin

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	Proposed	1	Alluvium	1.2	4S/3W-S31 SE NW	200'N, 1100'W fr center S 31
2						
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	162	105*	30*	*	230	0-100	0-230	NA	unknown	NA	NA	NA

Use data from application for proposed wells.

A4.   **Comments:** *Well is proposed. Water-bearing zones estimated from nearby well log (YAMH 24); water level estimated from groundwater contour map (Conlon et al., 2005). This rereview was triggered by a memo from EnviroLogic Resources, Inc., dated March 29, 2017. The requested rate was reduced from 1.34 cfs in the original application to 1.20 cfs, and it removed 124.5 acres of supplemental use. The memo also presents stream depletion modeling results.

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: **690-502-0240** classifies use from unconfined alluvial aquifers. This application proposes use from a confined aquifer, so this rule is not activated.

A6. ☐   **Well(s) #** _____ , _____ , _____ , _____ , _____ , tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: **NA**
Comments: _____

B. GROUNDWATER AVAILABILITY CONSIDERATIONS, OAR 690-310-130, 400-010, 410-0070

B1.   **Based upon available data**, I have determined that <u>groundwater*</u> 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** _____ ;
        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 _____ **alluvial** _____ 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 proposed well is located in an area that contains low-permeability silt and clay from land surface to a depth of approximately 100 feet below land surface. A 40 to 60 foot thick package of sand and gravel interbedded with silt and clay underlies the silt. This sand and gravel is likely the alluvial fan and braid-plain gravels of the Middle Sedimentary Unit (Conlon et al., 2005), which appear to be the most productive water-bearing zone reported in nearby well logs. Underlying the sand and gravel is a sequence of mostly fine-grained sediments with thin beds of sand and gravel.

Since the original review of this application in 2008, nearby water level data collection has increased in combination with the City of Dayton's groundwater development located about a mile to the west. As shown in Figure 3, water levels in nearby wells show decadal-scale trends that are likely due to climate cycles, but data collected since 2008 show long-term trends are relatively stable under the current level of use.

The proposed well is slightly more than ¼ mile from the closest groundwater POA. Well to well interference at this distance is estimated using Theis, 1941 (see Figure 5). Nearby pump tests show a reasonable estimate of transmissivity is approximately 2,000 ft^2/d, so expected drawdown at a quarter mile from the pumping well is on the order of 10 to 15 feet after 240 days of constant pumping at 1.2 cfs. This likely overestimates impacts, but water level monitoring conditions are recommended to address uncertainty regarding long-term impacts to the resource and other 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	**Alluvial**	☒	☐
		☐	☐
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Nearby well logs of similar depth report static water levels tens of feet above the first water-bearing zone, indicating 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? YES NO ASSUMED			Potential for Subst. Interfer. Assumed? YES NO	
1	1	**West Fork Palmer Creek**	130	120	2500	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: West Fork Palmer Creek ranges from 100 to 140 feet above mean sea level within one mile of the proposed well. The water level in the well is coincident with or above nearby perennial reaches of West Fork Palmer Creek. Nearby creeks do not incise through the Willamette Silt, which is on the order of 100 feet thick at this location, so hydraulic connection between the well and nearby creeks is expected to be inefficient. Groundwater likely discharges to surface water downgradient, providing baseflow to sustain nearby perennial reaches of the creeks.

Water Availability Basin the well(s) are located within: 30200801: YAMHILL R > WILLAMETTE R - AT MOUTH

C3a. **690-09-040 (4):** Evaluation of stream impacts for <u>each well</u> 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	☐	☐	NA	NA	☐	56.50	☒	0.01-0.16%	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

C3b. **690-09-040 (4):** Evaluation of stream impacts <u>by total appropriation</u> 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: PSI is triggered by the proposed rate of 1.2 cfs, which is greater than 1% of the 80% exceedence natural flow of 56.50 cfs. Stream depletion is estimated using Hunt (2003), because that model incorporates the effects of low-permeability materials lying between a stream and an aquifer. The aquifer parameters utilized to estimate stream depletion represent the range reported for the Middle Sedimentary Unit (Conlon et al, 2005; Woodward and Gannett, 1998), all of which predict much less than 25% stream depletion at 30 days of pumping. See Figure 4 for analytical modeling parameters and results.

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													

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

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

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.

OWRD water level database, includes reported water levels, accessed 9/25/2017.

