MAUL FOSTER ALONGI

MEMORANDUM

To: Dave Anderson, Public Works Director, City of The Dalles Date: July 27, 2020

From: Andrew Vidourek, RG and James J. Maul, LHG

REGISTERED OREGON JAMES J. MAUL G868 GEOLOGIST

EXPIRES: 11/1/2020
This digital seal certifies the signatory and document content.

RE: Groundwater technical memorandum - Review of proposed well siting at 2929 West 2nd Street in The Dalles, Oregon in relation to water quality

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We have prepared this memorandum to advance understanding of water quality at a potential siting location for new supply wells anticipated to be installed within the City's Service Zone 310 (310 zone), at 2650 River Road (the Siting Location). To assess potential water quality at the Siting Location, existing data from industrial production wells at 3313 West 2nd Street were reviewed (See Figure 1). 3313 West 2nd Street was formerly occupied by an aluminum reduction facility owned by Northwest Aluminum Company and thus this property will be referred to in this memorandum as the "Smelter Property". The location of the proposed well field, or Siting Location, is approximately 2,000 feet from the Smelter Property. Note the locations of the proposed production Wells 6 and 7 on Figure 1 are approximate, with final locations to be determined.

Four groundwater production wells (Wells 1 through 4) were installed on the Smelter Property in 1957 and 1958 by Martin Marietta. They provided an industrial and potable water supply to the former Martin Marietta Aluminum Reduction Facility. Martin Marietta operated from 1958 to 1984. Martin Marietta then leased the plant to Northwest Aluminum Company at which point aluminum operations resumed until 2003. Well 2 was decommissioned in 1985 (Geraghty & Miller, 1988). The remaining three production wells (Well 1, 3, and 4) are currently used by the property owner and a neighboring industry for potable and industrial purposes (i.e., non-contact cooling water).

Primary sources of contamination adjacent to or near the Smelter Property and/or the Siting Location property include:

- A Resource Conservation and Recovery Act (RCRA) landfill
- A Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) landfill
- Closed "Scrubber Sludge Ponds" that received waste from air filtration units (also a CERCLA unit)
- The Dalles Disposal Site landfill.

The Smelter and Siting Location properties, along with the RCRA landfill, the CERCLA landfill, Scrubber Sludge Ponds, and The Dalles Disposal Site, are collectively referred to herein as the Site.

Contaminants at the Site are typical of those associated with aluminum production and include fluoride, sulfate, cyanide, and polynuclear aromatic hydrocarbons (PAHs). All of the sources of contamination noted above, with the exception of The Dalles Disposal Site, are regulated waste units under Oregon Department of Environmental Quality (DEQ) and/or US Environmental Protection Agency (USEPA) oversight for post-closure monitoring and were generated as part of activities and remedial actions associated with the former aluminum reduction facility.

Specifically, we were asked to:

Evaluate if relocating a portion of the production well field to the Siting Location would induce contaminant migration from sources on the Site, i.e., the CERCLA landfill, the RCRA landfill, the Scrubber Sludge Ponds, The Dalles Disposal Site, or from areas of residual or remaining impacts in soil and/or shallow groundwater. [1]

ENVIRONMENTAL CONDITIONS

Smelter Property

The Smelter Property occupies a portion of the Martin Marietta Aluminum Reduction Facility that produced aluminum from 1958 to 1984. In 1986, Martin Marietta leased the plant to Northwest Aluminum Company at which point aluminum operations resumed until 2003. Former facility operations generated waste materials consisting largely of spent potliners (RCRA regulated waste K088); sludge from air scrubbers (containing fluoride and polycyclic aromatic hydrocarbons [PAHs]); and process water, including an electrolyte bath.

Extensive investigation and remedial actions have been conducted on the Site. The first major phase of work was conducted from approximately 1988 through 1991, under USEPA oversight and included

[1] Up to 6.01 cubic feet per second of water rights are proposed for transfer to new wells at the Siting Location.

consolidation of aluminum process waste to landfills (the CERCLA and RCRA landfills) and closure of two scrubber sludge ponds. This was conducted under a Record of Decision from USEPA issued in 1988. Remedial actions also included recovering and treating contaminated water from a portion of the Site, leachate treatment, and on-going compliance groundwater monitoring. Facility operations continued under the management of Northwest Aluminum Company, which took over from Martin Marietta, during and after the first phase of remedial action until ceasing its operations in 2003.

A second phase of remediation began in 2007, under the DEQ. This included additional Site investigation, a risk assessment, and remedial actions. This included removing process waste and contaminated soil in addition to building demolition. Soil removal and capping activities were conducted in 2009, 2010, and 2011, in selected areas during and after facility demolition (CH2MHILL, 2012).

On September 12, 2012, DEQ issued a conditional no further action determination (NFA) for the Site. As part of the NFA process, an Easement and Equitable Servitudes (EES) was filed with Wasco County that requires engineering and institutional controls. Groundwater monitoring in relation to the Smelter Property and the associated landfill units continue under EPA oversight.

The Siting Location

The Siting Location is located approximately 2,000 feet south from the Smelter Property. Between these two properties is an active industrial facility, Hydro Extrusions. The Siting Location property is comprised of approximately 73 acres and has remained largely undeveloped, except for the portion formerly used by the community for rodeo events. Additionally, the eastern portion of the Siting Location property contains approximately 1.2 acres of a 3.65-acre closed municipal landfill, the aforementioned "The Dalles Disposal Site", that operated from 1938 through 1955.

Environmental investigations conducted in 2014 and 2018, along with a risk assessment screening assessment, showed that arsenic and lead at The Dalles Disposal Site exceeded acceptable risk levels in landfill material and surface soil (MFA, 2015a; MFA, 2015b; MFA, 2018; and GeoPro, 2013a). The DEQ issued a conditional No Further Action determination for The Dalles Disposal Site in 2013 (DEQ, 2013a), a CMMP (GeoPro, 2013b), and an EES (Wasco County, 2013) were prepared and recorded by the Wasco County Clerk to define Site restrictions and procedures associated with impacted soil and groundwater in this area.

In association with due diligence and in relation to a Prospective Purchaser Agreement with DEQ, environmental assessments of the remainder of the Siting Location property were conducted and indicated that contamination was not present and that, in conjunction with the engineering and institutional controls identified in the EES, no further assessment or remedial actions were necessary (MFA, 2018).

In anticipation of two production wells being installed within the Siting Location, Wells 6 and 7 are shown on Figure 1 and approximately 900 feet apart. Additionally, the wells would be installed no

closer than 500 feet from the scrubber sludge ponds boundary. Note that these well locations are approximate, with final locations to be determined.

