Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE # # G-17180

ROUTED TO: WR's

TOWNSHIP/
RANGE-SECTION: 1N/1E-2

CONDITIONS ATTACHED?: [X] yes [ ] no

REMARKS OR FURTHER INSTRUCTIONS:

Reviewer: Donna Miller

WATER RESOURCES DEPARTMENT

MEMO April 24, 2009

TO: **Application G-** 17180

FROM: **GW:** Donn Miller
(Reviewer's Name)

SUBJECT: **Scenic Waterway Interference Evaluation**

_____YES
The source of appropriation is within or above a Scenic Waterway
__X__NO

_____YES
Use the Scenic Waterway condition (Condition 7J)
__X__NO

_____Per ORS 390.835, the Ground Water Section is **able** to calculate ground water interference with surface water that contributes to a Scenic Waterway. The calculated interference is distributed below.

__X__Per ORS 390.835, the Ground Water 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 GROUND WATER APPLICATIONS

TO: Water Rights Section Date **4/24/2009**

FROM: Ground Water/Hydrology Section **Donn Miller**
Reviewer's Name

SUBJECT: Application G- **17180** Supersedes review of **none**
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 ground water 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: **Gordon Kiyokawa, Col. Edgewater C. C.** County: **Multnomah**

A1. Applicant(s) seek(s) **0.50** cfs from **5** well(s) in the **Willamette** Basin, **Columbia** subbasin Quad Map: **Portland**

A2. Proposed use: **irrigation** Seasonality: **3/1-10/31**

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	**MULT 916**	**1**	**alluvium**	**0.5***	**1N/1E-S2 NW SE**	**1650'N, 2350'W fr SE cor S 2**
2	**MULT 921**	**2****	**alluvium**	**0.5***	**1N/1E-S2 NE SE**	**2050'N, 880'W fr SE cor S 2**
3	**MULT 918**	**3****	**alluvium**	**0.5***	**1N/1E-S2 NW SE**	**1670'N, 2390'W fr SE cor S 2**
4	**To be built**	**4**	**alluvium**	**0.5***	**1N/1E-S2 SW SE**	**750'N, 2310'W fr SE cor S 2**
5	**To be built**	**5**	**alluvium**	**0.5***	**1N/1E-S2 SE SE**	**500'N, 1120'W fr SE cor S 2**

* 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	**10**	**108**	**4**	**10/x/71**	**132**	**0-30**	**0-132**	**---**	**122-129**	**230**	**5**	**P**
2**	**10**	**110**	**1**	**7/19/71**	**135**	**0-35**	**0-135**	**---**	**119-131**	**1080**	**3.25**	**P**
3**	**12**	**---**	**22**	**4/13/70**	**172**	**10-30**	**0-172**	**---**	**120-147**	**2150**	**7**	**P**
4	**12**	**---**	**---**	**---**	**180**	**0-20**	**0-180**	**---**	**100-170**	**---**	**---**	**-**
5	**10**	**---**	**---**	**---**	**180**	**0-20**	**0-180**	**---**	**100-170**	**---**	**---**	**-**

Use data from application for proposed wells.

A4. **Comments: *from any combination of the 5 wells.**
****The well numbering and well report matches are those in the application. In application item 3B, the well report matches are identified as inferred, indicating some uncertainty. I have researched available records and conclude that the application erroneously switched the well log ID's for wells 2 and 3. Not changing well number or location, I maintain that the log for well 2 is MULT 918 and the log to well 3 is MULT 921. The USGS concurs per their well construction and location descriptions in USGS OFR 90-126. The several wells develop the unconsolidated sedimentary aquifer.**

A5. ☐ **Provisions of the Willamette** Basin rules relative to the development, classification and/or management of ground water hydraulically connected to surface water ☒ **are**, *or* ☐ **are not**, activated by this application. (Not all basin rules contain such provisions.)
Comments: **OAR 690-502-0240 The wells are located within ¼ mile of surface water and develop an unconfined aquifer.**

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

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

B1. **Based upon available data,** I have determined that ground water* 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 ground water 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 ground water 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 ground water resource; or

d. ☒ **will, if properly conditioned**, avoid injury to existing ground water rights or to the ground water resource:
   i. ☒ The permit should contain condition #(s) **7F**;
   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 ground water production from no deeper than _____ ft. below land surface;

b. ☐ **Condition** to allow ground water production from no shallower than _____ ft. below land surface;

c. ☐ **Condition** to allow ground water production only from the _____ ground water 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 Ground Water 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. **Ground water availability remarks: The wells are located at low elevation, in a shallow aquifer, and in close proximity to large surface water bodies. The water levels will be very stable as a result. They will continue to mirror the level of the Columbia River, the Columbia Slough and other associated surface waters. The material is also readily recharged by local precipitation. The wells are located in the Peninsula 2 Drainage District where shallow water is pumped out about 11 months of the year.**

The proposed well construction needs to be followed per condition 7F. There are other aquifers below the proposed one.