Theis, C.V., 1941, The effect of a well on the flow of a nearby stream: Am. Geophys. Union Trans., v. 22, pt.3, p. 734-738.

US Geological Survey Topographic Map, Dayton and McMinnville Quadrangles.

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.

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:** _____
    N/A _____
    _____
    _____
    _____

D4. ☐ **Route to the Well Construction and Compliance Section for a review of existing well construction.**

Figure 1. Water Availability Tables

Water Availability Analysis
Detailed Reports

YAMHILL R > WILLAMETTE R - AT MOUTH
WILLAMETTE BASIN

Water Availability as of 9/25/2017

Watershed ID #: 30200801 (Map)   Exceedance Level:80%

Date: 9/25/2017   Time: 8:59 AM

Water Availability Calculation

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

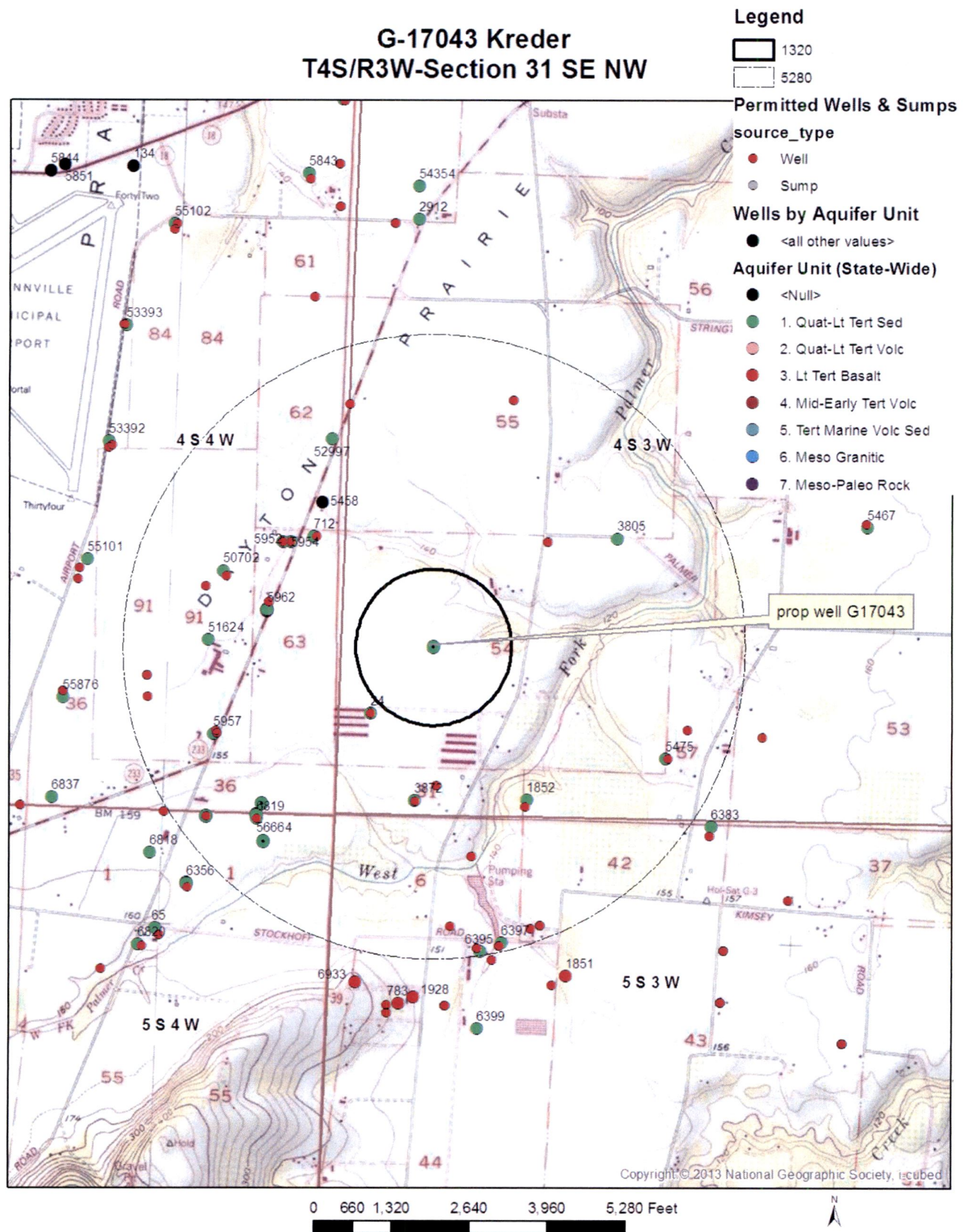| Month	Natural Stream Flow	Consumptive Uses and Storages	Expected Stream Flow	Reserved Stream Flow	Instream Flow Requirement	Net Water Available
JAN	1,840.00	68.40	1,770.00	0.00	31.70	1,740.00
FEB	2,070.00	66.10	2,000.00	0.00	31.70	1,970.00
MAR	1,760.00	41.80	1,720.00	0.00	31.70	1,690.00
APR	1,060.00	49.90	1,010.00	0.00	31.70	978.00
MAY	523.00	66.50	456.00	0.00	31.70	425.00
JUN	232.00	88.60	143.00	0.00	31.70	112.00
JUL	108.00	112.00	-3.96	0.00	31.70	-35.70
AUG	66.90	99.50	-32.60	0.00	31.70	-64.30
SEP	56.50	64.40	-7.95	0.00	31.70	-39.60
OCT	72.50	17.00	55.50	0.00	31.70	23.80
NOV	462.00	38.70	423.00	0.00	31.70	392.00
DEC	1,670.00	65.20	1,600.00	0.00	31.70	1,570.00
ANN	1,180,000.00	47,000.00	1,130,000.00	0.00	23,000.00	1,110,000.00

