

29 May 2019

Mr. Kenneth Thiessen
Oregon Department of Environmental Quality
700 NE Multnomah St., Suite #600
Portland, Oregon 97232

Subject: Well Decommissioning Work Plan
East Multnomah County Troutdale Sandstone Aquifer Remedy
Fairview, Oregon
ECSI No. 1479

Dear Ken:

Geosyntec Consultants (Geosyntec) has prepared this Work Plan for well decommissioning as part of the East Multnomah County Troutdale Sandstone Aquifer (TSA) remedy being conducted jointly by Cascade Corporation (Cascade) and The Boeing Company (Boeing). The TSA remedy is being implemented under the Oregon State Department of Environmental Quality (DEQ) Consent Order No. WMCSR-NWR-96-08 (DEQ, 1997). This Work Plan provides the procedures and schedule to decommission four groundwater monitoring wells [DEQ-1(dg), DEQ-5(ds), DEQ-5(dg), and CMW-3]. The locations of the wells to be decommissioned are shown on Figure 1.

Decommissioning of these groundwater monitoring wells was recommended in the *2017 TSA Annual Report* (Geosyntec et al., 2018), which was approved by DEQ (DEQ, 2018). Decommissioning was recommended for these wells because concentrations of volatile organic compounds (VOCs) met the TSA criteria for well decommissioning, and/or the well locations were no longer needed for PWB contingency monitoring, or were redundant with other locations.

WELL DESCRIPTIONS

Well construction details, including well location coordinates, screened aquifer units, ground surface elevations, well screen elevations, and total boring depths, are provided in Table 1. Well location and construction information are summarized below, and boring and well construction logs are provided in Attachment 1. Surveyed elevations datum and projection are North American Datum of 1983 (NAD83), Oregon State Plane-North Zone.

- **DEQ-1(dg):** Monitoring well DEQ-1(dg) is located south of Interstate 84 (I-84) on private property currently owned by Mr. Feimun Lum. Monitoring well DEQ-1(dg) was installed in 1990 and has a flush mount well monument with 8-inch steel outer casing that extends

from 0-70 feet below ground surface (bgs). Well casing is 2-inch schedule 80 (S80) PVC screened from elevation -53.4 to -73.4 ft. MSL in the Lower TSA.

- **DEQ-5(dg, ds):** Monitoring wells DEQ-5(dg) and DEQ-5(ds) are paired wells installed in 1993 and screened in the Lower and Upper TSA, respectively. The wells are located on commercial property located at 2271 NE 194th, Portland, Oregon. The property is owned by AJZ LLC of Sandy, Oregon and is currently occupied by Imperial-Brown manufacturing.
 - DEQ-5(dg) has a flush mount monument with 2-inch S80 PVC screened from elevation -58.1 to -78.1 ft. MSL in the Lower TSA.
 - DEQ-5(ds) has a flush mount monument with 2-inch S80 PVC screened from elevation 19.9 to -0.1 ft. MSL in the Upper TSA.
- **CMW-3:** Monitoring well CMW-3 is located on the Cascade Corporation property at 2201 NE 201st Ave., Fairview, Oregon. CMW-3 was installed in 1988 and has a flush mount monument with 2-inch PVC casing screened from elevation 25.05 to -52.95 ft. MSL across both the Upper and Lower TSA.

As stated in the 2017 Annual Report, these four wells have been utilized for groundwater elevation monitoring data only over the last 20 years or so. These four wells are located towards the south of the dissolved plume at upgradient locations. Groundwater elevation data from these wells is considered redundant, as there are TSA remedy wells located closer to the mound area plume that are utilized for groundwater elevation measurements (and water quality monitoring). Groundwater samples were last collected in 1993 from DEQ-1(dg), 1997 from DEQ-5(dg/ds), and in 1996 from CMW-3. Trichloroethene concentrations have consistently been below either the laboratory reporting limit or the cleanup level (5 µg/L) in all the wells except for three early (pre- May 1993) detections ranging from 7.0 to 40.0 µg/L at well CMW-3. Historical VOC concentrations from the groundwater monitoring wells are summarized in Table 2.

METHODOLOGY

The Oregon Water Resources Department (OWRD) approved special standard requests to backfill or decommission in place wells DEQ-1(dg), DEQ-5(dg) and DEQ-5(ds); however, well CMW-3 will require overdrilling to properly decommission the well. The OWRD approval is presented in Attachment 2.

Prior to decommissioning activities, the following activities will be performed:

- Perform underground utility locate survey to determine the potential presence and location of buried utilities in the well vicinity.

- Submit a well decommissioning start card, as required by OAR 690-240-0385.
- Measure the depth to water and the total depth of the well.

Well decommissioning procedures will be conducted in accordance with applicable Oregon Administrative Rules (OARs) outlined in OAR 690-240 using an Oregon Licensed Driller. The wells will be either decommissioned in place or overdrilled, as discussed below.

Decommissioned in Place

Three groundwater monitoring wells, DEQ-1(dg), DEQ-5(dg), and DEQ-5(ds) will be decommissioned in place by backfilling. Decommissioning methods will be conducted in accordance with OAR 690-240-0510(2) and will follow the general steps outlined below:

- The monument, concrete pad, steel vault, and other surface items (e.g. bollards, if present) will be removed using an excavator or similar heavy equipment.
- The well will be decommissioned by filling the well from the bottom up with a bentonite grout slurry that will meet the requirements of OAR 690-240-0475.
- The well casing will then be cut below grade, as compatible with the local site conditions and land practices.
- The holes/excavations at the ground surface (former monument area) will be backfilled with gravel or as determined by the property owner, and the ground surface will be finished to match surrounding areas.
- Upon completion of the well decommissioning, the decommissioning materials and debris will be removed and disposed at a permitted landfill.

Overdrilling

One groundwater monitoring well, CMW-3, will be decommissioned by overdrilling using a truck-mounted sonic drilling rig. Decommissioning methods will be conducted in accordance with OAR 690-240-0510(1) and will follow the general steps outlined below:

- The concrete pad, steel vault or well monument, and other surface items (e.g. bollards, if present) will be removed using an excavator or similar heavy equipment.
- The well casing and screen and well seal materials (e.g. filter pack sand, bentonite) will be removed by overdrilling the well from ground surface to the total depth of the well borehole. The drill bit will be selected to match the maximum outer diameter of the borehole. The CMW-3 boring/well installation log does not list the outer diameter of the borehole and is assumed to be 8-inch based on the boring/well installation log for adjacent

well CMW-2. Monitoring well CMW-2 was installed and completed one day prior to initiation of drilling CMW-3 with the same drilling rig and consultant oversight.

- The drill cuttings, sand filter pack, and other debris will be removed from the boring and placed in to 55-gallon drums or a 20-yard soil roll-off box.
- The bore hole will be backfilled with bentonite grout slurry from the bottom of the boring to approximately 5 ft bgs. The bentonite grout slurry will meet the requirements of OAR 690-240-0475 for backfill materials. Hydrated bentonite chips will be used to backfill the boring from 5 ft bgs to ground surface. The ground surface will be restored to match surrounding terrain.
- Upon completion of the well decommissioning, the decommissioning materials and debris will be removed and disposed at a permitted landfill.

SITE CLEANUP AND WASTE MANAGEMENT

Solid wastes and soil cuttings generated during decommissioning will be contained in 55-gallon drums or lined and covered soil roll-off boxes, temporarily staged at the Cascade remediation yard pending characterization, permitting, and transport to an off-site disposal facility.

Metal and concrete removed from the well will be disposed of or recycled at an appropriate solid waste or recycling facility.

Displaced water or decontamination water collected and/or generated during decommissioning will be temporarily stored in 55-gallon drums or water storage totes and allowed to settle. The water will be transferred to the TSA central treatment system (CTS) for treatment and ultimately discharged under the existing National Pollutant Discharge Elimination System permit. Remaining solids will be added to the soil drums/roll-off boxes prior to characterization and off-site disposal.

NOTIFICATION AND SCHEDULE

DEQ will be notified via email prior to, and upon the completion of, the well decommissioning. Notification information will include the following, in accordance with OAR 690-240-0510(6) (notification requirements):

- Well identification information;
- Decommissioning methodology;
- Amount and type of sealant/backfill material (i.e. bentonite grout) used; and
- Other information required by the DEQ.

Mr. Ken Thiessen
29 May 2019
Page 5

Well decommissioning activities will also be reported in either the 2019 TSA Annual Report or a separate stand-alone report depending on timing of field work. Well decommissioning activities are scheduled to begin Summer 2019 and are expected to require approximately five to 10 days to complete. The completion notification email will be sent to DEQ within two weeks after decommissioning activities are completed.

CLOSURE

We look forward to your review and approval of this Work Plan. Please contact us at 503-222-9518 with any questions regarding this Work Plan or if you need additional information.

Sincerely,

Geosyntec Consultants, Inc.



Cindy Bartlett, R.G.
Senior Geologist/Project Manager



Brent A. Miller, P.E.
Senior Principal

Cc: Jason Hegdahl, Cascade Corporation
Debbie Taege, The Boeing Company
Christine Kimmel, Landau Associates

Mr. Ken Thiessen
29 May 2019
Page 6

References:

Geosyntec Consultants, Landau Associates, SSPA, 2018. Annual Performance Report, 1 January 2017 – 31 December 2017, East Multnomah County Troutdale Sandstone Aquifer Remediation, 3 April 2018.

Oregon Department of Environmental Quality (DEQ), 2018a. Email from K. Thiessen RE: East Multnomah Co, TSA, 2017 Annual Report Approval. 2 August 2018.

Oregon Department of Environmental Quality (DEQ), 1997. TSA Remedy Order on Consent, WMCSR-NWR-96-08, 14 February 1997.

Oregon Water Resources Department (OWRD), 2019. Final Order—Special Standards Approval, 24 April 2019.

Attachments:

Table 1	Well Construction Summary
Table 2	Groundwater VOC Results Summary
Figure 1	TSA Monitoring Wells to be decommissioned
Attachment 1	Well Boring and Exploration Logs
Attachment 2	OWRD Special Standard Letter

Tables

Table 1
Well Construction Summary
East Multnomah County TSA Remedy

Well Name	Well Type	Well Tag	Stratigraphic Unit	Survey Data Easting (ft)	Survey Data Northing (ft)	Ground Surface (ft MSL)	Measuring Point (ft MSL)	Screen Top (ft bgs)	Screen Bottom (ft bgs)	Screen Top Elev (ft MSL)	Screen Bottom Elev (ft MSL)	Screen Length (ft)	Well Diameter (inches)	Well Material	Well Depth (ft bgs)	Boring Depth (ft bgs)	Boring Diameter	Casing Material	Date Completed	Property Owner	Section, Township, & Range	Notes	Analytical Summary
CMW-3	Monitoring Well	no tag	Upper & Lower TSA	7700342.25	688415.39	148.05	147.69	123	201	25.05	-52.95	78	2	PVC	201	209	Unknown	PVC	10/6/1988	Cascade Corporation; 2201 NE 201st Ave.; Fairview, OR 97024	S29 T1N R3E	Well is located on Cascade Corporation property, near main facility manufacturing building.	TCE (& other VOCs) <0.50 µg/L in 8 of 19 sampling events 1988-1996; TCE ranged 40 µg/l in 1993 to 0.7 and 1.7 in 1996.
DEQ-1(dg)	Monitoring Well	no tag	Lower TSA	7701973.42	688195.57	151	150.58	204.4	224.4	-53.4	-73.4	20	2	S80 PVC	225.4	235	12" (70 ft) 6" (235 ft)	S80 PVC	10/25/1990	Mr. Feimun Lum, resident & owner 2081 NE 205 Ave., Fairview, OR 97024 503-669-8351	S28 T1N R3E	Well is located in flower garden of private residence. Buried by mulch as of February 2019, will need to be located.	TCE (& other VOCs) <0.50 µg/L in 8 of 8 sampling events from 1991 to 1993.
DEQ-5(dg)	Monitoring Well	41656 start card no tag on well	Lower TSA	7698650.49	688787.31	155.9	155.95	214	234	-58.1	-78.1	20	2	S80 PVC	234.5	240	8" (105.5 ft) 6" (240 ft)	S80 PVC	3/16/1993	<u>Owned by:</u> AJZ LLC; PO Box 1597; Sandy, OR 97055 <u>Occupied by:</u> Imperial-Brown Manufacturing 2271 NE 194th Portland, OR 97230 Phone 800-238-4093 or 503-665-5539 http://imperialmfg.com/	S29 T1N R3E	Wells are located in parking lot, north side of building.	TCE (& other VOCs) <0.50 µg/L in 5 of 5 sampling events from 1994-1997.
DEQ-5(ds)	Monitoring Well	41655 start card no tag on well	Upper TSA	7698660.29	688786.41	155.9	155.68	136	156	19.9	-0.1	20	2	S80 PVC	156.5	160	8" (106.5 ft) 6" (160 ft)	S80 PVC	3/29/1993				TCE (& other VOCs) <0.50 µg/L in 5 of 7 sampling events from 1993 to 1997; TCE ranged from 0.90 to 1.0 µg/l in 1993.