C. GROUND WATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

C1. **690-09-040 (1):** Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	**Unconsolidated Sedimentary Aquifer (alluvium)**	☐	☒
2	**Unconsolidated Sedimentary Aquifer (alluvium)**	☐	☒
3	**Unconsolidated Sedimentary Aquifer (alluvium)**	☐	☒
4	**Unconsolidated Sedimentary Aquifer (alluvium)**	☐	☒
5	**Unconsolidated Sedimentary Aquifer (alluvium)**	☐	☒

Basis for aquifer confinement evaluation: well log entries often show clay and fine-grained material at shallow depth. This leads to a possible semi-confined environment. The inconsequential head difference between the wells and the surface water leads me to conclude that the aquifer is unconfined. Nearby geotechnical logs show that these shallow sediments are saturated.

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
1-5	**1**	**Various surface drains w/o natural outlets to the Columbia River or Slough**	**~5**	**~5**	**<800**	☒	☐	☐	☒	☐
1, 3, 4, 5	**2**	**Columbia River**	**~5**	**~5**	**1750-2800**	☒	☐	☐	☐	☒
1-5	**3**	**Columbia Slough**	**~5**	**~5**	**3800-5500**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
2	**2**	**Columbia River**	**~5**	**~5**	**1300**	☒	☐	☐	☒	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: unconfined aquifer, proximity and head relationships
Water Availability Basin the well(s) are located within: none identified by on-line mapping

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?
1-5	**1**	☒	☐	---	---	☐	**NA**	☐	**<25**	☒
1, 3, 4, 5	**2**	☐	☐	---	---	☐	**~265000**	☐	**<25**	☐
1-5	**3**	☐	☐	---	---	☐	**NA**	☐	**<25**	☐
		☐	☐			☐		☐		☐
2	**2**	☒	☐			☐	**~265000**	☐	**<25**	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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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: NA

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
NA		%	%	%	%	%	%	%	%	%	%	%	%
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: NA

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 ground water 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**

This project is on an island. It is also in the Peninsula 2 Drainage District which strives to dewater shallow earth materials to facilitate land use activities. Their website indicates that they pump water from the drainage district about 11 months of the year, seeking to maintain a level of 5-6 feet amsl. The semi-confined nature of the aquifer will buffer the impact of well pumping on the drains even though some wells are only 100 feet from a drain.

OAR 690-502-150(4) is the rule that speaks to the surface water classifications at the well sites and the associated drainage district drains. These classifications are important since there is the potential for substantial interference with the drains.

OAR 690-519-0000(1) is the rule that speaks to the classifications for the Columbia River. These classifications come into play with the potential for substantial interference.

The area is surface water rich. The impacts on most surface water sources will be imperceptible.

References Used: File G-17180, File G-16387 (a similar nearby application), well reports, USGS WSP 2470-A, USGS OFR 90-126

http://www.mcdd.org/ for drainage district information

Application G-17180 continued Date 4/24/2009

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #:** 2 **Logid:** MULT 918

D2. **THE WELL does not 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**:

a. ☐ constitutes a health threat under Division 200 rules;
b. ☐ commingles water from more than one ground water reservoir;
c. ☐ permits the loss of artesian head;
d. ☐ permits the de-watering of one or more ground water reservoirs;
e. ☒ other: (specify) **not sealed from 0-10 feet**

D4. **THE WELL construction deficiency is described as follows:** _____

D5. **THE WELL**

a. ☐ **was**, *or* ☐ **was not** constructed according to the standards in effect at the time of original construction or most recent modification.

b. ☒ I don't know if it met standards at the time of construction.

D6. ☒ **Route to the Enforcement Section.** I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Enforcement Section and the Ground Water Section.

THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

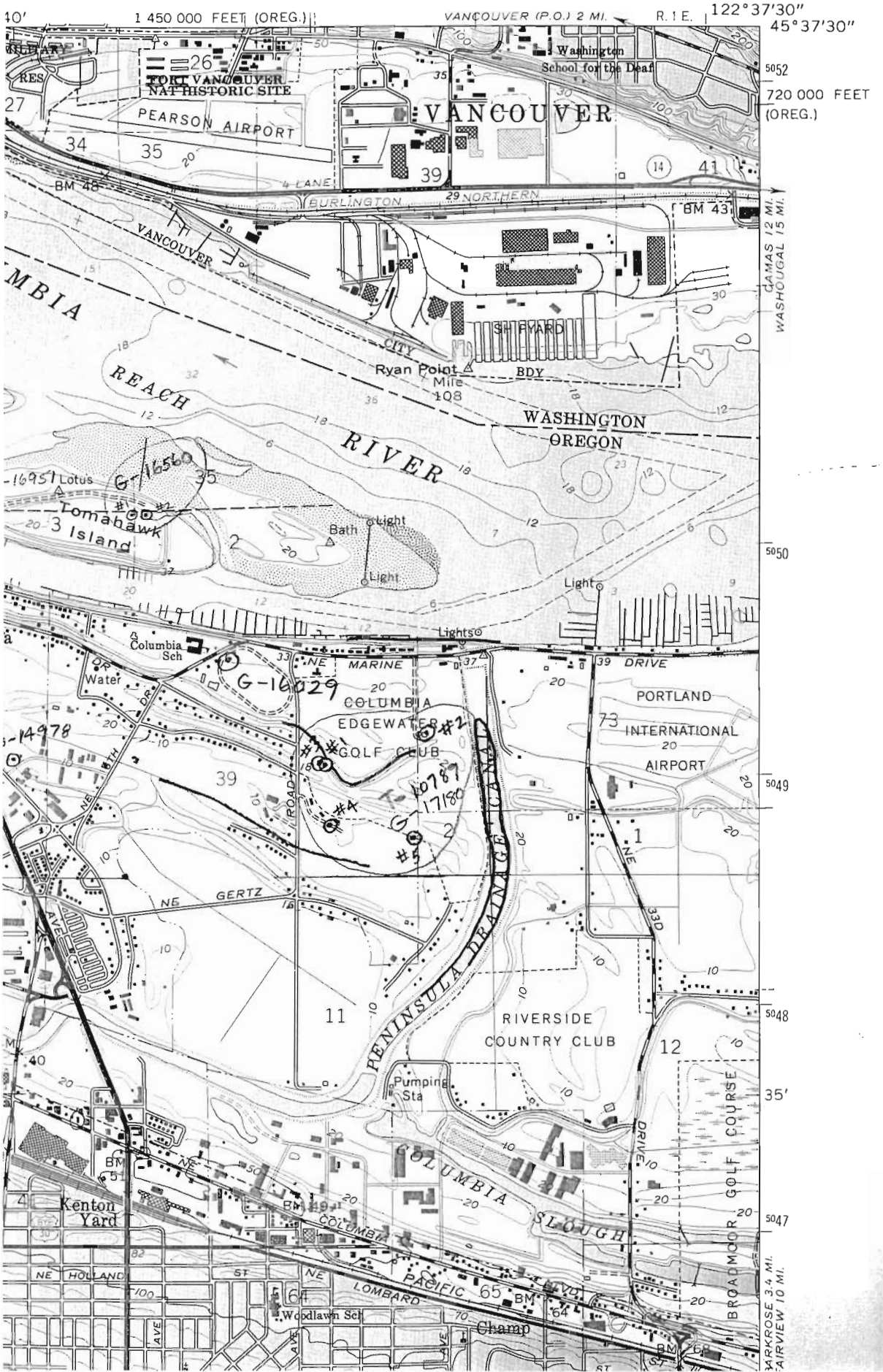
D7. ☐ Well construction deficiency has been corrected by the following actions: _____

_____, 200____.
(Enforcement Section Signature)

D8. ☐ **Route to Water Rights Section (attach well reconstruction logs to this page).**

PORTLAND QUADRANGLE
OREGON—WASHINGTON
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 PORTLAND 15' QUADRANGLE

1475 II NE (ORCHARDS)



NOTICE TO WATER WELL CONTRACTOR: The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED APR 17 1970 STATE ENGINEER SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print) (Do not write above this line)

MULT 918

WELL 2

State Well No. 1N/1-2ad

State Permit No.

(1) OWNER:
Name COLUMBIA EDGEWATER COUNTRY CLUB
Address 2137 NE MARINE DRIVE PORTLAND, ORE.

(2) TYPE OF WORK (check):
New Well [X] Deepening [ ] Reconditioning [ ] Abandon [ ]
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary [ ] Driven [ ]
Cable [X] Jetted [ ]
Dug [ ] Bored [ ]

(4) PROPOSED USE (check):
Domestic [ ] Industrial [X] Municipal [ ]
Irrigation [ ] Test Well [ ] Other [ ]

(5) CASING INSTALLED:
Threaded [ ] Welded [X]
20" Diam. from 0 ft. to 140 ft. Gage .375
14" Diam. from 1246 ft. to 1466 ft. Gage .375
14" Diam. from 164 ft. to 172 ft. Gage .375

(6) PERFORATIONS:
Perforated? [ ] Yes [X] No
Type of perforator used
Size of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? [X] Yes [ ] No
Manufacturer's Name UOP JOHNSON
Type STAINLESS STEEL Model No.
Diam. 16 Slot size 120 Set from 1466 ft. to 164 ft.
Diam. Slot size Set from ft. to ft.

