
APPENDIX C

Well Survey Report

Memorandum

TO: Christy Brown, United States Environmental Protection Agency, Region 10 (AWT-121) **DATE:** January 19, 2007

FROM: Gary Dupuy, Principal Hydrogeologist, Geomatrix Consultants, Inc. **PROJ. NO.:** 8769

CC: Project File **PROJ. NAME:** Former Rhone-Poulenc Site Tukwila, Washington

SUBJECT: Well Restoration and Surveying

1.0 INTRODUCTION

On March 13, 2006, the Respondents submitted the Western Parcel Redevelopment Work Plan (Redevelopment Work Plan) to the U.S. Environmental Protection Agency (EPA) for review. On March 29, 2006, the Respondents received conditional approval of the Redevelopment Work Plan; a revised final version of the work plan was sent to EPA on April 4, 2006. The Redevelopment Work Plan specified the procedures that would be used to locate, restore, and survey the groundwater monitoring wells on site after redevelopment of the West Parcel was completed.

Prior to regrading of the West Parcel, selected groundwater monitoring wells were abandoned in accordance with the Redevelopment Work Plan, and in accordance with the EPA-approved well abandonment list. A well abandonment report was submitted to EPA on August 8, 2006, providing a complete inventory of all wells known or expected to remain at the facility. EPA requested that a well survey report be submitted to EPA documenting the restoration and resurveying of the monitoring wells after completion of redevelopment. This memorandum documents the well restoration and well survey.

2.0 WELL RESTORATION

2.1 MONITORING WELLS

Prior to regrading of the site, the existing monitoring wells were covered by 2-foot-square metal plates to protect the wells and to facilitate relocation using a metal detector. Fill material

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was placed above the wells during regrading of the West Parcel to a depth ranging from approximately 0.5 to 4.0 feet. Once the site was graded and paved, a global positioning system (GPS) unit with Coast Guard radio beacon correction and a metal detector were used to relocate the monitoring wells. All of the existing monitoring wells were successfully relocated.

Once the wells were relocated, the well casings were extended and replacement surface-flush well monuments were installed. The wells are equipped with locking caps for security.

All of the wells were resurveyed by a licensed surveyor, Barghausen Consulting Engineers, Inc., of Kent, Washington. Figure 1 shows the surveyed well locations and the associated top-of-casing (TOC) elevations for each of the monitoring wells. The vertical datum for the survey is the National Geodetic Vertical Datum of 1929 (NGVD 29), and the horizontal datum is the North American Datum of 1927 (NAD 27); these are the same datums used for both the West and East Parcels. Table 1 lists the northings, eastings, and the surface and TOC elevations for each of the monitoring wells remaining on site.

2.2 EXTRACTION WELLS

As with the monitoring wells, the extraction wells were located by using a combination of GPS coordinates and a metal detector to locate the buried vaults. The surface vault lids for the three extraction wells, EX-1, EX-2, and EX-3, were raised to the new grade elevation at each well by removing the earlier vault lid and installing a new, larger lid in place of the original lid.

Concrete was poured around the perimeter of the new vault lid to stabilize it. The 1-inch-diameter sounding tubes next to the extraction wells were extended inside the vault to allow for measurement of water levels at these wells. These vaults are bolted with a unique bolt type for security. Figure 1 shows the location of the extraction wells, and Table 1 lists the northings, eastings, and the surface elevation for each extraction well. The “TOC elevation” for the extraction wells listed in Table 1 is the elevation of the extraction well sounding tubes rather than the extraction well casing.

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3.0 WELL REPLACEMENT

MW-38 was inadvertently damaged during demolition activities at the site. MW-38 was the only well damaged and subsequently abandoned during site redevelopment. MW-38 had been located approximately 4 feet north of MW-39, the adjacent monitoring well screened in the intermediate aquifer zone. MW-38 was damaged too severely to remedy, so it was abandoned in mid-June 2006 by overdrilling and grouting using “quik-grout”. Overdrilling of the well was required since the dedicated pump system could not be removed from the well casing.

