

Groundwater Application Review Summary Form

Application # G- 18854

GW Reviewer Travis Brown Date Review Completed: 9/23/2019

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:

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).

PUBLIC INTEREST REVIEW FOR GROUNDWATER APPLICATIONS

TO: Water Rights Section Date 9/23/2019
 FROM: Groundwater Section Travis Brown
 Reviewer's Name
 SUBJECT: Application G- 18854 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: Carol Lee County: Marion

A1. Applicant(s) seek(s) 0.0935 cfs from 2 well(s) in the Willamette Basin,
Mainstem Willamette subbasin

A2. Proposed use Irrigation (8.4 acres) Seasonality: March 1 – October 31

A3. Well and aquifer data (**attach and number logs for existing wells; mark proposed wells as such under logid**):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	MARI 14751	1	CRB	0.0401	8S/3W-18 NE-NW	1250'S, 1540'E fr NW cor S18 ^a
2	MARI 14754	2	CRB	0.0535	8S/3W-18 NE-NW	780'S, 1890'E fr NW cor S18 ^a

* 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	-876	315	155	8/2/1990	453	0-49	+1-49 (6")	0-453 (4")	370-450 (Perf)	18		Air (1 hr)
2	-862	298	190	8/30/1990	331	0-46	+1-46 (6")	0-331 (4")	251-331 (Perf)	23	82	Pump (4 hrs)

Use data from application for proposed wells.

A4. **Comments:** The proposed POA/POU are located ~1 mile outside the southwest edge of the City of Salem, OR. Applicant proposes to irrigate up to 8.4 acre between March 1 and October 31. Total annual volume would be limited to 8.4 af/year, per OAR 690-502-0200(1) (South Salem Hills Groundwater Limited Area; see Section A6, below).

^a Application does not specify which well (Logid) is associated with which set of metes and bounds coordinates. WRIS data entry and this review have assumed that the list order for well coordinates on the application map is identical to the list order in the tables of Section 3 of the application.

A5. **Provisions of the** Willamette Basin rules relative to the development, classification and/or management of groundwater hydraulically connected to surface water **are**, or **are not**, activated by this application. (Not all basin rules contain such provisions.)

Comments: The proposed aquifers are confined; therefore, per OAR 690-09-0240, the relevant basin rules do not apply.

A6. **Well(s) #** 1, 2, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.

Name of administrative area: South Salem Hills Groundwater Limited Area

Comments: Per OAR 690-502-0200(1), groundwater in the basalt aquifers in the South Salem Hills Groundwater Limited Area is classified for exempt uses, irrigation and rural residential fire protection systems only. Permits may be issued, for a period not to exceed five years, for fire protection and for drip or equally efficient irrigation provided the Director finds the proposed use and amount do not pose a threat to the groundwater resource or existing permit holders. The amount of water used for irrigation shall be further limited to one acre-foot per acre per year. Permits may be extended for additional five-year periods if the Director finds that the groundwater resource can probably support the extended use.

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) 7i (Willamette basalt condition), 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 _____ **CRBG** 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: Groundwater for the proposed use cannot be determined to be over-appropriated due to insufficient available data regarding rates of recharge and the current quantity of groundwater withdrawals from the aquifer system.**

The proposed POA are most likely completed in the bottom of the Winter Water Member of the Columbia River Basalt Group (CRBG), near its contact with the underlying marine sedimentary unit (Beeson and Tolan, 2001). Aquifers within the CRBG generally occur in relatively thin porous and permeable zones at the contacts between lava flows. The aquifers are generally confined by thick flow interiors that typically have very low porosity and permeability (Conlon et al., 2005; Gannett and Caldwell, 1998).

Geologic maps of this area show a significant fault (the “Plank Hill Fault”) ~1,400 ft northeast of the proposed POA 2 (Beeson and Tolan, 2001; Tolan and Beeson, 2000). Due to the geometry of the CRBG aquifers (thin and tabular), faults may act as hydraulic barriers. Additionally, the proposed POA are near the mapped, eroded edge of the CRBG in this area, which also represents a boundary of the CRBG aquifer(s) (Beeson and Tolan, 2001). Hydraulic barriers, such as the “Plank Hill Fault” and aquifer boundary, will limit groundwater availability and exacerbate well-to-well interference.

Nearby water level monitoring within the CRBG aquifer(s) does not indicate progressive or widespread declines (see Hydrographs, attached). Groundwater supplies would therefore appear to be adequate for existing users. However, additional pumping may lead to rapid declines within the aquifer. Furthermore, the available observation wells are more than 0.5 miles away from the proposed POA. In the faulted and eroded terrain of the South Salem Hills, aquifer conditions may be expected to change substantially over short distances. The South Salem Hills Groundwater Limited Area has been designated to address the sensitivity of these aquifers to pumping.

