PUBLIC INTEREST REVIEW FOR GROUND WATER APPLICATIONS

TO: Water Rights Section Date **June 15, 2009**

FROM: Ground Water/Hydrology Section **Marc Norton**
Reviewer's Name

SUBJECT: Application G- **16918** Supersedes review of **6/3/2008 & 2/12/2009**
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: **Donald Olson & Cote D' Mor** County: **Yamhill**

A1. Applicant(s) seek(s) **0.18** cfs from **2** well(s) in the **Willamette River** Basin, **Harvey Creek to Chehalem Creek** subbasin Quad Map: **Dundee**

A2. Proposed use: **Irrigation & Commercial** Seasonality: **3/1 – 10/31 & year round (commercial)**

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	**YAMH 4380**	**1**	**CRB**	**0.07**	**03S/03W-22 SE SW**	**240' N, 730' W fr S ¼ cor S 22**
2	**YAMH54285**	**2**	**CRB**	**0.11**	**03S/03W-22 SE SW**	**250' N, 1190' W fr S ¼ cor S 22**
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	**800**	**106**	**120**	**10/9/78**	**420**	**0 – 78**	**0 – 80**	**10 – 420**	**300 – 420**	**12**		**Air**
2	**785**	**441**	**274**	**10/27/05**	**570**	**0 – 278**	**+2 – 278**	**2 – 570**	**530 – 570**	**38**		**Air**

Use data from application for proposed wells.

A4. **Comments: See conceptual model discussion for more details on geology and ground water. Data collected by the Department in November 2007 shows that ground water levels in the two wells are at a similar elevation.**

A5. ☒ **Provisions of the Willamette River** 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: **The wells do not tap an alluvial aquifer, therefore this portion of the rule does not apply.**

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

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) **7B – Interference, 7I – Willamette Basin Basalt Ground Water Condition plus large totalizing, measuring, and reporting with one flow meter for each well**;
   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 **Columbia River Basalt** ground water reservoir **with an open interval of 100 feet or less**;

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): **Both wells are constructed such that the wells are open to a large interval of basalt. Wells constructed in this manner allow ground water to move vertically in the well, which wastes water and pressure. Well construction at well #1 is partially responsible for over 150 feet of decline from 1978 through 2007. On December 12, 2008, a temperature log was run on YAMH 4380. The applicant had the pump pulled but the liner was left in the well. The temperature data indicated borehole flow. Further work is planned to document the flow and help determine repair or replacement options.**

B3. **Ground water availability remarks: There are considerable water level data available from wells near the applicant's property. Some of the data were collected as part of the ground water permit condition requirement. The other water level data were collected by the Department. The water level data supports the Department's conceptual model of ground water in Columbia River Basalts. Well construction has a major impact on ground water levels and long-term supplies. Most of the wells develop water from more than one water-bearing zone. YAMH 4380, the applicant's well #1, develops water from at least two different zones. The water level has fallen below the upper zone; from 120 feet below land surface on 10/9/1978 to 277.6 feet below land surface on 11/20/2007. The water level measured in November of 2007 is similar to the water level in YAMH 54285 (well #2).**

The Department conducted temperature logging on YAMH 4380 on December 12, 2008 with the liner in the well and again on April 9, 2009 with the liner removed. A down-hole video was also conducted on April 9, 2009. The temperature log and video documented cascading water. The water was entering the well beginning at a depth of about 85 feet below land surface. The well will need to be reconstructed to meet minimum standards.

Special Conditions: 1) During the pump test required by this permit, observation water-level measurements shall also be made in at least one of the nearest existing wells on the permit. Both wells shall be idle prior to and after the test for at least 24 hours. Measurements shall be made at the same times as in the pumped well, shall be accurate to at least 0.1 of a foot, and shall be recorded on the Department's Pump Test Data Sheets. The pump test report shall identify each well by its corresponding Well ID (well tag number) or OWRD Well Log ID and shall include a map showing the well locations to an accuracy of at least 50 feet.

2) A measuring tube shall be installed in both wells prior to any water use under this permit. Measuring tubes shall meet Department standards as described in the OAR 690-210-0280.

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	**CRB - basalt**	☐	☒
2	**CRB - basalt**	☒	☐
		☐	☐

Basis for aquifer confinement evaluation: Generally, wells tapping an aquifer in the basalt, encounter a confined system. Well #1, when originally constructed tapped a confined aquifer. The water level has fallen sufficiently to make it unsure whether it is confined or unconfined. Well #2 reportedly taps a confined aquifer because the water level rose above where it was encountered. The water level elevations in the wells are very similar. Based on the well logs, water levels, well construction and relative elevations, both wells will be reviewed as unconfined.

