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Groundwater Application Review Summary Form

Application # G- 17998

GW Reviewer Paul Maray

Date Review Completed: 7/25/2017

Summary of GW Availability and Injury Review:

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

Summary of Potential for Substantial Interference Review:

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 07/24/2017
 FROM: Groundwater Section Phillip I. Marcy
 Reviewer's Name
 SUBJECT: Application G- 17998 Supersedes review of 08/05/2015**
 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: Wilks Ranch Oregon Limited County: Malheur

- A1. Applicant(s) seek(s) 2.26 cfs from 1 well(s) in the Malheur Basin,
Willow Creek subbasin
- A2. Proposed use Irrigation (135.50 acres) Seasonality: April 1st to October 31st (213 days)
- A3. Well and aquifer data (attach and number logs for existing wells; mark proposed wells as such under logid):

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	Proposed	1	Bedrock	2.26	14S/39E-24 SE-NW	1600'S, 6710'E fr SW cor S 14
2						
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	3662*	None	None	None	800	0-300	+1-300	None	None	None	None	None

Use data from application for proposed wells.

A4. **Comments:** *Well head elevation derived from proposed well location.
 The applicant intends to produce groundwater from the fractured bedrock aquifer beneath valley-fill alluvium.

**** This re-review addresses the applicant's change of location of the proposed POA well, submitted 06/20/2016.**

A5. **Provisions of the Malheur (690-510)** 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: _____

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

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

B1. **Based upon available data**, I have determined that groundwater* for the proposed use:

- a. is over appropriated, is not over appropriated, or **cannot be determined to be** over appropriated during any period of the proposed use. * This finding is limited to the groundwater portion of the over-appropriation determination as prescribed in OAR 690-310-130;
- b. **will not** or **will likely** be available in the amounts requested without injury to prior water rights. * This finding is limited to the groundwater portion of the injury determination as prescribed in OAR 690-310-130;
- c. **will not** or **will likely** to be available within the capacity of the groundwater resource; or
- d. **will, if properly conditioned**, avoid injury to existing groundwater rights or to the groundwater resource:
 - i. The permit should contain condition #(s) 7N – Annual measurement condition;
 - 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 Fractured Basalt groundwater reservoir between approximately 700 ft. and 900 ft. below land surface;
- d. **Well reconstruction** is necessary to accomplish one or more of the above conditions. The problems that are likely to occur with this use and without reconstructing are cited below. Without reconstruction, I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Department and approved by the Groundwater Section.

Describe injury –as related to water availability– that is likely to occur without well reconstruction (interference w/ senior water rights, not within the capacity of the resource, etc): _____

B3. **Groundwater availability remarks:** The applicant proposes to produce from a bedrock aquifer that historically has shown high head pressure (see attached well log for MALH 16). There has been minimal groundwater development in the area over the past two decades, so the impacts of additional development in this volcanic aquifer are difficult to quantify. During the period between 1962-1966, measured declines in groundwater levels were observed in the deep volcanic aquifer system near Ironside. This led researchers at the time to conclude that though moderately to highly permeable, there may not be sufficient recharge to support more than the handful of area wells producing from this system (Price, 1967). Therefore, development of further permanent groundwater rights in the volcanic aquifer should be approached with caution.

Special condition: Before drilling commences on the proposed POA well, the licensed well constructor shall consult with OWRD hydrogeologists to determine a plan for collection of drill cuttings at specific intervals during the course of drilling.

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	Fractured Basalt	<input checked="" type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer confinement evaluation: Nearby wells penetrating into this fractured bedrock system show significantly higher head elevations relative to the elevation of their respective water-bearing zones. This suggests some degree of *local* confinement that is not likely to be laterally extensive, based on the limited extent of these lava flows (Price, 1967), in addition to extensive faults mapped within the region (Brooks and others, 1976).

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	Willow Creek	?	3622	6600	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
						<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Basis for aquifer hydraulic connection evaluation: Little information is available concerning the local groundwater flow system. The high head pressure within the deep volcanic aquifer system indicates this part of Willow Creek basin to be a regional discharge zone. There is very likely hydraulic connection between the fractured volcanic aquifer and overlying fine-grained sediments, and in turn between these sediments and the adjacent and overlying alluvium. The head relationship suggests that indirect and diffuse interference is likely with a downstream reach of Willow Creek, and may be controlled by the placement of sand and gravel lenses within the sedimentary sequence separating the volcanic aquifer system and surface water.