(8) WATER LEVEL: Completed well.
Static level 22 ft. below land surface Date APR 13 1970
Artesian pressure lbs. per square inch Date

(9) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? [X] Yes [ ] No If yes, by whom? STRASSER
Yield: 1200 gal./min. with 3 ft. drawdown after 1 hrs.
" 1700 " 5 " 2 "
" 2150 " 7 " 9 "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 53° Was a chemical analysis made? [X] Yes [ ] No

(10) CONSTRUCTION:
Well seal—Material used READY MIX CONCRETE
Depth of seal 10 - 30 FT ft.
Diameter of well bore to bottom of seal 24 in.
Were any loose strata cemented off? [ ] Yes [X] No Depth
Was a drive shoe used? [X] Yes [ ] No
Did any strata contain unusable water? [ ] Yes [X] No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? [ ] Yes [X] No Size of gravel:
Gravel placed from ft. to ft.

(11) LOCATION OF WELL:
County MULT Driller's well number 5738
SE ¼ NE ¼ Section 2 T. 1N R. 1E W.M.
Bearing and distance from section or subdivision corner

(12) WELL LOG:
Diameter of well below casing —
Depth drilled 172 ft. Depth of completed well 172 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level as drilling proceeds. Note drilling rates.

MATERIAL	From	To	SWL
GRAVEL AND BOULDERS	0	18	
PACKED SAND	18	140	
WATER BEARING GRAVEL	140	172	

Work started MAR 18 1970 Completed APR 15 1970
Date well drilling machine moved off of well APR 15 1970

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Don Johnson (Drilling Machine Operator) Date APR 15 1970
Drilling Machine Operator's License No. 56

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME R J STRASSER DRILLING CO (Person, firm or corporation) (Type or print)
Address 8110 SE SUNSET LANE PORTLAND ORE
[Signed] Robert L. Strasser (Water Well Contractor)
Contractor's License No. 10 Date APR 15, 1970

(USE ADDITIONAL SHEETS IF NECESSARY)

USGS OFR 90-126

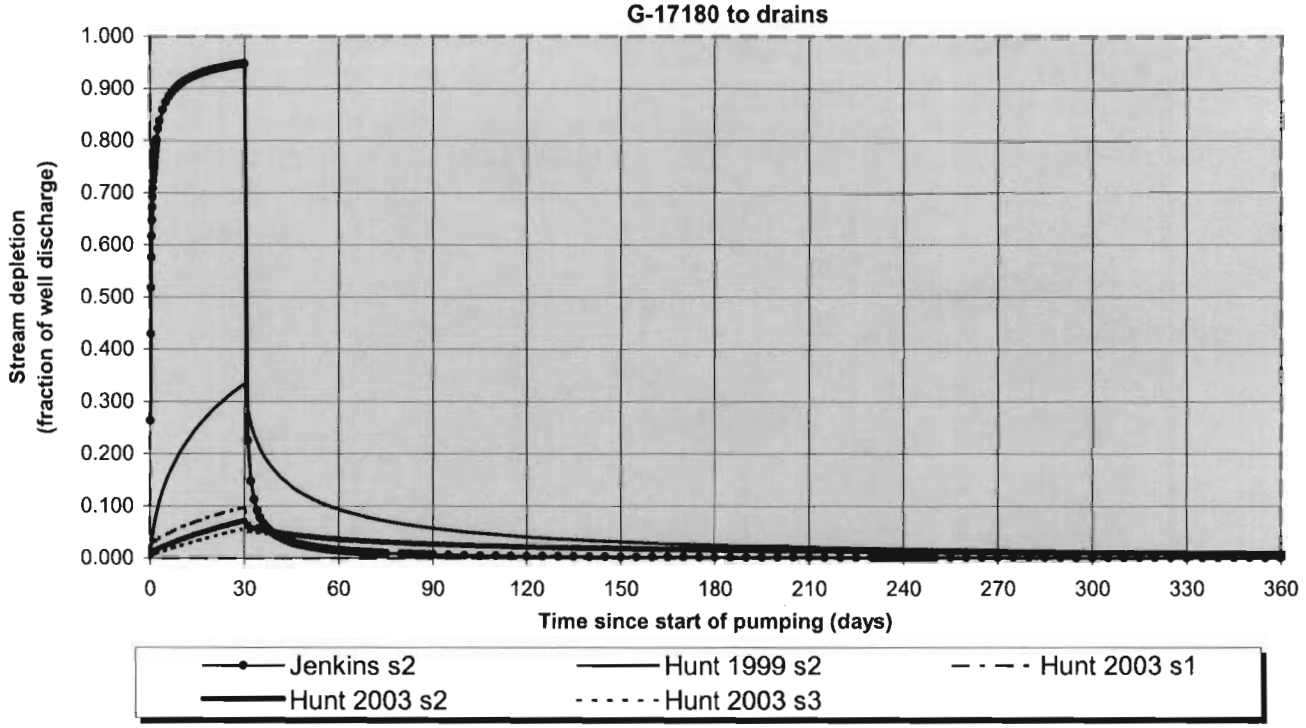
Table 1.--Records of selected wells in the Portland Basin--Continued