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**	**Harvey Creek**	**522**	**560**	**1320**	☐	☒	☐	☐	☒
2	**1**	**Harvey Creek**	**522**	**560**	**1320**	☐	☒	☐	☐	☒
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Based on the well logs, water levels, well construction and relative elevations, it appears that the wells tap an aquifer that is below the nearby stream (Harvey Creek).

Water Availability Basin the well(s) are located within: Willamette R > Columbia R >AB Molalla R

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?
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

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
		%	%	%	%	%	%	%	%	%	%	%	%
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**

References Used: See conceptual model discussion for more details.

Gannett and Caldwell, 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington, USGS Professional Paper 1424-A

Woodward, Gannett and Vaccaro, 1998, Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington, USGS Professional Paper 1424-B

Walton, William, 1962, Selected Analytical Methods for Well and Aquifer Evaluation, Bulletin 49, Illinois State Water Resources.

Freeze and Cherry, 1979, Groundwater, Prentice-Hall, Inc.

Conlon and Others, 2005, Ground-Water Hydrology of the Willamette Basin, Oregon, Scientific Report 2005-5168, USGS.

D. WELL CONSTRUCTION, OAR 690-200

D1. **Well #**: **1** **Logid: YAMH 4380**

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) **Temperature logging and down-hole video**

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) _____

D4. **THE WELL construction deficiency is described as follows: short seal in well allows ground water to flow down well into a lower aquifer. This is an area of water supply concerns.**

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.

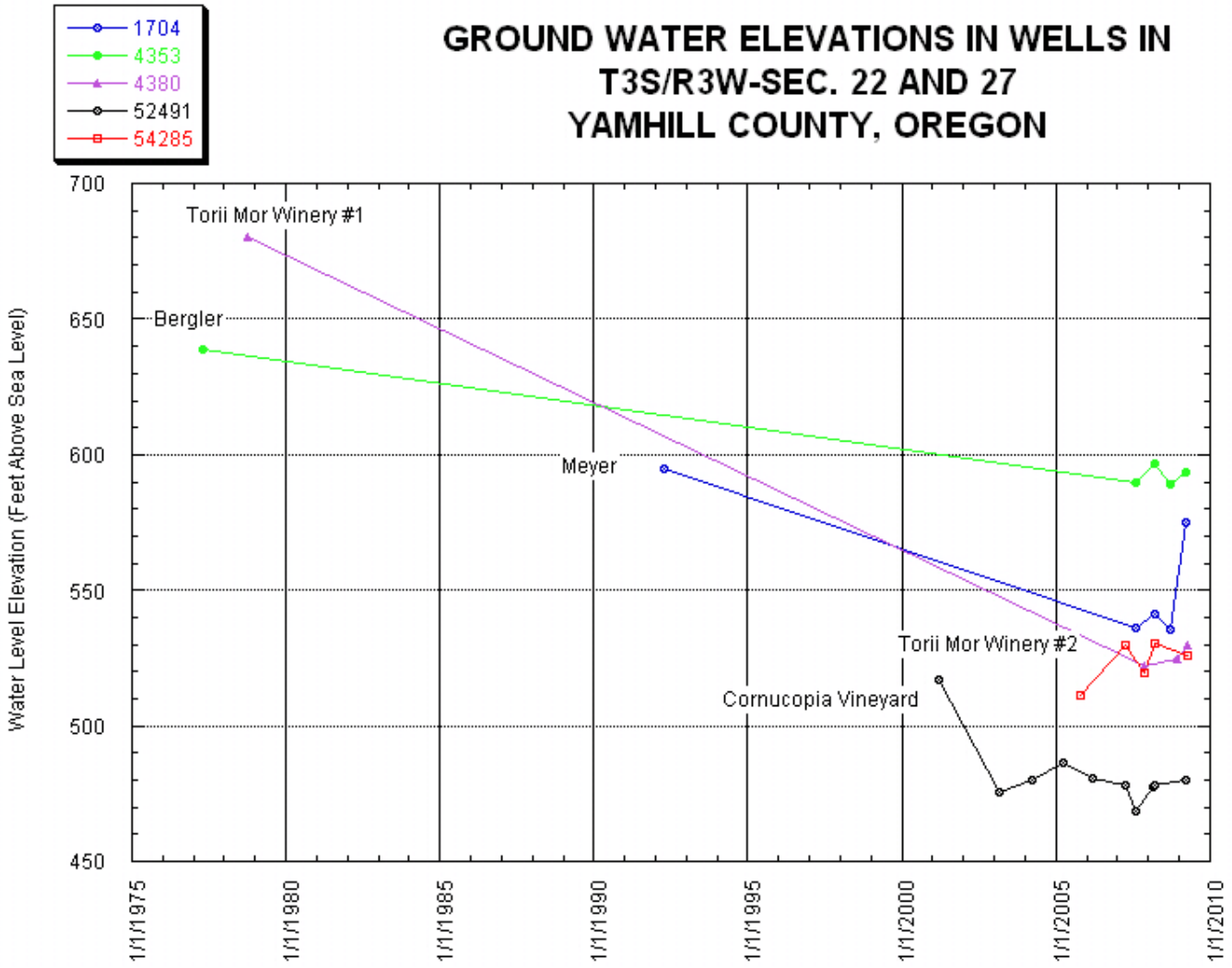
THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

