

# Revised Site Assessment Work Plan

East Gresham Elementary School  
900 SE 5th Street  
Gresham, Oregon 97080  
UST Facility ID 3677  
LUST# 26-95-0187

Prepared for:  
Gresham-Barlow School District No. 10Jt  
2020 SE Fleming Avenue  
Gresham, Oregon 97080

October 2023  
PBS Project 23767.204, Phase 0006



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## 1 INTRODUCTION

This site assessment work plan has been prepared for Gresham-Barlow School District No. 10Jt (Client) and documents the planning, implementation, and procedures for the continued assessment of the former regulated gasoline underground storage tank (UST) at East Gresham Elementary School located at 900 SE 5th Street in Gresham, Oregon (site). This assessment has been designed to address the area of concern around the former UST, which had a release in the 1990s that was assigned leaking underground storage tank (LUST) #26-95-0187. It considers review of historical documentation by previous consultants, PBS Engineering and Environmental Inc. (PBS), and regulatory correspondence from the Oregon Department of Environmental Quality (DEQ). The assessment is designed to address the request for additional assessment received from DEQ in 2019, comments received on August 16, 2023, and if applicable, request regulatory closure.

## 2 SITE LOCATION AND DESCRIPTION

### 2.1 Site Ownership and Regulatory History

The site is located at 900 SE 5th Street, Gresham, Oregon. It is in the southwest one-quarter of the southeast one-quarter of Section 10, Township 1 South, Range 3 East of the Willamette Meridian (Figure 1). According to the Multnomah County Assessor, it is located on Tax Lot 1S3E10DC-00100. It encompasses approximately 11.5 acres and is generally flat, at an approximate elevation of 375 feet above mean sea level. The southern portion of the site slopes down toward an unnamed tributary that drains to Johnson Creek along the property's southern boundary, and steeply on the west side towards off-site residences (Figure 2).

The site has operated as a public school facility since at least the 1950s. A previous school building was located on the western portion of the site, with athletic fields to the east and south. An automotive shop was located southwest of the former school building near the western property boundary (Figure 2).

A 2,000-gallon gasoline UST was discovered to have had a release near the shop building in 1995. The tank and the associated fuel pump were decommissioned by removal. Petroleum-contaminated soil (PCS) and petroleum-contaminated groundwater were observed during decommissioning and assessment activities. A total of 518 tons of PCS was excavated and disposed for off-site treatment.<sup>1</sup> H.G. Schlicker and Associates, Inc. (HGSA) expressed concern there was contamination migrating along the backfill of a nearby drain, referred to in some instances as a storm drain and others as a French drain, at the base of the west-facing slope on the western property margin, and that this drain discharged to the unnamed tributary to the south. A geophysical survey was completed to identify the drain. A signal was returned at 3 feet depth of a potential drain; however, the survey was not conclusive because of the variable terrain and vegetation, and no associated outfall could be located.

Eight monitoring wells (MW-1 through MW-8) were installed in 1996, and the wells were monitored until February 1997 (Figure 3). The site was determined to be a low priority for DEQ, and no sampling occurred until 2007 when one groundwater sampling event was completed by Grant and Associates, who made recommendations for additional site characterization and continued groundwater monitoring activities.

In 2019, DEQ prepared a file review summary that recommended the following actions for the school district:

- Complete assessment of groundwater contamination in the southwest direction.
- Develop a corrective action plan to reduce or eliminate residual contamination to meet current DEQ standards.

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<sup>1</sup> H.G. Schlicker & Associates, Inc. (1995, October 12). Summary of Actions, East Gresham Elementary School, Gresham, Oregon, UST Decommissioning and Cleanup, LUST #26-95-187.

- Continue groundwater monitoring.

A new school building was constructed between 2018 and 2019 east of the older building. As part of the redevelopment, the site was regraded to make way for new athletic fields. Monitoring wells previously indicated to be within a contaminated groundwater plume were sampled by PBS in May 2019 (see Table 1 and attached laboratory reports in Appendix A). Following sampling, the wells were decommissioned by removal by Cascade Drilling in August 2019.

In a December 5, 2019, letter from DEQ to Terry Taylor with the Client, DEQ recommended installing three to four groundwater monitoring wells and soil gas sampling points near the former UST for the purpose of determining if the site is eligible for regulatory closure. This work plan intends to address that request for additional assessment and incorporates DEQ comments received in August 2023.

### **3 GEOLOGY AND HYDROGEOLOGY**

Surficial deposits in the vicinity of the site are wind-blown loess deposited during Quaternary glacial episodes. The unit consists of massive, micaceous, quartzfeldspathic silt, and very fine sand. It is pale gray to tan in color near the surface, and overlies a firm, red-brown silt below.<sup>2</sup> Underlying these unconsolidated materials is the Troutdale Formation,<sup>3</sup> which is referred to as the Troutdale Gravel Aquifer in this area. The Troutdale Gravel Aquifer is typically well indurated and consists of pebbly to cobbly clast-supported conglomerate with a silty to sandy matrix. Most of the clasts are derived from basalt with the remainder composed of quartzite and other rock types.<sup>4</sup> Underlying the Troutdale Gravel Aquifer is typically a fine-grained confining unit that may interbed with the Troutdale Sand Aquifer. A deep sand and gravel aquifer underlies these units, with older deposits, including Columbia River Basalt, at depth.

Previous monitoring wells on the property indicated depths to groundwater ranging from 5 to 17 feet below ground surface (bgs) with groundwater elevations varying seasonally with a flow direction toward the west or southwest.<sup>5</sup>

### **4 PURPOSE AND OBJECTIVES**

This work plan documents the proposed activities intended to satisfy DEQ's requirements for additional assessment for the open LUST file. It is anticipated that the Client will request regulatory closure following the assessment, provided monitoring results indicate concentrations of residual contaminants do not exceed the applicable DEQ risk-based concentrations (RBCs).

### **5 HEALTH AND SAFETY**

A site-specific health and safety plan (HASP) was previously prepared; it will be updated to include the new scope of work before commencing fieldwork. Information to ensure safe working practices will be included in the HASP. In all cases, pertinent safety information will be relayed to field personnel, including subcontractors, to communicate mandatory elements from the federal code for hazardous waste operations and emergency response (29 CFR 1910.120(b)(4)).

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<sup>2</sup> Wells, Ray E., Haugerud, Ralph A., Niemi, Alan R., Niemi, Wendy A., Ma, Lina, Evarts, ... Sawlan, Michael G. (2020). Geologic Map of the Greater Portland Metropolitan Area and Surrounding Region, Oregon and Washington, USGS Scientific Investigation Map 3443.

<sup>3</sup> Snyder, Daniel T. (2008). *Estimated Depth to Ground Water and Configuration of the Water Table in the Portland, Oregon Area*. USGS Scientific Investigations Report 2008-5059.

<sup>4</sup> Hartford, Susan V., and William D. McFarland. (1989). *Lithology, Thickness, and Extent of Hydrogeologic Units Underlying the East Portland Area, Oregon*. USGS Water-Resources Investigations Report 88-4110.

<sup>5</sup> Grant Associates. (2007, October 3). Status Report No. 1 August 2007.

PBS will contact the Oregon Utility Notification Center to file a public utility locate request. PBS will also subcontract with a private utility locating company to survey private utilities and detectable subsurface obstructions. Soil boring locations are subject to utility constraints and may need to be moved according to the utility survey.