Notes:
Survey Data coordinates are NAD83, Oregon State Plane-North Zone
TSA = Troutdale Sandstone Aquifer
SGA = Sand and Gravel Aquifer
bgs = below ground surface
ft = feet
PVC = polyvinyl chloride
MSL = mean sea level

**Table 2
Groundwater VOC Results Summary
East Multnomah County TSA Remedy**

Location	Date Sampled	Sample Identification	Trichloroethene (TCE)	Tetrachloroethene (PCE)	cis-1,2-Dichloroethene	Vinyl Chloride	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1-dichloro-1-Propene	1,1-Dichloroethane	1,1-Dichloroethene	1,2-Dichloroethane	1,2-Dichloropropane	Acetone	Benzene	Bromoform	Carbon Tetrachloride	Chlorobenzene	Chlorodibromomethane	Chloroform	Chloromethane	cis-1,3-Dichloropropene	Dichlorobromomethane	Ethyl Chloride	Ethylbenzene	Freon 11	
CMW-3	1988-11-10	CMW-3;;19881110	0.60 J	--	--	--	--	--	--	--	--	--	--	--	0.0040 BJ	--	--	--	--	--	--	--	--	--	--	--	--	
CMW-3	1990-07-19	CMW-3;135DEQ;19900719	7.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	
CMW-3	1991-04-05	CMW-3;135;19910405	12	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.00050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.00050	< 0.50	
CMW-3	1991-04-05	CMW-3;195;19910405	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.00050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.00050	< 0.50	
CMW-3	1992-06-02	CMW-3;;19920602	3.5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	--	< 0.50	
CMW-3	1992-08-20	CMW-3;;19920820	1.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	--	< 0.50	
CMW-3	1992-11-11	CMW-3;;19921111	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 1.0	--	< 0.50	
CMW-3	1993-02-16	CMW-3;;19930216	40	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1993-05-27	CMW-3;;19930527	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1993-08-25	CMW-3;;19930825	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1993-11-23	CMW-3;;19931123	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	--	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	--	--	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	< 0.50 J	< 1.0 J	< 0.50 J	< 0.50 J	< 0.50 J	--	< 0.50 J	
CMW-3	1994-02-07	CMW-3;;19940207	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 1.0	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1994-05-18	CMW-3;;19940518	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 1.0	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1994-08-16	CMW-3;;19940816	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 1.0	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1994-11-22	CMW-3;;19941122	3.1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1995-02-17	CMW-3;;19950217	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1995-09-05	CMW-3;;19950905	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1996-02-27	CMW-3;;19960227	0.70	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
CMW-3	1996-08-26	CMW-3;;19960826	1.7	< 0.50	< 0.50	--	--	--	--	--	< 0.50	--	--	--	--	--	--	--	--	--	--	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50
DEQ-1dg	1991-02-19	DEQ1dg;;19910219	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1991-05-06	DEQ1dg;;19910506	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1991-09-24	DEQ1dg;;19910924	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1991-12-17	DEQ1dg;;19911217	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1992-03-23	DEQ1dg;;19920323	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1992-07-08	DEQ1dg;;19920708	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1992-11-10	DEQ1dg;;19921110	< 0.50	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--
DEQ-1dg	1993-02-22	DEQ1dg;;19930222	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.00050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.00050	< 0.50	
DEQ-5dg	1993-04-08	DEQ5dg;1A;19930408	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5dg	1993-04-08	DEQ5dg;1B;19930408	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5dg	1994-06-07	DEQ5dg;;19940607	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.00050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.00050	< 0.50	
DEQ-5dg	1995-02-22	DEQ5dg;;19950222	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
DEQ-5dg	1995-08-25	DEQ5dg;;19950825	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
DEQ-5dg	1996-08-13	DEQ5dg;;19960813	< 0.50	< 0.50	< 0.50	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5dg	1997-02-27	DEQ5dg;;19970227	< 0.50	< 0.50	< 0.50	--	--	--	--	--	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5ds	1993-04-08	DEQ5ds;2A;19930408	0.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5ds	1993-04-08	DEQ5ds;2B;19930408	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.50	--	--	--	--	--	--	--
DEQ-5ds	1994-06-08	DEQ5ds;;19940608	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.00050	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.00050	< 0.50	
DEQ-5ds	1995-02-22	DEQ5ds;;19950222	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
DEQ-5ds	1995-08-25	DEQ5ds;;19950825	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	--	< 0.50	< 0.50	< 0.50	< 0.50	--	--	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 0.50	< 0.50	< 0.50	--	< 0.50	
DEQ-5ds	1996-08-13	DEQ5ds;;19960813	< 0.50	< 0.50	< 0.50	--	--	--	--	--	--	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
DEQ-5ds	1997-02-27	DEQ5ds;;19970227	< 0.50	< 0.50	< 0.50	--	--	--	--	--	< 0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes

Results are presented in micrograms per liter (µg/L).

-- = not analyzed

< 0.50 indicates not detected at reporting limit shown

J = estimated value

**Table 2
Groundwater VOC Results Summary
East Multnomah County TSA Remedy**

Location	Date Sampled	Sample Identification	Freon 113	Methyl Bromide	Methyl ethyl ketone	Methyl Isobutyl Ketone (MIBK)	Methylene Chloride (DCM)	Styrene	Toluene	trans-1,2-Dichloroethene	trans-1,3-Dichloropropene	Vinyl 2-Chloroethyl ether	Xylenes, Total
CMW-3	1988-11-10	CMW-3;;19881110	--	--	--	--	--	--	--	--	--	--	--
CMW-3	1990-07-19	CMW-3;135DEQ;19900719	--	--	--	--	--	--	--	--	--	--	--
CMW-3	1991-04-05	CMW-3;135;19910405	--	< 0.50	--	--	< 0.50	< 0.00050	< 0.00050	< 0.50	--	--	< 0.00050
CMW-3	1991-04-05	CMW-3;195;19910405	--	< 0.50	--	--	< 0.50	< 0.00050	< 0.00050	< 0.50	--	--	< 0.00050
CMW-3	1992-06-02	CMW-3;;19920602	< 0.50	< 0.50	--	--	< 2.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1992-08-20	CMW-3;;19920820	< 0.50	< 0.50	--	--	< 2.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1992-11-11	CMW-3;;19921111	< 0.50	< 0.50	--	--	< 2.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1993-02-16	CMW-3;;19930216	< 0.50	< 0.50	--	--	< 2.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1993-05-27	CMW-3;;19930527	< 0.50	< 0.50	--	--	< 2.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1993-08-25	CMW-3;;19930825	< 0.50	< 0.50	--	--	< 0.50	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1993-11-23	CMW-3;;19931123	< 0.50 J	< 0.50 J	--	--	< 5.0 J	--	--	< 0.50 J	< 0.50 J	< 0.0050 J	--
CMW-3	1994-02-07	CMW-3;;19940207	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1994-05-18	CMW-3;;19940518	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1994-08-16	CMW-3;;19940816	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1994-11-22	CMW-3;;19941122	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1995-02-17	CMW-3;;19950217	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1995-09-05	CMW-3;;19950905	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1996-02-27	CMW-3;;19960227	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
CMW-3	1996-08-26	CMW-3;;19960826	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1991-02-19	DEQ1dg;;19910219	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1991-05-06	DEQ1dg;;19910506	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1991-09-24	DEQ1dg;;19910924	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1991-12-17	DEQ1dg;;19911217	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1992-03-23	DEQ1dg;;19920323	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1992-07-08	DEQ1dg;;19920708	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1992-11-10	DEQ1dg;;19921110	--	--	--	--	--	--	--	--	--	--	--
DEQ-1dg	1993-02-22	DEQ1dg;;19930222	--	< 0.50	< 0.10	< 0.050	< 0.50	< 0.00050	< 0.00050	< 0.50	< 0.50	< 0.00050	--
DEQ-5dg	1993-04-08	DEQ5dg;1A;19930408	--	--	--	--	--	--	0.0010	--	--	--	0.00080
DEQ-5dg	1993-04-08	DEQ5dg;1B;19930408	--	--	--	--	--	--	0.0012	--	--	--	0.0013
DEQ-5dg	1994-06-07	DEQ5dg;;19940607	--	< 0.50	< 0.050	< 0.0050	< 0.50	< 0.00050	< 0.00050	< 0.50	< 0.50	< 0.0050	--
DEQ-5dg	1995-02-22	DEQ5dg;;19950222	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
DEQ-5dg	1995-08-25	DEQ5dg;;19950825	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
DEQ-5dg	1996-08-13	DEQ5dg;;19960813	--	--	--	--	--	--	--	--	--	--	--
DEQ-5dg	1997-02-27	DEQ5dg;;19970227	--	--	--	--	--	--	--	--	--	--	--
DEQ-5ds	1993-04-08	DEQ5ds;2A;19930408	--	--	--	--	--	--	0.00060	--	--	--	--
DEQ-5ds	1993-04-08	DEQ5ds;2B;19930408	--	--	--	--	--	--	0.00080	--	--	--	0.00080
DEQ-5ds	1994-06-08	DEQ5ds;;19940608	--	< 0.50	< 0.050	< 0.0050	< 0.50	< 0.00050	< 0.00050	< 0.50	< 0.50	< 0.0050	--
DEQ-5ds	1995-02-22	DEQ5ds;;19950222	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
DEQ-5ds	1995-08-25	DEQ5ds;;19950825	< 0.50	< 0.50	--	--	< 5.0	--	--	< 0.50	< 0.50	< 0.0050	--
DEQ-5ds	1996-08-13	DEQ5ds;;19960813	--	--	--	--	--	--	--	--	--	--	--
DEQ-5ds	1997-02-27	DEQ5ds;;19970227	--	--	--	--	--	--	--	--	--	--	--

Notes

Results are presented in micrograms per liter (µg/L).