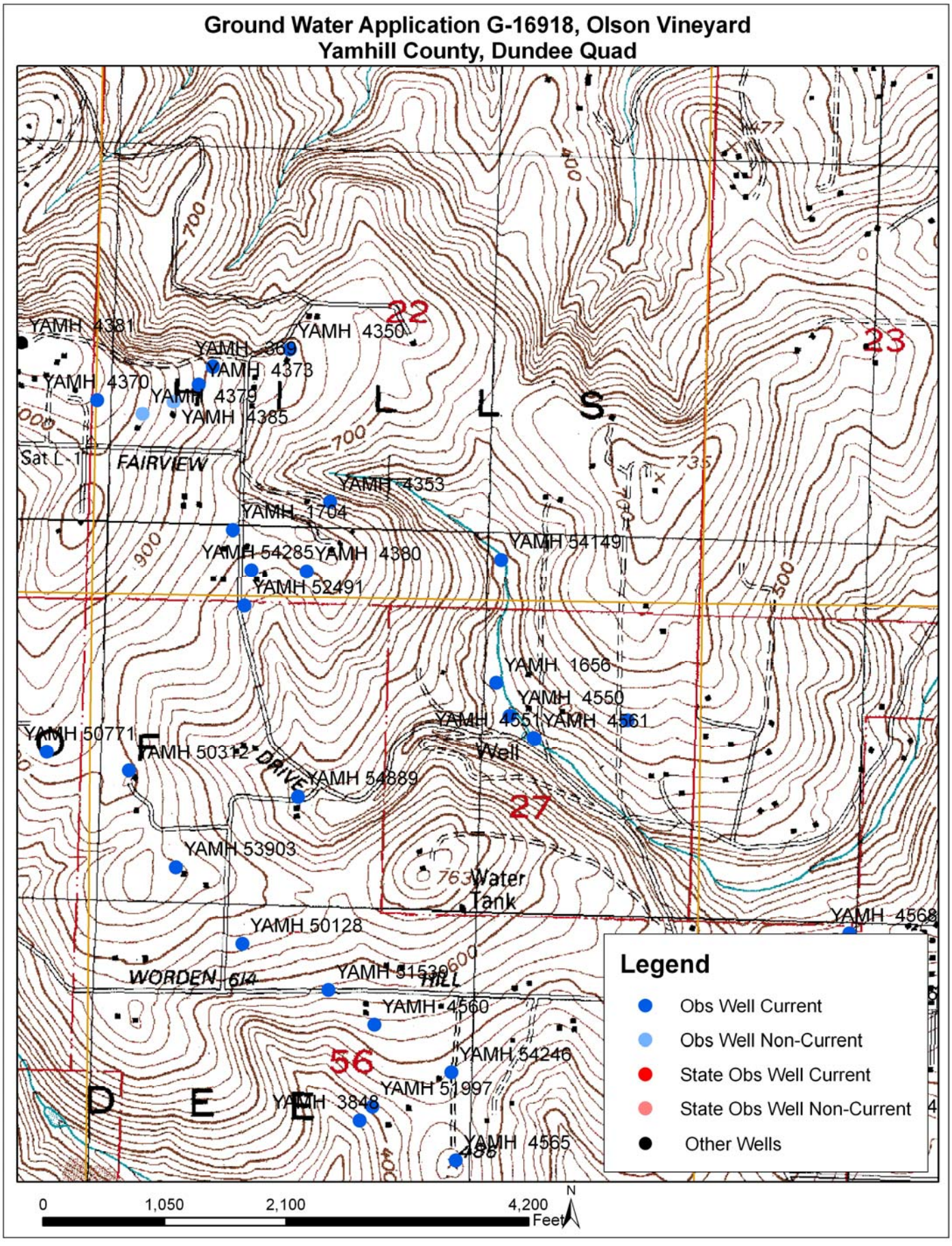
D7. ☐ Well construction deficiency has been corrected by the following actions: _____