## **6 MONITORING WELL INSTALLATION, AND SOIL GAS WELL INSTALLATION ACTIVITIES**

### **6.1 Groundwater Monitoring Well Installation**

PBS plans to install three groundwater monitoring wells in the former gasoline UST area using a direct-push drilling rig. These are intended to replace former monitoring wells MW-2, MW-5, and MW-7.

Previous monitoring activities indicated the groundwater table fluctuates as much as 6 feet between the wet winter months and the dry summer months. Therefore, to ensure the wells have sufficient water to sample, borings will be advanced into the groundwater table so that they are approximately 10 feet below the top of the seasonally high groundwater table to account for seasonal variations. For MW-2R and MW-7R, PBS anticipates the total depth will be 20 feet bgs. MW-5R is planned to be constructed on the west property boundary, which is approximately 8 feet lower than the former MW-5. Depending on field observations and depth to groundwater at this location, the total depth of this monitoring well may be shallower than MW-2R and MW-7R. The wells will be constructed with a 2-inch Schedule 40 polyvinyl chloride (PVC) pipe with a 15-foot well screen that will straddle the water table. MW-2R and MW-7R will be constructed with flush mount concrete well monuments with steel lids and a steel aboveground well monument will be installed at MW-5R.

During drilling, soil from each boring will be continuously logged and field screened for the presence of petroleum hydrocarbons by visual/olfactory observation and for the presence of volatile organic compounds (VOCs) using a photoionization detector (PID).

After the wells are constructed, PBS will perform well development no earlier than 24 hours after the well sealant material has been placed. The wells will be surveyed by a PBS survey crew, and the top-of-casing elevation will be surveyed to an accuracy of 0.01 foot for determining groundwater gradient and flow direction.

### **6.2 Soil Gas Monitoring Well Installation**

Five permanent soil gas monitoring wells will be installed at locations indicated in Figure 3. Two co-located soil gas wells, SG-1S and SG-1D, will be placed near former monitoring well MW-2, which was the zone of highest contamination observed before the former wells were decommissioned. Soil gas wells SG-2, SG-3, and SG-4 will be placed near the western property boundary to evaluate the potential for off-site vapor migration.

Lithology and depth to groundwater at MW-2R will inform PBS at what depths the permanent shallow and deep soil gas monitoring points at SG-1 can be installed for vertical soil gas delineation purposes. The deeper soil gas sampling interval will be set at least one foot above the measured depth to groundwater at MW-2R, or at a maximum of 10 feet bgs.

Installation of the soil gas wells will be completed by a licensed driller. The five permanent borings will be advanced using a direct-push drill rig to a final depth where a soil gas implant will be installed and then attached to Teflon tubing that will be placed from the implant to the surface. The implant depth will be set at a depth of 5 feet bgs in SG-1S, SG-2, SG-3, and SG-4. PBS plans to install the deeper probe (SG-1D) at 10 feet bgs if depth to groundwater permits. A flush mount concrete well monument with a steel lid will be installed at SG-1S and SG-1D, and steel aboveground well monuments will be installed at SG-2, SG-3, and SG-4 to

protect the vapor monitoring wells. The monitoring points will be allowed to rest and equilibrate for a period of at least 48 hours prior to sample collection, in accordance with DEQ's *Guidance for Assessing and Remediating Vapor Intrusion in Buildings* (VI Guidance).<sup>6</sup>

## **7 SAMPLING AND ANALYSIS PLAN**

### **7.1 Soil Sampling**

Soil samples are not planned.

### **7.2 Groundwater Sampling**

Groundwater monitoring activities will occur no sooner than 48 hours following well development activities. PBS plans to complete monitoring activities on a quarterly basis for a period of one year unless suspended earlier in consultation with DEQ.

PBS will collect groundwater samples using low-flow sampling protocols as described in PBS' standard operating procedure (SOP) for sampling groundwater monitoring wells. A copy of the SOP is included in Appendix B. A peristaltic pump and new tubing will be used to collect the samples into laboratory-provided containers that will be labeled, placed on ice for the duration of sampling, and transportation to an Oregon-accredited laboratory under chain-of-custody documentation.

Groundwater samples will be analyzed for the following:

- Gasoline-range total petroleum hydrocarbons (TPH) by Northwest Method TPH, gasoline extended (NWTPH-Gx); and
- Risk-based decision making (RBDM) VOCs by Environmental Protection Agency (EPA) Method 8260.

Previous groundwater monitoring included lead as an analyte; however, the resulting data have not indicated that lead is a contaminant of concern. Therefore, it is not planned to be sampled.

### **7.3 Soil Gas Sampling**

PBS will complete two soil gas sampling events on the permanent soil gas monitoring points: one during wet (winter), and another during dry (summer) conditions. PBS will collect the soil gas samples according to the PBS SOP (Appendix B), which follows Sections 3.2.1 and 3.2.2 of the VI Guidance with modifications for leak detection measures. Adjustments to the following protocol may be warranted based on field conditions and will be documented in field notes. Summa canisters will be ordered from the laboratory with flow regulators assuming a flow rate of no more than 200 milliliters per minute (mL/minute). The Summa canisters will be batch certified for petroleum-related VOCs and helium.

Soil gas samples will be analyzed for the following:

- Gasoline-range TPH and RBDM VOCs by EPA Method TO-15; and
- Helium by ASTM Method D1946.

Laboratory analysis will be conducted under standard turnaround time.

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<sup>6</sup> DEQ (State of Oregon Department of Environmental Quality). (2010, March 25). *Guidance for Assessing and Remediating Vapor Intrusion in Buildings. Environmental Cleanup Program. 10-LQ-007.*

## 8 QUALITY CONTROL

DEQ has a guidance document specifying quality control (QC) samples to be collected during sampling events.<sup>7</sup> The document specifies that a field duplicate and trip blank should be collected and analyzed during each sampling event. Groundwater will be the only medium to have field duplicates collected; a soil gas field duplicate will not be collected. The samples will be analyzed for the same analytes as the parent sample. The QC trip blank will be analyzed for RBDM VOCs by EPA Method 8260.

## 9 INVESTIGATION-DERIVED WASTES

Investigation-derived waste (IDW) consisting of soil cuttings, purge water, and decontamination wash water will be placed into 55-gallon drums that will be sealed, labeled, and stored on site in a client-approved location. It is anticipated that soil and water can be disposed of as nonhazardous waste. Disposable sampling equipment and supplies will be bagged and disposed of as solid waste. PBS will coordinate the disposal with a licensed waste hauler to transport to a licensed disposal or treatment facility.

## 10 DELIVERABLES

Upon receiving final laboratory analytical testing reports following the fourth quarter of sampling, PBS will prepare an electronic report that will include a description of field activities, tables of analytical results, a comparison of detections to applicable DEQ RBCs, boring logs, figures, laboratory reports, and recommendations.

Assuming no contamination above applicable RBCs is observed following four quarters in groundwater or soil gas samples, PBS will issue a final report with a request that DEQ issue a No Further Action (NFA) determination and close the regulatory file.

Prepared by PBS Engineering and Environmental Inc.