-- = not analyzed

< 0.50 indicates not detected at reporting limit shown

J = estimated value

Figure

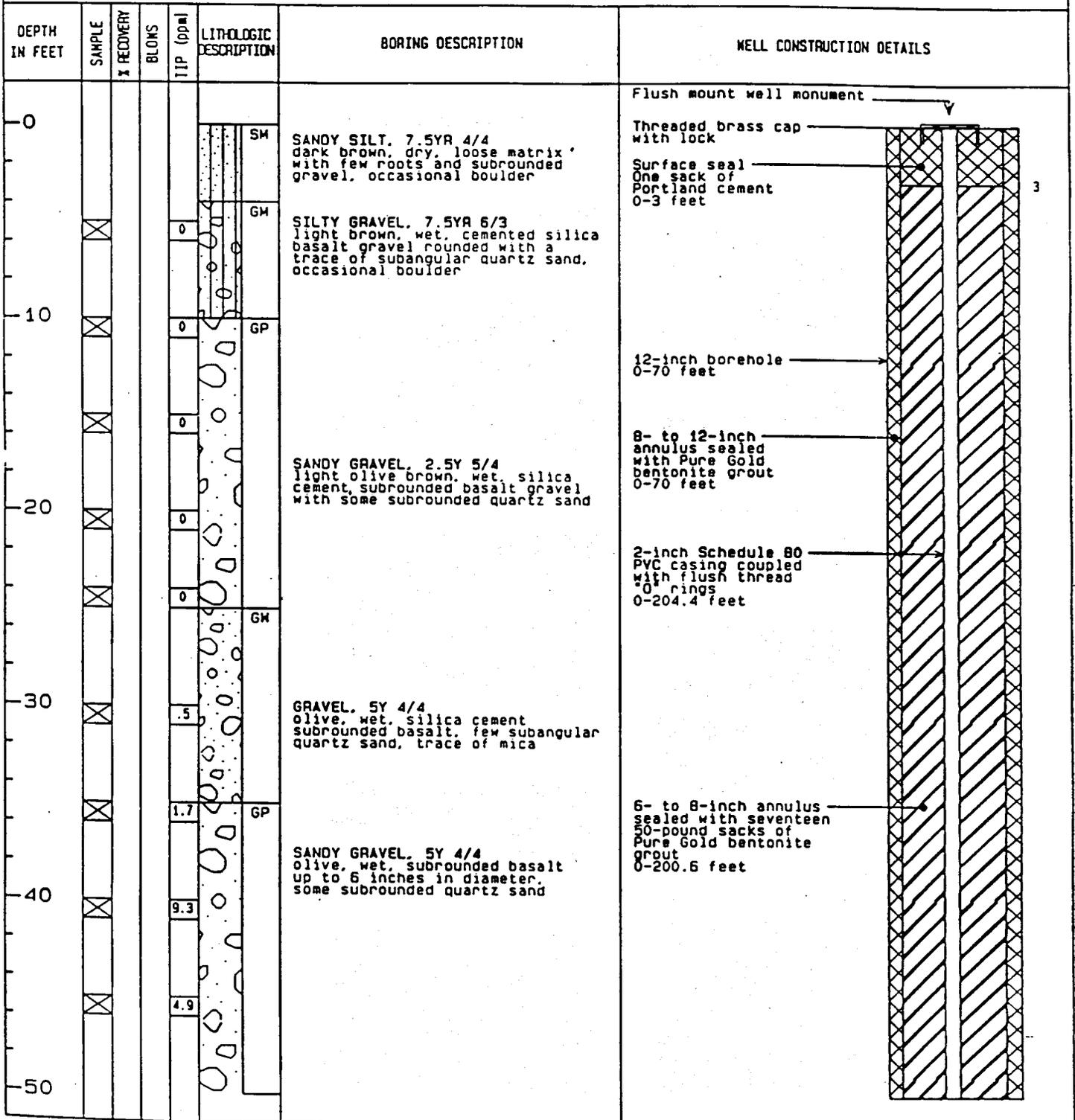
Attachment 1

Well Boring and Exploration Logs

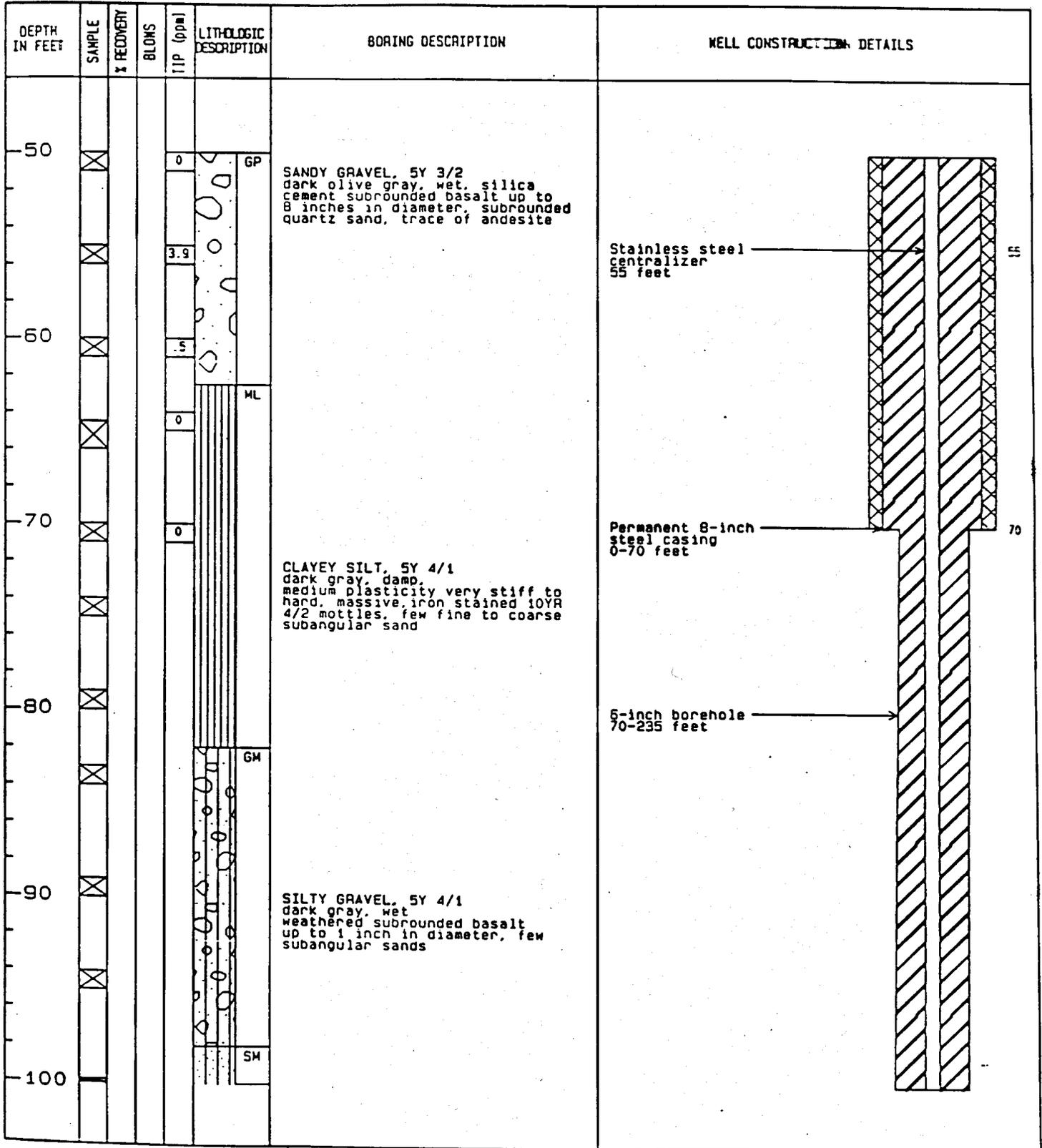
WELL DEQ-1 (dg)

PROJECT EAST MULTNOMAH COUNTY
 LOCATION FAIRVIEW, OREGON
 CONTRACT NUMBER CB421403
 GEOLOGIST/ENGINEER C. PETERSON/P. BEESON
 DRILLING CONTRACTOR STACO WELL SERVICES, INC.
 DRILLING METHOD 12-IN. CABLE TOOL/6-IN. ODEX AIR ROT.

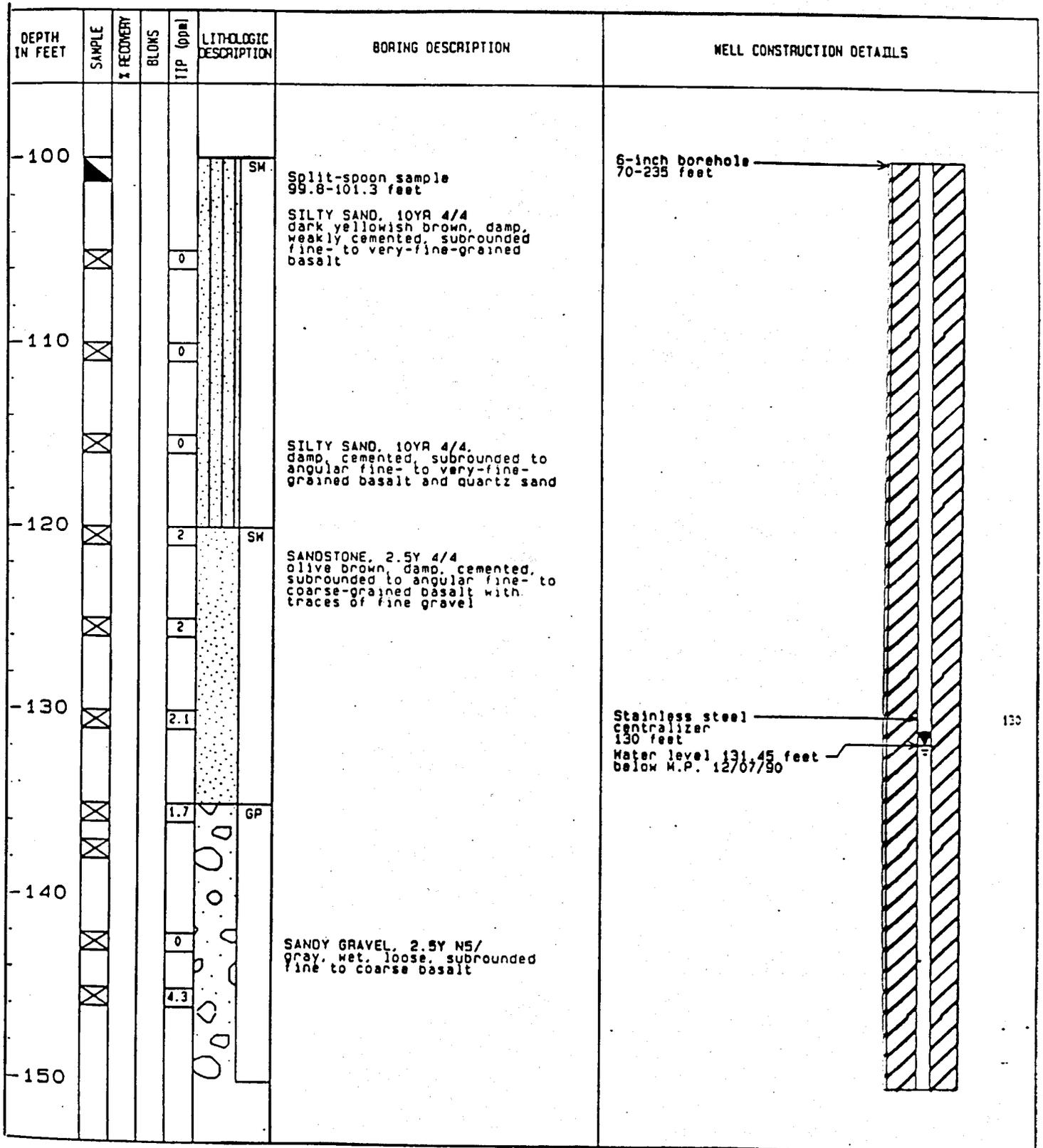
DEPTH OF BORING 235 FEET
 DATE (s) DRILLED 09/20/90 TO 10/25/90
 COORDINATES N 45 32' 2" W 122 26' 36"
 WELL HEAD ELEVATION 150.66 FEET (USGS DATUM)
 SURFACE PAD ELEVATION 150.98 FEET (USGS DATUM)
 TOTAL WELL CASING LENGTH 225.4 FEET



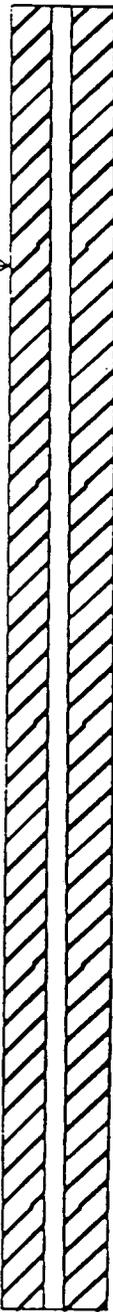
WELL DEQ-1 (dg)



WELL DEQ-1 (dg)



WELL DEQ-1 (dg)