EPA was notified that Container Properties intended to replace MW-38 with a well constructed in the same manner and materials. EPA accepted this approach and the replacement well, MW-38R (Figure 1), was installed on October 27, 2006. MW-38R was installed approximately 5 feet south of MW-39. The lithologic and well construction logs for MW-38R are included as Attachment A.

Attachments: Table 1, Monitoring and Extraction Well Survey Data
Figure 1, Existing Well Surveyed Locations and Elevations
Attachment A, Lithologic and Well Construction Log for MW-38R

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On behalf of the respondents, I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to evaluate the information submitted. I certify that the information contained in or accompanying this memorandum, Well Restoration and Surveying, is true, accurate, and complete. As to those portions of the report for which I cannot personally verify accuracy, I certify under penalty of law that this report and all attachments were prepared in accordance with procedures designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who may manage the system or those directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

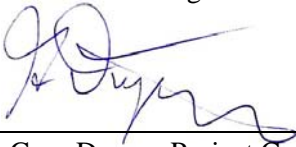
By:  _____ Date: January 19, 2007
Mr. Gary Dupuy, Project Coordinator

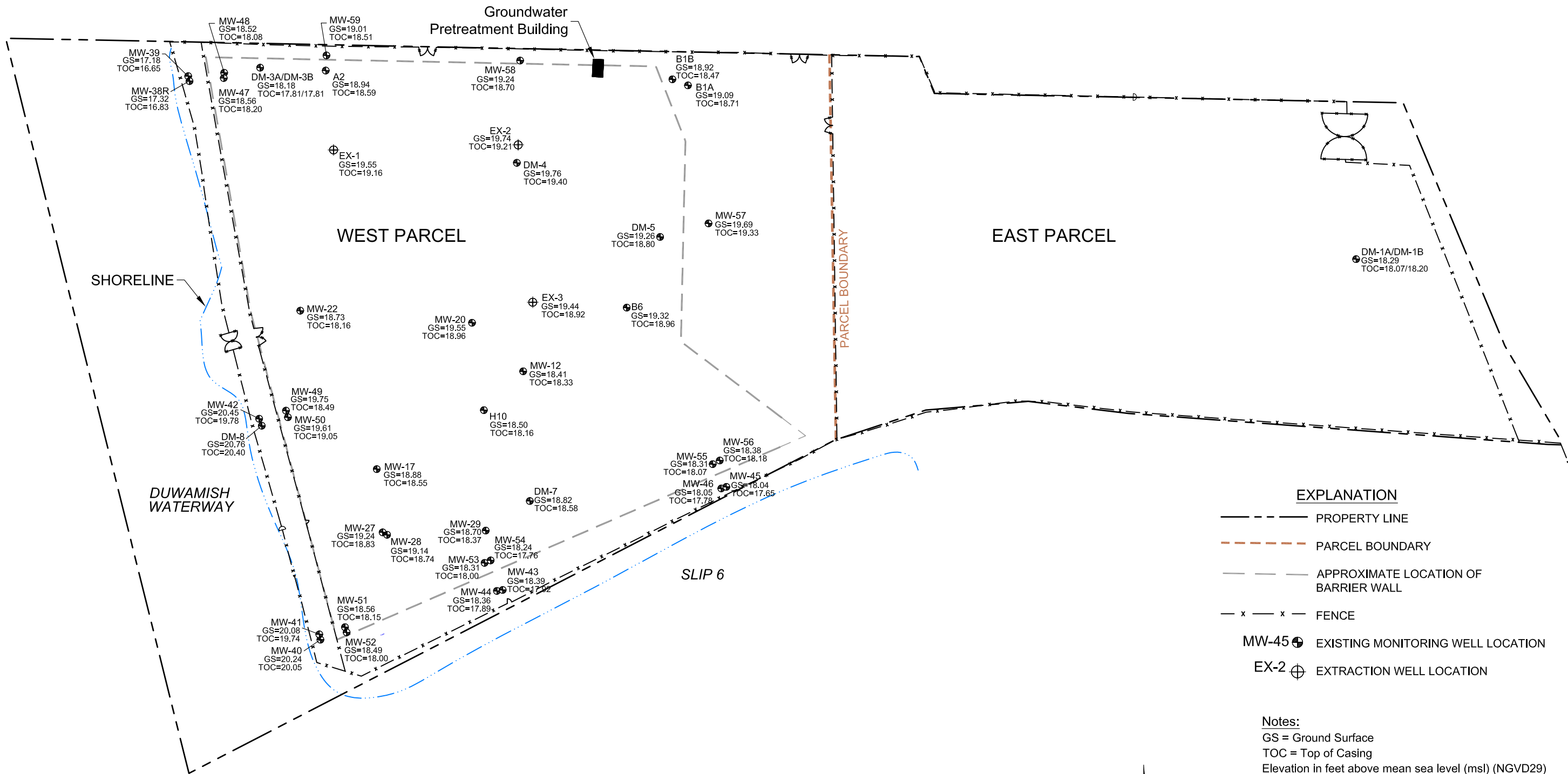
TABLE 1
MONITORING AND EXTRACTION WELL SURVEY DATA¹
Former Rhone-Poulenc Site
Tukwila, Washington