Well location number	Well identification number	Owner	Date drilled	Latitude	Longitude	Altitude	Depth of well (feet)	Depth of open interval (feet) Top	Depth of open interval (feet) Bottom	Well diameter (inches)	Well performance: Test method	Well performance: Yield (gal/min)	Well performance: Drawdown (feet)	Well performance: Test period (hours)	Water level: Feet below datum	Water level: Date	Specific conductance	Remarks
CLACKAMAS COUNTY, OREGON--Continued																		
3S/4E-8AAB(A)	900629	HERMAN HAUGEN	1963	451948	1222009	450	225.0	205.0	220.0	6.0	B	14.0	225.0	1.0	129.8	4/ 3/73	--	
3S/4E-9CAB(L)	900630	HARRY WALLACE	1964	451926	1221928	670	90.0	85.0	86.0	6.0	B	6.0	5.0	1.0	79.8	4/ 3/73	--	
								89.0	90.0									
3S/4E-10CCB(N)	900631	CHUCK REED	1970	451912	1221834	832	74.0	61.0	73.0	6.0	B	15.0	25.0	1.0	35.0(D)	3/22/70	--	
3S/4E-10CDB(P)	900632	CHUCK WALKER	1971	4519 B	1221819	810	338.0	280.0	333.0	6.6	P	8.0	51.0	1.0	277.7	4/27/73	--	
3S/4E-11ACB(G)	900633	U.S. BUREAU OF LAND MANAGEMENT	1961	451937	1221642	565	90.0	23.0	90.0	6.0	B	18.0	80.0	1.0	-6.0(D)	11/ 8/61	--	
3S/4E-12AAC(A)	900634	RALPH GOIUS	--	451942	1221508	1235	138.0	105.0	125.0	6.0	B	15.0	60.0	2.0	42.0(D)	8/30/64	--	
3S/4E-12BCB(E)	900635	RUSSELL NIEMI	1969	451935	1221602	930	301.0	209.0	301.0	6.0	P	12.0	171.0	1.0	125.0(D)	4/ 8/69	--	
3S/4E-13CCD(N)	900636	ROSS A. JANNSEN	1969	451814	1221559	635	158.0	58.8	158.0	6.0	P	16.0	142.0	1.0	9.2	3/29/73	--	
3S/4E-14CAC(L)	900637	ORLA G. REISCH	1967	451829	1221705	960	145.0	52.0	145.0	6.0	B	10.0	4.0	1.0	126.0(D)	1/30/67	--	
3S/4E-15ACC(G)	900638	JAMES H. CANOVA	1969	451838	1221753	890	80.0	68.0	80.0	6.0	B	18.0	23.0	1.0	18.2	4/ 3/73	--	
3S/4E-15ADD(H)	900639	EUGENE PHERNETTON	1968	451842	1221725	880	213.0	213.0	213.0	6.0	B	10.0	20.0	1.5	177.1	4/ 3/73	--	
3S/4E-15BAD(C)	900640	FRANK DURAND	1971	451853	1221803	887	233.0	54.0	70.0	6.6	P	10.0	26.0	1.0	27.3	4/ 3/73	--	
								132.0	233.0									
3S/4E-15BC81(E)	900641	JORDON	1968	451844	1221831	850	70.0	30.0	60.0	6.0	B	30.0	0.0	2.0	17.1	5/31/73	--	
								60.0	70.0									
3S/4E-16CBC(M)	900642	LESTER O. CLOSNER	1971	451827	1221951	490	50.0	28.0	30.0	6.0	B	10.0	20.0	4.0	8.0(D)	5/14/71	--	
								34.0	40.0									
								40.0	50.0									
3S/4E-17ACC(G)	900643	GENE DIMICK	1970	451841	1222027	462	45.0	45.0	45.0	6.0	B	8.0	5.0	1.0	25.1	4/ 3/73	--	
3S/4E-18BBA(D)	900644	WALT CHURCH	1971	451900	1222206	382	150.0	90.0	150.0	6.0	B	5.0	70.0	1.0	79.4	4/ 5/73	--	
3S/4E-19BDD(F)	900645	STATE OF OREGON	1964	451745	1222146	305	40.0	20.0	25.0	6.0	B	50.0	0.0	2.0	7.7	4/ 4/73	--	
3S/4E-21ADC(H)	900646	ROBERT A. YOUNG	1968	451748	1221847	755	128.0	35.5	128.0	6.0	B	5.0	45.0	1.0	96.1	7/18/72	--	C
3S/4E-22BDA(F)	900647	WILLIAM SOMMERVILLE	1971	451751	1221806	880	66.0	58.0	65.0	6.0	B	16.0	10.0	4.0	24.3	4/27/73	--	
3S/4E-23ABC(B)	900648	MARVIN YONKERS	1971	451800	1221646	985	245.0	100.0	245.0	6.0	P	21.0	67.0	2.0	178.0(D)	7/16/71	--	
3S/4E-23BB0(D)	900649	ROGER MOORE	1970	451801	1221707	1095	330.0	310.0	330.0	6.0	B	13.0	0.0	4.0	190.0(D)	8/15/70	--	
3S/4E-23BCC(E)	900650	PETER HOLLORAN	1970	451746	1221716	1070	98.0	80.0	98.0	6.0	B	8.0	0.0	2.0	82.8	4/ 4/73	--	