The nearest groundwater users to the proposed POA are MARI 63710, ~280 ft northwest of POA 1 and ~670 ft southwest of POA 2, and MARI 59485, ~500 ft east of POA 1 and ~570 ft south of POA 2. Both MARI 63710 and MARI 59485 are exempt domestic wells. To assess the degree of drawdown, analyses were conducted for the proposed use using the Theis equation for drawdown in a confined aquifer (see attached Theis Drawdown Analyses). **Results indicate that the proposed use could cause well-to-well interference with MARI 63710 and MARI 59485 to exceed 15 ft of drawdown within less than 1 week of continuous operation at the maximum proposed rate (0.0935 cfs or ~42 gpm), which would require curtailment of**

the proposed use per Condition 7i, above. Therefore, it would appear that groundwater for the proposed use will not likely be available in the amounts requested without injury to prior water rights.

The conditions detailed in B1(d)(i) and B2(c), above, are recommended for any permit issued pursuant to this application in order to protect the groundwater resource and senior users. In addition, the following Special Conditions should be applied:

1. Best management practices shall be used to maximize the efficiency of water use. Drip irrigation or low-pressure sprinklers shall be used. Use shall be limited to one acre-foot per acre per year.
2. The wells shall be continuously cased and continuously sealed to at least 240 feet below land surface (bls), or as approved by a Department hydrogeologist.
3. The wells shall be open to a single aquifer in the Winter Water Unit of the Grande Ronde Basalt Formation in the Columbia River Basalt Group and shall meet applicable well construction standards (OAR 690-200 and OAR 690-210). In addition, the open interval shall be no greater than 100 feet. However, a larger open interval may be approved by the Department if the applicant can demonstrate to the satisfaction of the Department that each well is only open to a single aquifer. Following well completion, the well shall be thoroughly developed to remove cuttings and drilling fluids. Substantial evidence of a single aquifer completion may be collected by video log, downhole flowmeter, water chemistry and temperature, or other downhole geophysical methods approved by the Department. These methods shall characterize the nature of the basalt rock and assess whether water is moving in the borehole. Any discernable movement of water within the well bore when the well is not being pumped shall be assumed as evidence of the presence of multiple aquifers in the open interval.
4. A dedicated water-level measuring tube shall be installed in the production wells. The measuring tube shall meet the standards described in OAR 690-215-0060. When requested, access to the well shall be provided to Department staff in order to make water-level measurements.
5. Copies of all geologic and hydrogeologic reports completed for the permittee during the development of the wells, including geophysical well logs and borehole video logs, shall be provided to the Department. Except for borehole video logs, two paper copies, or a single electronic copy, shall be provided of each report. Digital tables of any data shall be provided upon request.
6. For any well operated under a permit issued pursuant to this application, a constant-rate aquifer test shall be conducted before beneficial use of the well begins to determine aquifer properties and to assess the potential impacts from use of the well. The test shall be designed and conducted by an Oregon Registered Geologist and the test design shall be subject to the approval of the Groundwater Section of the Department prior to the test. At a minimum, the test shall include discharge and water-level measurements in the pumping well and simultaneous water-level measurements in all other wells operated under this water right. Simultaneous water-level measurements shall also be made in MARI 63710 and MARI 59485. The applicant will be responsible for obtaining permission from the owners of MARI 63710 and MARI 59485 to monitor the wells throughout the aquifer test. Additionally, water-level measurements shall be made at a minimum of one observation well that is constructed to a similar bottom elevation as the pumping well and with a similar open interval. The observation well shall be at least 500 feet from the production well. Pumping duration for the test shall be determined by the Groundwater Section of the Department after well yield and specific capacity are determined. The requirement for a constant-rate aquifer test on each well may be waived if a multiple-well aquifer test is performed involving all permitted wells on this water right within five years of the date of permit issuance. The results of each aquifer test shall be presented in a report to the Department that includes an analysis of aquifer properties, aquifer boundaries, and the potential impact on nearby wells that is likely to occur over the duration of an irrigation season if the well is used at the proposed rate and duty. The permittee shall allow Department staff access to install water-level monitoring equipment for the duration of this permit.

NOTE: Both of the proposed POA are inadequately constructed based on these conditions. Authorized use of these POA as proposed would require reconstruction or abandonment and replacement of the existing wells.

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	CRBG (Winter Water)	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	CRBG (Winter Water)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: The water well reports for the proposed POA and nearby wells indicate static water levels above the applicable water-bearing zones. Based on the available evidence, the aquifer is confined.

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	Unnamed tributary to Croisan Creek	~720-670	~700-480	~1,760	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	2	Pettijohn Creek	~720-670	~465-215	~3,310	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	3	Croisan Creek	~720-670	~630-560	~4,200	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	1	Unnamed tributary to Croisan Creek	~720-670	~700-480	~1,760	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	2	Pettijohn Creek	~720-670	~465-215	~3,000	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	3	Croisan Creek	~720-670	~630-560	~4,610	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: The perennial reach of Pettijohn Creek (SW 2) heads within marine sediments, outside of the mapped boundary of the local CRBG units (Beeson and Tolan, 2001; USGS, 2017a). Therefore, a viable pathway does not appear to exist for hydraulic connection between the CRBG aquifer(s) and Pettijohn Creek.