| Well Name | State Plane North Coordinates (feet) ² | | Elevations (feet above msl) ³ | |
|-------------|---|--------------|--|--------------------------|
| | Northing | Easting | Ground Surface | TOC ⁴ |
| A2 | 193589.4282 | 1636719.6534 | 18.94 | 18.59 |
| B1-A | 193572.2695 | 1637139.0520 | 19.09 | 18.71 |
| B1-B | 193579.3066 | 1637120.8683 | 18.92 | 18.47 |
| B6 | 193314.8421 | 1637068.3617 | 19.32 | 18.96 |
| DM-1A/DM-1B | 193371.1743 | 1637912.6707 | 18.29 | 18.07/18.20 ⁵ |
| DM-3A/DM-3B | 193592.9471 | 1636643.5960 | 18.18 | 17.81/17.81 ⁵ |
| DM-4 | 193482.6316 | 1636940.9222 | 19.76 | 19.40 |
| DM-5 | 193396.7258 | 1637106.8481 | 19.26 | 18.8 |
| DM-7 | 193090.9996 | 1636955.9109 | 18.82 | 18.58 |
| DM-8 | 193178.1739 | 1636645.5827 | 20.76 | 20.40 |
| H-10 | 193196.3566 | 1636902.8367 | 18.50 | 18.16 |
| MW-12 | 193241.2492 | 1636948.2593 | 18.41 | 18.33 |
| MW-17 | 193127.9498 | 1636778.7406 | 18.88 | 18.55 |
| MW-20 | 193297.3956 | 1636889.0208 | 19.55 | 18.96 |
| MW-22 | 193311.3188 | 1636690.0766 | 18.73 | 18.16 |
| MW-27 | 193054.5080 | 1636785.4211 | 19.24 | 18.83 |
| MW-28 | 193051.6101 | 1636790.8346 | 19.14 | 18.74 |
| MW-29 | 193056.7803 | 1636904.9034 | 18.70 | 18.37 |
| MW-38 | 193577.1730 | 1636561.9686 | 17.32 | 16.83 |
| MW-39 | 193582.9737 | 1636560.4004 | 17.18 | 16.65 |
| MW-40 | 192930.6527 | 1636713.5474 | 20.24 | 20.05 |
| MW-41 | 192936.5025 | 1636712.1872 | 20.08 | 19.74 |
| MW-42 | 193186.2917 | 1636642.5636 | 20.45 | 19.78 |
| MW-43 | 192988.0155 | 1636924.5169 | 18.39 | 17.92 |
| MW-44 | 192986.9456 | 1636917.8381 | 18.36 | 17.89 |
| MW-45 | 193107.3735 | 1637183.4888 | 18.04 | 17.65 |
| MW-46 | 193105.6111 | 1637177.6309 | 18.05 | 17.78 |
| MW-47 | 193580.7066 | 1636601.5870 | 18.56 | 18.20 |
| MW-48 | 193586.6998 | 1636601.9485 | 18.52 | 18.08 |
| MW-49 | 193195.6818 | 1636673.6134 | 19.75 | 18.49 |
| MW-50 | 193187.9733 | 1636675.8766 | 19.61 | 19.05 |
| MW-51 | 192944.9772 | 1636741.9484 | 18.56 | 18.15 |
| MW-52 | 192938.9388 | 1636743.8590 | 18.49 | 18.00 |
| MW-53 | 193019.4135 | 1636903.5184 | 18.31 | 18.00 |
| MW-54 | 193022.2529 | 1636910.5761 | 18.24 | 17.76 |
| MW-55 | 193133.7537 | 1637167.7247 | 18.31 | 18.07 |
| MW-56 | 193137.9136 | 1637175.8804 | 18.38 | 18.18 |
| MW-57 | 193412.4581 | 1637162.8661 | 19.69 | 19.33 |
| MW-58 | 193601.0167 | 1636944.7209 | 19.24 | 18.70 |
| MW-59 | 193606.8011 | 1636720.5517 | 19.01 | 18.51 |
| EX-1 | 193496.3564 | 1636728.0558 | 19.55 | 19.16 ⁶ |
| EX-2 | 193502.2905 | 1636941.2832 | 19.74 | 19.21 ⁶ |
| EX-3 | 193320.4475 | 1636958.6863 | 19.44 | 18.92 |