3S/4E-23DCA(Q)	900651	BEN RICHARDSON	1971	451727	1221635	1115	227.0	85.0	222.0	6.0	P	2.0	140.0	1.0	83.0(D)	10/12/71	--	
3S/4E-25BBB(D)	900652	ELDON FRAY	1970	451711	1221610	1090	73.0	70.0	73.0	6.0	B	10.0	0.0	2.0	36.3	9/19/72	--	
3S/4E-25BDC1(F)	900653	GLENN UNDERHILL	1968	451656	1221548	1110	405.0	157.5	405.0	6.0	B	3.0	405.0	2.0	169.8	4/ 5/73	--	C
3S/4E-25BDC2(F)	900654	ROBERT MALTBY	1972	451654	1221551	1100	170.0	62.0	170.0	6.0	B	18.0	170.0	1.0	120.0(D)	3/ 7/72	--	
3S/4E-26ABD(B)	900655	LYNN LEWIS	1972	451709	1221635	1150	100.0	80.0	100.0	6.0	B	10.0	30.0	2.0	13.5	4/ 5/73	--	
3S/4E-26CDA(P)	900656	W.O. YOUNGBERG	--	451635	1221657	1120	193.0	45.0	60.0	8.0	P	124.0	80.0	4.0	60.8	11/ 7/72	--	I
								60.0	193.0									
3S/4E-27ADD(H)	900657	WILBER BECKTEL	1970	451653	1221727	1020	84.0	84.0	84.0	6.0	B	15.0	0.0	2.0	56.0(D)	10/12/70	--	
3S/4E-27CDB(P)	900658	FRED A. TREPTOW	1971	451634	1221817	900	261.0	50.0	261.0	6.0	B	2.0	200.0	2.0	35.0(D)	7/ 3/71	--	
3S/4E-28ADD(H)	900659	H.L. DUVALL	1958	451656	1221841	813	57.0	55.5	57.0	6.0	B	8.0	35.0	1.0	18.0(D)	10/29/58	--	
3S/4E-28BDD(F)	900660	D.E. ANDERSON	1967	451656	1221921	720	466.0	20.0	466.0	6.0	P	0.5	292.0	1.0	26.9	8/ 4/72	--	
3S/4E-29CCA3(N)	900661	MICHAEL MUCCULLOCH	1971	451632	1222053	750	224.0	40.0	224.0	6.0	B	10.0	60.0	4.0	162.6	4/27/73	--	
3S/4E-29DAB(J)	900662	DAN JENNINGS	1965	451650	1222007	535	100.0	82.0	90.0	6.0	B	16.0	105.0	2.0	28.5	4/ 5/73	--	
								100.0	105.0									
3S/4E-29DBD(K)	900663	ZORREN EDISON	1969	451639	1222015	690	260.0	175.0	260.0	6.0	B	10.0	65.0	2.0	185.0(D)	11/ 3/69	--	
3S/4E-30BCA(E)	900664	E.B. SUTTER	1959	451702	1222208	855	60.0	41.0	50.0	6.0	B	5.0	80.0	2.0	10.0(D)	12/ 9/59	--	
								60.0	80.0									
3S/4E-30CAA(L)	900665	KARL MECKLENBURG	1969	451649	1222151	885	401.0	311.0	401.0	6.0	B	11.0	401.0	1.0	321.9	9/20/72	--	
3S/4E-32ACD(G)	900666	TED MELLICK	1971	451603	1222012	1045	190.0	73.0	190.0	6.0	A	10.0	--	2.0	157.3	4/27/73	--	
3S/4E-32BAA(C)	900667	FRANK G. STUDER	1971	451618	1222029	990	200.0	100.0	120.0	6.0	B	5.0	200.0	2.0	77.0(D)	4/ 1/71	--	
								140.0	180.0									
3S/4E-32CBB(M)	900668	S.E. LAWRENCE	1968	451556	1222103	992	67.0	48.0	67.0	6.0	B	10.0	6.0	1.0	42.6	4/27/73	--	
3S/4E-33CDB(P)	900669	IRVIN JOYNER	1967	451544	1221929	1105	84.0	65.0	84.0	6.0	B	22.0	43.0	1.0	20.0(D)	3/ 6/67	--	
3S/4E-34ADA(H)	900670	EDWARD C.GRASSMAN	1971	451610	1221728	1160	95.0	60.0	93.0	6.0	P	100.0	98.0	1.0	10.0(D)	3/15/71	--	
								95.0	98.0									
3S/4E-34ADD(H)	900671	HENRY BEAL	1970	451600	1221728	1165	105.0	85.0	105.0	6.0	B	20.0	0.0	2.0	40.0(D)	8/31/70	--	
3S/4E-35DBC(K)	900672	JOHN HAMILTON	1969	451547	1221642	1180	103.0	46.6	103.0	6.0	P	4.0	60.0	1.0	35.0(D)	8/15/69	--	
3S/4E-36DDB(R)	900673	MERLE WEBSTER	1970	451542	1221513	1230	90.0	36.0	90.0	6.0	B	11.0	30.0	1.0	36.1	4/ 5/73	--	
COLUMBIA COUNTY, OREGON																		
3N/1W-6BAA1 (C)	9613	JOHN HAVLIC	1967	454644	1225122	42	85.0	85.0	85.0	8.0	P	240.0	0.0	5.0	39.7	3/10/83	--	H O
3N/2W-12DA01(J)	900578	CITY OF SCAPPOOSE	1950	454519	1225207	36	116.0	86.0	116.0	8.0	N	228.0	--	--	24.5	4/ 4/89	--	
3N/2W-12DCB1(Q)	9799	STEINFELD PICKLE COMPANY	1956	454509	1225230	62	163.0	113.0	155.0	8.0	P	300.0	54.0	--	39.0(D)	7/20/56	--	C