_____ _____, 200____.

(Enforcement Section Signature)

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


GROUND WATER ELEVATIONS IN WELLS IN
T3S/R3W-SEC. 22 AND 27
YAMHILL COUNTY, OREGON
1704
4353
4380
52491
54285
Water Level Elevation (Feet Above Sea Level)
700
650
600
550
500
450
Torii Mor Winery #1
Bergler
Meyer
Torii Mor Winery #2
Cornucopia Vineyard
1/1/1975
1/1/1980
1/1/1985
1/1/1990
1/1/1995
1/1/2000
1/1/2005
1/1/2010


Ground Water Application G-16918, Olson Vineyard
Yamhill County, Dundee Quad
YAMH 4381
YAMH 4350
YAMH 369
YAMH 4373
YAMH 4370
YAMH 4379
YAMH 4385
Sat L-1
FAIRVIEW
YAMH 4353
YAMH 1704
YAMH 54285
YAMH 4380
YAMH 54149
YAMH 52491
YAMH 1656
YAMH 4550
YAMH 4551
YAMH 4561
YAMH 50771
YAMH 50312
DRIVE
YAMH 54889
Well
YAMH 53903
Water Tank
YAMH 50128
YAMH 4568
WORDEN
YAMH 51530
HILL
YAMH 4560
YAMH 54246
YAMH 51997
YAMH 3848
YAMH 4565
22
23
27
56
Legend
Obs Well Current
Obs Well Non-Current
State Obs Well Current
State Obs Well Non-Current
Other Wells
0
1,050
2,100
4,200
Feet
N

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION
Water Availability as of 6/ 3/2008 for
WILLAMETTE R > COLUMBIA R - AB MOLALLA R

Watershed ID #: 182 Basin: WILLAMETTE Exceedance Level: 80
Time: 09:31 Date: 06/03/2008

Month	Natural Stream Flow	Consumptiv Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Require-ments	Net Water Available
1	21400.00	2250.00	19100.00	0.00	1500.00	17600.00
2	23200.00	7440.00	15800.00	0.00	1500.00	14300.00
3	22400.00	7220.00	15200.00	0.00	1500.00	13700.00
4	19900.00	6870.00	13000.00	0.00	1500.00	11500.00
5	16600.00	4200.00	12400.00	0.00	1500.00	10900.00
6	8740.00	2050.00	6690.00	0.00	1500.00	5190.00
7	4980.00	1870.00	3110.00	0.00	1500.00	1610.00
8	3830.00	1710.00	2110.00	0.00	1500.00	614.00
9	3890.00	1470.00	2420.00	0.00	1500.00	917.00
10	4850.00	718.00	4130.00	0.00	1500.00	2630.00
11	10200.00	851.00	9350.00	0.00	1500.00	7850.00
12	19300.00	924.00	18400.00	0.00	1500.00	16900.00
Stor-50%	15200000	2245000	13000000	0	1090000	11900000

DETAILED REPORT OF INSTREAM REQUIREMENTS
Water Availability as of 6/ 3/2008 for
WILLAMETTE R > COLUMBIA R - AB MOLALLA R

Watershed ID #: 182 Basin: WILLAMETTE Exceedance Level: 80
Time: 09:31 Date: 06/03/2008

	ISWRs						
APP #	MF 182	0	0	0	0	0	0	MAXIMUM
Status	Cert.							
1	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
2	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
3	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
4	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
5	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
6	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
7	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
8	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
9	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
10	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
11	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00
12	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	1500.00

Conceptual Model -- Generalized Ground Water Flow Systems.
Marc Norton
January 8, 2004

Based on:

OWRD GRID - Ground water Resource Information Distribution

OWRD Ground Water Database

Memo on Recommended Vertical Hydraulic Conductivity Values for the Willamette Silt Hydrogeologic Unit When Using the Hunt Analytical Model, Karl Wozniak, January 6, 2004.

Ground-Water Resources of the Willamette Valley, Oregon, 1942, Water-Supply Paper 890, Piper.

Hydrogeologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington, 1998, US Geological Survey Professional Paper 1424 B, Woodward, Gannett, and Vaccaro.

GENERALIZED GEOLOGY

The Willamette Lowland in Oregon and Washington encompasses 3,700 square mile and includes the low-lying parts of the Willamette Valley in Oregon and most of Clark county in Washington. About 70% of the population of Oregon and Clark County reside in the lowlands. The lowland is 145 miles long and averages 10 to 15 miles in width. Water is recharged to the Willamette Lowland aquifer system primarily through the direct infiltration of precipitation on the lowland. The regional water-table map shows an overall pattern of ground-water flow to the major streams, indicating that the base flow of these streams is sustained by ground water discharge. This ground-water discharge fully supports the base flow of streams that head in the lowland and partially support the base flow of the other streams.