Notes:

1. Survey conducted by Barghausen Consulting Engineers, Inc.
2. Horizontal datum is North American Datum of 1927 (NAD 27).
3. msl = mean sea level (vertical datum = NGV VD 1929).
4. TOC = Top of Casing -- elevation of north side of well casing.
5. DM-1A/-1B, DM-3A/-3B were constructed with two wells in the same boring within one well monument.
6. TOC elevations for EX-1, EX-2, EX-3 represent the top of casing for the 1-inch sounding tube


Plot Date: 12/18/06 - 11:41am, Plotted by: astenberg
Drawing Path: S:\8769_2006\037_WellWorkPlan\ Drawing Name: Sitelayout_WellLocations.dwg



EXPLANATION

- PROPERTY LINE
- - - - - PARCEL BOUNDARY
- - - - - APPROXIMATE LOCATION OF BARRIER WALL
- x - x - FENCE
- MW-45 ● EXISTING MONITORING WELL LOCATION
- EX-2 ⊕ EXTRACTION WELL LOCATION

Notes:
GS = Ground Surface
TOC = Top of Casing
Elevation in feet above mean sea level (msl) (NGVD29)

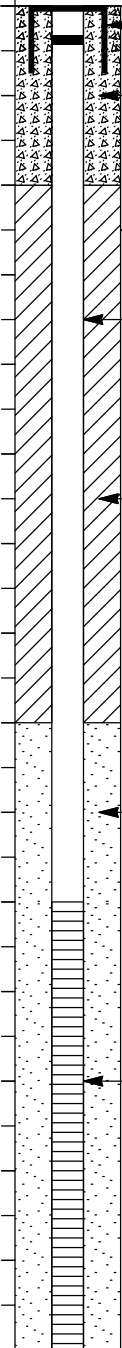
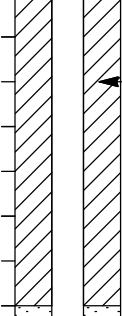
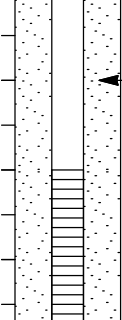
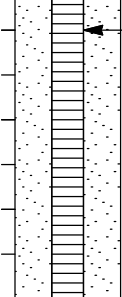

| EXISTING WELL SURVEYED LOCATIONS AND ELEVATIONS Former Rhone-Poulenc, East Marginal Way Facility Tukwila, Washington | | |
|--|----------------|----------------------|
| By: APS | Date: 12/18/06 | Project No. 8769.005 |
|  Geomatrix | | Figure 1 |