Figure 2. Well Location Map

G-17043 Kreder
T4S/R3W-Section 31 SE NW

Figure 3. Water-Level Trends in Nearby Wells

Observation Well Data

Figure 4a. Transient Stream Depletion

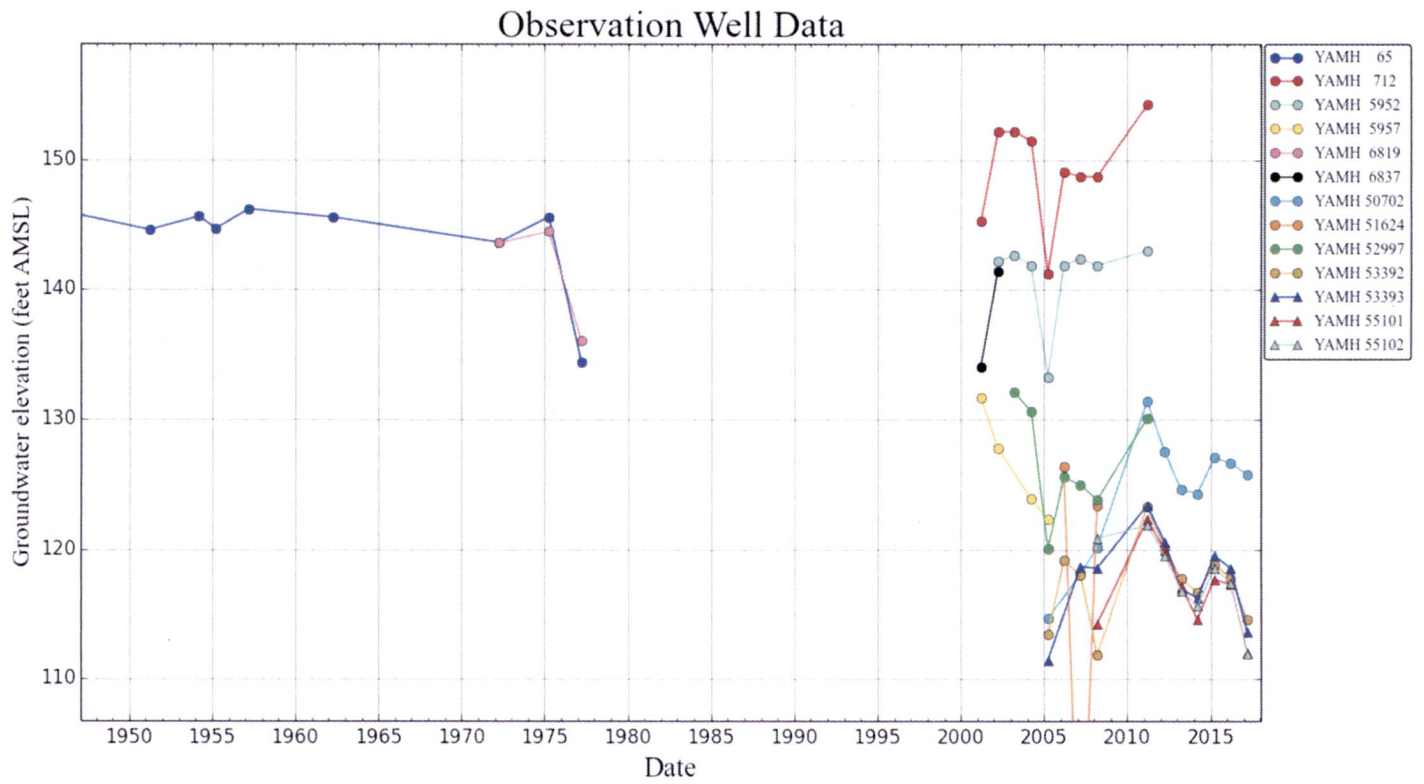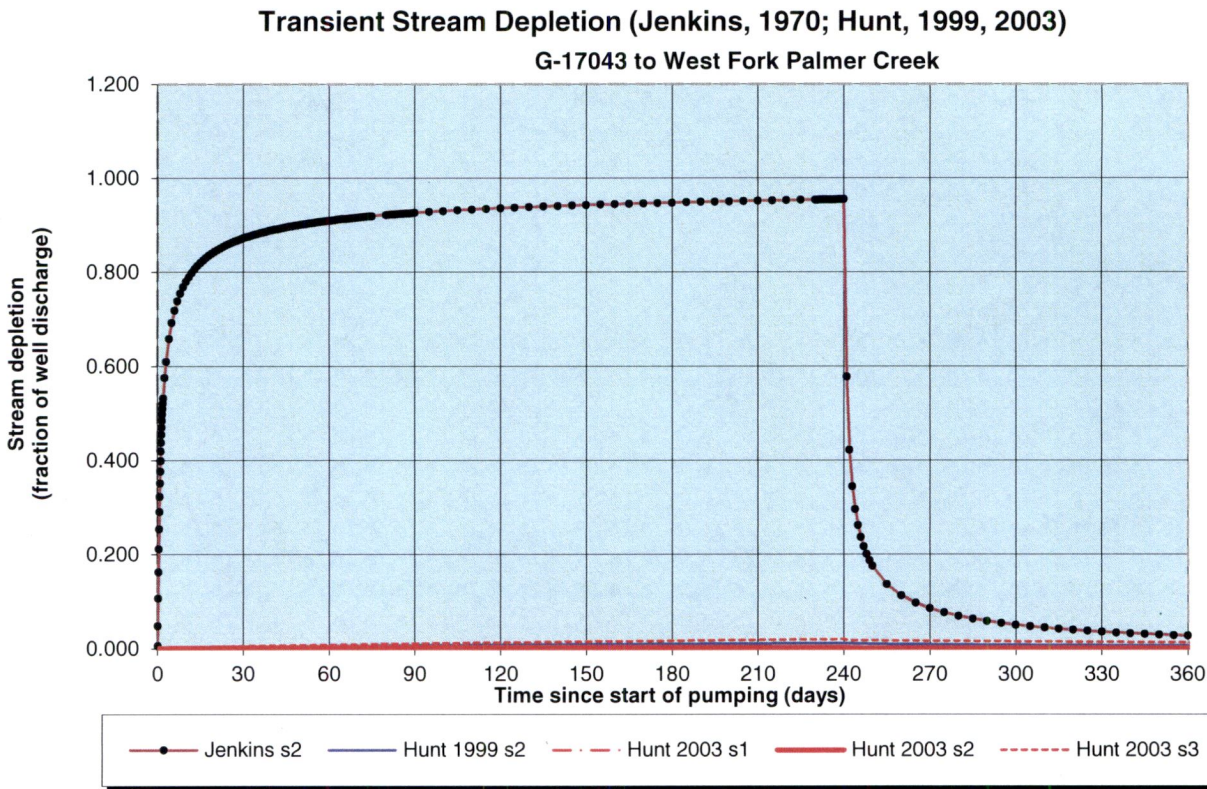Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)
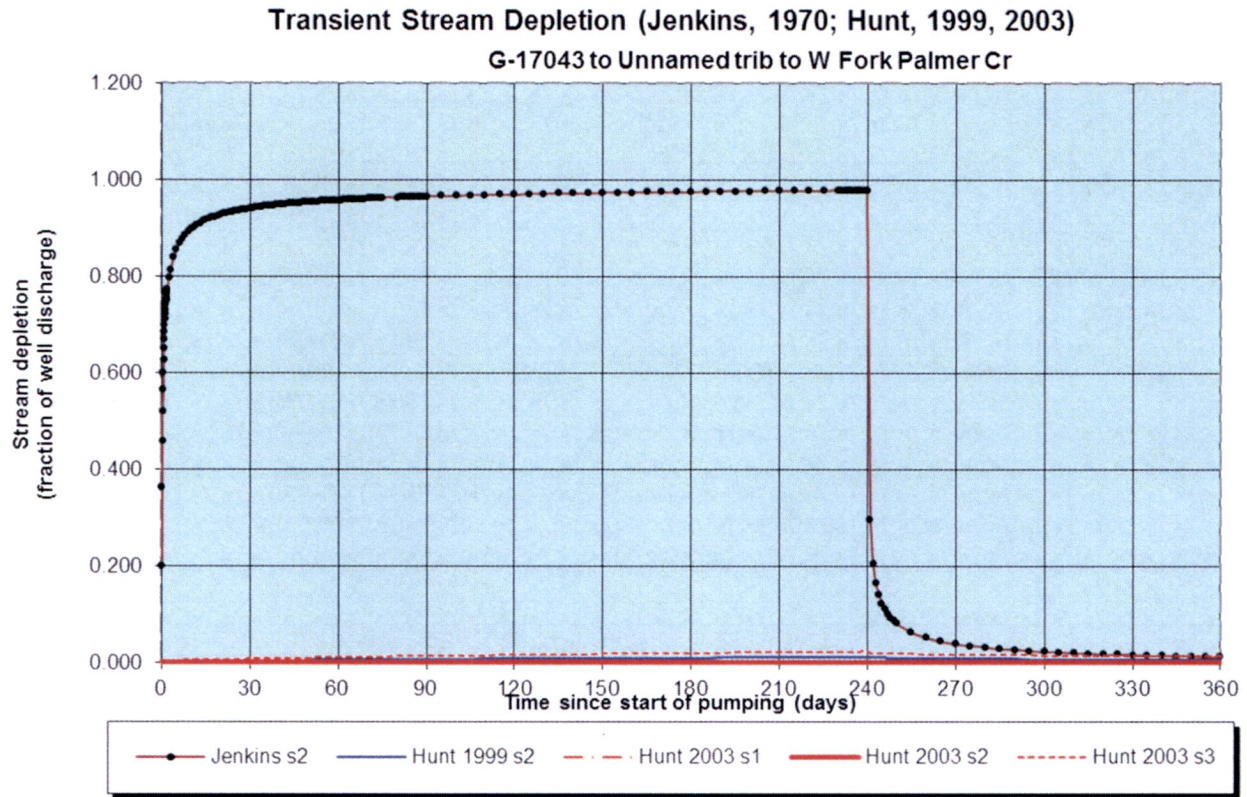G-17043 to West Fork Palmer Creek