HYDROGEOLOGY/NATURE AND EXTENT OF CONTAMINATION

The existing production wells are completed in "The Dalles Groundwater Reservoir" aquifer (DGWR). The DGWR is confined and is hydraulically distinct from other aquifers at the Site. The top of the DGWR at the Site is almost 300 feet deep and is between 20 to 40 feet thick. It is highly permeable and yields over 1,000 gallons per minute to production wells (Geraghty & Miller, 1988).

The hydrostratigraphic units underlying the Site include:

- Perched zone
- S and S_L-Aquifers
- A-Aquifer
- B-Aquifer
- DGWR

With the exception of the shallow perched zone, the S-, S_L-, A-, B-, and DGWR aquifers occur in more permeable (e.g., fractured or broken) zones of the Columbia River Basalt Group that lie between dense, impermeable layers of basalt (CH2MHILL, 2012). See Figure 2 for a general representation of the hydrostratigraphy at the Site.

Routine sampling of production wells conducted in 1983 indicated the presence of cyanide above the detection limit from Well 2. Well 2 was subsequently decommissioned in March 1985 by pulling the pump and backfilling the borehole with cement grout. Routine sampling of the other three production wells did not identify water quality problems (Geraghty & Miller, 1988). Since that time, cyanide has been detected in samples from the remaining production wells at concentrations ranging from 0.004 milligrams per liter (mg/L) to 0.017 mg/L, well below the USEPA Maximum Contaminant Level (MCL) of 0.2 mg/L for free cyanide (Oregon Health Authority, 2020).[2] Cyanide was last detected over 20 years ago (1999) from Well 1 at a concentration of 0.007 mg/L and has not been detected in any of the production well samples since (see attached Table).

The annual volume of groundwater pumped from the DGWR from 1980 through 1998, the time period in which the production well sampling results presented on the attached Table were collected, and when the Smelter Property facility was in operation, ranged from 2,450 to 5,650 acre-feet per year. After the discontinuance of operations at the Smelter Property, from 2004 through 2017, the annual volume of groundwater pumped from the DGWR ranged from approximately 1,400 to 3,400 acre-

[2] The fraction of cyanide analyzed historically was not specified in the documentation reviewed. If the cyanide data is representative of total or weak acid dissociable cyanide it likely over represent the portion of cyanide comparable to the free cyanide MCL.

feet per year (Golder, 1999). It is anticipated that groundwater pumped from new wells to be installed on the Siting Location will not mobilize contaminants, if similar groundwater withdrawal rates increase back up to 2,450 to 5,650 acre-feet per year.

Groundwater impacts on the Smelter Property, where the current production well field is located, are limited to the perched- and the S-aquifers (AMEC, 2014). Contamination concentrations that exceed USEPA MCLs are not present within the A-, B-, or DGWR, all of which are confined and as a result, limit contaminant migration. The DGWR is separated from overlying units by low permeability sediments which effectively preclude the exchange of water between the B-aquifer and the DGWR (Geraghty & Miller, 1988). Therefore, the DGWR is hydraulically distinct from all other aquifers at the Site and is not considered by the DEQ to be part of the Site's locality of facility (LOF). The LOF is defined as anywhere groundwater contamination is present or likely to become impacted in the future. By the establishing the LOF, the DEQ has determined that contamination at the Site has not, and will not in the future, impact the DGWR.

The only groundwater monitoring wells on the Siting Location property are near The Dalles Disposal Site and adjacent to the Scrubber Sludge Ponds property (near River Road). These monitoring wells are located 1,000 or more feet from the proposed well locations and are drilled in the shallow perched- and S-aquifers (i.e. approximately 250 to 300 feet shallower than the wells proposed to be drilled in the DGWR). Limited detections of cyanide, fluoride, sulfate, and PAHs were present in groundwater samples collected from 2014 through 2019 from these shallow wells (MW-5, MW-4U, MW-4L, MWR-29S, MW13-15SL, MW15-19SL, and MW13-14SL, see Figure 1). The only regulatory exceedances of a screening level were for fluoride in MW13-14SL, however, this monitoring well is only completed at 20 feet bgs (Wood, 2019). Cyanide, fluoride, sulfate, and PAH impacts are not anticipated to be present on the Siting Location property in the A-, B-, or DGWR aquifers, and accordingly those aquifers are not included in the on-going groundwater monitoring program (Wood, 2019).

In 2008, an existing irrigation supply well located within the western portion of the Siting Location property, was decommissioned. The well was completed to a depth of approximately 86-feet below ground surface (bgs) and approximately 200 to 215 feet shallower than the depth of the proposed wells to be drilled in the DGWR. Chemical samples were collected and analyzed for cyanide, fluoride, sulfate, and PAHs. No cyanide or PAHs were detected, and the detections of fluoride and sulfate were well below the USEPA MCLs (Tetra Tech, 2008).

Two additional monitoring wells (MW-24S and MW-24A, see Figure 1), were located near the northwest portion of the Siting Location property (southwest of the Scrubber Sludge Ponds), and were decommissioned as they were not needed for the on-going groundwater monitoring program associated with the Site. These wells were completed in the S- and A- Aquifers, and analytical data collected for total and free cyanide and fluoride, were not detected or well below USEPA MCLs. MW-24S and MW-24A were completed to a depth of 21.5 and 158 feet bgs, respectively (Geraghty & Miller, 1988).

WATER USE

Surface water from The Dalles Municipal Watershed (aka South Fork Mill Creek and Dog Creek) is the source of the majority of the city's drinking water supply. The City supplements during dry months with groundwater. The DGWR is one of six Critical Groundwater Areas (CGA) in Oregon. The CGA order restricts groundwater use to prevent excessive pumping and overuse of the aquifer that could result in "groundwater mining," where the withdrawal of groundwater exceeds the aquifer recharge rate (State of Oregon, 1959).

The rights proposed for transfer to the Siting Location total 6.01 cubic feet per second (3.9 million gallons per day). Future groundwater withdrawal will be limited to the amount allotted through the water rights and subject to the CGA. The average withdrawal from the DGWR since termination of aluminum smelting activities has been approximately 1,800 acre-feet per year. The capacity of the aquifer for sustainable yield is approximately 5,500 acre-feet, which is considered to be the annual sustainable yield from the aquifer (Golder, 1999). The difference is 3,700 acre-feet per year which equates to an instantaneous pumping rate of 5.1 cubic feet per second (assuming continuous pumping operations). This is less than the current water rights proposed for transfer to the Siting Location of 6.01 cubic feet per second.