3N/2W-13ABD1(B)	9796	SCAPPOOSE HIGH SCHOOL	1973	454451	1225218	30	177.0	137.0	172.0	--	P	450.0	107.0	6.0	21.2	4/26/88	--	I
3N/2W-13CAC1(L)	9811	CITY OF SCAPPOOSE	1978	454423	1225246	70	227.0	186.7	226.7	12.0	P	500.0	72.0	48.0	56.9	4/19/88	--	
3N/2W-24CCB1(N)	9924	MARES BERNARD	1973	454328	1225312	250	300.0	250.0	300.0	--	B	15.0	55.0	1.0	240.0(D)	12/12/73	--	
3N/2W-24CDA1(P)	9934	MEANS NURSERY	1978	454327	1225238	85	90.0	90.0	90.0	6.0	B	16.0	10.0	1.0	51.7	5/24/88	--	
4N/1W-5DDB1(R)	900580	CITY OF ST. HELENS	1940	455117	1224937	105	421.0	15.0	421.0	12.0	P	300.0	--	--	71.6	4/ 4/89	--	
4N/1W-7BCBB(E)	9991	NORTHWEST NATURAL GAS	1982	455052	1225157	253	180.0	--	--	--	N	--	--	--	--	--/--/--	--	
4N/1W-7CCA1(N)	9990	MCNULTY WATER ASSOCIATION	1982	455026	1225141	160	410.0	97.0	410.0	10.0	A	450.0	--	3.0	124.8	4/28/88	--	
4N/1W-7CCA2(N)	9989	MCNULTY WATER ASSOCIATION	1981	455026	1225141	160	417.0	98.5	417.0	8.0	A	360.0	--	2.0	65.0(D)	1/27/81	--	D
4N/1W-17BDD1(F)	900582	CITY OF ST. HELENS	1988	454949	1225014	28	372.0	372.0	372.0	12.3	A	313.0	--	8.0	--	--/--/--	--	
4N/1W-17CAA1(L)	900581	CITY OF ST. HELENS	1988	454944	1225015	25	327.0	327.0	327.0	12.0	P	750.0	124.0	48.0	27.9	4/ 4/89	--	
4N/1W-19CBC1(M)	900579	WARREN WATER DISTRICT	--	454848	1225156	118	150.0	150.0	150.0	12.0	N	--	--	--	91.4	4/19/88	--	
4N/2W-12DCC1(Q)	10177	MCNULTY WATER ASSOCIATION	1968	455019	1225234	360	410.0	100.0	410.0	8.0	B	125.0	120.0	1.0	276.0	4/28/88	--	
4N/2W-13BDC(F)	10191	MCNULTY WATER ASSOCIATION	1974	454952	1225247	240	150.0	150.0	150.0	--	N	--	--	--	82.7	3/23/77	--	D
4N/2W-24ABB1(B)	10301	WARREN WATER DISTRICT	1967	454917	1225234	135	300.0	227.0	300.0	8.0	P	68.0	255.0	8.0	47.8	4/ 4/89	--	
	10302		1968				450.0	227.0	450.0	7.5	B	350.0	400.0	1.0	--	--/--/--	--	D
4N/2W-36DAB1(J)	10419	COLUMBIA MEMORIAL GARDENS	1985	454710	1225210	40	100.0	100.0	100.0	6.0	A	90.0	--	1.0	40.0(D)	5/21/85	--	I
MULTNOMAH COUNTY, OREGON																		
1N/1E-1CBC1(M)	800514	U.S. GEOLOGICAL SURVEY	1987	453550	1223822	16	25.0	19.8	24.8	2.0	N	--	--	--	8.6	3/ 1/89	--	B G H O
1N/1E-1CBC2(M)	800513	U.S. GEOLOGICAL SURVEY	1987	453550	1223822	16	82.0	77.0	82.0	2.0	N	--	--	--	9.9	3/ 1/89	--	B H O
1N/1E-1CCB1(N)	800512	U.S. GEOLOGICAL SURVEY	1987	453540	1223819	21	29.0	23.6	28.6	2.0	N	--	--	--	11.8	3/ 1/89	--	B H O
1N/1E-1CCB2(N)	800511	U.S. GEOLOGICAL SURVEY	1987	453540	1223819	21	77.2	72.2	77.2	2.0	N	--	--	--	14.0	3/ 1/89	--	B H O
1N/1E-2ADD1(H)	800521	U.S. GEOLOGICAL SURVEY	1987	453600	1223824	25	24.4	19.4	24.4	2.0	N	--	--	--	14.4	3/ 1/89	--	B G H O
1N/1E-2ADD2(H)	800520	U.S. GEOLOGICAL SURVEY	1987	453600	1223824	25	83.0	79.0	83.0	2.0	N	--	--	--	18.6	3/ 8/88	--	B H O
1N/1E-2BCD(E)	7037	PORTLAND SCHOOL DISTRICT	1965	453602	1223926	20	217.0	133.5	137.0	12.0	P	300.0	1.5	2.0	2.3	3/29/89	--	I
								139.0	147.0									
								185.0	190.0									
								204.0	217.0									
1N/1E-2DAB(J)	7036	COLUMBIA EDGEWATER COUNTRY CLUB	1970	453550	1223836	12	172.0	146.5	164.0	--	P	1200.0	3.0	1.0	9.7	3/29/89	--	C
1N/1E-2DBC1(K)	7034	COLUMBIA EDGEWATER COUNTRY CLUB	1971	453547	1223855	10	135.0	119.0	131.0	--	P	1080.0	3.3	4.0	0.5	3/29/89	--	I
1N/1E-2DBC2(K)	7035	COLUMBIA EDGEWATER COUNTRY CLUB	1971	453546	1223854	10	132.0	122.0	129.0	--	P	230.0	5.0	4.0	4.0(D)	10/ 2/71	--	I