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	87.2%	90.9%	92.6%	93.6%	94.2%	94.7%	95.1%	95.5%	8.5%	5.0%	3.5%	2.7%
H SD 1999	0.4%	0.5%	0.7%	0.8%	0.9%	1.0%	1.1%	1.2%	0.9%	0.8%	0.7%	0.6%
H SD 2003	0.15%	0.15%	0.16%	0.16%	0.16%	0.16%	0.16%	0.16%	0.02%	0.01%	0.01%	0.01%
Qw, cfs	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
H SD 99, cfs	0.004	0.006	0.008	0.009	0.011	0.012	0.013	0.014	0.010	0.009	0.008	0.008
H SD 03, cfs	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.000	0.000	0.000	0.000

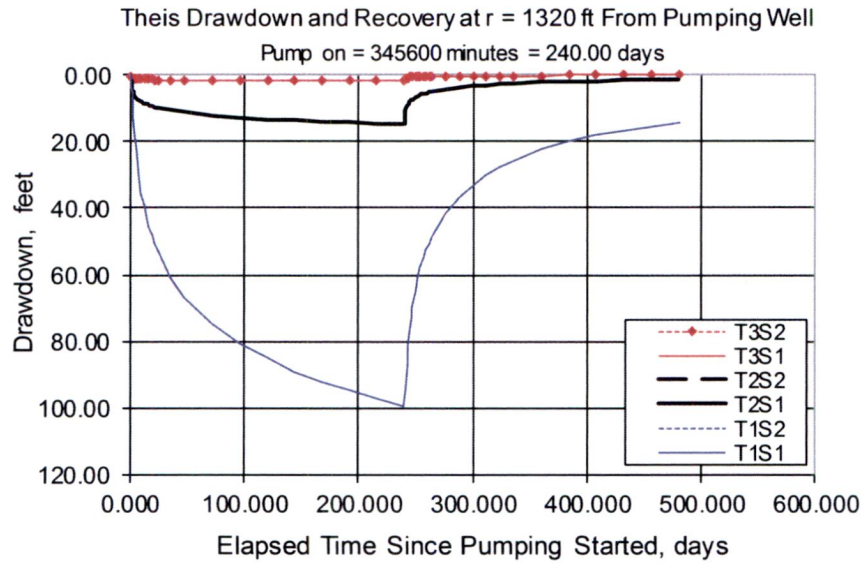| Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	1.20	1.20	1.20	cfs
Time pump on (pumping duration)	tpon	240	240	240	days
Perpendicular from well to stream	a	2500	2500	2500	ft
Well depth	d	230	230	230	ft
Aquifer hydraulic conductivity	K	10	100	1000	ft/day
Aquifer saturated thickness	b	40	40	40	ft
Aquifer transmissivity	T	400	4000	40000	ft*ft/day
Aquifer storativity or specific yield	S	0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva	0.001	0.01	1	ft/day
Aquitard saturated thickness	ba	100	100	100	ft
Aquitard thickness below stream	babs	70	70	70	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	20	20	20	ft

Figure 4b. Transient Stream Depletion

Transient Stream Depletion (Jenkins, 1970; Hunt, 1999, 2003)
G-17043 to Unnamed trib to W Fork Palmer Cr

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	94.1%	95.8%	96.6%	97.0%	97.4%	97.6%	97.8%	97.9%	3.9%	2.3%	1.6%	1.3%
H SD 1999	0.4%	0.6%	0.7%	0.8%	0.9%	1.0%	1.1%	1.2%	0.9%	0.8%	0.7%	0.6%
H SD 2003	0.19%	0.19%	0.19%	0.19%	0.20%	0.20%	0.20%	0.20%	0.02%	0.01%	0.01%	0.01%
Qw, cfs	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200	1.200
H SD 99, cfs	0.005	0.007	0.009	0.010	0.011	0.012	0.013	0.014	0.010	0.009	0.008	0.008
H SD 03, cfs	0.002	0.002	0.002	0.002	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		1.20	1.20	1.20	cfs
Time pump on (pumping duration)	tpon		240	240	240	days
Perpendicular from well to stream	a		1150	1150	1150	ft
Well depth	d		230	230	230	ft
Aquifer hydraulic conductivity	K		10	100	1000	ft/day
Aquifer saturated thickness	b		40	40	40	ft
Aquifer transmissivity	T		400	4000	40000	ft*ft/day
Aquifer storativity or specific yield	S		0.001	0.001	0.001	
Aquitard vertical hydraulic conductivity	Kva		0.001	0.01	1	ft/day
Aquitard saturated thickness	ba		100	100	100	ft
Aquitard thickness below stream	babs		70	70	70	ft
Aquitard porosity	n		0.2	0.2	0.2	
Stream width	ws		20	20	20	ft

Figure 5. Well to well interference at ¼ mile.

Theis Drawdown and Recovery at r = 1320 ft From Pumping Well
Pump on = 345600 minutes = 240.00 days

Input Data:	Var Name	Scenario 1	Scenario 2	Scenario 3	Units	
Total pumping time	t		240		d	
Radial distance from pumped well:	r		1320.00		ft	**Q conversions**
Pumping rate	Q		1.2		cfs	538.56 gpm
Hydraulic conductivity	K	10	100	1,000	ft/day	1.20 cfs
Aquifer thickness	b		40		ft	72.00 cfm
Storativity	S_1		0.00100			103,680.00 cfd
	S_2		0.00100			2.38 af/d
Transmissivity Conversions	T_f2pd	400	4,000	40,000	ft2/day	
	T_ft2pm	0.2778	2.7778	27.7778	ft2/min	
	T_gpdpft	2,992	29,920	299,200	gpd/ft	