ATTACHMENT A

Lithologic and Well Construction Log for MW-38R

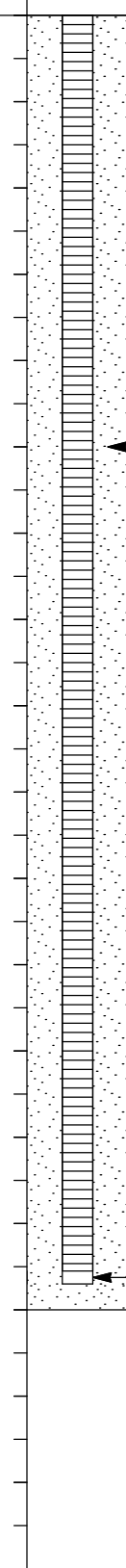
| | | | | | | | | |
|---|--|--|-------|--|-------------------------------|-------|------------------|----------|
| PROJECT: Former Rhone-Poulenc Site Tukwila, Washington | | | | | Boring Log Explanation | | | |
| BORING LOCATION: | | | | | ELEVATION AND DATUM: | | | |
| DRILLING CONTRACTOR: | | | | | DATE STARTED: | | DATE FINISHED: | |
| DRILLING METHOD: | | | | | TOTAL DEPTH (ft.): | | MEASURING POINT: | |
| DRILLING EQUIPMENT: | | | | | DEPTH TO WATER | FIRST | COMPL. | 24 HRS. |
| SAMPLING METHOD: | | | | | LOGGED BY: | | | |
| HAMMER WEIGHT: | | | DROP: | | RESPONSIBLE PROFESSIONAL: | | | REG. NO. |

| DEPTH (feet) | SAMPLES | | | OVM READING (ppm) | DESCRIPTION | REMARKS |
|-----------------|---------------|--------|----------------|-------------------------|---|---------|
| | Sample No. | Sample | Blows/ Foot | | NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. | |
| | | | | | Surface Elevation: | |
| | | | | | Notes | |
| 1 | | | | | 1. Soil descriptions are in accordance with the USCS as set forth by ASTM D2488-90 "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)." | |
| 2 | | | | | 2. Soil color described according to Munsell Color Chart. | |
| 3 | | | | | 3. Dashed lines separating soil strata represent inferred boundaries between sampled intervals that may be abrupt or gradual transitions. | |
| 4 | | | | | 4. Solid lines represent approximate boundaries observed within sample intervals. | |
| 5 | | | | | 5. OVM = organic vapor meter, reading in volumetric parts per million. HS = head space measurement. | |
| 6 | | | | | 6. Odor, if noted is subjective and not necessarily indicative of specific compounds or concentrations. | |
| 7 | | | | | 7. NA = Not applicable. | |
| 8 | | | | | 8. ND = No data. | |
| 9 | 1 | X | | | Interval of split spoon sample. | |
| 10 | | | | | Interval of recovered soil collected with Geoprobe sampler. | |
| 11 | | | | | Interval of no recovery. | |
| 12 | | X | | | | |
| 13 | | | | | Sample collected for chemical analysis and sample identification. | |
| 14 | | | | | | |
| 15 | | | | | | |