Based upon review of drillers logs for production Wells 1 and 4, the target zone for the production wells was the DGWR located approximately 262 to 306 feet bgs (porous basalt). The proposed wells for the Siting Location property are also planned for completion within the DGWR. The wells were sealed from ground surface to 220 to 227 feet bgs within dense basalt that acts as a confining layer between the shallower aquifers and the DGWR. The water levels measured in the wells after construction of the seal rose to levels ranging from 73 to 77 feet bgs, a hydrostatic rise of up to 150 feet of artesian head. The predicted drawdown during active pumping from the proposed wells, based on a well spacing of at least 500 feet between Well 6 and Well 7, is up to 46 feet (Bryan C., 2020). Drawdown during active pumping is estimated, and groundwater levels are expected to recover when pumping is inactive. Based on available groundwater elevation data, it is well within the capacity of the DGWR to support this level of withdrawal (Vidourek A., 2020) (see Attachment for production well logs).

AQUIFER STORAGE AND RECOVERY (ASR)

An ASR project has been permitted with the state and is proposed for advancement.

Because the aquifer is confined, the water level in the DGWR is a potentiometric surface that represents the pressure within the aquifer and does not represent the actual level of the saturated zone beneath the ground surface. Therefore, the potentiometric surface in the aquifer is independent of features on the ground surface, or other hydrogeologic units that are not hydraulically connected with the DGWR, of which, there are none at the Site.

ASR storage in the DGWR will help maintain hydrostatic levels in the aquifer and provide an additional source of water for the City in addition to groundwater from the DGWR under the City's existing water rights. This additional source of water will effectively allow a net increase in pumping from the aquifer without exceeding the sustainable annual yield of the aquifer.

CONCLUSION

As discussed above, the DGWR is present at the Site at a depth of up to 306 feet bgs, is confined, and is below other discrete, hydraulically unconnected, confined aquifers. In other words, the DGWR is hydraulically separate from the other aquifers at the Site. The proposed wells for the Siting Location property are planned for completion within the DGWR.

In addition to remediation at the Site, numerous studies have been conducted to define the hydrogeology and nature and extent of contamination at the Site. These studies have shown that contamination at the Site is primarily present in the perched- and S-Aquifers. Two other hydrostratigraphic units, the A- and B-Aquifers, have minimal detections of contaminants well below USEPA MCLs, and separate the DGWR from the perched- and S-Aquifers.

Based on the information reviewed, the DGWR is not hydraulically connected to any of the overlying aquifers and groundwater withdrawal from the DGWR will not mobilize surface contamination or groundwater contamination at the Site, nor is the DGWR subject to impacts from Site sources of contamination.

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Vidourek, A. 2020. Personal communication (re: well relocation and water rights planning meeting follow up) with T. Ressler, GSI Water Solutions, Inc. January 30.

LIMITATIONS

The services undertaken in completing this memorandum were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This memorandum is solely for the use and information of our client and the City of The Dalles unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this memorandum apply to conditions existing when services were performed and are intended only for the client and the City of The Dalles, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

FIGURES

Source: Aerial photograph obtained from the Oregon Statewide Imagery Program.
Well locations provided by Amec Foster Wheeler.

Note: Well locations are approximate.

Legend

- Production well (existing)
- Production well (proposed)
- Production well (decommissioned)
- Monitoring well (existing)
- Monitoring well (decommissioned)
- Smelter Property Boundary
- Siting Location Property Boundary
- Restricted Area 1 (RA1)
- Landfills and Sludgeponds

Figure 1
Production Well Locations

3313 West 2nd Street and
2650 River Road
The Dalles, Oregon

CONFIDENTIAL

0 250 500
Feet

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Produced By: sturner
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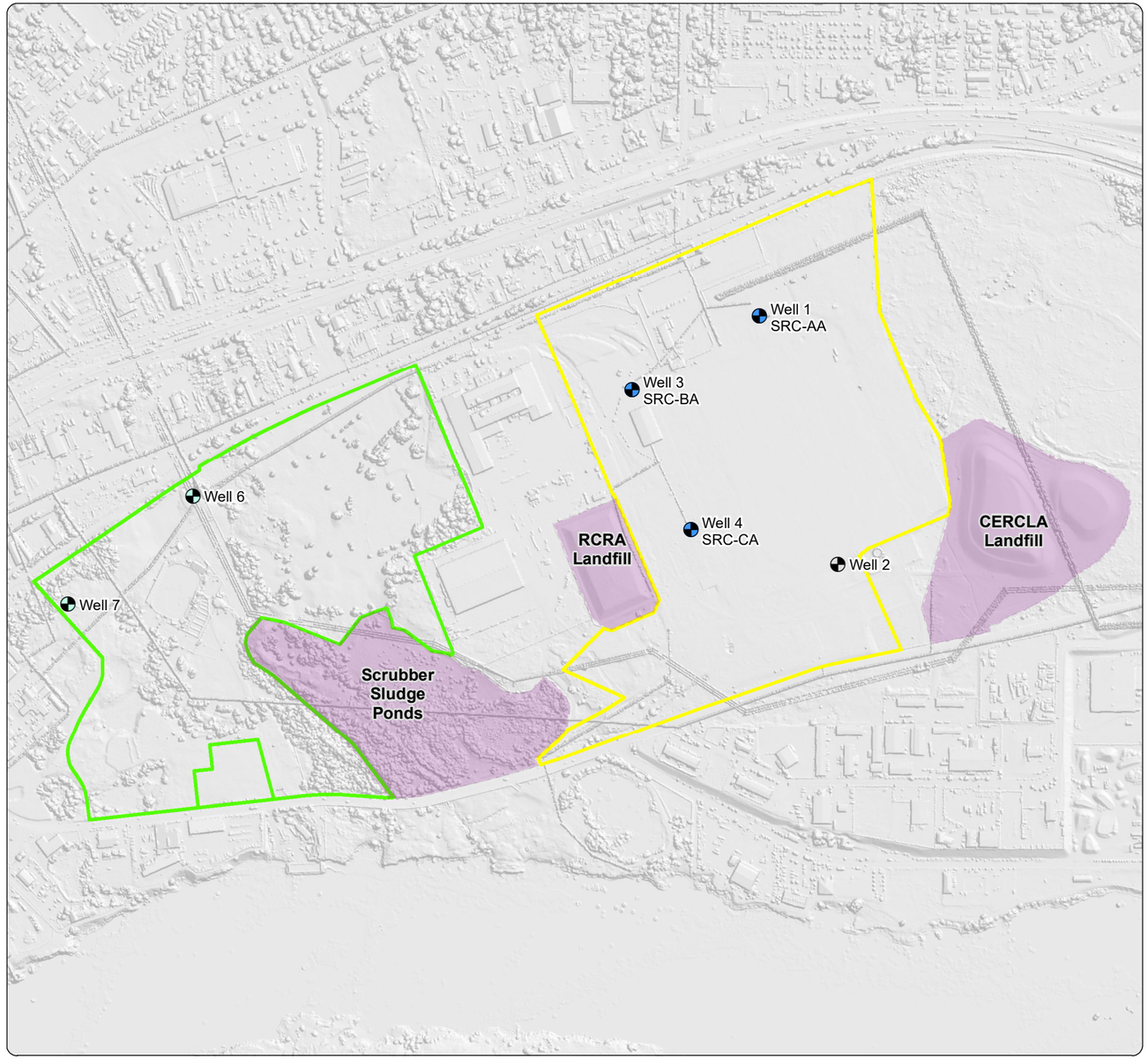