Numerous mapped springs, some with water rights, do appear to emerge from the exposures and contacts of CRBG units (Beeson and Tolan, 2001). The perennial reach of SW 1 (Unnamed tributary to Croisan Creek) is mapped as heading within the outcrop/subcrop of the Winter Water unit southeast of the proposed POA (Beeson and Tolan, 2001; USGS, 2017a). The estimated surface water elevations for SW 1 and SW 3 (Croisan Creek) are coincident with or below the static water levels reported for POA 1 and 2. Furthermore, both SW 1 and SW 3 have incised below the elevation of the water-bearing zones noted in the logs for MARI 14751 (~561 ft bls) and MARI 14754. Based on the available evidence, the proposed POA are hydraulically connected to SW 1 and SW 3.

Water Availability Basin the well(s) are located within: SW 1-3: WILLAMETTE R > COLUMBIA R – AB MILL CR AT GAGE 14191000 (WID #183)

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	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>
1	3	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>
2	1	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>
2	3	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>

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?
	1	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>
	3	<input type="checkbox"/>			<input type="checkbox"/>	3,620	<input type="checkbox"/>	*	<input type="checkbox"/>

Comments: * No appropriate analytical model is available for assessing depletion of these surface water sources due to pumping of the CRBG aquifer(s). However, it may be reasonably assumed, based on the typical behavior of basalt interflow aquifers, that the effects of pumping will propagate rapidly to the aquifer boundaries. Because of the proximity of the proposed POA to multiple hydraulic barriers – specifically the aquifer outcrop/boundary and nearby faults – the effects of pumping will be further exacerbated.

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													
(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: N/A

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:

Application Files: G-18854, G-16187, LL-1249

Pumping Test Files: MARI 11654, MARI 12357, MARI 12788, MARI 12958, MARI 18891, MARI 19217, MARI 65954

Beeson, M.H., and Tolan, T.L., 2001, Geologic map of the Salem West quadrangle, 1:24,000, unpublished data.

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*, Scientific Investigations Report 2005-5168: U. S. Geological Survey, Reston, VA.

Gannett, M.W. and Caldwell, R., 1998, *Geologic framework of the Willamette Lowland aquifer system, Oregon and Washington*, Professional Paper 1424-A, 32 p: U. S. Geological Survey, Reston, VA.

Tolan, T. L., and Beeson, M.H., 2000, Geologic map of Sidney quadrangle, 1:24,000, unpublished data.

United States Geological Survey, 2013, National Elevation Dataset (NED) [DEM geospatial data]. 1/9th arc-second, updated 2013.

United States Geological Survey, 2017a, Salem West quadrangle, Oregon [map], 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, Virginia.

United States Geological Survey, 2017b, Sidney quadrangle, Oregon [map], 1:24,000, 7.5 minute topographic series, U.S. Department of the Interior, Reston, Virginia.

Watershed Sciences, 2009, LIDAR remote sensing data collection, Department of Geology and Mineral Industries, Willamette Valley Phase I, Oregon: Portland, OR, December 21.

Woodward, D.G., Gannett, M.W., and Vaccaro, J.J., 1998, Hydrogeologic framework of the Willamette Lowland aquifer system, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-B, 82 p.

D. WELL CONSTRUCTION, OAR 690-200

D1. Well #: 1 & 2 Logid: MARI 14751 & MARI 14754

D2. **THE WELL does not appear to meet current well construction standards based upon:**