| | | | | | | | | | | | | |
|---|---------------|--------|----------------|----------------|--|--|---|-----------------|--------------------------------------|--|--|--|
| PROJECT: Former Rhone-Poulenc Site Tukwila, Washington | | | | | | Log of Well No. MW-38R | | | | | | |
| BORING LOCATION: West Parcel | | | | | | TOP OF CASING ELEVATION AND DATUM: 16.83 feet above msl (NGVD 1929) | | | | | | |
| DRILLING CONTRACTOR: Cascade Drilling, Inc. | | | | | | DATE STARTED: 10/27/06 | | | DATE FINISHED: 10/27/06 | | | |
| DRILLING METHOD: Hollow-stem auger | | | | | | TOTAL DEPTH (ft.): 30.0 | | | SCREEN INTERVAL (ft.): 9.7 - 29.5 | | | |
| DRILLING EQUIPMENT: Limited Access Track rig | | | | | | DEPTH TO WATER (ft.): | FIRST 14.0 | COMPL. 11.95 | CASING: 2" Sched. 40 PVC | | | |
| SAMPLING METHOD: SPT split spoon drive sampler [18" x 1.5"] | | | | | | LOGGED BY: N. Gray | | | | | | |
| HAMMER WEIGHT: 140 lb | | | | DROP: 30 in | | RESPONSIBLE PROFESSIONAL: N. Gray | | | REG. NO. L.G. 2557 | | | |
| DEPTH (feet) | SAMPLES | | | OVM Reading | DESCRIPTION | | WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS | | | | | |
| | Sample No. | Sample | Blows/ Foot | | NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. | | | | | | | |
| | | | | | Surface Elevation: 17.32 feet above msl (NGVD 1929) | | | | | | | |
| 1 | 1 | | 4 5 3 | 1000 | POORLY GRADED SAND (SP): Medium dark gray SAND (loose) (moist) (hydrocarbon odor) | |  | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | 2 | | 2 2 2 | 120 | As above, grading dark gray/black silt (decreasing hydrocarbon odor) | |  | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | 3 | | 3 4 4 | 75 | SILT/POORLY GRADED SAND (ML/SP): Gray, interbedded, medium SAND and silt/fine sand (moist) (slight hydrocarbon odor) | |  | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | Wet at 14' | |  | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| | | | | | | OAKWELLV_TOC(REV. 9/00) | | | | | | |
|  Geomatrix Consultants | | | | | | Project No. 8769.006 | | | Page 1 of 2 | | | |

PROJECT: Former Rhone-Poulenc Site
Tukwila, Washington

Log of Well No. MW-38R (cont'd)

| DEPTH (feet) | SAMPLES | | | OVM Reading | DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. | WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS |
|-----------------|---------------|--------|----------------|----------------|--|--|
| | Sample No. | Sample | Blows/ Foot | | | |
| 16 | 4 | | 1 3 4 | 3 | Gray, medium-fine SAND, some silt bedding (decreasing hydrocarbon odor, no sheen) |  <p>2/12 Monterey filter pack sand</p> <p>Schedule 40 PVC endcap</p> |
| 17 | | | | | | |
| 18 | | | | | | |
| 19 | | | | | POORLY GRADED SAND (SP): Dark gray, medium SAND, trace white and gray grains (wet) (no apparent odor or sheen) | |
| 20 | | | 3 5 10 | 12 | | |
| 21 | 5 | | | | | |
| 22 | | | | | | |
| 23 | | | | | Slight heave | |
| 24 | | | | | | |
| 25 | | | 3 13 26 | 6 | | |
| 26 | 6 | | | | As above, no apparent odor or stain silt/fine sand at shoe | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | 6 21 27 | 2 | | |
| 31 | 7 | | | | SILT (ML) | <p>Boring was completed to 30' bgs. Groundwater was encountered at 11.95' bgs. Boring was completed as monitoring well. (Note: lithology, samples, blow counts, and OVM readings are copied from previous log for boring MW-38 (URS, 9/3/02)).</p> |
| 32 | | | | | | |
| 33 | | | | | | |

OAKWELLV_TOC(REV. 9/00)



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