DEPTH IN FEET	SAMPLE	% RECOVERY	BLDNs	TIP (ppm)	LITHOLOGIC DESCRIPTION	BORING DESCRIPTION	WELL CONSTRUCTION DETAILS
150	X			.8	SP		 <p>6-inch borehole 70-235 feet</p>
	X			.9			
160	X			.4			
	X			.5			
170	X			.5			
	X			.5			
180	X			0			
	X			0	GW		
190	X			0			
	X			0			
200							

SAND, 2.5Y N2/
black, wet, loose, subrounded
fine- to medium-grained
basalt, few subrounded gravel up
to 2 inches in diameter

SANDY GRAVEL, 2.5Y N2/
black, wet, loose, rounded
basalt up to 0.5 inches in diameter,
trace of quartz

WELL DEQ-1 (dg)

DEPTH IN FEET	SAMPLE	% RECOVERY	BLOMS	TIP (ppm)	LITHOLOGIC DESCRIPTION	BORING DESCRIPTION	WELL CONSTRUCTION DETAILS
200	X			0	GM		<p> One 100-pound sack of 20-40 fine Colorado silica sand 200.6-202.6 feet Stainless steel centralizer 204.4 feet Six 100-pound sacks of 10-20 Colorado silica sand 202.6-225 feet 2-inch Schedule 80 0.02-inch slotted PVC well screen 204.4-224.4 feet Stainless steel centralizer 224.4 feet Sump 224.4 to 225.4 feet End cap Natural backfill and four 50-pound sacks of 10-20 Colorado silica sand 225-235 feet Total depth: 235 feet </p>
210	X			.8		SANDY GRAVEL, 2.5Y N2/ black, wet, cemented silica, rounded basalt up to 1 inch in diameter, trace of quartz	
220	X			1.4		SANDY GRAVEL, 2.5Y N2/ black, wet, cemented silica, rounded basalt up to 0.5 inches in diameter, quartz, trace of mica	
230	X			0	ML	SILT, 5Y 4/2 olive gray, wet, low plasticity, some fine sand, mica, few gravel	
240	X			0			
250							<p>COMMENTS: WELL INSTALLED: 11/07/90 SCREENED INTERVAL ELEVATION: -53.7 TO -73.7 FEET (USGS DATUM) CASING STICKUP: -0.32 MEASURING POINT FOR WATER LEVEL: TOP OF PVC AT NOTCH IN BRASS CAP 150.66 FEET (USGS DATUM) WATER LEVEL ELEVATION 12/07/90: 19.21 FEET (USGS DATUM)</p>

STATE OF OREGON
MONITORING WELL REPORT
 (as required by ORS 537.765 & OAR 690-240-095)

MULT
 3432

RECEIVED
 APR 8 1993

IN/ 3E/ 29 db
 Start Card # 41656

(1) OWNER/PROJECT: WELL NO. DEQ 5(dg)
 Name Oregon DEQ
 Address 811 SW Sixth Ave
 City Portland State OR Zip 97204

(6) LOCATION OF WELL By legal description
 SALEM, OREGON Multnomah
 Well Location: County Multnomah
 Township 1 N (N or S) Range 3 E (E or W) Section 29
 1. NW 1/4 of SE 1/4 of above section.
 2. Street address of well location Lot #1 San Rafael Industrial District
 3. Tax lot number of well location #1
 4. ATTACH MAP WITH LOCATION IDENTIFIED.

(2) TYPE OF WORK:
 New construction Repair Recondition
 Conversion Deepening Abandonment

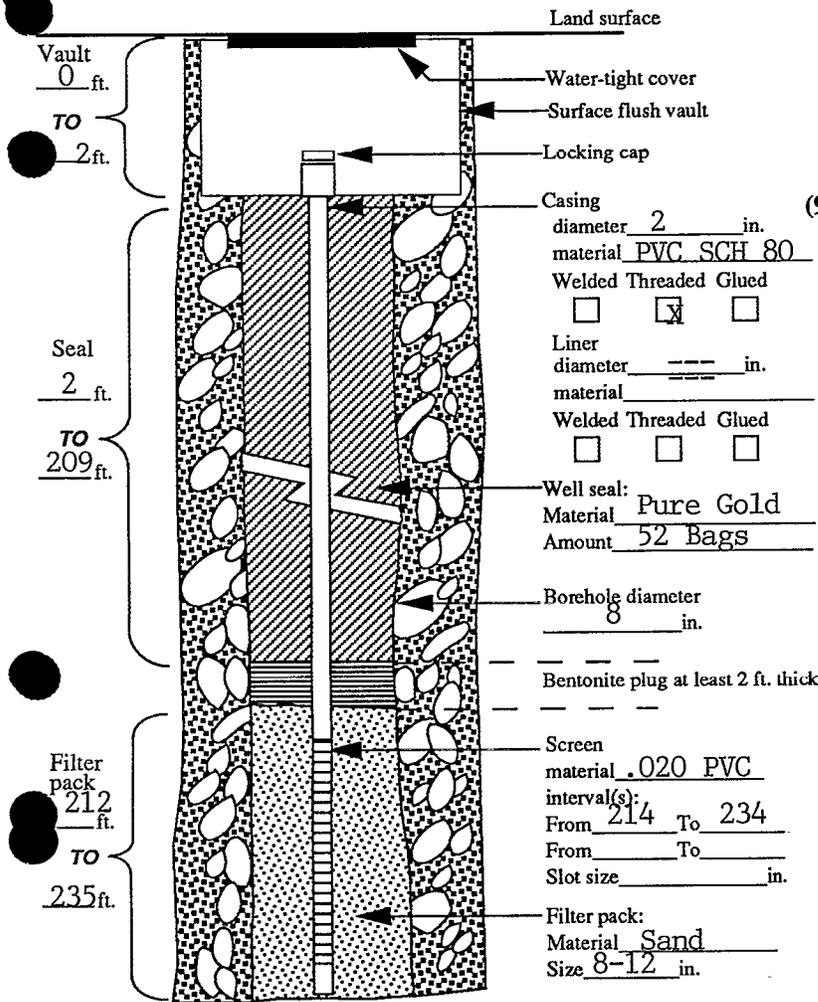
(3) DRILLING METHOD
 Rotary Air Rotary Mud Cable
 Hollow Stem Auger Other

(7) STATIC WATER LEVEL:
 138 Ft. below land surface. Date 3-16-93
 Artesian Pressure --- lb/sq. in. Date

(4) BORE HOLE CONSTRUCTION
 Special Standards Yes No
 Depth of completed well 235 ft.

(8) WATER BEARING ZONES:
 Depth at which water was first found 38

From	To	Est. Flow Rate	SWL
38	103	30	33
138	235	30	138



(9) WELL LOG: Ground elevation

Material	From	To	SWL
Top soil	0	8	
Sandy gravel	8		
Predominately basalt		103	33
Light brown yellowish clay	103	134	
Sandstone	134	170	
Medium gravels	170	190	138
Gravels with sands	190	235	
Grayish green clayey silt	235	240	

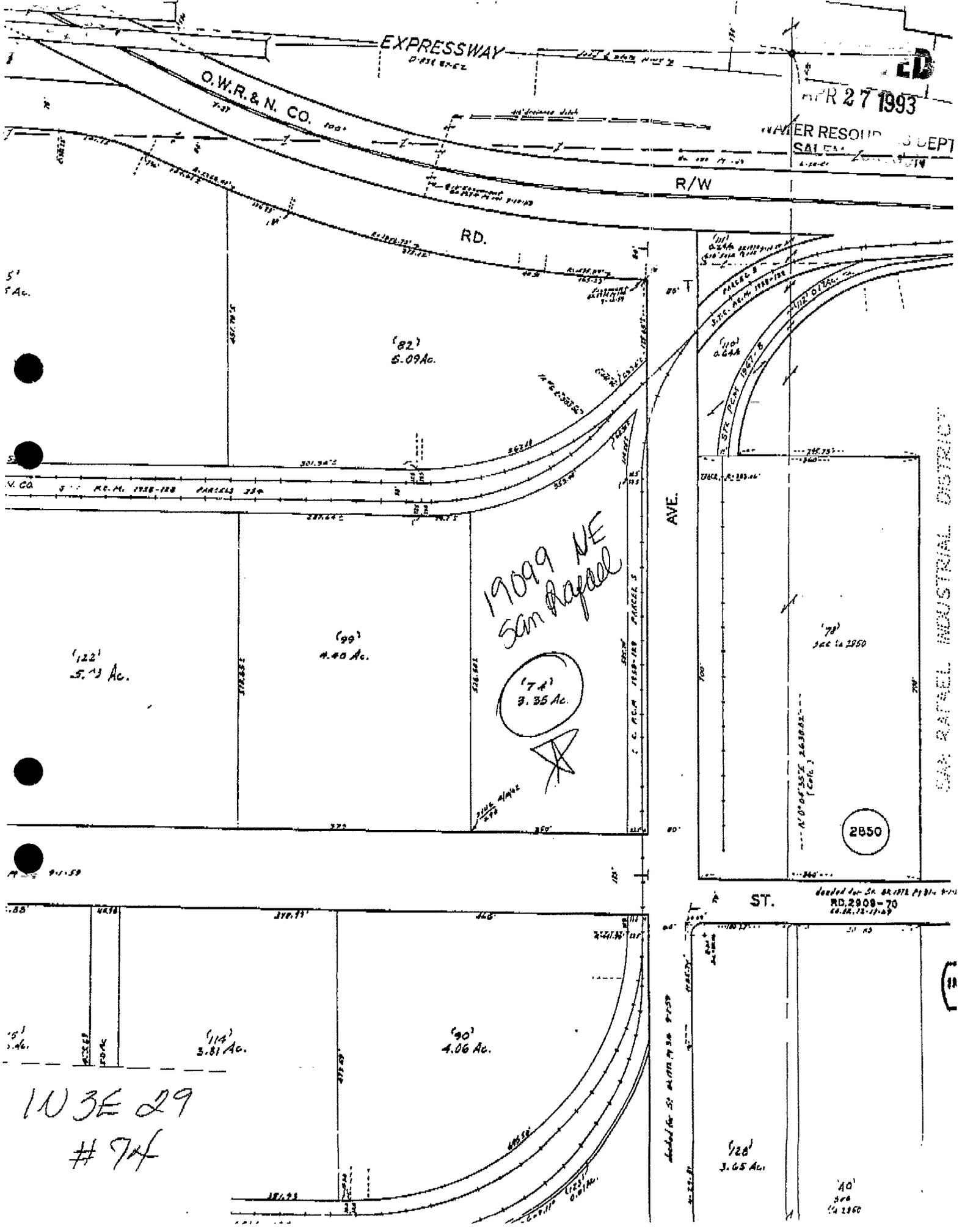
RECEIVED
 APR 27 1993
 WATER RESOURCES DEPT
 SALEM, OREGON

Date started 3-3-93 Completed 3-16-93

(5) WELL TEST:
 Pump Bailer N/A Air Flowing Artesian
 Permeability ----- Yield ----- GPM
 Conductivity ----- PH -----
 Temperature of water 56 °F/C Depth artesian flow found _____ ft.
 Was water analysis done? Yes No
 By whom? Parametrix
 Depth of strata to be analyzed. From 134 ft. to 254 ft.
 Remarks:
 Name of supervising Geologist/Engineer Rick Malin

(unbonded) Monitor Well Constructor Certification:
 I certify that the work 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 the best knowledge and belief.
 Signed _____ MWC Number 10308
 Date 3/31/93

(bonded) Monitor 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.
 Signed _____ MWC Number 10097
 Date 3/31/93



EXPRESSWAY

O.W.R. & N. CO.

ED
MAR 27 1993

PLAT RESOLUTION SUBJECT
SALE

R/W

RD.

(82)
5.09 Ac.

19099 NE
San Rafael

(7A)
3.35 Ac.

(99)
4.40 Ac.

(122)
5.13 Ac.

(78)
3.66 Ac.

2850

(90)
4.06 Ac.

(114)
3.81 Ac.

(128)
3.65 Ac.