Water Availability Basin the well(s) are located within: 31011926, WILLOW CR> MALHEUR R- AB LONG CR.

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?
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<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?
		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>
		<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

Comments: The updated POA location (received map 06/20/2016) is greater than one mile from nearby perennial surface waters, therefore the above table does not apply.

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
1	1	0.01%	0.01%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.03%	0.01%	0.01%
Well Q as CFS				2.26	2.26	2.26	2.26	2.26	2.26	2.26	2.26		
Interference CFS		0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.00	0.00
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													
(A) = Total Interf.		0.000	0.000	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.000	0.000
(B) = 80 % Nat. Q		6.35	12.5	17.6	32.2	29.2	21.5	7.9	3.25	2.10	2.75	5.42	5.75
(C) = 1 % Nat. Q		.064	.125	.176	.322	.292	.215	.079	.0325	0.021	0.028	0.054	0.058
(D) = (A) > (C)													
(E) = (A / B) x 100		0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %	0 %

(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: Expected impacts to Willow Creek due to pumping at the proposed POA location were calculated using the model of Hunt (2003). Parameters for these calculations were provided by an interference test performed in March of 2016 on two wells producing from the target aquifer. During this test, several nearby wells were repeatedly measured to assess impacts to the shallow aquifer system, and no appreciable effects were observed. This suggests that any hydraulic connection between the deep volcanic aquifer and the shallow alluvial aquifer in this area is extremely inefficient.

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:**

If a permit is issued, the following conditions should be applied:

7N – Annual Measurement Condition, "Large water use reporting", 7K – "The well may not be completed in such a manner that it allows groundwater to be developed from alluvium overlying the volcanic aquifer."

Special condition:

Before drilling commences on the proposed POA well, the licensed well constructor shall consult with OWRD hydrogeologists to determine a plan for collection of drill cuttings at specific intervals during the course of drilling.

References Used: Local well logs; water-level data at nearby wells; application file G-17996;

Geology of the Oregon Part of the Baker 1° by 2° Quadrangle, by Brooks, et al, 1976 (GMS-7); Hydrogeology of the Ontario Area, Malheur County, Oregon, by Gannett, 1990, OWRD Groundwater Report #34.

Price, Don. 1967, Ground-Water Reconnaissance in the Burnt River Valley Area, Oregon: Geological Survey Water Supply Paper 1839-1. 27 p.

Interference test conducted 03/2016 on nearby MALH 16 / MALH 54260.

Hunt, B., 2003, Unsteady stream depletion when pumping from semiconfined aquifer: *Journal of Hydrologic Engineering*, January/February, 2003.

D. WELL CONSTRUCTION, OAR 690-200

D1. Well #: _____ Logid: _____

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

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

D3. **THE WELL construction deficiency or other comment is described as follows:** _____