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Bret Waldron, RG  
Senior Geologist

Date

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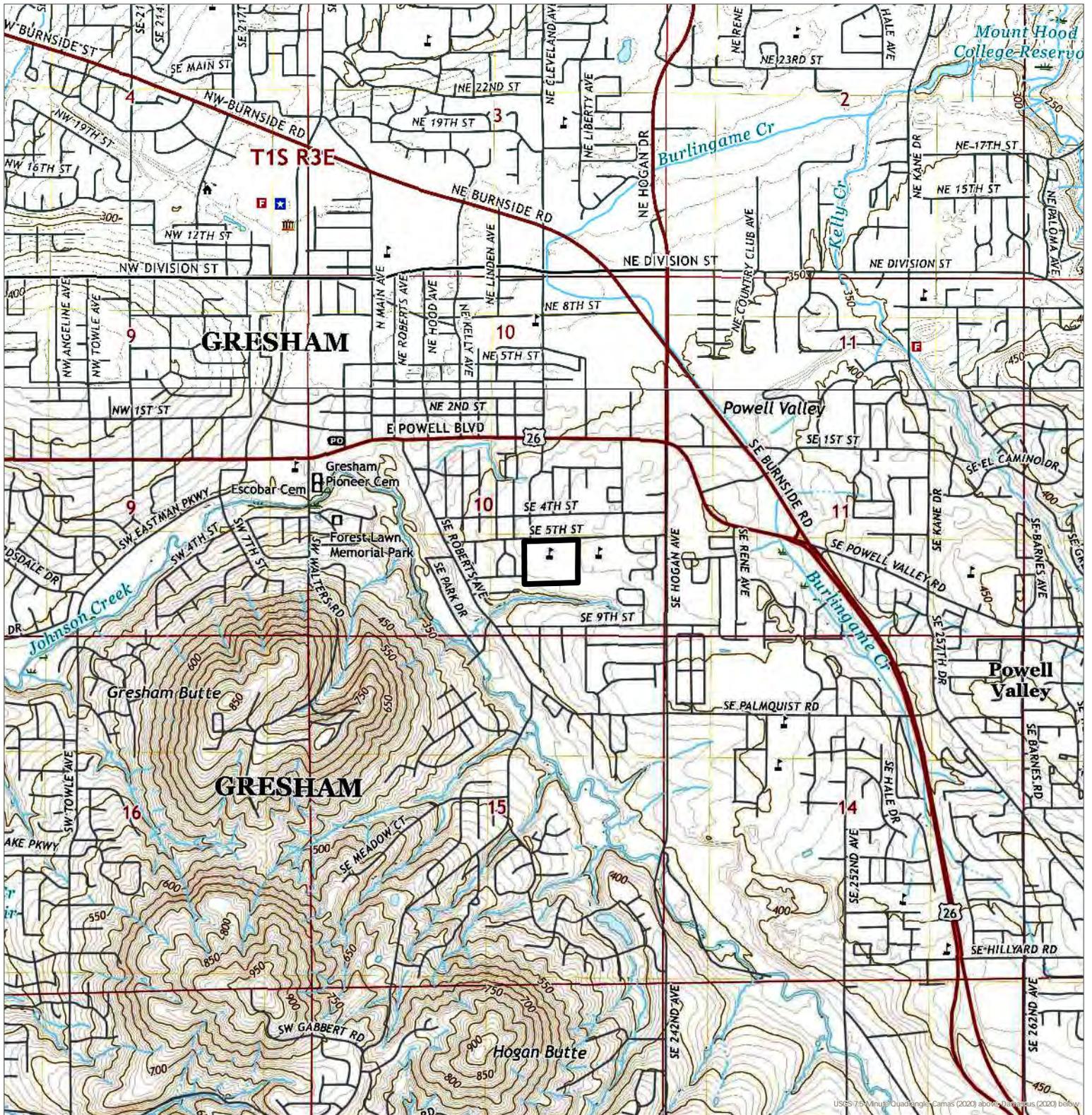
<sup>7</sup> DEQ (State of Oregon Department of Environmental Quality). (2015, July 31). *Quality Assurance for the Environmental Cleanup Programs*.

# Figures

Figure 1. Vicinity Map

Figure 2. Site Plan

Figure 3. Study Area



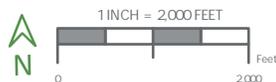
### Site Vicinity

900 SE 5th Street, Gresham, Oregon

Date: October 2023 | Project: 23767.204

Figure: 1

 Site Boundary



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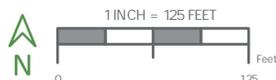
## Site Plan

900 SE 5th Street, Gresham, Oregon

Date: October 2023 | Project: 23767.204

Figure: 2

- Former Underground Storage Tank
- Former Shop Building
- Study Area
- Site Boundary



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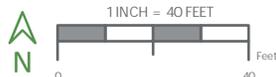
## Study Area

900 SE 5th Street, Gresham, Oregon

Date: October 2023 | Project: 23767.204

Figure: 3

- Proposed Soil Vapor Sampling Point
- ⊕ Decommissioned Monitoring Well
- ⊙ Proposed Monitoring Well
- Former Underground Storage Tank
- Former Shop Building
- - - Study Area
- ▭ Site Boundary



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# Table

Table 1. Summary of Groundwater Monitoring Analytical Results – TPH, VOCs, and Lead

**Table 1. Summary of Groundwater Analytical Results - TPH, VOCs, and Lead**

East Gresham Elementary School  
 900 SE 5th Street, Gresham, Oregon  
 DEQ File #26-95-0187 & #26-19-0304

Well ID	Sample Date	Total Petroleum Hydrocarbons (TPH)			Volatile Organic Compounds (VOCs)														Metals	
		Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	1,2-Dibromoethane (EDB)	1,2-Dichloroethane (EDC)	Methyl tert-butyl ether (MTBE)	Naphthalene	Isopropylbenzene	n-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	n-Butylbenzene	sec-Butylbenzene	Dissolved Lead	
		µg/L																		
MW-1	4/17/1996	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	1.0
	10/30/1996	-	-	-	5.0	5.0	5.0	5.0	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	< 0.5	< 2.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	< 0.5	< 0.5	< 0.5	< 0.5	-	-	1.28	
	5/16/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-2	4/17/1996	-	-	-	5.0	5.0	< 1.0	13.0	-	-	-	-	-	-	-	-	-	-	-	3.6
	10/30/1996	-	-	-	348	55	42	169	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	70	9.3	20	18.6	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	190	41.9	59.3	48.3	< 0.5	< 0.5	< 0.5	54.3	19.7	32.4	10.3	18.2	-	-	2.26	
	5/16/2019	2,460	77.7	< 151	19.5	3.67	6.06	8.67	< 0.5	0.790	< 1.00	3.15	1.84	3.71	7.84	15.6	< 1.00	< 1.00	-	
MW-3	4/17/1996	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	-	-	-	< 5.0
	10/30/1996	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5/16/2019	< 100	< 75.5	< 151	< 0.200	< 1.00	< 0.500	< 1.50	< 0.500	< 0.400	< 1.00	< 2.00	< 1.00	< 0.500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	-
MW-4	4/17/1996	-	-	-	< 1.0	< 1.0	< 1.0	< 1.0	-	-	-	-	-	-	-	-	-	-	-	< 5.0
	10/30/1996	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	< 0.5	< 2.0	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	0.96	< 0.5	< 0.5	< 0.5	-	-	< 1.0	
	5/16/2019	< 100	< 75.5	< 151	< 0.200	< 1.00	< 0.500	< 1.50	< 0.500	< 0.400	< 1.00	< 2.00	< 1.00	< 0.500	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	-
MW-5	4/17/1996	-	-	-	1,100	50	180	180	-	-	-	-	-	-	-	-	-	-	-	3.7
	10/30/1996	-	-	-	329	12	57	33	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	150	3.8	25	12.7	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	312	2.08	26.2	4.73	< 0.5	< 0.5	38.7	13.0	15.4	20	5.37	2.6	-	-	< 1.0	
	5/16/2019	216	< 75.5	< 151	0.730	< 1.00	< 0.500	< 1.50	< 0.500	< 0.400	< 1.00	< 2.00	< 1.00	< 0.500	< 1.00	< 1.00	< 1.00	1.45	-	
MW-6	10/30/1996	-	-	-	109	10	30	11	-	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	40	3.8	9.7	5.4	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	15.5	< 2.0	11.4	< 0.5	< 0.5	< 0.5	8.07	< 5.0	16.3	28.6	< 0.5	1.16	-	-	< 1.0	
	5/16/2019	< 100	< 75.5	< 151	0.310	< 1.00	< 0.500	< 1.50	< 0.500	< 0.400	< 1.00	< 2.00	< 1.00	< 0.500	< 1.00	< 1.00	< 1.00	< 1.00	-	