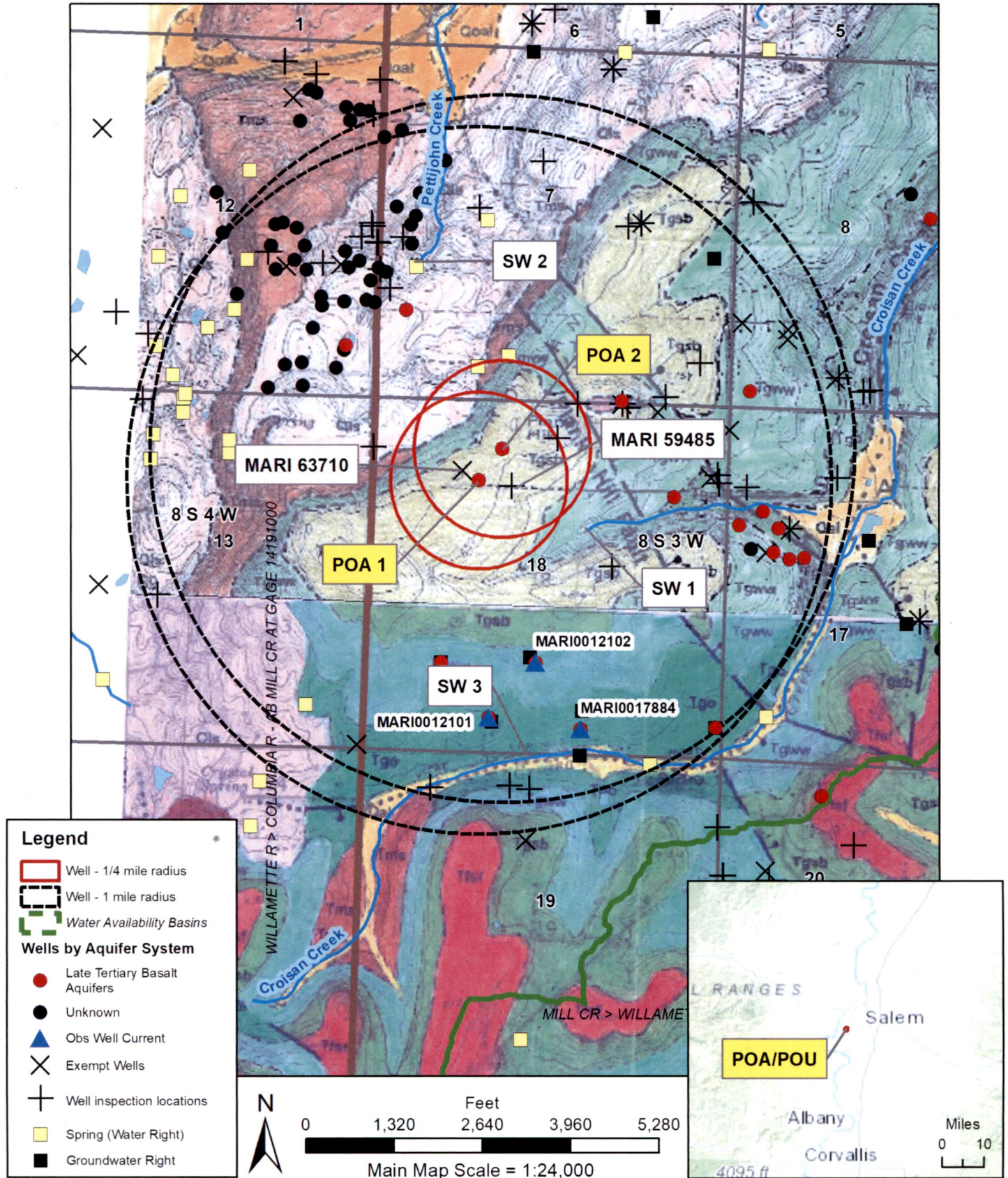
- a. review of the well log;
- b. field inspection by _____;
- c. report of CWRE _____;
- d. other: (specify) _____

D3. **THE WELL construction deficiency or other comment is described as follows:** Inadequate seal: Both wells are only cased and sealed to 49 ft bls. Target water-bearing zones, however, begin at 315 and 298 ft bls, respectively, as noted in the well logs. The intervening depths are described as "Badly Weathered Basalt" and "Badly Weather Vesicular (*sic*) Basalt, Broken, Caving". Per OAR 690-210-0150, the acceptable methods for sealing of water supply wells in consolidated formation require that unperforated, permanent well casing be sealed into "at least five feet [of] solid, unfractured, consolidated rock overlying the water-bearing rock formation." Current construction of MARI 14751 and MARI 14754 may allow for leakage of groundwater and aquifer pressure, having a detrimental effect on water levels within the aquifer.