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

Water Availability Tables

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION

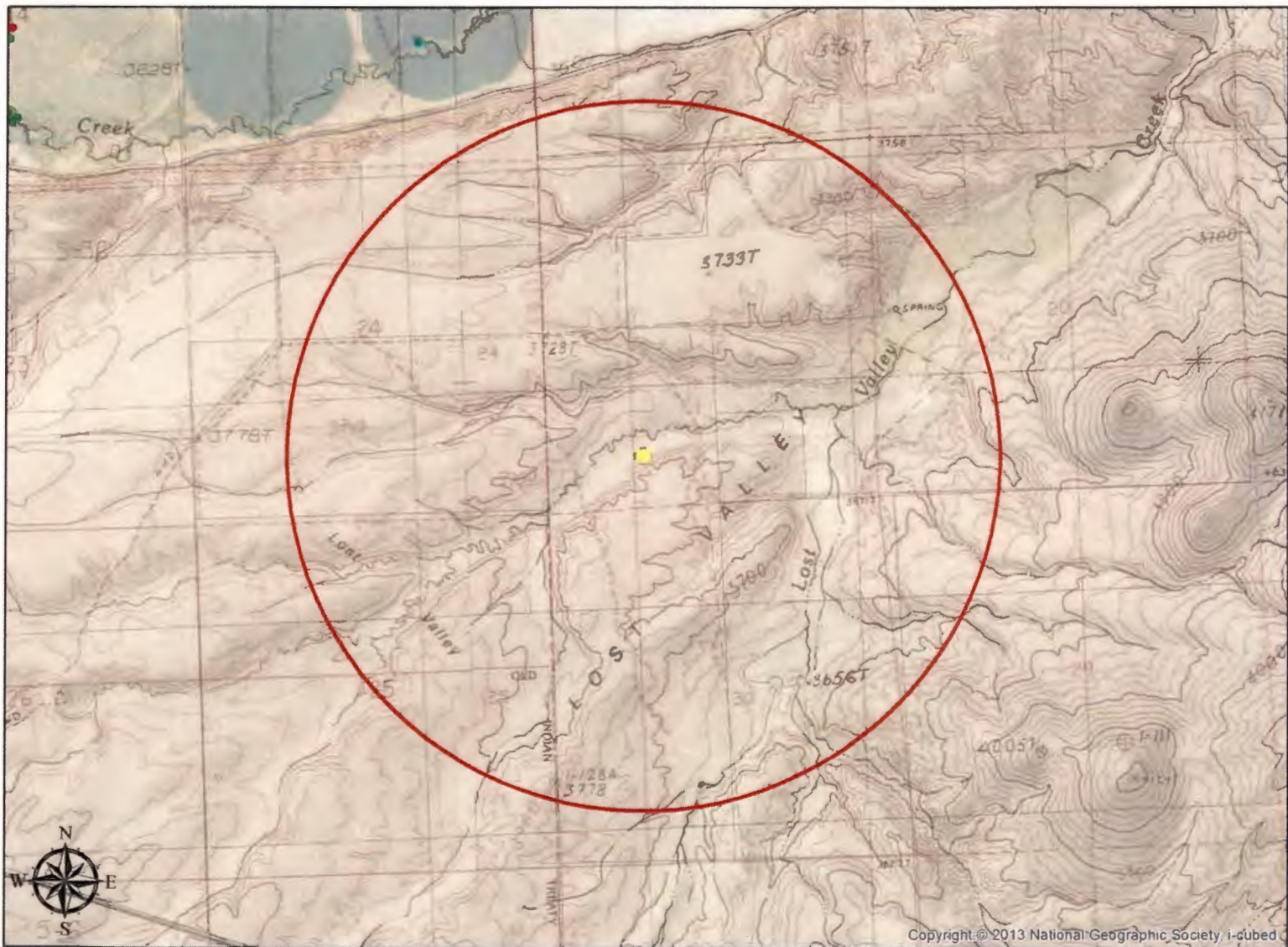
watershed ID #: 31011926
Time: 4:19 PM

WILLOW CR > MALHEUR R - AB LONG CR
Basin: MALHEUR

Exceedance Level: 80
Date: 07/07/2015

Month	Natural Stream Flow	Consumptive Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Requirements	Net water Available
Monthly values are in cfs. Storage is the annual amount at 50% exceedance in ac-ft.						
JAN	6.35	0.07	6.28	0.00	0.00	6.28
FEB	12.50	0.22	12.30	0.00	0.00	12.30
MAR	17.60	3.89	13.70	0.00	0.00	13.70
APR	32.20	17.90	14.30	0.00	0.00	14.30
MAY	29.20	45.10	-15.90	0.00	0.00	-15.90
JUN	21.50	36.50	-15.00	0.00	0.00	-15.00
JUL	7.90	12.20	-4.29	0.00	0.00	-4.29
AUG	3.25	4.88	-1.63	0.00	0.00	-1.63
SEP	2.10	2.53	-0.43	0.00	0.00	-0.43
OCT	2.75	1.25	1.50	0.00	0.00	1.50
NOV	5.42	0.07	5.35	0.00	0.00	5.35
DEC	5.75	0.07	5.68	0.00	0.00	5.68
ANN	14,200	7,550	7,940	0	0	7,940