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Well ID	Sample Date	Total Petroleum Hydrocarbons (TPH)			Volatile Organic Compounds (VOCs)														Metals
		Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	1,2-Dibromoethane (EDB)	1,2-Dichloroethane (EDC)	Methyl tert-butyl ether (MTBE)	Naphthalene	Isopropylbenzene	n-Propylbenzene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	n-Butylbenzene	sec-Butylbenzene	Dissolved Lead
µg/L																			
MW-7	10/30/1996	-	-	-	<b>24</b>	8	<b>100</b>	83	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	<b>6.7</b>	2.2	<b>12</b>	32.7	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	< 0.5	< 2.0	0.69	< 0.5	< 0.5	< 0.5	< 0.5	< 5.0	9.94	15.9	< 0.5	< 0.5	-	-	< 1.0
	5/16/2019	<b>129</b>	< 74.8	< 150	< 0.200	< 1.00	< 0.500	< 1.50	< 0.500	< 0.400	< 1.00	< 2.00	< 1.00	< 0.500	< 1.00	< 1.00	< 1.00	< 1.00	-
MW-8	10/30/1996	-	-	-	< 0.5	< 0.5	< 0.5	< 0.5	-	-	-	-	-	-	-	-	-	-	-
	2/11/1997	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8/30/2007	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5/16/2019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Groundwater in Excavation <sup>1</sup>	Construction & Excavation Worker	14,000	>S		1,800	220,000	4,500	23,000	27	630	63,000	500	51,000	NS	6,300	7,500	NS	NS	> S
Ingestion from Tapwater <sup>1</sup>	Occupational	<b>450</b>	450		<b>2.1</b>	6,300	<b>6.4</b>	830	0.034	<b>0.78</b>	68	<b>0.72</b>	2,000	NS	250	280	NS	NS	15
	Residential	<b>110</b>	110		<b>0.46</b>	1,100	<b>1.5</b>	190	0.0075	<b>0.17</b>	<b>14</b>	<b>0.17</b>	440	NS	54	59	NS	NS	15
Volatilization to Indoor Air <sup>2</sup>	Commercial	<b>520</b>	1,700		<b>12</b>	150,000	<b>31</b>	3,300	1.5	18	3,200	<b>50</b>	9,100	22,000	2,400	1,700	NS	NS	NV
	Residential	<b>120</b>	400		<b>2.8</b>	36,000	<b>7.1</b>	780	0.34	4.0	740	<b>11</b>	2,200	5,300	560	400	NS	NS	NV
Volatilization to Outdoor Air <sup>1</sup>	Occupational	>S	>S		14,000	>S	43,000	>S	790	9,000	1,500,000	16,000	>S	NS	>S	>S	NS	NS	NV
	Residential	>S	>S		3,100	> S	9,900	>S	180	2,100	350,000	3,600	>S	NS	>S	>S	NS	NS	NV

Notes:

See laboratory report for full list of analytes and quality-control data.

**Bold** text indicates an exceedance of one or more of the cleanup levels.

<: not detected above the laboratory reporting limit

-: analyte not tested

µg/L: micrograms per liter

>S: The groundwater RBC exceeds the solubility limit.

NS: no set value for this analyte

NV: this analyte is considered nonvolatile

<sup>1</sup>Oregon Risk-Based Decision-Making for the Remediation of Petroleum-Contaminated Sites, Oregon DEQ Sept. 2003. Revised RBCs June 2023.

# **Appendix A**

## **Laboratory Report**



**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
EPA ID: OR01039

Friday, May 24, 2019

Chris Sheridan  
PBS Engineering and Environmental  
4412 SW Corbett Ave  
Portland, OR 97239

RE: A9E0583 - East Gresham Elementary - 23767.204

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A9E0583, which was received by the laboratory on 5/17/2019 at 10:12:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: [ldomenighini@apex-labs.com](mailto:ldomenighini@apex-labs.com), or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of final reporting, unless prior arrangements have been made.

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Cooler Receipt Information

(See Cooler Receipt Form for details)

Cooler #1	1.6 degC	Cooler #2	1.8 degC
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This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.

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Lisa Domenighini, Client Services Manager



**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
EPA ID: OR01039

**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **East Gresham Elementary**

Project Number: **23767.204**

Project Manager: **Chris Sheridan**

**Report ID:**

**A9E0583 - 05 24 19 1403**

**ANALYTICAL REPORT FOR SAMPLES**

**SAMPLE INFORMATION**

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW2-GW	A9E0583-01	Water	05/16/19 16:05	05/17/19 10:12
MW3-GW	A9E0583-02	Water	05/16/19 16:35	05/17/19 10:12
MW4-GW	A9E0583-03	Water	05/16/19 14:30	05/17/19 10:12
MW5-GW	A9E0583-04	Water	05/16/19 12:20	05/17/19 10:12
MW6-GW	A9E0583-05	Water	05/16/19 12:55	05/17/19 10:12
MW7-GW	A9E0583-06	Water	05/16/19 11:00	05/17/19 10:12
MWDUP-GW	A9E0583-07	Water	05/16/19 12:00	05/17/19 10:12
TB-05162019	A9E0583-08	Water	05/16/19 17:00	05/17/19 10:12

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> <b>A9E0583 - 05 24 19 1403</b>
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**ANALYTICAL SAMPLE RESULTS**

**Diesel and/or Oil Hydrocarbons by NWTPH-Dx**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW2-GW (A9E0583-01)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	0.0777	---	0.0755	mg/L	1	05/23/19	NWTPH-Dx	F-18
Oil	ND	---	0.151	mg/L	1	05/23/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 80 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/23/19</i>	<i>NWTPH-Dx</i>
<b>MW3-GW (A9E0583-02)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	ND	---	0.0755	mg/L	1	05/23/19	NWTPH-Dx	
Oil	ND	---	0.151	mg/L	1	05/23/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 80 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/23/19</i>	<i>NWTPH-Dx</i>
<b>MW4-GW (A9E0583-03)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	ND	---	0.0755	mg/L	1	05/23/19	NWTPH-Dx	
Oil	ND	---	0.151	mg/L	1	05/23/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 81 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/23/19</i>	<i>NWTPH-Dx</i>
<b>MW5-GW (A9E0583-04)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	ND	---	0.0755	mg/L	1	05/22/19	NWTPH-Dx	
Oil	ND	---	0.151	mg/L	1	05/22/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 78 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/22/19</i>	<i>NWTPH-Dx</i>
<b>MW6-GW (A9E0583-05RE1)</b>				<b>Matrix: Water</b>		<b>Batch: 9051224</b>		
Diesel	ND	---	0.0755	mg/L	1	05/24/19	NWTPH-Dx	
Oil	ND	---	0.151	mg/L	1	05/24/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 77 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/24/19</i>	<i>NWTPH-Dx</i>
<b>MW7-GW (A9E0583-06)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	ND	---	0.0748	mg/L	1	05/23/19	NWTPH-Dx	
Oil	ND	---	0.150	mg/L	1	05/23/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 80 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/23/19</i>	<i>NWTPH-Dx</i>
<b>MWDUP-GW (A9E0583-07)</b>				<b>Matrix: Water</b>		<b>Batch: 9051129</b>		
Diesel	ND	---	0.0755	mg/L	1	05/23/19	NWTPH-Dx	
Oil	ND	---	0.151	mg/L	1	05/23/19	NWTPH-Dx	
<i>Surrogate: o-Terphenyl (Surr)</i>		<i>Recovery: 88 %</i>		<i>Limits: 50-150 %</i>		<i>1</i>	<i>05/23/19</i>	<i>NWTPH-Dx</i>