40'
3.66
1/4 1960

IN 3E 29
7A

SAN RAFAEL INDUSTRIAL DISTRICT

ST.
deduced for St. 04/10/78 P. 31, 3-2
RD. 2908-70
04/08/78-07-07

EXPLORATORY BORING LOG

Parametrix, Inc.

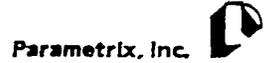
Project Name: DEQ-EMC WELL INSTALLATION
 Project Number: 55-1846-23
 Location: IMPERIAL MANUFACTURING
 PMX Representative: RICK MALIN
 Drilled By: STACO WELL SERVICES
 Drill Method: AIR ROTARY

Boring Number: DEQ-5dg
 Sheet: 1 OF 5
 Total Depth: 240 FEET
 Date Started/Completed: MARCH 3, '93/MARCH 16, '93
 Ground Level Elevation: 155.9 FEET
 Measuring Point Elevation: 155.95 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-5DG-5	C		5	FLUSH MOUNT LOCKABLE CASING SECURED IN CONCRETE 0-1.5 FEET HYDRATED GRANULAR BENTONITE 1.5-13 FEET	0-6 FEET: Brown SILTY GRAVELS (GM). Fine to very fine sands present in the silt matrix. Silts tend to be slightly plastic. Gravel are fine to coarse, subrounded to rounded. ● 5 feet: Decrease in brown silts, increase in sand. Predominantly basaltic gravels with some quartzites. Fine to coarse gravels. Loose. Fairly well-graded.	
DEQ-5DG-10	C		10		6-104 FEET: SANDY GRAVELS (GP). Fine gravels to large cobbles/boulders of predominantly basalt with smaller percentage of quartzites. Rounded to well-rounded. Fine to medium, tannish brown micaceous sand matrix. Small percentage of silt. Appears loose to slightly indurated. Poor to fairly well-graded.	
DEQ-5DG-15	C		15			
DEQ-5DG-20	C		20	2-INCH SCHEDULE 80 PVC CASING COUPLED WITH FLUSH MOUNT "O" RINGS 0-214 FEET	● 20 feet: Decrease in average gravel size. Drilling loose.	
DEQ-5DG-25	C		25	8-INCH BOREHOLE 0-105.5 FEET	● 24 feet: Predominantly fine gravels. Trending toward fairly well-graded. ● 25 feet: signs of cementation.	
DEQ-5DG-30	C		30	HIGH SOLIDS BENTONITE GROUT 13-209.1 FEET	● 30 feet: Greenish brown to black micaceous very fine to medium sand matrix.	
DEQ-5DG-35	C		35		● 33 feet: Fine to medium gravels. Damp.	
DEQ-5DG-40	C		40		● 35 feet: Noncemented gravels of predominantly basalt with multi-colored quartzites. Some granitic derived gravels. ● 38 feet: Producing small quantities of water.	
DEQ-5DG-45	C		45		● 40 feet: Increase in coarse gravels. Cementation on some gravels. Rounded to well-rounded. Greenish brown to black micaceous, fine to medium binding sand.	
DEQ-5DG-50	C		50		● 45 feet: decrease in signs of cementation.	

51245983
 EMCON 0043703
 CONFIDENTIAL

EXPLORATORY BORING LOG



Project Name: DEQ-EMC WELL INSTALLATION **Boring Number:** DEQ-5dg
Project Number: 55-1846-23 **Sheet:** 2 OF 5
Location: IMPERIAL MANUFACTURING **Total Depth:** 240 FEET
PMX Representative: RICK MALIN **Date Started/Completed:** MARCH 3, '93/MARCH 16, '93
Drilled By: STACO WELL SERVICES **Ground Level Elevation:** 155.9 FEET
Drill Method: AIR ROTARY **Measuring Point Elevation:** 155.95 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-5DG-55	C		55		<ul style="list-style-type: none"> ● 50 feet: Coarse gravels with an increase in nonbasaltic gravels. Increasing signs of cementation. ● 53 feet: Decrease in cementation. Increase in sands, predominantly medium greenish tan micaceous sands. ● 55 feet: Increasing diversity in gravels of granitic origin. Possible sand interbeds. 	
DEQ-5DG-60	C	60	<ul style="list-style-type: none"> ● 60 feet: Increase in signs of cementation. Greenish brown to tan, fine to medium binding sands. 			
DEQ-5DG-65	C	65	<ul style="list-style-type: none"> ● 65 feet: Cemented gravels. 			
DEQ-5DG-70	C	70	<ul style="list-style-type: none"> ● 73 feet: Indications of basaltic cobbles. 			
DEQ-5DG-75	C	75				
DEQ-5DG-80	C	80	<ul style="list-style-type: none"> ● 80 feet: Fine to coarse gravels with indications of basaltic cobbles. Gravels rounded to well-rounded with signs of cementation. Fine to slightly coarse binding sands. 			
DEQ-5DG-85	C	85	<ul style="list-style-type: none"> ● 89 feet: Basalt cobbles and coarse gravels. 			
DEQ-5DG-90	C	90	<ul style="list-style-type: none"> ● 91 feet: Decrease in gravel size and cementation signs. Larger gravels tend to be of basaltic origin with weathering rinds. 			
DEQ-5DG-95	C	95	<ul style="list-style-type: none"> ● 94 feet: Little or no sign of cementation. Appears loose. Decrease in observed sand percentage. ● 97 feet: Coarse basaltic gravels. 			

0042704

EXPLORATORY BORING LOG



Project Name: <u>DEQ-EMC WELL INSTALLATION</u>	Boring Number: <u>DEQ-5dg</u>
Project Number: <u>55-1846-23</u>	Sheet: <u>3 OF 5</u>
Location: <u>IMPERIAL MANUFACTURING</u>	Total Depth: <u>240 FEET</u>
PMX Representative: <u>RICK MALIN</u>	Date Started/Completed: <u>MARCH 3, '93/MARCH 16, '93</u>
Drilled By: <u>STACO WELL SERVICES</u>	Ground Level Elevation: <u>155.9 FEET</u>
Drill Method: <u>AIR ROTARY</u>	Measuring Point Elevation: <u>155.95 FEET</u>

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHOLOGIC COLUMN
DEQ-5DG-103.5	C		105		104-105 FEET: Tannish brown SILTY SAND (SM). Slightly lithified. Apparent increase in fines with depth.	[Lithologic Column Pattern]
DEQ-5DG-107.5	SS	46/8 100/3		8-INCH CASING DRIVEN FROM 105.5 TO 108 FEET	105-106.5 FEET: Light yellowish brown CLAY (CL). Cuttings are sticky and plastic. Appears to be very stiff.	[Lithologic Column Pattern]
DEQ-5DG-110	C		110		106.5-107.5 FEET: Bluish green SANDSTONE (SS/SM). Apparent increasing silt percentage with depth.	[Lithologic Column Pattern]
DEQ-5DG-115	C		115	5-INCH BOREHOLE 105.5 TO 240 FEET	107.5-117 FEET: Grayish green to grayish blue SILTSTONE (ML) with lenses of bluish green silty clay. Contains fine sands. Lithified - dense to very dense. Small void pockets observed in split-spoon sample.	[Lithologic Column Pattern]
DEQ-5DG-118	SS	31/8 36/8 74/6			117-124.5 FEET: Brownish orange SILTSTONE (ML). Contains very fine micaceous sands. Lithified - very stiff to hard. Not plastic or sticky. Split-spoon sample dry to slightly moist.	[Lithologic Column Pattern]
DEQ-5DG-120	C		120		● 120: Slight increase in fine sands.	[Lithologic Column Pattern]
DEQ-5DG-125	C		125	STAINLESS STEEL CENTRALIZER ● 126 FEET	124.5-136 FEET: Brown SILTY SANDSTONE (SS/SM). Brown and black, fine to medium vitric sands with silt. Lithified.	[Lithologic Column Pattern]
DEQ-5DG-130	C		130	HIGH SOLIDS BENTONITE GROUT 13-209.1 FEET	● 128 feet: Decreasing silt percentage. ● 130 feet: Increase in over all sand coarseness. Lithified.	[Lithologic Column Pattern]
DEQ-5DG-134	C		135		● 132 feet: Slight grain coarsening. Appearance of white grains of an unknown material.	[Lithologic Column Pattern]
DEQ-5DG-140	C		140	WATER LEVEL 138.4 FEET BELOW GROUND SURFACE 3/25/93	136-153 FEET: Brownish black SANDSTONE (SS). Predominantly fine to medium weathered vitric sands. Some signs of palagonite. Well lithified.	[Lithologic Column Pattern]
DEQ-5DG-142	C				● 140 feet: Fine vitric sandstone trending towards a coarse siltstone. Possible interbeds of finer and coarser sands.	[Lithologic Column Pattern]
DEQ-5DG-145	C		145		● 145 feet: greenish black to black, fine to medium weathered vitric sands with white grains of an unknown material. Lithified - slightly friable.	[Lithologic Column Pattern]

EXPLORATORY BORING LOG



Project Name: DEQ-EMC WELL INSTALLATION Boring Number: DEQ-5dg
 Project Number: 55-1846-23 Sheet: 4 OF 5
 Location: IMPERIAL MANUFACTURING Total Depth: 240 FEET
 PMX Representative: RICK MALIN Date Started/Completed: MARCH 3, '93/MARCH 16, '93
 Drilled By: STACO WELL SERVICES Ground Level Elevation: 155.9 FEET
 Drill Method: AIR ROTARY Measuring Point Elevation: 155.95 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN	
DEQ-5DG-152	C				<ul style="list-style-type: none"> ● 150 feet: Decrease in degree of lithification. 		
DEQ-5DG-155	C		155		<ul style="list-style-type: none"> ● 155 feet: sands appear loose. 		
DEQ-5DG-160	C		160		<ul style="list-style-type: none"> ● 160 feet: Slightly friable to lithified fine to medium sands. 		
DEQ-5DG-165	C		165				
DEQ-5DG-170	C		170		<ul style="list-style-type: none"> ● 170-179 FEET: Black vitric SANDS WITH FINE GRAVEL (SW/GW). Does not appear to be lithified. Fairly well- to well-graded. 		
DEQ-5DG-172	C		172		<ul style="list-style-type: none"> ● 174 feet: Increase in gravel coarseness. Gravels range from fine to cobble size. Presence of quartzites and other nonbasaltic material. Some indications of cementation on gravels. 		
DEQ-5DG-175	C		175				
DEQ-5DG-180	C		180		<ul style="list-style-type: none"> ● 179-187 FEET: SANDY GRAVEL (GW). Vitric sands and basaltic gravels. No quartzites or nonbasaltic material. No indications of cementation, drills loose. Generally well-graded. 		
DEQ-5DG-183	C		183		<ul style="list-style-type: none"> ● 183 feet: general decrease in gravel size. Increase in lithification. Trending towards a fine to coarse gravelly vitric sandstone. Palagonite cementation. Fairly well- graded. Very clean - no fines. 		
DEQ-5DG-185	C		185				
DEQ-5DG-190	C		190		<ul style="list-style-type: none"> ● 187-203 FEET: Vitric SANDS (SP). Predominantly black and greenish brown sands and lower percentage of orangish red sands. No indications of lithification. Uniform grain size. Poorly graded. No fines. 		
DEQ-5DG-195	C		195		<ul style="list-style-type: none"> ● 195 feet: Gravel interbeds. Gravels contain a few white quartzite gravels. Clean sands and gravels. Appears generally loose with some indications of cementation on the larger gravels. 		
DEQ-5DG-200	C		200				

EMCON 0043706
CONFIDENTIAL

EXPLORATORY BORING LOG



Project Name: DEQ-EMC WELL INSTALLATION
 Project Number: 55-1846-23
 Location: IMPERIAL MANUFACTURING
 PMX Representative: RICK MALIN
 Drilled By: STACO WELL SERVICES
 Drill Method: AIR ROTARY

Boring Number: DEQ-5dg
 Sheet: 5 OF 5
 Total Depth: 240 FEET
 Date Started/Completed: MARCH 3, '93/MARCH 16, '93
 Ground Level Elevation: 155.9 FEET
 Measuring Point Elevation: 155.95 FEET