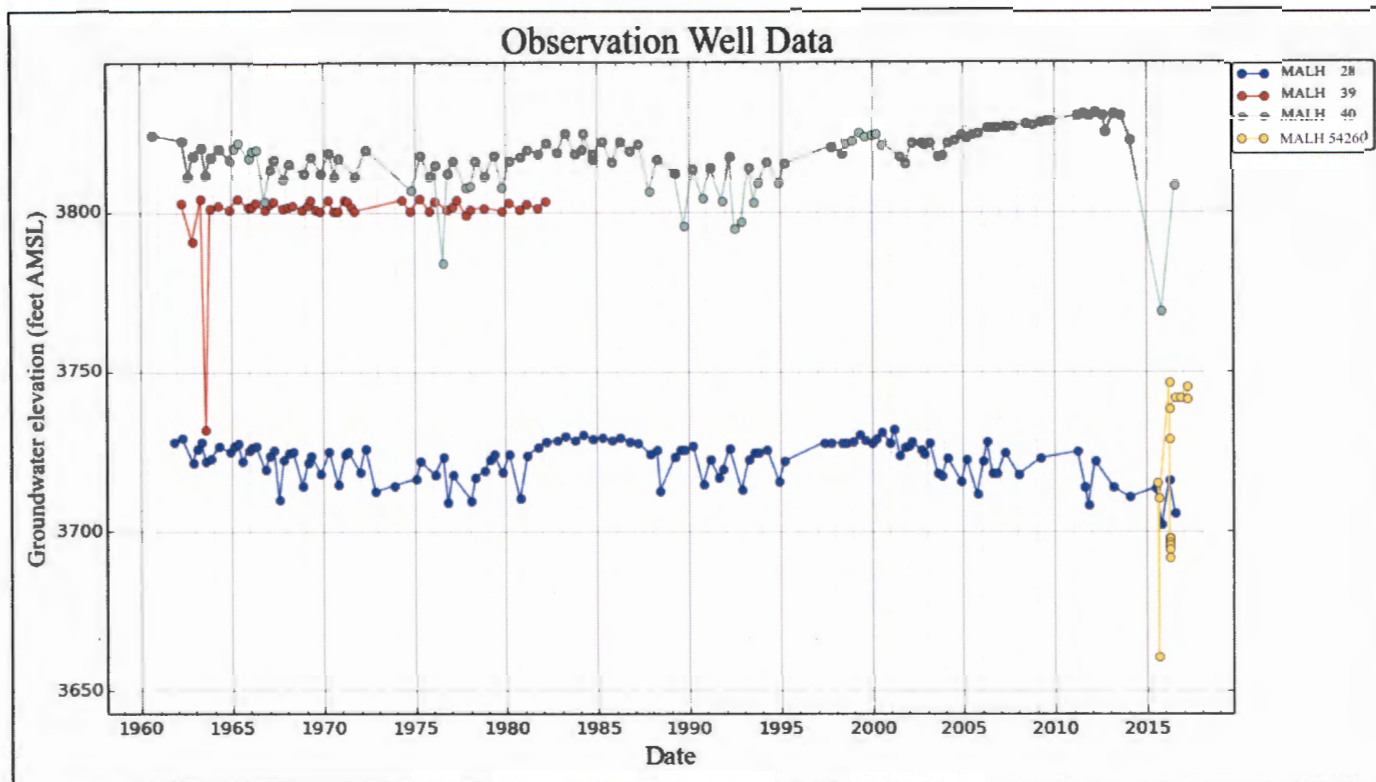
Well Location Map



0 0.125 0.25 0.5 0.75 1 Miles

1:24,000

Water-Level Trends in Nearby Wells



Well log for MALH 16, artesian well in the Ironside area producing from deep volcanic aquifer.