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Lisa Domenighini, Client Services Manager

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<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> <b>A9E0583 - 05 24 19 1403</b>
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**ANALYTICAL SAMPLE RESULTS**

**Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW2-GW (A9E0583-01)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Gasoline Range Organics</b>	<b>2.46</b>	---	0.100	mg/L	1	05/17/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 105 %	Limits: 50-150 %	1	05/17/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		101 %	50-150 %	1	05/17/19	NWTPH-Gx (MS)		
<b>MW3-GW (A9E0583-02)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Gasoline Range Organics</b>	<b>ND</b>	---	0.100	mg/L	1	05/17/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 101 %	Limits: 50-150 %	1	05/17/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		105 %	50-150 %	1	05/17/19	NWTPH-Gx (MS)		
<b>MW4-GW (A9E0583-03)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Gasoline Range Organics</b>	<b>ND</b>	---	0.100	mg/L	1	05/17/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 101 %	Limits: 50-150 %	1	05/17/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		104 %	50-150 %	1	05/17/19	NWTPH-Gx (MS)		
<b>MW5-GW (A9E0583-04)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Gasoline Range Organics</b>	<b>0.216</b>	---	0.100	mg/L	1	05/18/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 101 %	Limits: 50-150 %	1	05/18/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		102 %	50-150 %	1	05/18/19	NWTPH-Gx (MS)		
<b>MW6-GW (A9E0583-05)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Gasoline Range Organics</b>	<b>ND</b>	---	0.100	mg/L	1	05/18/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 103 %	Limits: 50-150 %	1	05/18/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		105 %	50-150 %	1	05/18/19	NWTPH-Gx (MS)		
<b>MW7-GW (A9E0583-06)</b>				<b>Matrix: Water</b>		<b>Batch: 9051041</b>		
<b>Gasoline Range Organics</b>	<b>0.129</b>	---	0.100	mg/L	1	05/20/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 98 %	Limits: 50-150 %	1	05/20/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		103 %	50-150 %	1	05/20/19	NWTPH-Gx (MS)		
<b>MWDUP-GW (A9E0583-07)</b>				<b>Matrix: Water</b>		<b>Batch: 9051041</b>		
<b>Gasoline Range Organics</b>	<b>0.133</b>	---	0.100	mg/L	1	05/20/19	NWTPH-Gx (MS)	
Surrogate: 4-Bromofluorobenzene (Sur)		Recovery: 97 %	Limits: 50-150 %	1	05/20/19	NWTPH-Gx (MS)		
1,4-Difluorobenzene (Sur)		103 %	50-150 %	1	05/20/19	NWTPH-Gx (MS)		

Apex Laboratories

Lisa Domenighini, Client Services Manager

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW2-GW (A9E0583-01)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Acetone	ND	---	20.0	ug/L	1	05/17/19	EPA 8260C	
Acrylonitrile	ND	---	48.0	ug/L	1	05/17/19	EPA 8260C	R-02
<b>Benzene</b>	<b>19.5</b>	---	0.200	ug/L	1	05/17/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Bromoform	ND	---	4.00	ug/L	1	05/17/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Butanone (MEK)	ND	---	19.0	ug/L	1	05/17/19	EPA 8260C	R-02
n-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
<b>1,2-Dichloroethane (EDC)</b>	<b>0.790</b>	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW2-GW (A9E0583-01)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
<b>Ethylbenzene</b>	<b>6.06</b>	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
<b>Isopropylbenzene</b>	<b>1.84</b>	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/17/19	EPA 8260C	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
<b>Naphthalene</b>	<b>3.15</b>	---	2.00	ug/L	1	05/17/19	EPA 8260C	
<b>n-Propylbenzene</b>	<b>3.71</b>	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
<b>Toluene</b>	<b>3.67</b>	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
<b>1,2,4-Trimethylbenzene</b>	<b>7.84</b>	---	1.00	ug/L	1	05/17/19	EPA 8260C	
<b>1,3,5-Trimethylbenzene</b>	<b>15.6</b>	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
<b>m,p-Xylene</b>	<b>6.34</b>	---	1.00	ug/L	1	05/17/19	EPA 8260C	
<b>o-Xylene</b>	<b>2.33</b>	---	0.500	ug/L	1	05/17/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>

<b>MW3-GW (A9E0583-02)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Acetone	ND	---	20.0	ug/L	1	05/17/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
Benzene	ND	---	0.200	ug/L	1	05/17/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW3-GW (A9E0583-02)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Bromoform	ND	---	4.00	ug/L	1	05/17/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/17/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW3-GW (A9E0583-02)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>

<b>MW4-GW (A9E0583-03)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Acetone	ND	---	20.0	ug/L	1	05/17/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
Benzene	ND	---	0.200	ug/L	1	05/17/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Bromoform	ND	---	4.00	ug/L	1	05/17/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW4-GW (A9E0583-03)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Carbon disulfide	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/17/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/17/19	EPA 8260C	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/17/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW4-GW (A9E0583-03)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/17/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/17/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/17/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/17/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/17/19</i>	<i>EPA 8260C</i>

<b>MW5-GW (A9E0583-04)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Acetone	ND	---	20.0	ug/L	1	05/18/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
<b>Benzene</b>	<b>0.730</b>	---	0.200	ug/L	1	05/18/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Bromoform	ND	---	4.00	ug/L	1	05/18/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
<b>sec-Butylbenzene</b>	<b>1.45</b>	---	1.00	ug/L	1	05/18/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW5-GW (A9E0583-04)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/18/19	EPA 8260C	
4-Methyl-2-pentanone (MIBK)	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW5-GW (A9E0583-04)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>	<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>	
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>	<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>	
<i>4-Bromofluorobenzene (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>	<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>	
<b>MW6-GW (A9E0583-05)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Acetone	ND	---	20.0	ug/L	1	05/18/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
<b>Benzene</b>	<b>0.310</b>	---	0.200	ug/L	1	05/18/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Bromoform	ND	---	4.00	ug/L	1	05/18/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW6-GW (A9E0583-05)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/18/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/18/19	EPA 8260C	
4-Methyl-2-pentanone (MIBK)	ND	---	10.0	ug/L	1	05/18/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/18/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW6-GW (A9E0583-05)</b>				<b>Matrix: Water</b>		<b>Batch: 9051001</b>		
Vinyl chloride	ND	---	0.400	ug/L	1	05/18/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/18/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/18/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 107 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/18/19</i>	<i>EPA 8260C</i>
<b>MW7-GW (A9E0583-06)</b>				<b>Matrix: Water</b>		<b>Batch: 9051041</b>		
Acetone	ND	---	20.0	ug/L	1	05/20/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
Benzene	ND	---	0.200	ug/L	1	05/20/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromoform	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW7-GW (A9E0583-06)</b>				<b>Matrix: Water</b>		<b>Batch: 9051041</b>		
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/20/19	EPA 8260C	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> <b>A9E0583 - 05 24 19 1403</b>
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**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MW7-GW (A9E0583-06)</b>			<b>Matrix: Water</b>		<b>Batch: 9051041</b>			
<i>Surrogate: 4-Bromofluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>		
<b>MWDUP-GW (A9E0583-07)</b>			<b>Matrix: Water</b>		<b>Batch: 9051041</b>			
Acetone	ND	---	20.0	ug/L	1	05/20/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
Benzene	ND	---	0.200	ug/L	1	05/20/19	EPA 8260C	
Bromobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromoform	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>MWDUP-GW (A9E0583-07)</b>				<b>Matrix: Water</b>		<b>Batch: 9051041</b>		
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Isopropylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/20/19	EPA 8260C	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>			<i>Recovery: 103 %</i>	<i>Limits: 80-120 %</i>	<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>	
<i>Toluene-d8 (Surr)</i>			<i>102 %</i>	<i>80-120 %</i>	<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>	
<i>4-Bromofluorobenzene (Surr)</i>			<i>102 %</i>	<i>80-120 %</i>	<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>	