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

Well Location Map

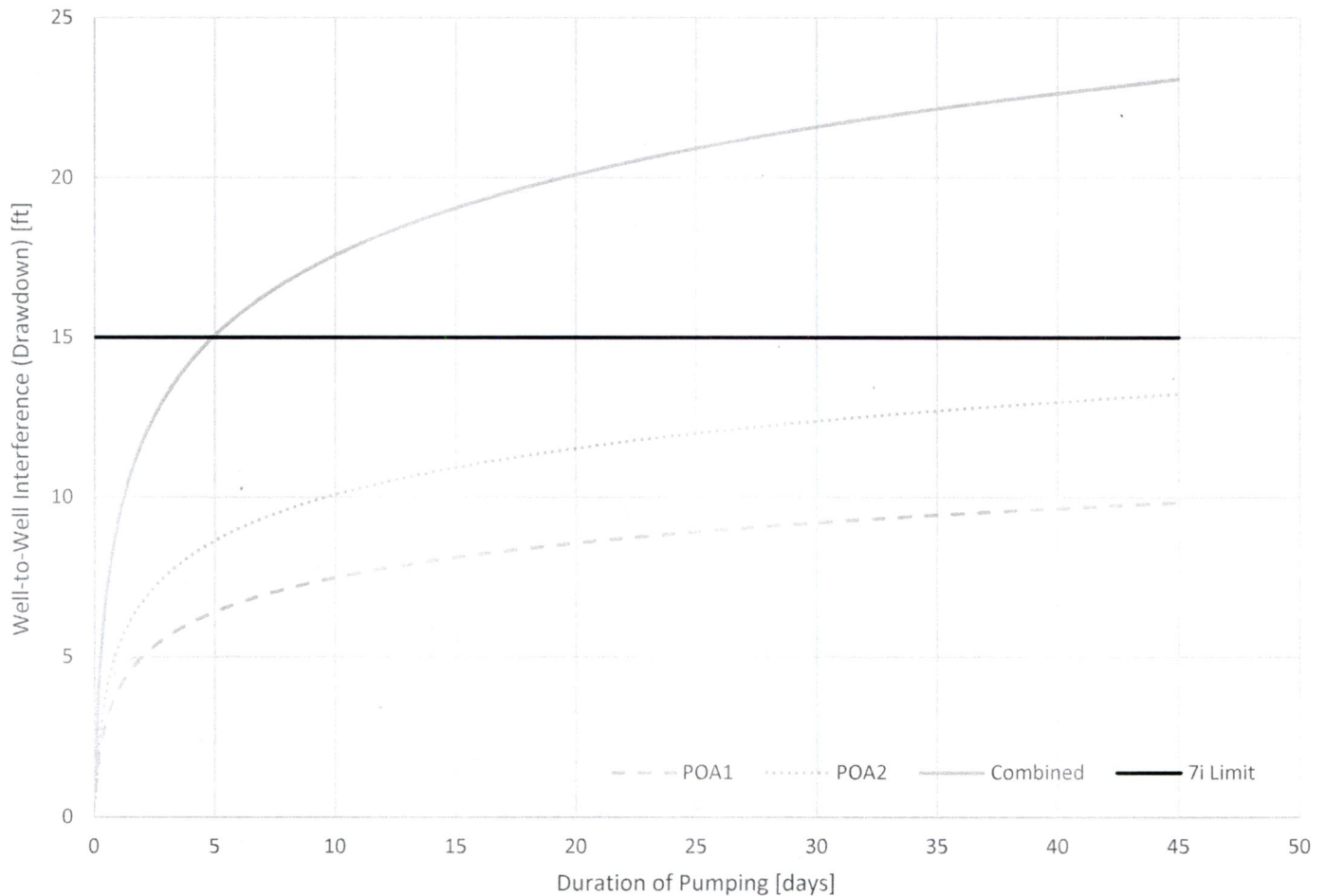
G-18854 Lee



Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

This Drawdown Analyses

Projected Well-to-Well Interference with MARI 63710



Distance to Barrier/Boundary (aquifer boundary/contact) from Pumping Well (x):

POA 1 (MARI 14751) = 820 ft

POA 2 (MARI 14754) = 600 ft

Distance from Pumping Well to Affected Well (MARI 63710) (x,y):

POA 1 (MARI 14751) = 400 ft, -260 ft

POA 2 (MARI 14754) = 0 ft, 675 ft

Pumping Rate (Q):

POA 1 (MARI 14751) = 18 gpm [proposed rate]

POA 2 (MARI 14754) = 24 gpm [proposed rate]