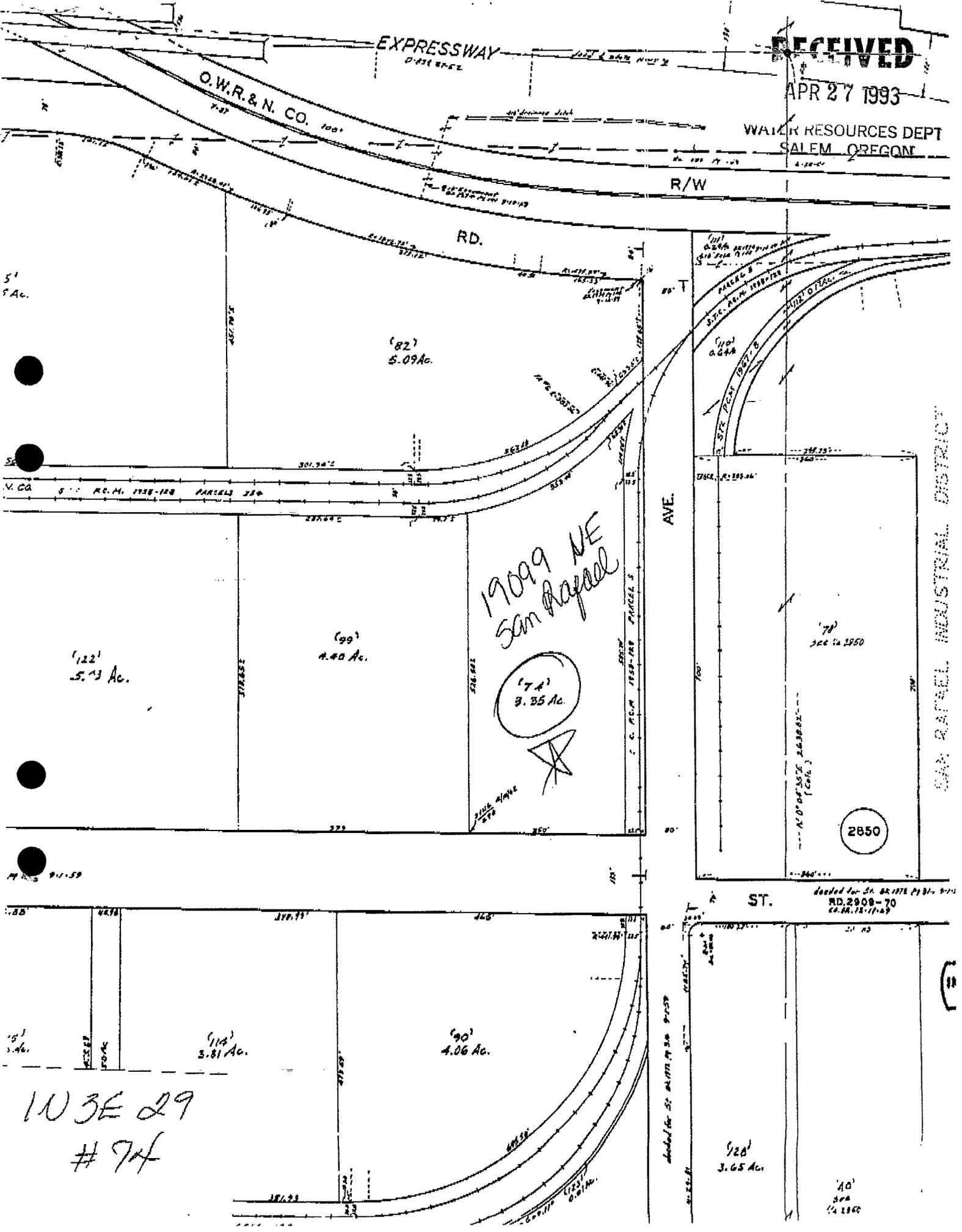
SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-50G-204	C		205	HIGH SOLIDS BENTONITE GROUT 13-209.1 FEET	203-208 FEET: GRAVELLY SANDS (SW/GW). Vitric sands with gravels. No indications of lithification. Clean. Little or no fines.	[Lithologic Column Pattern]
DEQ-50G-210	C		210	HYDRATED BENTONITE 3/8" PELLETS 209.1-212.3 FEET	208-211 FEET: Light brownish tan CLAYEY SILT (CL). Cuttings are sticky and plastic. Contain very fine micaceous sands.	[Lithologic Column Pattern]
DEQ-50G-213	C		215	STAINLESS STEEL CENTRALIZER 213.5 FEET	211-235 FEET: SANDY GRAVELS (GW). Gravels consisting of basalt and multi-colored quartzites. Some gravels show signs of cementation. Binding material are tan to green quartzite sands containing mica. Gravels range from fine to cobble size. Well- to fairly well-graded. Gravels are well-rounded. Signs of sandy interbeds consisting of coarse sands and fine gravels.	[Lithologic Column Pattern]
DEQ-50G-215	C		215	8-12 MESH SILICA SAND 212.3-235.5 FEET		
DEQ-50G-219	C		220	2-INCH SCHEDULE 80 0.020-INCH SLOTTED PVC WELL SCREEN 214-234 FEET	219 feet: Decrease in indications of cementation on gravels. Predominantly coarse gravels.	[Lithologic Column Pattern]
DEQ-50G-225	C		225	SUMP 234-234.5 FEET	225 feet: Predominantly green micaceous binding sand. Even mixture of gravels from basaltic and granitic origin. Indications of variable cementation.	[Lithologic Column Pattern]
DEQ-50G-230	C		230	STAINLESS STEEL CENTRALIZER 234 FEET	230 feet: Decrease in basaltic gravels. Greenish fine micaceous binding sand on some gravels.	[Lithologic Column Pattern]
DEQ-50G-234	C		235	BENTONITE 3/8" PELLETS 235.5-240 FEET	234 feet: Increase in gravel size. Coarse gravels and cobbles. Well-rounded.	[Lithologic Column Pattern]
237	C			BOTTOM OF BORING 240 FEET BELOW GROUND SURFACE	235-240 FEET: Grayish green CLAYEY SILT (ML) with some very fine micaceous sand. Cuttings are sticky and plastic. No apparent transition zone from overlying gravels.	[Lithologic Column Pattern]
239	SS	PUSHED NC			237 feet: Increasing grey color and percentage of very fine micaceous sands.	[Lithologic Column Pattern]
240	C		240		240 feet: Split spoon sample indicates a dry to very slightly moist greenish grey clayey silt. Not plastic or sticky. Breaks down to a very fine flour texture.	[Lithologic Column Pattern]

- NOTES:**
1. C = CUTTING SAMPLE
 2. SS = SPLIT-SPOON SAMPLE
 3. WELL WAS DRILLED USING A TUBEX STEP CASING TECHNIQUE WITH 8 AND 8-INCH CASING.
 4. WATER SAMPLES WERE COLLECTED AT 58, 77, 97, 183, 204, AND 220 FEET.
 5. MEASURING POINT ELEVATION IS THE TOP OF THE DEDICATED SAMPLING PUMP WATER LEVEL ACCESS HOLE.

RECEIVED

APR 27 1993

WATER RESOURCES DEPT
SALEM OREGON



5' 5 Ac.

5' 5 Ac.

V. CA

14 1/2 9 1/2 59

1.55

15' 3.46

IN 3E 29
74

19099 NE
San Rafael

(74)
3.35 Ac.



deducted for St. 24, 1978 29 31, 32, 33
RD. 2908-70
CD. 24, 25, 26, 27, 28

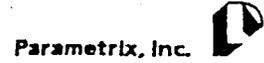
SAN RAFAEL INDUSTRIAL DISTRICT

2850

(128)
3.65 Ac.

(10)
3.46
(4 1/2)

EXPLORATORY BORING LOG

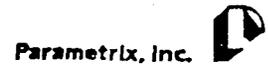


Project Name: DEQ-EMC WELL INSTALLATION Boring Number: DEQ-5ds
 Project Number: 55-1846-23 Sheet: 1 OF 4
 Location: IMPERIAL MANUFACTURING Total Depth: 160 FEET
 PMX Representative: RICK MALIN Date Started/Completed: MARCH 18, '93/MARCH 29, '93
 Drilled By: STACO WELL SERVICES Ground Level Elevation: 155.9 FEET
 Drill Method: AIR ROTARY Measuring Point Elevation: 155.68 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-5DS-3	C		0	FLUSH MOUNT LOCKABLE CASING SECURED IN CONCRETE 0-1.0 FEET	0-6 FEET: Brown SILTY GRAVELS (GM). Fine to very fine sands present in the silt matrix. Silts tend to be slightly plastic. Gravels are fine to coarse, subrounded to rounded.	
DEQ-5DS-5	C		5		⑤ 5 feet: Decrease in brown silts, increase in sand. Predominantly basaltic gravels with some quartzites. Fine to coarse gravels. Loose. Fairly well-graded.	
DEQ-5DS-7	C			HYDRATED GRANULAR BENTONITE 1.0-12 FEET		
DEQ-5DS-10	C		10		6-104 FEET: SANDY GRAVELS (GP). Fine gravels to large cobbles/boulders of predominantly basalt with smaller percentage of quartzites. Rounded to well-rounded. Fine to medium, tannish brown micaceous sand matrix. Small percentage of silt. Appears loose to slightly indurated. Poor to fairly well-graded.	
DEQ-5DS-15	C		15			
DEQ-5DS-20	C		20	2-INCH SCHEDULE 80 PVC CASING COUPLED WITH FLUSH MOUNT "O" RINGS 0-136 FEET	⑤ 20 feet: Decrease in average gravel size. Drilling loose.	
DEQ-5DS-25	C		25	8-INCH BOREHOLE 0-106.5 FEET	⑤ 24 feet: Predominantly fine gravels. Trending toward fairly well-graded. ⑤ 25 feet: signs of cementation.	
DEQ-5DS-30	C		30		⑤ 30 feet: Greenish brown to black micaceous very fine to medium sand matrix.	
DEQ-5DS-33	C			HIGH SOLIDS BENTONITE GROUT 12-132 FEET	⑤ 33 feet: Fine to medium gravels. Damp.	
DEQ-5DS-35	C		35		⑤ 35 feet: Noncemented gravels of predominantly basalt with multi-colored quartzites. Some granitic derived gravels.	
DEQ-5DS-40	C		40		⑤ 38 feet: Producing small quantities of water. ⑤ 40 feet: Increase in coarse gravels. Cementation on some gravels. Rounded to well-rounded. Greenish brown to black micaceous, fine to medium binding sand.	
DEQ-5DS-45	C		45		⑤ 45 feet: decrease in signs of cementation.	
DEQ-5DS-50	C		50			

EMCON 0043699
CONFIDENTIAL

EXPLORATORY BORING LOG



Project Name: DEQ-EMC WELL INSTALLATION
Project Number: 55-1846-23
Location: IMPERIAL MANUFACTURING
PMX Representative: RICK MALIN
Drilled By: STACO WELL SERVICES
Drill Method: AIR ROTARY

Boring Number: DEQ-5ds
Sheet: 2 OF 4
Total Depth: 160 FEET
Date Started/Completed: MARCH 18, '93/MARCH 29, '93
Ground Level Elevation: 155.9 FEET
Measuring Point Elevation: 155.68 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-5DS-55	C		55	HIGH SOLIDS BENTONITE GROUT 12-132 FEET	<ul style="list-style-type: none"> ● 50 feet: Coarse gravels with an increase in nonbasaltic gravels. Increasing signs of cementation. ● 53 feet: Decrease in cementation. Increase in sands, predominantly medium greenish tan micaceous sands. ● 55 feet: Increasing diversity in gravels of granitic origin. Possible sand interbeds. 	
DEQ-5DS-60	C		60		<ul style="list-style-type: none"> ● 60 feet: Increase in signs of cementation. Greenish brown to tan, fine to medium binding sands. 	
DEQ-5DS-65	C		65		<ul style="list-style-type: none"> ● 65 feet: Cemented gravels. 	
DEQ-5DS-70	C		70			
DEQ-5DS-75	C		75	STAINLESS STEEL CENTRALIZER ● 75 FEET	<ul style="list-style-type: none"> ● 73 feet: Indications of basaltic cobbles. 	
DEQ-5DS-80	C		80		<ul style="list-style-type: none"> ● 80 feet: Fine to coarse gravels with indications of basaltic cobbles. Gravels rounded to well-rounded with signs of cementation. Fine to slightly coarse binding sands. 	
DEQ-5DS-85	C		85			
DEQ-5DS-90	C		90		<ul style="list-style-type: none"> ● 89 feet: Basalt cobbles and coarse gravels. 	
DEQ-5DS-95	C		95		<ul style="list-style-type: none"> ● 91 feet: Decrease in gravel size and cementation signs. Larger gravels tend to be of basaltic origin with weathering rinds. ● 94 feet: Little or no sign of cementation. Appears loose. Decrease in observed sand percentage. 	
DEQ-5DS-100	C		100		<ul style="list-style-type: none"> ● 97 feet: Coarse basaltic gravels. 	