<b>TB-05162019 (A9E0583-08)</b>				<b>Matrix: Water</b>		<b>Batch: 9051040</b>		
Acetone	ND	---	20.0	ug/L	1	05/20/19	EPA 8260C	
Acrylonitrile	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
Benzene	ND	---	0.200	ug/L	1	05/20/19	EPA 8260C	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>TB-05162019 (A9E0583-08)</b>				<b>Matrix: Water</b>		<b>Batch: 9051040</b>		
Bromobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Bromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromodichloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Bromoform	ND	---	4.00	ug/L	1	05/20/19	EPA 8260C	
Bromomethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
n-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
sec-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
tert-Butylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Carbon disulfide	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Carbon tetrachloride	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Chloroethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
Chloroform	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Chloromethane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Chlorotoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Dibromochloromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dibromomethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Ethylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	05/20/19	EPA 8260C	
2-Hexanone	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**ANALYTICAL SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes
<b>TB-05162019 (A9E0583-08)</b>				<b>Matrix: Water</b>		<b>Batch: 9051040</b>		
Isopropylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Methylene chloride	ND	---	3.00	ug/L	1	05/20/19	EPA 8260C	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	05/20/19	EPA 8260C	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Naphthalene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
n-Propylbenzene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Styrene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Toluene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	05/20/19	EPA 8260C	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
Vinyl chloride	ND	---	0.400	ug/L	1	05/20/19	EPA 8260C	
m,p-Xylene	ND	---	1.00	ug/L	1	05/20/19	EPA 8260C	
o-Xylene	ND	---	0.500	ug/L	1	05/20/19	EPA 8260C	
<i>Surrogate: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 104 %</i>		<i>Limits: 80-120 %</i>		<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>1</i>	<i>05/20/19</i>	<i>EPA 8260C</i>



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Diesel and/or Oil Hydrocarbons by NWTPH-Dx**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051129 - EPA 3510C (Fuels/Acid Ext.)</b>						<b>Water</b>						
<b>Blank (9051129-BLK1)</b>		Prepared: 05/22/19 08:25 Analyzed: 05/23/19 01:41										
<b>NWTPH-Dx</b>												
Diesel	ND	---	0.0727	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.145	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 94 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					
<b>LCS (9051129-BS1)</b>		Prepared: 05/22/19 08:25 Analyzed: 05/23/19 02:04										
<b>NWTPH-Dx</b>												
Diesel	0.429	---	0.0800	mg/L	1	0.500	---	86	58 - 115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 96 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					
<b>LCS Dup (9051129-BSD1)</b>		Prepared: 05/22/19 08:25 Analyzed: 05/23/19 02:26 <span style="float: right;"><b>Q-19</b></span>										
<b>NWTPH-Dx</b>												
Diesel	0.405	---	0.0800	mg/L	1	0.500	---	81	58 - 115%	6	20%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 95 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					
<b>Batch 9051224 - EPA 3510C (Fuels/Acid Ext.)</b>						<b>Water</b>						
<b>Blank (9051224-BLK1)</b>		Prepared: 05/23/19 15:12 Analyzed: 05/23/19 23:49										
<b>NWTPH-Dx</b>												
Diesel	ND	---	0.0800	mg/L	1	---	---	---	---	---	---	
Oil	ND	---	0.160	mg/L	1	---	---	---	---	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 83 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					
<b>LCS (9051224-BS1)</b>		Prepared: 05/23/19 15:12 Analyzed: 05/24/19 00:11										
<b>NWTPH-Dx</b>												
Diesel	0.394	---	0.0800	mg/L	1	0.500	---	79	58 - 115%	---	---	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 92 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					
<b>LCS Dup (9051224-BSD1)</b>		Prepared: 05/23/19 15:12 Analyzed: 05/24/19 00:32 <span style="float: right;"><b>Q-19</b></span>										
<b>NWTPH-Dx</b>												
Diesel	0.388	---	0.0800	mg/L	1	0.500	---	78	58 - 115%	1	20%	
<i>Surr: o-Terphenyl (Surr)</i>		<i>Recovery: 86 %</i>			<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>					

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**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC % REC	% REC Limits	RPD RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051001-BLK1)</b>		Prepared: 05/17/19 12:00 Analyzed: 05/17/19 14:25										
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 102 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						
<b>LCS (9051001-BS2)</b>		Prepared: 05/17/19 12:00 Analyzed: 05/17/19 13:58										
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	0.500	---	0.100	mg/L	1	0.500	---	100	80 - 120%	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 103 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>100 %</i>		<i>50-150 %</i>		<i>"</i>						
<b>Duplicate (9051001-DUP2)</b>		Prepared: 05/17/19 14:13 Analyzed: 05/17/19 23:25										
<u>QC Source Sample: MW3-GW (A9E0583-02)</u>												
<u>NWTPH-Gx (MS)</u>												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	ND	---	---	---	30%	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 100 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>104 %</i>		<i>50-150 %</i>		<i>"</i>						



<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> A9E0583 - 05 24 19 1403
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**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051041-BLK1)</b>		Prepared: 05/20/19 10:37 Analyzed: 05/20/19 13:17										
<b>NWTPH-Gx (MS)</b>												
Gasoline Range Organics	ND	---	0.100	mg/L	1	---	---	---	---	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 94 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>103 %</i>		<i>50-150 %</i>		<i>"</i>						
<b>LCS (9051041-BS2)</b>		Prepared: 05/20/19 10:37 Analyzed: 05/20/19 12:50										
<b>NWTPH-Gx (MS)</b>												
Gasoline Range Organics	0.460	---	0.100	mg/L	1	0.500	---	92	80 - 120%	---	---	---
<i>Surr: 4-Bromofluorobenzene (Sur)</i>		<i>Recovery: 102 %</i>		<i>Limits: 50-150 %</i>		<i>Dilution: 1x</i>						
<i>1,4-Difluorobenzene (Sur)</i>		<i>102 %</i>		<i>50-150 %</i>		<i>"</i>						