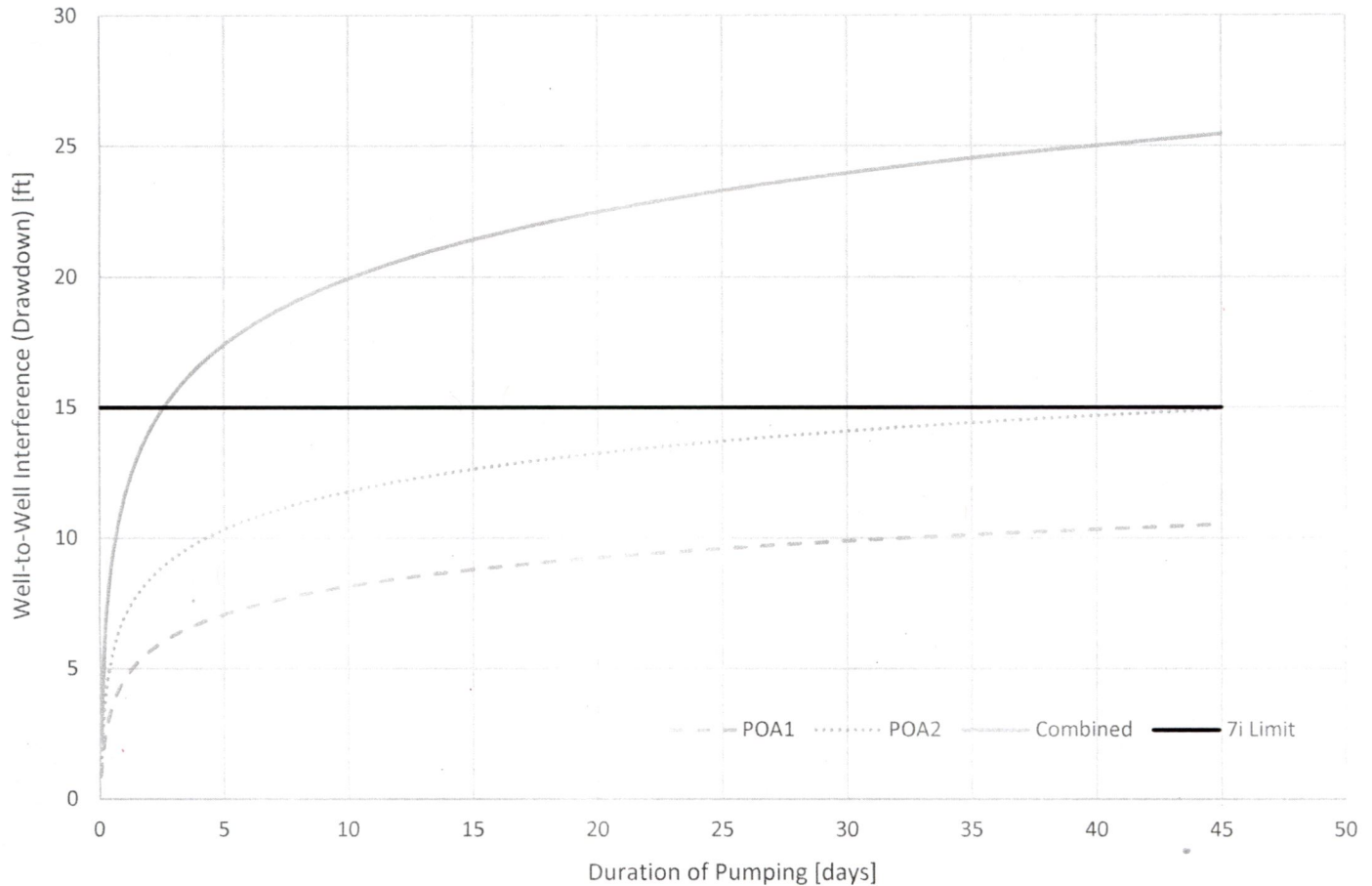
Aquifer Transmissivity (T) = 2,618 gpd/ft (350 ft²/day) [based on data from nearby pumping tests]

Aquifer Storativity (S) = 7×10^{-5} [MARI 65954 aquifer test]

Total Pumping Time = 45 days [time to reach maximum annual volume, 8.4 af/year]

Theis Drawdown Analysis (cont.)

Projected Well-to-Well Interference with MARI 59485



Distance to Barrier/Boundary (aquifer boundary/contact) from Pumping Well (x):

POA 1 (MARI 14751) = 820 ft

POA 2 (MARI 14754) = 600 ft

Distance from Pumping Well to Affected Well (MARI 59485) (x,y):

POA 1 (MARI 14751) = -320 ft, -340 ft

POA 2 (MARI 14754) = -530 ft, 240 ft

Pumping Rate (Q):

POA 1 (MARI 14751) = 18 gpm [proposed rate]

POA 2 (MARI 14754) = 24 gpm [proposed rate]

Aquifer Transmissivity (T) = 2,618 gpd/ft (350 ft²/day) [based on data from nearby pumping tests]

Aquifer Storativity (S) = 7×10^{-5} [MARI 65954 aquifer test]

Total Pumping Time = 45 days [time to reach maximum annual volume, 8.4 af/year]

Water Availability Tables

Water Availability Analysis

Detailed Reports

WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000
WILLAMETTE BASIN

Water Availability as of 9/23/2019

Watershed ID #: 183 ([Map](#))

Exceedance Level: 80%

Date: 9/23/2019

Time: 11:00 AM

Water Availability Calculation	Consumptive Uses and Storages	Instream Flow Requirements	Reservations
Water Rights	Watershed Characteristics		