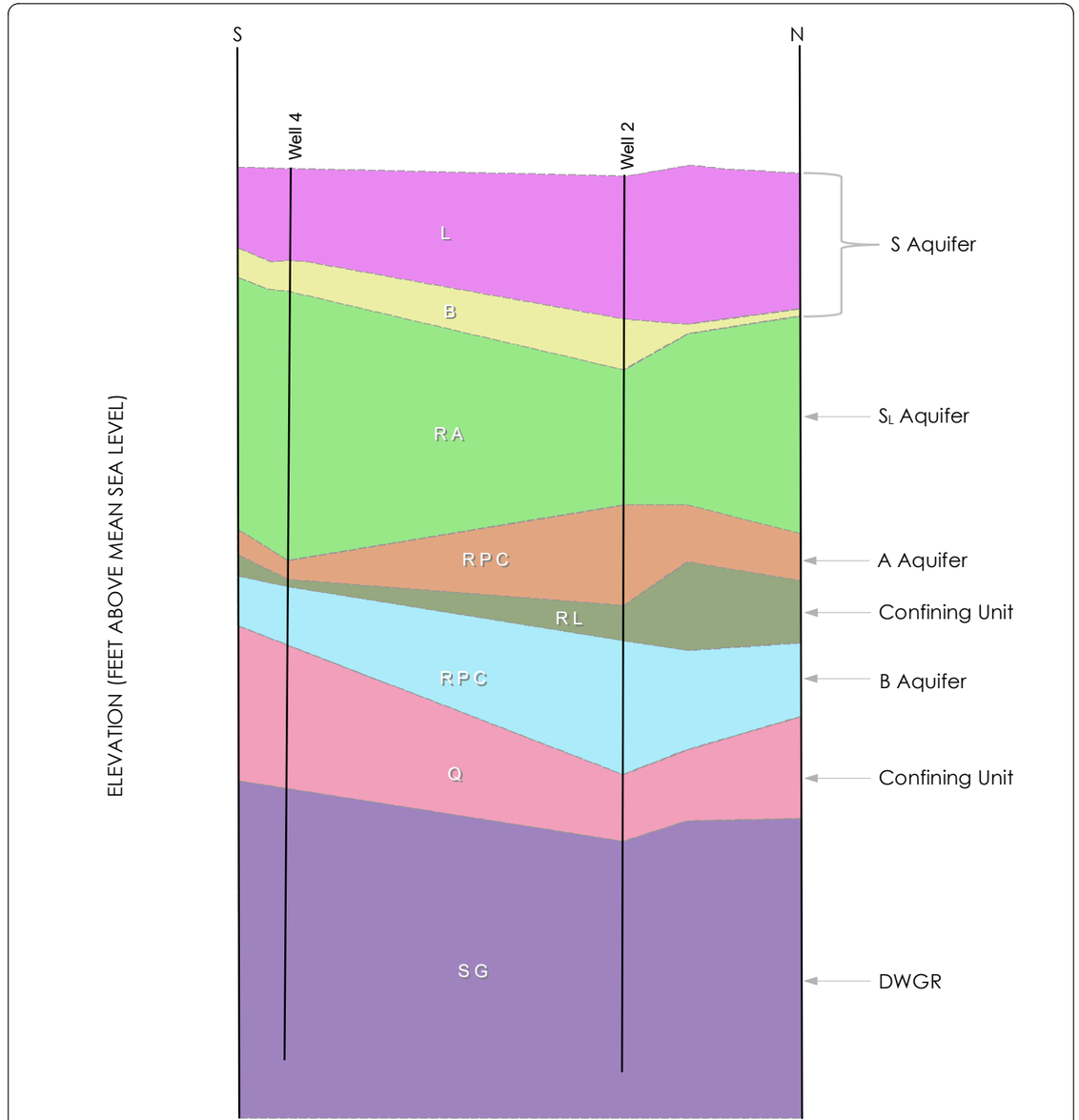

Source:
Digital Terrain Model obtained from the Oregon Lidar Consortium.

NOTES:
DWGR = The Dalles Groundwater Reservoir

Legend

- Smelter Property Boundary
- Siting Location Property Boundary
- Landfills and Sludgeponds
- Production Well (existing)
- Production Well (proposed)
- Production Well (decommissioned)

- L = Lolo FLow
- B = Byron Member (Interbed)
- RA = Rosalia Flow (Upper Subaerial Portion)
- RPC = Roaslia Flow, Upper Pillow Complex
- RL = Roaslia Flow, Lava FLow Lobe
- RPC = Roaslia Flow, Lower Pillow Complex
- Q = Quincy Member (Interbed)
- SG = Sentinel Gap Flow

Figure 2
Generalized Stratigraphic Column and Hydrostratigraphy

3313 West 2nd Street and
2650 River Road
The Dalles, Oregon

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Approved By: A.Vidourek
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Project: 8006.42

TABLE

Table
Summary of Detections
3313 West 2nd Street, The Dalles, Oregon
Drinking Water System OR41 90872