6"ϕ

Well #2 — MULT 918
Well #3 — 921
Well #1 — FPS says 152' TD
916

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



Output for Stream Depletion, Scenerio 2 (s2):						Time pump on (pumping duration) = 30 days						
Days	30	60	90	120	150	180	210	240	270	300	330	360
J SD	94.9%	1.5%	0.7%	0.4%	0.3%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%
H SD 1999	33.5%	9.4%	5.8%	4.1%	3.2%	2.6%	2.1%	1.8%	1.6%	1.4%	1.2%	1.1%
H SD 2003	7.28%	3.68%	2.74%	2.22%	1.89%	1.66%	1.48%	1.34%	1.23%	1.13%	1.05%	0.99%
Qw, cfs	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
H SD 99, cfs	0.168	0.047	0.029	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.006	0.005
H SD 03, cfs	0.036	0.018	0.014	0.011	0.009	0.008	0.007	0.007	0.006	0.006	0.005	0.005

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate of well	Qw	0.50	0.50	0.50	cfs
Time pump on (pumping duration)	tpon	30	30	30	days
Perpendicular from well to stream	a	100	500	800	ft
Well depth	d	150	150	150	ft
Aquifer hydraulic conductivity	K	100	100	100	ft/day
Aquifer saturated thickness	b	100	100	100	ft
Aquifer transmissivity	T	10000	10000	10000	ft*ft/day
Aquifer storativity or specific yield	S	0.01	0.01	0.01	
Aquitard vertical hydraulic conductivity	Kva	1	1	1	ft/day
Aquitard saturated thickness	ba	20	20	20	ft
Aquitard thickness below stream	babs	3	3	3	ft
Aquitard porosity	n	0.2	0.2	0.2	
Stream width	ws	5	5	5	ft
Streambed conductance (lambda)	sbc	1.666667	1.666667	1.666667	ft/day
Stream depletion factor	sdf	0.010000	0.250000	0.640000	days
Streambed factor	sbf	0.016667	0.083333	0.133333	
input #1 for Hunt's Q_4 function	t'	100.000000	4.000000	1.562500	
input #2 for Hunt's Q_4 function	K'	0.050000	1.250000	3.200000	
input #3 for Hunt's Q_4 function	epsilon'	0.050000	0.050000	0.050000	
input #4 for Hunt's Q_4 function	lamda'	0.016667	0.083333	0.133333	