HYDROGEOLOGIC UNITS

The aquifer system is composed of five hydrogeologic units, from oldest to youngest:

1) the basement confining unit,
2) the Columbia River basalt aquifer,
3) the Willamette confining unit,
4) the Willamette aquifer, and
5) the Willamette silt unit.

The basement-confining unit forms the lateral and basal boundary to the Willamette aquifer system. The basement-confining unit includes all the stratigraphic units that underlie either the Columbia River Basalt Group in the northern part of the basin or the basin-fill deposits in the southern part. The unit is composed of marine sedimentary rocks and volcanic rocks of the Coast and Cascade ranges. The basement-confining unit is generally a low yielding aquifer where wells develop water primarily from fractures in the rock. Ground water can be found under unconfined conditions in the highlands and under confined conditions with greater depth and lower elevations. Yields are generally less than 10 gpm and usually decrease over time. The deeper the well, the greater the chance of brackish water being encountered.

The Columbia River basalt aquifer overlies the basement-confining unit and consists of layers of basalt flows of the Columbia River Basalt Group. The thickness of the aquifer generally is several hundred feet but locally is as much as 1000 feet. Ground water in the basalts is generally under confined conditions except in the foot-

hills where they may be unconfined. Well yields vary from tens to hundreds of gallons per minutes. Brackish water has been encountered in several areas, particularly with depth.

The Willamette confining unit consists primarily of fine-grained, distal alluvial fan and low-gradient stream deposits. The fine-grained deposits are considered a regional confining unit because of their wide spread occurrence and low permeability. Ground water in the Willamette confining unit is generally under confined conditions and well yields are very low to "dry".

The Willamette aquifer consists primarily of coarse-grained proximal alluvial-fan and braided-stream deposits. The greatest thickness, and coarsest materials of the Willamette aquifer outside of the Portland Basin occur in six major alluvial fans that were deposited where major streams from the Cascade Range enter the Willamette Lowland. Ground water in the Willamette aquifer unit varies from unconfined to confined conditions, depending on location and depth. Vertical gradients are usually downward except near major streams. Deposits of lower permeable material can act as a confining layer but are generally of limited aerial extent.

The Willamette silt unit is deposited throughout much of the Willamette Lowland by glacial-outburst floods. The deposits range in thickness from 0 to 130 feet. They consist primarily of silt and fine sand of relatively uniform lithology. Ground water in the Willamette silt unit is generally under unconfined conditions and well yields are low, less than 5 to 10 gpm.

STRUCTURAL BASINS

Outcrops of folded and faulted basalt within the Willamette Valley divide the lowland into four separate areas or structural basins -- from north to south, **the Portland Basin, the Tualatin Basin, the central Willamette Valley, and the southern Willamette valley**. Each of these areas has decidedly different hydrologic and hydrogeologic properties. The aquifer system in each basin, although hydraulically connected through a series of restrictive water gaps, is distinctive.

Tualatin Basin. The Columbia River basalt aquifer and the Willamette confining unit are the only regional hydrogeologic units above the basement-confining unit in the Tualatin Basin. The Columbia River basalt aquifer underlies the entire basin, and its upper surface forms a sediment-filled bowl-like depression.

The Central Willamette Valley All five of the hydrogeologic units occur in the central Willamette Valley. The Columbia River basalt aquifer underlies the entire central Willamette Valley, except for small areas along the far eastern margin. A number of faults have been mapped in the central Willamette Valley, some of which offset the aquifer, and numerous other faults have been mapped in the uplands surrounding the basin where the aquifer crops out. The Willamette aquifer in the central Willamette Valley contains three major alluvial fans -- the Salem fan, the Molalla fan, and the Canby fan. The Willamette Silt unit overlies most of the central valley with a maximum thickness of about 130 feet near the center and thins towards the south and near the margins of the basin.

The Southern Willamette Valley In the southern Willamette Valley, all of the regional hydrogeologic units are present; however, the Columbia River basalt aquifer occurs only in the Stayton area. The Willamette confining unit is thinner in the southern Willamette Valley than elsewhere in the Willamette Lowland. The Willamette aquifer contains the Lebanon fan and the Stayton fan. The Willamette aquifer is much thinner (averaging only about 20 to 40 feet thick) between the alluvial fans of the southern Willamette Valley. The Willamette Silt unit covers most of the southern Willamette Valley and generally thin towards the south.