Identifier and Well Location	Date	Barium	Chromium	Fluoride	Nitrate	Nitrite	Selenium	Cyanide	Sodium	Sulfate	Combined Uranium	Combined Radium	Cadmium	Antimony	Nickel	Copper	Lead
	USEPA MCL	2 mg/L	0.1 mg/L	4 mg/L	10 mg/L	1 mg/L	0.05 mg/L	0.2 mg/L	NA	250 mg/L	0.03 mg/L	5 PCI/L	0.005 mg/L	0.006 mg/L	0.1 mg/L	1.3 mg/L	0.015 mg/L
SRC-AA (Well 1)	2/22/1993	0.075	0.0003	0.62	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/25/1993	--	--	--	--	--	--	--	26.1	--	--	--	--	--	--	--	--
	5/29/1996	0.018	0.013	0.67	0.02	--	--	0.017	30.7	34	--	--	--	--	--	--	--
	6/1/1999	0.022	0.001	0.7	--	--	--	0.007	35	34	--	--	--	--	--	--	--
	11/21/2002	0.017	--	0.6	--	--	--	--	26	--	0.002	--	0.0032	--	--	--	--
	9/21/2010	0.0151	--	0.595	--	--	--	--	22.1	--	--	--	--	0.00117	--	--	--
	9/26/2013	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.018	--
	9/7/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0006
	9/30/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0527	0.0063
	9/18/2019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.008	0.00083
	10/29/2019	0.0168	--	0.475	--	--	--	--	21.7	--	--	--	--	--	--	--	--
SRC-BA (Well 3)	3/24/1993	--	--	0.79	--	--	0.0039	0.013	--	--	--	--	--	--	--	--	--
	5/25/1993	--	--	0.77	--	--	--	--	36.1	--	--	--	--	--	--	--	--
	5/29/1996	0.025	0.011	0.85	0.02	--	--	0.007	41.4	32.5	--	--	--	--	--	--	--
	6/1/1999	0.022	0.005	0.8	--	--	--	--	46	31	--	--	--	--	--	--	--
	11/21/2002	0.016	--	0.9	--	--	--	--	35	--	--	--	--	--	--	--	--
	9/15/2010	0.0145	--	0.829	--	--	--	--	34.7	--	--	--	--	--	--	--	--
SRC-CA (Well 4)	3/8/1993	--	--	--	--	0.003	0.0029	--	--	--	--	--	--	--	--	--	--
	5/25/1993	--	--	--	--	--	--	--	21.4	--	--	--	--	--	--	--	--
	5/29/1996	0.011	--	0.62	--	--	--	0.004	22.7	23	--	--	--	--	0.027	--	--
	6/1/1999	0.014	--	0.6	--	--	--	--	26	21	--	--	--	--	--	--	--
	11/21/2002	0.014	--	0.5	--	--	--	--	22	--	0.001	0.4	--	--	--	--	--
	9/15/2010	0.0152	--	0.579	--	--	--	--	22.6	--	--	--	--	--	--	--	--

NOTES:

Data retrieved online from https://yourwater.oregon.gov/chemlatest.php?pwsno=90872. Data from June 1980 to October 2019 was reviewed, and all results that were non-detect were excluded from this table.

Where multiple detections of the same analyte are available on the same sample date, the highest sample result is presented.

-- = either not analyzed, or result is non-detect.

MCL = maximum contaminant level or secondary drinking water standard as applicable .

mg/L = milligrams per liter.

NA = not available.

PCI/L = picocuries per liter.

USEPA = United States Environmental Protection Agency.

ATTACHMENT A

PRODUCTION WELL LOGS

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

WASC 003256

RECEIVED AUG 19 1957 STATE ENGINEER SALEM, OREGON

WATER WELL REPORT

STATE OF OREGON

OBSERVATION WELL: 2N/13-28M(1)

State Well No. G-471

State Permit No. G-338

(1) OWNER:

Name HARVEY MACHINE CO., INC.

Address Torrance, California

(2) LOCATION OF WELL:

County Wasco Owner's number, if any— 1

NW ¼ SW ¼ Section 28 T. 2N R. 13 E W.M.

Bearing and distance from section or subdivision corner

1358.49 ft. S 15° 53' 50" E from the quarter corner of Secs. 28 & 29 T2N R 13 E W M

TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

[redacted] ☐ Industrial ☒ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) TYPE OF WELL:

Rotary ☐ Driven ☐

Cable ☐ Jetted ☐

Dug ☐ Bored ☐

(6) CASING INSTALLED:

Threaded ☐ Welded ☒

20" O.D. Diam. from Surface ft. to 220 ft. Gage 3/8"

" Diam. from ft. to ft. Gage

" Diam. from ft. to ft. Gage

(7) PERFORATIONS:

Perforated? ☐ Yes ☒ 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.

(8) SCREENS:

Well screen installed ☐ Yes ☐ No

Manufacturer's Name

Type Model No.

Diam. Slot size Set from ft. to ft.

Diam. Slot size Set from ft. to ft.

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? 220 ft.

Material used in seal— Cement Grout

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? Depth of strata

Method of sealing strata off

(10) WATER LEVELS:

Static level 86 ft. below land surface Date 7-31-57

Artesian pressure lbs. per square inch Date

Log Accepted by: Harvey Aluminum Co.

[Signed] R. Hamill (Owner) Date July, 1957

(11) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Geologist

Yield: 2145 gal./min. with 4.3 ft. drawdown after 5 hrs.

" 2160 " 4.4 " 8 "

" 1260 " 1.7 " 10 "

Bailer test gal./min. with ft. drawdown after hrs.

Artesian flow g.p.m. Date

Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(12) WELL LOG:

Diameter of well 20 inches.

Depth drilled 314 ft. Depth of completed well 314 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
See attached well Log		

Work started Nov 1956. Completed July 1957

(13) PUMP:

Manufacturer's Name Not Purchased

Type: H.P.

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 R. J. Strasser Drilling Company (Person, firm, or corporation) (Type or print)

Address 8110 S. E. Sunset Lane, Portland 6, Or

Driller's well number 1

[Signed] W. L. Strasser Partner (Well Driller)

License No. 10 Date August 13, 1957

(USE ADDITIONAL SHEETS IF NECESSARY)

GEOLOGIC LOG OF #1 WELL

HARVEY ALUMINUM - THE DALLES, OREGON

0' to 4'	Surface
4' to 11'	Hard sloping rock ledge
11' to 19'	Hard gray rock
19' to 21'	Broken formation
21' to 27'	Hard gray rock
27' to 36'	Mixture of colors Hard gray-black and white rock
36' to 39'	Layer of decomposed formation (similar to coal)
43' to 89'	Very hard gray rock
89' to 95'	Very hard gray rock
95' to 104'	Hard gray rock, but coarse in texture Drilled faster
104' to 108'	Very hard gray rock - very fine cuttings
108' to 129'	Hard gray rock. Same formation as the 104' to 108' strata
129' to 132'	Very hard gray rock
132' to 146'	Very hard gray rock
146' to 152'	Medium hard rough black rock
152' to 155'	Hard gray rock
155' to 166'	Medium hard rough black rock
166' to 181'	Medium hard rough black rock
181' to 189'	Hard gray rock
189' to 205'	Blue shale

205'	to 212'	Conglomerate
212'	to 229'	Medium hard brown rock
229'	to 242'	Hard gray rock
242'	to 250'	Hard gray rock
250'	to 255'	Hard gray rock
255'	to 260'	Hard gray rock
260'	to 262'	Hard gray rock
262'	to 265'	Hard gray rock
265'	to 268'	Hard gray rock
268'	to 271'	Hard gray rock
271'	to 264'	Hard gray rock
274'	to 277'	Hard gray rock
277'	to 279'	Hard gray rock
279'	to 281'	Hard gray rock
281'	to 284'	Hard gray rock
284'	to 286'	Hard gray rock
286'	to 288'	Porous Blackrock (water bearing)
288'	to 294'	Porous Blackrock (water bearing)
294'	to 296'	Harder, but still water-brown color
296'	to 306'	Porous Blackrock (water bearing very good)
306'	to 310'	Rough black rock