STATE ENGINEER
Salem, Oregon

*Malh
016*

Well Record

STATE WELL NO. 14/39-15N(1)
COUNTY Malheur
APPLICATION NO. U-410
Permit No. 735

OWNER: A. E. Nichols

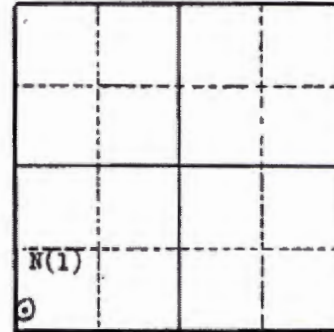
MAILING ADDRESS: Route 2

LOCATION OF WELL: Owner's No. _____

CITY AND STATE: Vale, Oregon

SW 1/4 SW 1/4 Sec. 15 T. 14 N. S. R. 39 E. W.M.

Bearing and distance from section or subdivision
corner 232' East and 314' North of SW cor.
Section 15



Altitude at well _____

TYPE OF WELL: Drilled Date Constructed 1948-51

Depth drilled 860 Depth cased _____

Section 15

CASING RECORD:

10 inch

FINISH:

AQUIFERS:

Broken rock from 856 to 860 feet

WATER LEVEL:

Flows approximately 1800 gpm

PUMPING EQUIPMENT: Type None H.P. _____
Capacity _____ G.P.M.

WELL TESTS:

Drawdown _____ ft. after _____ hours _____ G.P.M.
Drawdown _____ ft. after _____ hours _____ G.P.M.

USE OF WATER Irrigation Temp. _____ °F. _____ 19 _____

SOURCE OF INFORMATION U-410

DRILLER or DIGGER Max Holloway

ADDITIONAL DATA:

Log Water Level Measurements _____ Chemical Analysis _____ Aquifer Test _____

REMARKS:

Flow measured on April 11, 1951 3.3 c.f.s.

Well log for MALH 28, State Observation Well #550, drilled into the deep volcanic aquifer in Ironside area.

550
RECEIVED
OBSERVATION WELL
WATER WELL REPORT
STATE OF OREGON
 State Well No. MALH 28
 State Permit No. 218827
 CBS. Well 550.
 14/39-21P

(1) OWNER:
 Name Don & Oaker
Ralph H. Hesse
 Address Ironside Oregon

(2) LOCATION OF WELL:
 County MALHEUR Owner's number, if any—
SE 1/4 SW 1/4 Section 21 T. 14 R. 39 W.M.
 Bearing and distance from section or subdivision corner
75' East of County Road
20' from Old Windmill well.

(3) TYPE OF WORK (check):
 New Well Deepening Reconditioning Abandon
 If abandonment, describe material and procedure in Item 11.

PROPOSED USE (check):
 Domestic Industrial Municipal Irrigation Test Well Other
 (5) TYPE OF WELL:
 Rotary Cable Dug Driven Jetted Bored

(6) CASING INSTALLED:
 Threaded Welded
 12" Diam. from -1 ft. to 161 ft. Gage 1/4"

(7) PERFORATIONS:
 Perforated? Yes No
 Type of perforator used TORCH
 SIZE of perforations 3/8 in. by 6 in.
 1680 perforations from 20 ft. to 140 (160) ft.

(8) SCREENS:
 Well screen installed Yes No
 Manufacturer's Name _____ Model No. _____
 Type _____
 Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(9) CONSTRUCTION:
 Was well gravel packed? Yes No Size of gravel: _____
 Gravel placed from _____ ft. to _____ ft.
 Was a surface seal provided? Yes No To what depth? _____ ft.
 Material used in seal—
 Did any strata contain unusable water? Yes No
 Type of water? _____ Depth of strata _____
 Method of sealing strata off _____

(10) WATER LEVELS:
 Static level 8 ft. below land surface Date 11-6-61
 Artesian pressure _____ lbs. per square inch Date _____

Log Accepted by:
 Signed Don & Oaker Date 12-4, 1961
by Donald Oaker

(11) WELL TESTS:
 Drawdown is amount water level is lowered below static level
 Was a pump test made? Yes No If yes, by whom? DRILLER
 Yield: 700 gal./min. with 140 ft. drawdown after 8 hrs.