EXPLORATORY BORING LOG



Project Name: DEQ-EMC WELL INSTALLATION
 Project Number: 55-1846-23
 Location: IMPERIAL MANUFACTURING
 PMX Representative: RICK MALIN
 Drilled By: STACO WELL SERVICES
 Drill Method: AIR ROTARY

Boring Number: DEQ-5ds
 Sheet: 3 OF 4
 Total Depth: 160 FEET
 Date Started/Completed: MARCH 18, '93/MARCH 29, '93
 Ground Level Elevation: 155.9 FEET
 Measuring Point Elevation: 155.68 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-50S-105	C		105	8-INCH CASING DRIVEN FROM 106.5 TO 109.0 FEET	104-105 FEET: Tannish brown SILTY SAND (SM). Slightly lithified. Apparent increase in fines with depth.	
DEQ-50S-108	C		110		105-106.5 FEET: Light yellowish brown CLAY (CL). Cuttings are sticky and plastic. Appears to be very stiff.	
			115	6-INCH BOREHOLE 106.5 TO 160 FEET	106.5-107.5 FEET: Bluish green SANDSTONE (SS/SM). Apparent increasing silt percentage with depth.	
DEQ-50S-118	C		120		HIGH SOLIDS BENTONITE GROUT 12-132 FEET	
DEQ-50S-125	C		125	HYDRATED BENTONITE 3/8" PELLETS 132-134.5 FEET	117-124.5 FEET: Brownish orange SILTSTONE (ML). Contains very fine micaceous sands. Lithified - very stiff to hard. Not plastic or sticky. Split-spoon sample dry to slightly moist.	
DEQ-50S-130	C		130		STAINLESS STEEL CENTRALIZER @ 135.5 FEET	
DEQ-50S-132	C		135	WATER LEVEL 138.1 FEET BELOW GROUND SURFACE 3/31/93		124.5-136 FEET: Brown SILTY SANDSTONE (SS/SM). Brown and black, fine to medium vitric sands with silt. Lithified.
DEQ-50S-136	C		140		2-INCH SCHEDULE 80 0.020-INCH SLOTTED PVC WELL SCREEN 138-158 FEET	● 128 feet: Decreasing silt percentage.
DEQ-50S-140	C		145			● 130 feet: Increase in over all sand coarseness. Lithified.
DEQ-50S-145	C		150			● 132 feet: Slight grain coarsening. Appearance of white grains of an unknown material.
DEQ-50S-150	C		150		136-153 FEET: Brownish black SANDSTONE (SS). Predominantly fine to medium weathered vitric sands. Some signs of palagonite. Well lithified.	
					● 140 feet: Fine vitric sandstone trending towards a coarse siltstone. Possible interbeds of finer and coarser sands.	
					● 145 feet: greenish black to black, fine to medium weathered vitric sands with white grains of an unknown material. Lithified - slightly friable.	

EMCON 0043701
CONFIDENTIAL

EXPLORATORY BORING LOG



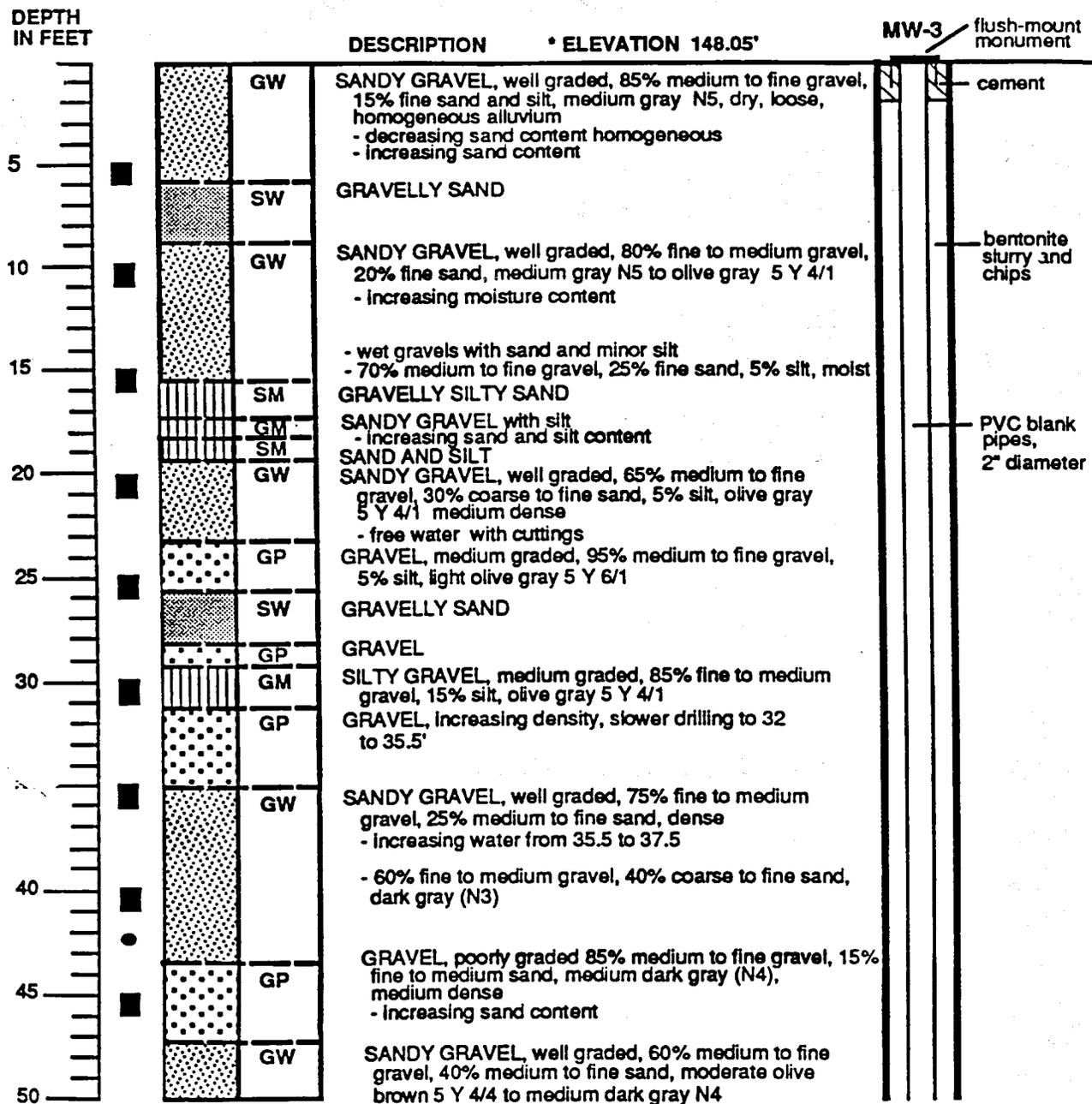
Project Name: DEQ-EMC WELL INSTALLATION Boring Number: DEQ-5ds
 Project Number: 55-1846-23 Sheet: 4 OF 4
 Location: IMPERIAL MANUFACTURING Total Depth: 160 FEET
 PMX Representative: RICK MALIN Date Started/Completed: MARCH 18, '93/MARCH 29, '93
 Drilled By: STACO WELL SERVICES Ground Level Elevation: 155.9 FEET
 Drill Method: AIR ROTARY Measuring Point Elevation: 155.68 FEET

SAMPLE NUMBER	SAMPLE TYPE	BLOW COUNT	DEPTH IN FEET	WELL CONSTRUCTION DETAILS	LITHOLOGIC DESCRIPTION	LITHO-LOGIC COLUMN
DEQ-5DS-155	C		155	<p> 8-12 MESH SILICA SAND 134.5-157 FEET STAINLESS STEEL CENTRALIZER ● 156 FEET SUMP 156-156.5 FEET HYDRATED BENTONITE 3/8" PELLETS 157-158.4 FEET SLOUGH/NATURAL BACKFILL 158.4-160 FEET BOTTOM OF BORING ● 160 FEET BELOW GROUND SURFACE </p>	<p>● 150 feet: Decrease in degree of lithification.</p> <p>153-17 FEET: Greenish black to black, fine to medium vitric SAND (SP). Presence of fine quartzite gravels. Predominantly clean sands. Low percentage of fines. Poorly graded.</p> <p>● 155 feet: sands appear loose.</p> <p>● 160 feet: Slightly friable to lithified fine to medium sands.</p>	
DEQ-5DS-160	C		160			

- NOTES:**
1. C = CUTTING SAMPLE
 2. WELL WAS DRILLED USING A TUBEX STEP CASING TECHNIQUE WITH 8 AND 6-INCH CASING.
 3. MEASURING POINT ELEVATION IS THE TOP OF THE DEDICATED SAMPLING PUMP WATER LEVEL ACCESS HOLE.

BORING BH-3 (1 of 4)

MONITORING WELL



Key:

- Interval over which sample was taken for field screening analysis
- Interval over which driven sample was obtained
- Point at which water sample was taken from drill cuttings
- Gradational contact between geologic units

Note: * Elevation relative to 1929 National Geodetic Vertical Datum

LOG OF BORING / WELL COMPLETION DETAILS

Cascade Corporation
Troutdale Plant

Dames & Moore
January 1989

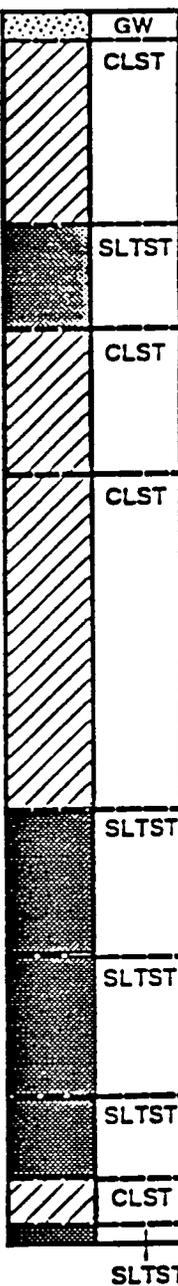
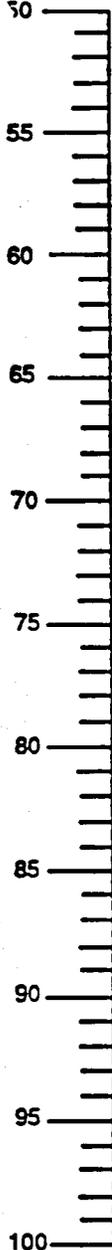
BORING BH-3 (2 OF 4)

MONITORING WELL

**DEPTH
IN FEET**

DESCRIPTION

MW-3



CLST
SANDY CLAYSTONE, 80% friable clay, 10% medium to fine sand, 10% silt, moderate yellowish brown 10 YR 5/4, medium dense, damp to moist

- decrease in sand and formation less stiff

SLTST
SANDY SILTSTONE, 85% silt, 15% coarse sand, moderate brown 5 YR 4/4, friable- dense, dry to moist

CLST
SANDY CLAYSTONE, 85% clay, 15% fine to medium sand, dark yellowish brown 10 YR 4/2 to pale yellowish brown 10 YR 6/2, medium plasticity