255
WRSC 3255

GR 145 J18

January 8, 1958

GEOLOGIC LOG OF #1 WELL

HARVEY ALUMINUM * THE DALLES, OREGON

0' to 4'	Surface
4' to 11'	Hard sloping rock ledge
11' to 19'	Hard gray rock
19' to 21'	Broken formation
21' to 27'	Hard gray rock
27' to 36'	Mixture of colors Hard gray-black and white rock
36' to 39'	Layer of decomposed formation (similar to coal)
43' to 89'	Very hard gray rock ~~(similar to coal)~~

O. J. Norris

R. J. Strasser Drilling Co.

1

3255
WRSC
3255

January 18, 1957

GEOLOGIC LOG OF #1 WELL

HARVEY ALUMINUM - THE DALLES, ORREGON

REPORT NO. 2

89' to 95'	Very hard gray rock
95' to 104'	Hard gray rock, but coarse in texture Drilled faster
104' to 108'	Very hard gray rock - very fine cuttings
108' to 129'	Hard gray rock. Same formation as the 104' to 108' strata
129' to 132'	Very hard gray rock

Samples up to date.

O. J. Norris

R. J. Strasser Drilling Co.

255
WRSC
3855

REPORT NO. 3 -- GEOLOGICAL LOG

WELL NO. 1

HARVEY ALUMINUM

THE DALLES, OREGON

(Continuing Log)

January 25, 1957

132'	to 146'	Very hard gray rock
146'	to 152'	Medium hard rough black rock
152'	to 155'	Hard gray rock
155'	to 166'	Medium hard rough black rock

O. J. Morris

R. J. Strasser Drilling Co.

255
WASC
3255

February 1, 1957

GEOLOGIC LOG OF # 1 WELL

HARVEY ALUMINUM - THE DALLES, OREGON

REPORT NO. 4

166 ft. to 181 ft.	Medium hard rough black rock
181 ft. to 189 ft.	Hard gray rock
189 ft. to 205 ft.	Blue shale
205 ft. to 212 ft.	Conglomerate
212 ft. to 229 ft.	Medium hard brown rock
229 ft. to 242 ft.	Hard gray rock

O. J. Morris

R. J. STRISSER DRILLING CO.

255
WASC 3255

March 15, 1957

GEOLOGIC LOG OF #1 WELL

HARVEY ALUMINUM - THE DALLES, OREGON

REPORT NO. 4

242 ft. to 250 ft.	Hard gray rock
250 ft. to 255 ft.	Hard gray rock
255 ft. to 260 ft.	Hard gray rock
260 ft. to 262 ft.	Hard gray rock
262 ft. to 265 ft.	Hard gray rock
265 ft. to 268 ft.	Hard gray rock
268 ft. to 271 ft.	Hard gray rock
271 ft. to 274 ft.	Hard gray rock
274 ft. to 277 ft.	Hard gray rock
277 ft. to 279 ft.	Hard gray rock
279 ft. to 281 ft.	Hard gray rock
281 ft. to 284 ft.	Hard gray rock
284 ft. to 286 ft.	Hard gray rock
286 ft. to 288 ft.	Porous Blackrock (water bearing)
288 ft. to 294 ft.	Porous Blackrock (water bearing)
294 ft. to 296 ft.	Harder, but still water - brown color
296 ft. to 306 ft.	Porous Blackrock (water bearing very good)
306 ft. to 310 ft.	Rough black rock

O. J. Norris
R. J. STRASSER DRILLING CO.

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

MAY 16 1985

WATER RESOURCES DEPT

SALEM, OREGON

Please Type or PRINT IN INK

2N/13E 28

abandon

(for official use only)

(1) OWNER:

Name Martin Marietta

Address P.O. Box 711

City The Dalles, State Or.

(2) TYPE OF WORK (check):

New Well ☐ Deepening ☐ Reconditioning ☐ Abandon ☒

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Air ☒ Driven ☐

Rotary Mud ☐ Dug ☐

Cable ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐

Irrigation ☒ Thermal: Withdrawal ☐ Reinjection ☐

Other: Piezometric ☐ Grounding ☐ Test ☐

(5) CASING INSTALLED:

Steel ☐ Plastic ☐

Threaded ☐ Welded ☐

none

_____" Diam. from _____ ft. to _____ ft. Gauge _____

_____" Diam. from _____ ft. to _____ ft. Gauge _____

LINER INSTALLED:

Steel ☐ Plastic ☐

Threaded ☐ Welded ☐

none

_____" Diam. from _____ ft. to _____ ft. Gauge _____

(6) PERFORATIONS:

Perforated? ☒ Yes ☐ No

Size of perforations 1/8 & 3/8 in. by round in.

898 perforations from 11 ft. to 227 ft.

_____ perforations from _____ ft. to _____ ft.

_____ perforations from _____ ft. to _____ ft.

(7) SCREENS:

Well screen installed? ☐ Yes ☒ No

Manufacturer's Name _____

Type _____ Model No. _____

Diam. _____ Slot Size _____ Set from _____ ft. to _____ ft.

Diam. _____ Slot Size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☒ No If yes, by whom?

_____ gal./min. with _____ ft. drawdown after _____ hrs.

Air test _____ gal./min. with drill stem at _____ ft. _____ hrs.

Bailer test _____ gal./min. with _____ ft. drawdown after _____ hrs.

Artesian flow _____ g.p.m.

Temperature of water _____ Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Special standards: Yes ☐ No ☒

Well seal—Material used Cement & bent.

Well sealed from land surface to 303 ft.

Diameter of well bore to bottom of seal 0 in.

Diameter of well bore below seal 0 in.

Amount of sealing material 11 bent- 194 cement ☒ pounds ☐

How was cement grout placed? pumped from bottom up toward surface thru 2" pipes with wilden pump

Was pump installed? no Type _____ HP _____ Depth _____ ft.

Was a drive shoe used? ☐ Yes ☒ No Plugs _____ Size: location _____ ft.

Did any strata contain unusable water? ☒ Yes ☐ No

Type of Water Cyanide depth of strata 0 to ? TD

Method of sealing strata off perf. & grout-abandon

Was well gravel packed? ☐ Yes ☒ No Size of gravel: _____

Gravel placed from _____ ft. to _____ ft.

(10) LOCATION OF WELL by legal description:

County Wasco ¼ ¼ of Section 28 of

Township 2N (Township is North or South) Range 13E (Range is East or West) WM.

Tax Lot _____ Lot _____ Block _____ Subdivision _____

MAILING ADDRESS OF WELL (or nearest address) M&M Aluminum plant The Dalles, Or.

(11) WATER LEVEL of COMPLETED WELL:

Depth at which water was first found abandoned ft.