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051001-BLK1)</b>		Prepared: 05/17/19 12:00		Analyzed: 05/17/19 14:25								
<b>EPA 8260C</b>												
Acetone	ND	---	20.0	ug/L	1	---	---	---	---	---	---	
Acrylonitrile	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Bromoform	ND	---	4.00	ug/L	1	---	---	---	---	---	---	
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
n-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
sec-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
tert-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Carbon disulfide	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051001-BLK1)</b>	Prepared: 05/17/19 12:00					Analyzed: 05/17/19 14:25						
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	3.00	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051001-BLK1)</b>		Prepared: 05/17/19 12:00		Analyzed: 05/17/19 14:25								
o-Xylene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>101 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>"</i>						
<b>LCS (9051001-BS1)</b>		Prepared: 05/17/19 12:00		Analyzed: 05/17/19 13:31								
<b>EPA 8260C</b>												
Acetone	41.5	---	20.0	ug/L	1	40.0	---	104	80 - 120%	---	---	
Acrylonitrile	21.9	---	2.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Benzene	21.8	---	0.200	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Bromochloromethane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Bromodichloromethane	23.4	---	1.00	ug/L	1	20.0	---	117	80 - 120%	---	---	
Bromoform	16.2	---	4.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
Bromomethane	21.1	---	5.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
2-Butanone (MEK)	44.7	---	10.0	ug/L	1	40.0	---	112	80 - 120%	---	---	
n-Butylbenzene	22.0	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
sec-Butylbenzene	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
tert-Butylbenzene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Carbon disulfide	22.8	---	10.0	ug/L	1	20.0	---	114	80 - 120%	---	---	
Carbon tetrachloride	23.0	---	1.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
Chlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloroethane	22.9	---	5.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
Chloroform	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Chloromethane	24.2	---	5.00	ug/L	1	20.0	---	<b>121</b>	<b>80 - 120%</b>	---	---	Q-56
2-Chlorotoluene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
4-Chlorotoluene	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Dibromochloromethane	18.6	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	17.9	---	5.00	ug/L	1	20.0	---	89	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	21.6	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
Dibromomethane	22.3	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,2-Dichlorobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,3-Dichlorobenzene	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,4-Dichlorobenzene	18.7	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (9051001-BS1)</b>	Prepared: 05/17/19 12:00					Analyzed: 05/17/19 13:31						
Dichlorodifluoromethane	24.7	---	1.00	ug/L	1	20.0	---	<b>123</b>	<b>80 - 120%</b>	---	---	Q-56
1,1-Dichloroethane	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	22.4	---	0.400	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1-Dichloroethene	19.5	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
cis-1,2-Dichloroethene	22.5	---	0.400	ug/L	1	20.0	---	113	80 - 120%	---	---	
trans-1,2-Dichloroethene	19.7	---	0.400	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2-Dichloropropane	22.2	---	0.500	ug/L	1	20.0	---	111	80 - 120%	---	---	
1,3-Dichloropropane	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
2,2-Dichloropropane	24.6	---	1.00	ug/L	1	20.0	---	<b>123</b>	<b>80 - 120%</b>	---	---	Q-56
1,1-Dichloropropene	22.3	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
cis-1,3-Dichloropropene	23.1	---	1.00	ug/L	1	20.0	---	115	80 - 120%	---	---	
trans-1,3-Dichloropropene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
Ethylbenzene	21.1	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Hexachlorobutadiene	20.7	---	5.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
2-Hexanone	40.1	---	10.0	ug/L	1	40.0	---	100	80 - 120%	---	---	
Isopropylbenzene	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
4-Isopropyltoluene	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
Methylene chloride	15.7	---	3.00	ug/L	1	20.0	---	<b>78</b>	<b>80 - 120%</b>	---	---	Q-55
4-Methyl-2-pentanone (MiBK)	44.3	---	10.0	ug/L	1	40.0	---	111	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Naphthalene	20.9	---	2.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
n-Propylbenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Styrene	21.3	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	23.0	---	0.400	ug/L	1	20.0	---	115	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	21.3	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
Tetrachloroethene (PCE)	19.1	---	0.400	ug/L	1	20.0	---	95	80 - 120%	---	---	
Toluene	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,3-Trichlorobenzene	20.9	---	2.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,2,4-Trichlorobenzene	19.9	---	2.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,1-Trichloroethane	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,1,2-Trichloroethane	20.0	---	0.500	ug/L	1	20.0	---	100	80 - 120%	---	---	
Trichloroethene (TCE)	19.9	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
Trichlorofluoromethane	23.2	---	2.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
1,2,3-Trichloropropane	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>												
<b>Water</b>												
<b>LCS (9051001-BS1)</b>												
			Prepared: 05/17/19 12:00			Analyzed: 05/17/19 13:31						
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	22.0	---	2.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,2,4-Trimethylbenzene	22.0	---	1.00	ug/L	1	20.0	---	110	80 - 120%	---	---	
1,3,5-Trimethylbenzene	21.6	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Vinyl chloride	23.1	---	0.400	ug/L	1	20.0	---	116	80 - 120%	---	---	
m,p-Xylene	42.4	---	1.00	ug/L	1	40.0	---	106	80 - 120%	---	---	
o-Xylene	21.2	---	0.500	ug/L	1	20.0	---	106	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr) Recovery: 104 % Limits: 80-120 % Dilution: 1x</i>												
<i>Toluene-d8 (Surr) 101 % 80-120 % "</i>												
<i>4-Bromofluorobenzene (Surr) 94 % 80-120 % "</i>												

<b>Duplicate (9051001-DUP2)</b>												
			Prepared: 05/17/19 14:13			Analyzed: 05/17/19 23:25						
<b>QC Source Sample: MW3-GW (A9E0583-02)</b>												
<b>EPA 8260C</b>												
Acetone	ND	---	20.0	ug/L	1	---	ND	---	---	---	<b>30%</b>	Q-05
Acrylonitrile	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
Benzene	ND	---	0.200	ug/L	1	---	ND	---	---	---	30%	
Bromobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Bromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromodichloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Bromoform	ND	---	4.00	ug/L	1	---	ND	---	---	---	30%	
Bromomethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Butanone (MEK)	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	
n-Butylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
sec-Butylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
tert-Butylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Carbon disulfide	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Chloroethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
Chloroform	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Chloromethane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>												
<b>Water</b>												
<b>Duplicate (9051001-DUP2)</b>			Prepared: 05/17/19 14:13 Analyzed: 05/17/19 23:25									
<b>QC Source Sample: MW3-GW (A9E0583-02)</b>												
Dibromochloromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dibromomethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Ethylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	ND	---	---	---	30%	
2-Hexanone	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Methylene chloride	ND	---	3.00	ug/L	1	---	ND	---	---	---	30%	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	---	ND	---	---	---	30%	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Naphthalene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
n-Propylbenzene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Styrene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	

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<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> A9E0583 - 05 24 19 1403
---------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------	----------------------------------------------

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051001 - EPA 5030B</b>						<b>Water</b>						
<b>Duplicate (9051001-DUP2)</b>			Prepared: 05/17/19 14:13 Analyzed: 05/17/19 23:25									
<b>QC Source Sample: MW3-GW (A9E0583-02)</b>												
Toluene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	---	2.00	ug/L	1	---	ND	---	---	---	30%	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
Vinyl chloride	ND	---	0.400	ug/L	1	---	ND	---	---	---	30%	
m,p-Xylene	ND	---	1.00	ug/L	1	---	ND	---	---	---	30%	
o-Xylene	ND	---	0.500	ug/L	1	---	ND	---	---	---	30%	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 106 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>97 %</i>		<i>80-120 %</i>		<i>"</i>						