CLST
SILTY CLAYSTONE, 75% clay, 20% silt, 5% coarse sand, dark greenish gray 5 GY 4/1, firm to stiff, moist

-70 to 85% clay, 15 to 30% silt, olive black 5 Y 2/1, slight plasticity

- greenish black 5 G 2/1 to olive black 5 Y 2/1

SLTST
CLAYEY SILTSTONE, 60% silt, 40% clay, medium dark gray N4, medium plasticity

SLTST
SILTSTONE, 100% silt, olive black 5 Y 2/1, mottled texture with 1/8" blue green stringers and brick red modules, moist, very dense

SLTST
CLAYEY SILTSTONE, 80% silt, 2% clay, medium dark gray N4, stiff, slight plasticity

CLST
CLAYSTONE, brown

SLTST
CLAYEY SILTSTONE, 65% silt, 35% clay, moderate brown 5 YR 3/4, firm to stiff, slight to medium plasticity

PVC blank pipe, 2" diameter

bentonite slurry

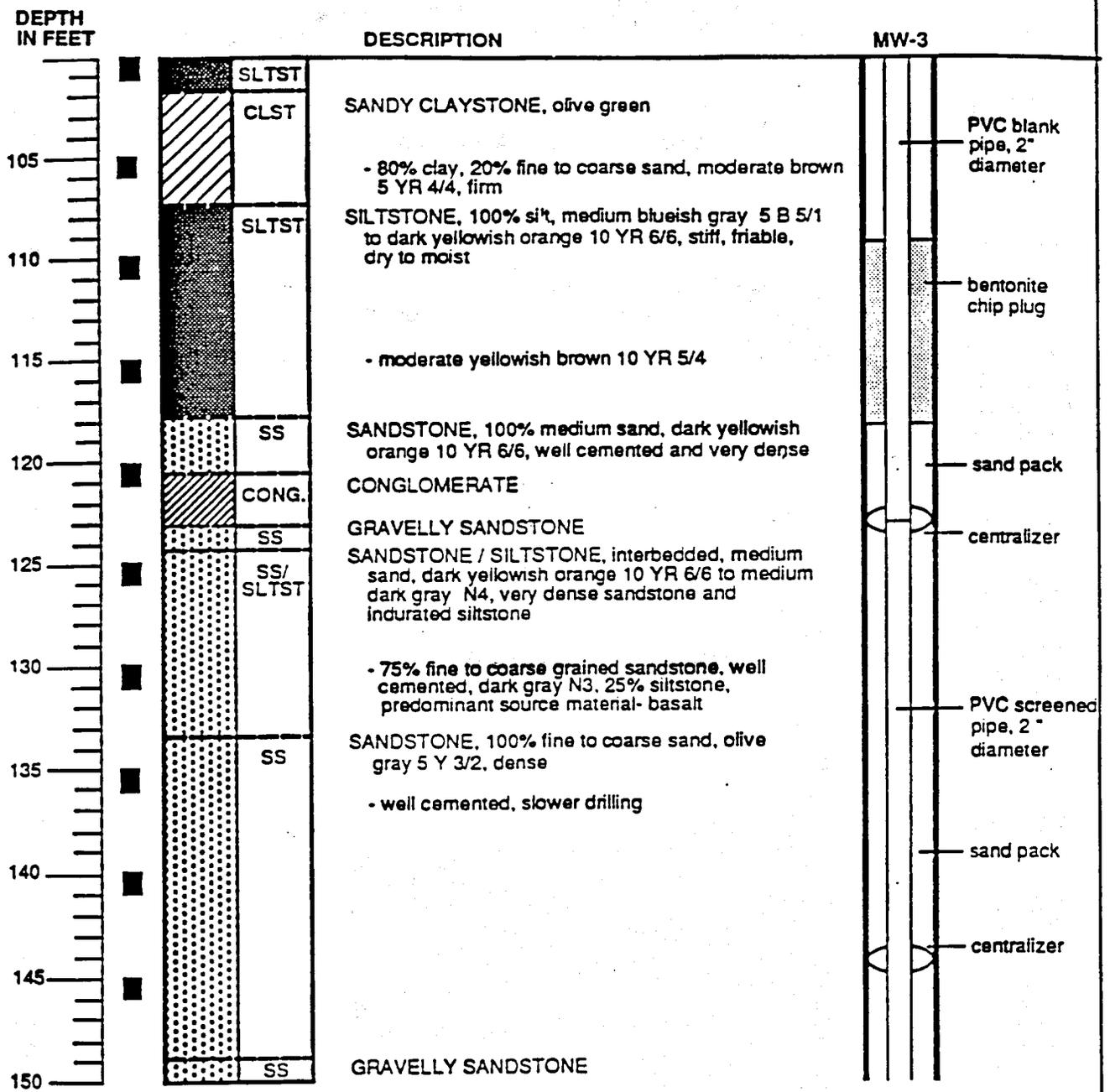
**LOG OF BORING /
WELL COMPLETION
DETAILS**

Cascade Corporation
Troutdale Plant

Dames & Moore
January 1989

BORING BH-3 (3 OF 4)

MONITORING WELL



LOG OF BORING / WELL COMPLETION DETAILS

Cascade Corporation
Troutdale Plant

Dames & Moore
January 1989

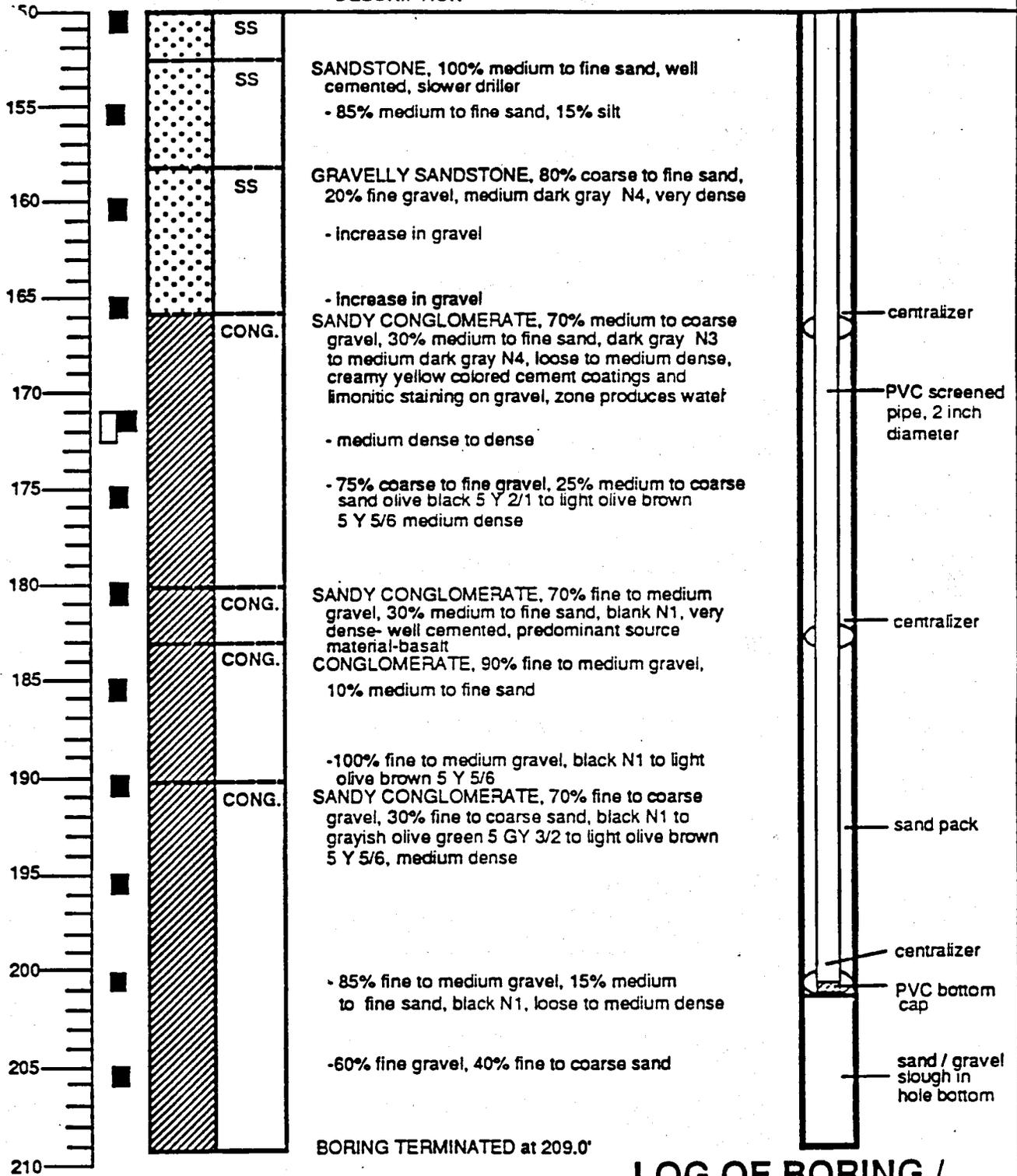
BORING BH-3 (4 OF 4)

MONITORING WELL

DEPTH
IN FEET

DESCRIPTION

MW-3



Driller: Onwego Drilling Company
 Equipment: Air Rotary Drill
 Begin Drill: 9/12/88 @ 13:00
 Finish drill: 10/6/88 @ 14:44
 Surface Condition: Level Asphalt
 Logged by: PLS

LOG OF BORING / WELL COMPLETION DETAILS

Cascade Corporation
 Troutdale Plant

Dames & Moore
 January 1989

Attachment 2

OWRD Special Standard Letters



Oregon

Kate Brown, Governor

Water Resources Department

North Mall Office Building

725 Summer St NE, Ste A

Salem, OR 97301

Phone: 503-986-0900

Fax: 503-986-0904

www.Oregon.gov/OWRD

April 24, 2019

DONALD LARSON, MWC #10443
YELLOW JACKET DRILLING SERVICES, LLC
C/O 3939 NORTH MARINE DRIVE # 18
PORTLAND, OREGON 97217

FINAL ORDER

Dear Mr. Larson:

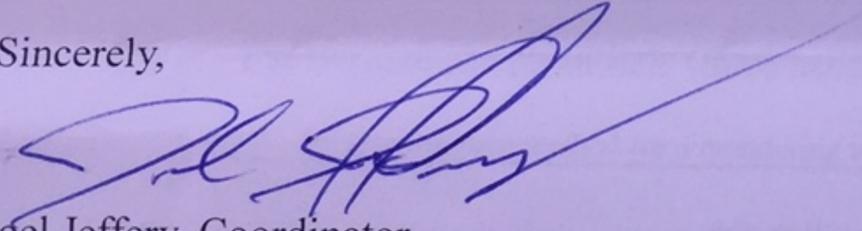
The Special Standards Request Form you submitted for owners: Cascade Corp, Feimun and AJZ LLC, Start Card numbers: 1042474 through 1042476 is Hereby approved for the following: You may abandon these monitoring wells in-place per OAR 690-240-0510(2). *Bentonite grout may only be used to abandon the portion of the wells that are below the static water level.* Above the static water level another approved sealing method sealing material must be used.

Unfortunately the Special Standards Request for Start Card Number 1042473 is denied. The basis for the denial of this Special Standards Request is that Trichloroethene (TCE), was detected in the last groundwater sample, at a level that exceeded the ODEQ's Risk Based Table, of concentrations, for Groundwater for the Ingestion and Inhalation from Tapwater Exposure Pathway for the Residential Receptor. All casing, screen, annular sealing material, drill cuttings, debris and filter pack material shall be removed prior to sealing.

All other monitoring well decommissioning standards must be adhered to. A copy of your Special Standards Request Form is enclosed.

If you have any questions regarding this letter, I may be contacted at (503) 986-0852, or by e-mail at Joel.W.Jeffery@oregon.gov.

Sincerely,



Joel Jeffery, Coordinator
Well Construction Program
Well Construction and Compliance Section

cc: Barry Sanford, Well Inspector, NW Region
File

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either petition for judicial review or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.