(12) WELL LOG:
 Diameter of well 12" x 8" inches.
 Depth drilled 734 ft. Depth of completed well 734 ft.
 Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
TOP SOIL	0	8
CLAY	8	18
GRAVEL WATER	18	40
GREEN CLAY Crumbly	40	63
GREEN CLAY	63	140
GRAVEL STRIP	140	145
GREEN CLAY	145	446
BLACK OILY CLAY	446	498
BLUE SCAP STONE	498	510
SMALL PEAG GRAVEL	510	512
GREY CLAY HARD	512	582
BLACK ROCK	582	610
CALING BLACK ROCK	610	613
GRANITE ROCK	613	621
Reduced to 8" Hole		
BLUE CLAY	621	648
HARD BLACK ROCK	648	680
Red ROCK	680	698
HARD BLACK ROCK	698	719
GREYICE WITH BROKEN ROCK	719	730
BROKEN BLACK ROCK	730	734

Work started 9-19 1961 Completed 11-6 1961

(13) PUMP:
 Manufacturer's Name No pump yet.
 Type: _____

Well Driller's Statement:
 This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
 NAME HOLLOWAY DRILLING Co.
 Address ONTARIO OREGON
 Driller's well number _____
 (Signed) May Holloway
 License No. 16 Date 12-2, 1961

(USE ADDITIONAL SHEETS IF NECESSARY)

Well log for MALH 19, drilled into the deep volcanic aquifer system in Ironside area.

ORIGINAL File Original and Duplicate with the STATE ENGINEER, SALEM, OREGON

WATER WELL DRILLERS REPORT STATE OF OREGON

Malh 019 Do Not State Well No. C 1439-160 File In State Permit No. G-26

(1) OWNER Name: A.A. DUNCAN Address: IRONSIDE ORE

(2) LOCATION OF WELL: County: Malheur Owner's number, if any: #1 R. F. D. or Street No.: Ironside Ore

(3) TYPE OF WORK (check): New well [x] Deepening [] Reconditioning [] Abandon []

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

(5) EQUIPMENT: Rotary [] Cable [x] Dug Well []

CASING INSTALLED: Table with columns for FROM, ft. to, Diam., Gage of Wall, Diameter of Bore, from ft., to ft.

(7) PERFORATIONS: Table with columns for SIZE of perforations, in., length by, No. of rows

SCREENS: Give Manufacturer's Name, Model No. and Size

(8) CONSTRUCTION: Was a surface sanitary seal provided? [] Yes [x] No To what depth: ft.

METHOD OF SEALING

(9) WATER LEVELS: Depth at which water was first found: 19' Standing level before perforating: none Standing level after perforating: Flouwing

(10) WELL TESTS: Was a pump test made? [x] Yes [] No Yield: 500 gal./min. with 150 ft. draw down after 4 hrs.

(11) WELL LOG: Diameter of well: 10 inches Total depth: 940 ft. Depth of completed well: 915 ft.

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers... 0 ft. to 4 ft. TOP SOIL 4' 4'-19" HARD CLAY 15' 19'-30" CLAY GRAVEL MIXED 11' 30"-160" BLUE SHALE 130' 160"-165" SOAPSTONE 5' 165"-405" BLUE SHALE 240' 405"-408" SANDSTRIP 3' 408"-445" BLUE SHALE 37' 445"-450" SOAPSTONE 5' 450"-454" BROWN SANDSTONE 4' 454"-605" HARD BLACK ROCK 151' 605"-630" BLUE SHALE 25' 630"-660" BLUE COARSE ROCK 30' 660"-665" SOFT COAL 5' 665"-675" BLUE COARSE ROCK 10' 675"-680" RED ROCK 5' 680"-700" BLACK BASALT ROCK 20' 700"-705" RED ROCK 5' 705"-815" BLACK BASALT ROCK 110' 815"-840" COARSE GRAINED ROCK 25' 840"-900" BLACK BASALT ROCK 60' 900"-912" CRACK IN ROCK 12' 912"-940" CARVING SOAPSTONE

Ground elevation at well site: feet above mean sea level. Work started: May 14 1955 Completed: July 3 1955

Well Driller's Statement: This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME: Holloway DRILLING Co. Address: 80 HILL CREST DR. Driller's well number: #1 [Signed] May Holloway License No. 16 Dated Aug 10 1955