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	18,400.00	2,240.00	16,200.00	0.00	1,300.00	14,900.00
FEB	20,100.00	7,430.00	12,700.00	0.00	1,300.00	11,400.00
MAR	19,600.00	7,220.00	12,400.00	0.00	1,300.00	11,100.00
APR	18,000.00	6,870.00	11,100.00	0.00	1,300.00	9,830.00
MAY	15,500.00	4,180.00	11,300.00	0.00	1,300.00	10,000.00
JUN	8,310.00	1,690.00	6,620.00	0.00	1,300.00	5,320.00
JUL	4,710.00	1,450.00	3,260.00	0.00	1,300.00	1,960.00
AUG	3,620.00	1,330.00	2,290.00	0.00	1,300.00	991.00
SEP	3,680.00	1,150.00	2,530.00	0.00	1,300.00	1,230.00
OCT	4,650.00	748.00	3,900.00	0.00	1,300.00	2,600.00
NOV	9,400.00	857.00	8,540.00	0.00	1,300.00	7,240.00
DEC	16,700.00	917.00	15,800.00	0.00	1,300.00	14,500.00
ANN	13,500,000.00	2,160,000.00	11,300,000.00	0.00	942,000.00	10,400,000.00

MEMO



To: Kristopher Byrd, Well Construction and Compliance Section Manager
From: Joel Jeffery, Well Construction Program Coordinator
Subject: Review of Water Right Application G-18854
Date: January 23, 2020

The attached application was forwarded to the Well Construction and Compliance Section by Water Rights. Travis Brown reviewed the application. Please see Travis's Groundwater Review and the Well Logs.

Applicant's Well #1 (MARI 14751): Based on a review of the Well Report, Applicant's Well #1 does not appear to comply with current minimum well construction standards (See OAR 690 Division 210). The problem is that the casing and seal is not to the appropriate depth. The well report indicates that the well is cased and sealed to a depth of 49 feet below land surface. In order to meet minimum well construction standards, the well must be continuously cased and continuously sealed to a minimum depth of 196 feet below land surface.

My recommendation is that the Department **not issue** a permit for Applicant's Well #1 (MARI 14751) unless it is brought into compliance with current minimum well construction standards, or information is provided to show that it is in compliance with current minimum well construction standards.

Applicant's Well #2 (MARI 14754): Based on a review of the Well Report, Applicant's Well #2 does not appear to comply with current minimum well construction standards (See OAR 690 Division 210). The problem is that the casing and seal is not to the appropriate depth. The well report indicates that the well is cased and sealed to a depth of 46 feet below land surface. In order to meet minimum well construction standards, the well must be continuously cased and continuously sealed to a minimum depth of 193 feet below land surface.

My recommendation is that the Department **not issue** a permit for Applicant's Well #2 (MARI 14754) unless it is brought into compliance with current minimum well construction standards, or information is provided to show that it is in compliance with current minimum well construction standards.

Note: Travis Brown's Groundwater Application Review states that to satisfy any hydraulic connection issues, Applicant's Wells #1 and #2 "shall be continuously cased and continuously sealed to at least of 240 below land surface or as approved by a Department hydrogeologist." These requirements exceed the minimum well construction standards.

STATE OF OREGON
WATER WELL REPORT
 (as required by ORS 537.765)

RECEIVED
 man
 1/15/18

85/3w/18 ba

(START CARD) # 20572

(1) OWNER:
 Name RICHARD E. MORROW
 Address P.O. Box 3306
 City Salem State Oregon Zip 97302

(9) LOCATION OF WELL by legal description:
 County Marion Latitude _____ Longitude _____
 Township 8 South N or S, Range 3 West E or W, WM.
 Section 18 NE $\frac{1}{4}$ NW $\frac{1}{4}$
 Tax Lot _____ Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) _____
3705 Ballantyne Road South Salem, Oregon

(2) TYPE OF WORK:
 New Well Deepen Recondition Abandon

(3) DRILL METHOD
 Rotary Air Rotary Mud Cable
 Other _____

(4) PROPOSED USE:
 Domestic Community Industrial Irrigation
 Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION:
 Special Construction approval Yes No _____
 Depth of Completed Well 453 ft.
 Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			Amount
Diameter	From	To	Material	From	To	sacks or pounds
10"	0'	49'	Cement	0'	49'	21
6"	49'	453'				

How was seal placed: Method A B C D E
 Other _____
 Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Casing:	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
					<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	6"	+1	49'	.240	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner:	4"	0'	453'	PVC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
				SDR 26	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) 49 Feet

(7) PERFORATIONS/SCREENS:
 Perforations Method Electric
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
370'	450'		170	1/8x	5 Inch	<input type="checkbox"/>	<input checked="" type="checkbox"/>

(8) WELL TESTS: Minimum testing time is 1 hour
 Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
18		450 Ft	1 hr.

Air Test GPM May Fluctuate.