Static level 0 ft. below land surface. Date 3-19-8

Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing 0

Depth drilled 0 ft. Depth of completed well 0 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 and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Bentonite comb. slurry of national & 8 mesh pumped from	303	250	
Cement grout pumped from	250'	up to apprx 100' 1st stage. cement grout pumped from apprx 100' up to	surface 2nd stage.
Perforations were constructed using oil well perforater shaped charges manufactured by Gearhart Co. using apprx 700 5½ & 200 3½			

Date work started 3-14-85 /completed 3-19-85

Date well drilling machine moved off of well 3-19-85 19

(unbonded) Water Well Constructor Certification (if applicable):

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] _____ Date _____, 19 _____

(bonded) Water Well Constructor Certification:

Bond _____ (number) Issued by: Union Indemnity (Surety Company Name)

On behalf of West Coast Drlng Chuck Stadeli (Type or print name of Water Well Constructor)

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

(Signed) _____ (Water Well Constructor)

(Dated) 3-15-85

NOTICE TO WATER WELL CONSTRUCTOR

The original and first copy of this report are to be filed with the

F-256

WATER RESOURCES DEPARTMENT, SALEM, OREGON 97310 within 30 days from the date of well completion.

SP* 44866-800

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

WATER WELL DRILLERS REPORT
STATE OF OREGON App 735

Do Not Fill In: State Well No. 2N/13-28 L (1)
State Permit No. G646

RECEIVED
MAR 3 1958
STATE ENGINEER
SALEM, OREGON

(1) OWNER:
00325

Name Harvey Aluminum Company

Address 19200 Southwestern Avenue
Torrance, California

(2) LOCATION OF WELL:
County Wasco Owner's number, if any— 2A

R. F. D. or Street No.

Bearing and distance from section or subdivision corner
2057' North & 970' W. from the ¼ 28/33 corner of Sect., 28 TWP, 2N R. 13E being within the NE¼ SW¼ of Sec. 28 TWP 2N R. 13E bearing N 24°50' W. Dist. 2274'

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☒ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☐
Cable ☒
Dug Well ☐

(6) CASING INSTALLED:
Threaded ☐ Welded ☒

FROM	ft. to	ft.	Diam.	Gage or Wall
0	227		10	Stndrd

Type and size of shoe or well ring

Describe joint

If gravel packed

Diameter of Bore	from ft.	to ft.

Size of gravel:

(7) PERFORATIONS:
Type of perforator used

SIZE of perforations in., length, by in.

FROM	ft. to	ft.	perf per foot	No. of rows

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

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☒ Yes ☐ No
If yes, note depth of strata surface to 226'

FROM	ft. to	ft.

METHOD OF SEALING grouting casing

(9) WATER LEVELS:
Depth at which water was first found 153 ft.
Standing level before perforating ft.
Standing level after perforating 73 ft.

Log Accepted by:
[Signed] Harvey Aluminum Dated 3-28, 1958
Owner
by Claude C. Cook

(10) WELL TESTS: OBSERVATION WELL
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Driller

Yield: 1080 gal./min. with 11 ft. draw down after 8 hrs.
" " " "
" " " "

Artesian flow g.p.m.
Shut-in pressure lbs. per square inch.
Bailer test g.p.m. with ft. drawdown
Temperature of water 61 Was a chemical analysis made? ☒ Yes ☐ No
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:
Diameter of well, 10 inches.
Total depth 302 ft. Depth of completed well 302 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.*

0 ft. to	48 ft.		hard grey basalt
48 "	65 "		soft interbed
65 "	71 "		hard grey basalt
71 "	75 "		soft basalt
75 "	103 "		hard grey basalt crevice @ 90'
103 "	108 "		soft grey basalt
108 "	111 "		hard grey basalt
111 "	115 "		caving rock
115 "	132 "		hard grey rock, sloping
132 "	153 "		lava rock
153 "	164 "		black water bearing rock
164 "	166 "		hard grey basalt
166 "	198 "		black lava rock
198 "	221 "		clay
221 "	227 "		lava rock
227 "	254 "		hard grey basalt
254 "	298 "		hard & soft layers lava rock water bearing
298 "	302 "		hard black basalt

Well Designation #2A

Ground elevation at well site 735.0 feet above mean sea level.
Work started 5-28-57 19 , Completed 7-24-57 19

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 Jannsen Drilling Company
(Person, firm, or corporation) (Typed or printed)
Address 20175 S. W. Tualatin Valley Highway
Aloha, Oregon
Driller's well number
[Signed] Edward C. Jannsen
(Well Driller)
License No. 79 Dated 8-23-57, 19

STATE ENGINEER,
Salem, Oregon

State Well No. 2N/13-28L(1)
County Wasco
Application No. G-735

Well Log

Owner: Harvey Machine Co. Owner's No. 2-A

Driller: A. M. Jannaen Drilling Co. Date Drilled June & July 1957

CHARACTER OF MATERIAL	(Feet below land surface) From	To	Thickness (feet)
Basalt, hard gray	0	48	48
Soft interbed	48	65	17
Basalt, hard gray	65	71	6
Basalt, soft	71	75	4
Basalt, hard, gray crevice at 90'	75	103	28
Basalt, soft gray	103	108	5
Basalt, hard gray	108	111	3
Rock caving	111	115	4
Rock, hard, gray, (sloping, very hard to maintain a straight hole)	115	145	30
Lava, rock	145	153	8
Rock, black, water bearing	153	164	11
Basalt, hard, gray	164	166	2
Lava rock, black	166	198	32
Clay	198	221	23
Lava Rock	221	227	6
Basalt, hard gray	227	254	27
Hard and soft layers of lava rock water bearing	254	298	44
Basalt, hard, black	298	303	5

Duplicate with the STATE ENGINEER, SALEM, OREGON

WR&C 603255 MAR 3 1958 STATE ENGINEER SALEM, OREGON

STATE OF OREGON

Ap. G736 | Fill In State Permit No. G-647

(1) OWNER:

Name Harvey Aluminum Company

Address The Dalles, Oregon

(2) LOCATION OF WELL:

County Wasco Owner's number, if any— #3A

R. F. D. or Street No.

Bearing and distance from section or subdivision corner

652 N. & 1840' W. from the ¼ 28/33 corner of Sect. 28, TWP 2N, Range 13E being within the SW¼ of SW¼ of Sec. 28 TWP 2N Range 13E bearing N 70° 04' W. Dist. 1952'

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☒ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐

Cable ☒

Dug Well ☐

(6) CASING INSTALLED:

Threaded ☐ Welded ☒

FROM	ft. to	ft.	Diam.	Gage or Wall
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"

Type and size of shoe or well ring

Describe joint

If gravel packed

Diameter of Bore	from ft.	to ft.
	"	"
	"	"
	"	"
	"	"
	"	"

Size of gravel:

(7) PERFORATIONS:

Type of perforator used

SIZE of perforations in., length, by in.