Temperature of water _____ Depth Artesian Flow Found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
 Depth of strata: _____

(10) STATIC WATER LEVEL:
155 ft. below land surface. Date 8-2-90
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:
 Depth at which water was first found 315 Feet

From	To	Estimated Flow Rate	SWL
315 Ft	449 Ft	18 GPM	155'

(12) WELL LOG: Ground elevation _____

Material	From	To	SWL
Soil	0	1	
Brown Clay	1	9	
Reddish Brown Clay	9	19	
Decomposed Rock Multi-Colored	19	31	
Weathered Basalt	31	38	
Black Basalt	38	52	
Badly Weathered Basalt, With Multi-Colored Claystones	52	71	
Weathered Basalt	71	84	
Gray Basalt	84	166	
Badly Weathered Vesicular Basalt, Broken, Caving	166	191	
Gray Basalt	191	305	
Weathered Basalt, With Multi-Colored Clays & Claystones	305	332	
Black Basalt	332	376	
Weathered Basalt	376	434	
Black Basalt & Gray Claystones	434	449	
Gray Clay Soft	449	453	155'
5% Bentonite Used To Seal Well.			

Date started 7-31-90 Completed 8-5-90

(unbonded) Water Well Constructor Certification:
 I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.
 WWC Number _____
 Signed _____ Date _____

(bonded) Water Well Constructor Certification:
 I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.
 MONDERS DRILLING, INC. WWC Number 1325
 Signed J.D. Monders Date 8-14-90

STATE OF OREGON
WATER WELL REPORT
 (as required by ORS 537.765)

*Agri
14754*

RECEIVED
 OCT 3 1990

85/3W/18 ba

(START CARD) # 20580

(1) OWNER:

Name RICHARD E. MORROW
 Address P.O. Box 3306
 City Salem State Oregon Zip _____

Well Number: WATER RESOURCES DEPT LOCATION OF WELL by legal description:

County Marion Latitude _____ Longitude _____
 Township 8 South Nor S, Range 3 West E or W, WM.
 Section 18 NE 1/4 NW 1/4
 Tax Lot _____ Lot _____ Block _____ Subdivision _____
 Street Address of Well (or nearest address) 3705 Ballantyne Road South Salem, Oregon

(2) TYPE OF WORK:

New Well Deepen Recondition Abandon

(3) DRILL METHOD

Rotary Air Rotary Mud Cable
 Other _____

(4) PROPOSED USE:

Domestic Community Industrial Irrigation
 Thermal Injection Other _____

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes No Depth of Completed Well 331 ft.
 Explosives used Yes No Type _____ Amount _____

HOLE			SEAL			Amount sacks or pounds
Diameter	From	To	Material	From	To	
10"	0'	46'	Cement	0'	46'	18
6"	46'	440'				

How was seal placed: Method A B C D E
 Other _____

Backfill placed from _____ ft. to _____ ft. Material _____
 Gravel placed from _____ ft. to _____ ft. Size of gravel _____

(6) CASING/LINER:

Diameter	From	To	Gauge	Material			
				Steel	Plastic	Welded	Threaded
Casing: 6"	+1	46'	.240	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Liner: 4"	0'	331'	PVC	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		SDR 26		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Final location of shoe(s) 46 Ft

(7) PERFORATIONS/SCREENS:

Perforations Method Electric Saw
 Screens Type _____ Material _____

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
251'	331'		190	1/8 x	5 Inch	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Driller Recommended That _____							
Pump Be Set At 325 Ft. _____							

(8) WELL TESTS: Minimum testing time is 1 hour

Pump Bailer Air Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
24	55 Ft		1 hr.
23	82 Ft		2 Hrs.
23	82 Ft		4 Hrs.

Temperature of water _____ Depth Artesian Flow Found _____
 Was a water analysis done? Yes By whom _____
 Did any strata contain water not suitable for intended use? Too little
 Salty Muddy Odor Colored Other _____
 Depth of strata: _____

(10) STATIC WATER LEVEL:

190 ft. below land surface. Date 8-30-90
 Artesian pressure _____ lb. per square inch. Date _____

(11) WATER BEARING ZONES:

Depth at which water was first found 298 Ft

From	To	Estimated Flow Rate	SWL
298 Ft	438 Ft	24 GPM	190'

(12) WELL LOG:

Ground elevation _____

Material	From	To	SWL
Soil	0	1	
Brown Clay	1	7	
Multi-Colored Clays, And Claystones Broken	7	26	
Weathered Basalt	26	32	
Gray Basalt Firm	32	127	
Black Basalt	127	169	
Weathered Basalt, With Multi-Colored Clays & Claystones	169	188	
Black Basalt	188	274	
Gray Basalt	274	298	
Weathered Basalt, With Multi-Colored Claystones, Broken	298	329	
Black Vesicular Basalt, Broken And Caving Water Bering	329	342	
Weathered Broken Caving Basalt Water Bering	342	386	
Black Basalt WB	386	438	
Gray Clay Soft	438	440	190'
Well Caved In @ 331 Ft Before 4" PVC Well Liner Could Be Installed.			

Date started 8-25-90 Completed 8-30-90

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed _____ WWC Number _____
 Date _____

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. all work performed during this time is in compliance with Oregon well construction standards. This report is true to the best of my knowledge and belief.

MONDERS DRILLING, INC. WWC Number 1325
 Signed D. Monders Date 8-31-90