FROM	ft. to	ft.	perf per foot	No. of rows
"	"	"	" " "	" " "
"	"	"	" " "	" " "
"	"	"	" " "	" " "
"	"	"	" " "	" " "

SCREENS:

Give Manufacturer's Name, Model No. and Size

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☒ Yes ☐ No

If yes, note depth of strata 207'

FROM	ft. to	ft.
" Surface	" 207'	"

METHOD OF SEALING Cementing Casing

(9) WATER LEVELS:

Depth at which water was first found 35' ft.

Standing level before perforating 77' ft.

Standing level after perforating ft.

Log Accepted by:

[Signed] Harvey Aluminum by Clarence C. Cook Dated 2-28, 1958

(10) WELL TESTS: OBSERVATION WELL

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Driller

Yield: 1000 gal./min. with 2' 2" ft. draw down after 4 hrs.

" " " "

" " " "

Artesian flow g.p.m.

Shut-in pressure lbs. per square inch.

Bailer test g.p.m. with ft. drawdown

Temperature of water Was a chemical analysis made? ☒ Yes ☐ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Diameter of well, 10 inches.

Total depth 319 ft. Depth of completed well 319 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.*

ft. to	ft.	
0 "	5 "	Rock Fill
5 "	15 "	Fractured Rock
15 "	17 "	Broken Rock
17 "	23 "	Hard Grade Basalt
23 "	33 "	Blue Shale Interbed
33 "	50 "	Black Basalt with layers clay
50 "	63 "	Hard Black Basalt
63 "	92 "	Hard grade Basalt
92 "	96 "	Black Basalt
96 "	98 "	Black Basalt
98 "	101 "	Black Basalt with trace quartz
101 "	104 "	Black Basalt
104 "	117 "	Black Basalt with Quartz
117 "	128 "	Hard Grade Basalt
128 "	172 "	Hard & Soft Layers Black Basalt
172 "	176 "	Broken Black Basalt
176 "	180 "	Hard grade Basalt
180 "	182 "	Black Rock
182 "	202 "	Blue Clay
202 "	207 "	Rock
207 "	229 "	Black Basalt
229 "	277 "	Black Basalt with Hard & soft La
277 "	318 "	Porous Black rock water bearing
318 "	319 "	Hard Grey Rock
"	"	
"	"	
"	"	

Ground elevation at well site 1220.30 feet above mean sea level.

Work started Aug. 1 1957. Completed Dec. 31 1957

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 A. M. Jannsen Drilling Company
(Person, firm, or corporation) (Typed or printed)

Address 21075 S. W. Tualatin Valley Highway Aloha, Oregon

Driller's well number

[Signed] A. M. Jannsen
(Well Driller)

License No. 79 Dated January 3,

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

WASC 3254

WELL LOGGERS REPORT

STATE OF OREGON

Do Not Fill In: State Well No. 113 20 1 [illegible]

App G739 | State Permit No. G648

RECEIVED
MAR 31 1958
STATE ENGINEER
SALEM, OREGON

WASC 3249

(1) OWNER:

Name Harvey Aluminum Company

Address 19200 Southwestern Avenue

Torrance, California

(2) LOCATION OF WELL:

County Wasco Owner's number, if any— 4A

R. F. D. or Street No.

Bearing and distance from section or subdivision corner

981' North and 1078' west from ¼ 28/33 Corner Section 28 TWP. 2N Range 13E boring within the SE ¼, SW¼ of Section 28 TWP. 2N Range 13E bearing N47° 16' W. Dist. 1457'

(3) TYPE OF WORK (check):

New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☒ Municipal ☐

Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐

Cable ☒

Dug Well ☐

(6) CASING INSTALLED:

Threaded ☐ Welded ☒

FROM	ft. to	ft.	Diam.	Gage or Wall
0	223	ft.	10	std
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"
"	"	"	"	"

Type and size of shoe or well ring

Describe joint

If gravel packed

Diameter of Bore	from ft.	to ft.
	"	"
	"	"
	"	"
	"	"
	"	"

Size of gravel:

(7) PERFORATIONS:

Type of perforator used

SIZE of perforations in., length, by in.

FROM	ft. to	ft.	perf per foot	No. of rows
"	"	"	" " "	" " "
"	"	"	" " "	" " "
"	"	"	" " "	" " "
"	"	"	" " "	" " "

SCREENS:

Give Manufacturer's Name, Model No. and Size

(8) CONSTRUCTION:

Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.

Were any strata sealed against pollution? ☐ Yes ☐ No

If yes, note depth of strata surface to 227'

FROM	ft. to	ft.
"	"	"

METHOD OF SEALING grouting casing

(9) WATER LEVELS:

Depth at which water was first found 262 ft.

Standing level before perforating ft.

Standing level after perforating 74 ft.

Log Accepted by:

[Signed] Harvey Aluminum, Owner By Clarence C. Cook, 19....

(10) WELL TESTS:

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Driller

Yield: 1170 gal./min. with 3 ft. draw down after 8 hrs.

" " " "

" " " "

Artesian flow ..... g.p.m.

Shut-in pressure ..... lbs. per square inch.

Bailer test ..... g.p.m. with ..... ft. drawdown

Temperature of water Was a chemical analysis made? ☒ Yes ☐ No

Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:

Diameter of well, 10 inches.

Total depth 303 ft. Depth of completed well 303 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.*

ft. to	ft.	
0 "	10 "	fill
10"	28 "	broken basalt
28"	30 "	hard basalt
30"	41 "	soft rock & clay
41"	58 "	black basalt
58 "	89 "	hard rock basalt
89"	98 "	weathered basalt
98"	110 "	hard grey basalt
110"	115 "	grey basalt with clear quartz
115"	132 "	hard grey basalt
132"	140 "	porous grey basalt
140"	143 "	hard grey basalt
143"	155 "	porous grey lava rock
155"	162 "	hard grey basalt
162"	190 "	coal or peat
190"	195 "	grey clay
195"	212 "	clay with small gravel
212"	217 "	brown clay and rock
217"	223 "	rock
223"	258 "	hard grey basalt
258"	262 "	hard grey basalt
262"	290 "	porous basalt with hard & soft layer
290"	300 "	grey basalt slightly porous
300"	303 "	Rock firm but turning brown
"	"	with bits of clay
"	"	

Ground elevation at well site 1326.50 feet above mean sea level

Work started 5-28-57 19 , Completed 7-27-57 19

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 A. M. Jannsen Drilling Company
(Person, firm, or corporation) (Typed or printed)

Address 20175 S. W. Tualatin Valley Highway
Aloha, Oregon

Driller's well number

[Signed] E. Everett McJannsen
(Well Driller)

License No. 79 Dated 8-23-57, 19....