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051040 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051040-BLK1)</b>		Prepared: 05/20/19 10:36 Analyzed: 05/20/19 13:13										
<b>EPA 8260C</b>												
Acetone	ND	---	20.0	ug/L	1	---	---	---	---	---	---	---
Acrylonitrile	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	---
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	4.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Butanone (MEK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---
n-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
sec-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
tert-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Carbon disulfide	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051040 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051040-BLK1)</b>	Prepared: 05/20/19 10:36					Analyzed: 05/20/19 13:13						
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	3.00	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	

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4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051040 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051040-BLK1)</b>		Prepared: 05/20/19 10:36		Analyzed: 05/20/19 13:13								
o-Xylene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 105 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>95 %</i>		<i>80-120 %</i>		<i>"</i>						
<b>LCS (9051040-BS1)</b>		Prepared: 05/20/19 10:36		Analyzed: 05/20/19 12:19								
<b>EPA 8260C</b>												
Acetone	49.8	---	20.0	ug/L	1	40.0	---	<b>124</b>	<b>80 - 120%</b>	---	---	Q-56
Acrylonitrile	23.1	---	2.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
Benzene	20.3	---	0.200	ug/L	1	20.0	---	102	80 - 120%	---	---	
Bromobenzene	18.9	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	
Bromochloromethane	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Bromodichloromethane	22.4	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
Bromoform	15.6	---	4.00	ug/L	1	20.0	---	<b>78</b>	<b>80 - 120%</b>	---	---	Q-55
Bromomethane	16.1	---	5.00	ug/L	1	20.0	---	81	80 - 120%	---	---	
2-Butanone (MEK)	49.2	---	10.0	ug/L	1	40.0	---	<b>123</b>	<b>80 - 120%</b>	---	---	Q-56
n-Butylbenzene	21.2	---	1.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
sec-Butylbenzene	20.2	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
tert-Butylbenzene	19.5	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Carbon disulfide	22.0	---	10.0	ug/L	1	20.0	---	110	80 - 120%	---	---	
Carbon tetrachloride	19.6	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chlorobenzene	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Chloroethane	20.8	---	5.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Chloroform	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Chloromethane	24.3	---	5.00	ug/L	1	20.0	---	<b>122</b>	<b>80 - 120%</b>	---	---	Q-56
2-Chlorotoluene	19.8	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
4-Chlorotoluene	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Dibromochloromethane	17.5	---	1.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	19.5	---	5.00	ug/L	1	20.0	---	98	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.9	---	0.500	ug/L	1	20.0	---	105	80 - 120%	---	---	
Dibromomethane	21.4	---	1.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,2-Dichlorobenzene	19.9	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,3-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,4-Dichlorobenzene	18.7	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	

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<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051040 - EPA 5030B</b>												
						<b>Water</b>						
<b>LCS (9051040-BS1)</b>	Prepared: 05/20/19 10:36					Analyzed: 05/20/19 12:19						
Dichlorodifluoromethane	22.4	---	1.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,1-Dichloroethane	18.6	---	0.400	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	21.2	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1-Dichloroethene	17.8	---	0.400	ug/L	1	20.0	---	89	80 - 120%	---	---	
cis-1,2-Dichloroethene	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
trans-1,2-Dichloroethene	18.1	---	0.400	ug/L	1	20.0	---	90	80 - 120%	---	---	
1,2-Dichloropropane	20.8	---	0.500	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,3-Dichloropropane	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
2,2-Dichloropropane	21.9	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,1-Dichloropropene	20.4	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
cis-1,3-Dichloropropene	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
trans-1,3-Dichloropropene	19.2	---	1.00	ug/L	1	20.0	---	96	80 - 120%	---	---	
Ethylbenzene	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Hexachlorobutadiene	21.2	---	5.00	ug/L	1	20.0	---	106	80 - 120%	---	---	
2-Hexanone	48.6	---	10.0	ug/L	1	40.0	---	<b>121</b>	<b>80 - 120%</b>	---	---	Q-56
Isopropylbenzene	22.2	---	1.00	ug/L	1	20.0	---	111	80 - 120%	---	---	
4-Isopropyltoluene	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Methylene chloride	14.4	---	3.00	ug/L	1	20.0	---	<b>72</b>	<b>80 - 120%</b>	---	---	Q-55
4-Methyl-2-pentanone (MiBK)	49.9	---	10.0	ug/L	1	40.0	---	<b>125</b>	<b>80 - 120%</b>	---	---	Q-56
Methyl tert-butyl ether (MTBE)	21.7	---	1.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
Naphthalene	23.5	---	2.00	ug/L	1	20.0	---	118	80 - 120%	---	---	
n-Propylbenzene	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Styrene	21.8	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	21.1	---	0.400	ug/L	1	20.0	---	106	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	20.4	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Tetrachloroethene (PCE)	18.3	---	0.400	ug/L	1	20.0	---	92	80 - 120%	---	---	
Toluene	19.0	---	1.00	ug/L	1	20.0	---	95	80 - 120%	---	---	
1,2,3-Trichlorobenzene	22.4	---	2.00	ug/L	1	20.0	---	112	80 - 120%	---	---	
1,2,4-Trichlorobenzene	21.3	---	2.00	ug/L	1	20.0	---	107	80 - 120%	---	---	
1,1,1-Trichloroethane	18.8	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,1,2-Trichloroethane	19.6	---	0.500	ug/L	1	20.0	---	98	80 - 120%	---	---	
Trichloroethene (TCE)	18.9	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
Trichlorofluoromethane	21.6	---	2.00	ug/L	1	20.0	---	108	80 - 120%	---	---	
1,2,3-Trichloropropane	20.8	---	1.00	ug/L	1	20.0	---	104	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
 Tigard, OR 97223  
 503-718-2323  
 EPA ID: OR01039

<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051040 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (9051040-BS1)</b>		Prepared: 05/20/19 10:36		Analyzed: 05/20/19 12:19								
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	20.3	---	2.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
1,2,4-Trimethylbenzene	21.1	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,3,5-Trimethylbenzene	20.5	---	1.00	ug/L	1	20.0	---	102	80 - 120%	---	---	
Vinyl chloride	22.0	---	0.400	ug/L	1	20.0	---	110	80 - 120%	---	---	
m,p-Xylene	42.5	---	1.00	ug/L	1	40.0	---	106	80 - 120%	---	---	
o-Xylene	21.5	---	0.500	ug/L	1	20.0	---	108	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 101 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>98 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>94 %</i>		<i>80-120 %</i>		<i>"</i>						

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051041-BLK1)</b>		Prepared: 05/20/19 10:37 Analyzed: 05/20/19 13:17										
<b>EPA 8260C</b>												
Acetone	ND	---	20.0	ug/L	1	---	---	---	---	---	---	---
Acrylonitrile	ND	---	2.00	ug/L	1	---	---	---	---	---	---	---
Benzene	ND	---	0.200	ug/L	1	---	---	---	---	---	---	---
Bromobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Bromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromodichloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromoform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Bromomethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Butanone (MEK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---
n-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
sec-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
tert-Butylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Carbon disulfide	ND	---	10.0	ug/L	1	---	---	---	---	---	---	---
Carbon tetrachloride	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Chloroethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
Chloroform	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Chloromethane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
2-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
4-Chlorotoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
Dibromochloromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromo-3-chloropropane	ND	---	5.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dibromoethane (EDB)	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dibromomethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,2-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,3-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
1,4-Dichlorobenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	---
Dichlorodifluoromethane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,2-Dichloroethane (EDC)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
1,1-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
cis-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---
trans-1,2-Dichloroethene	ND	---	0.400	ug/L	1	---	---	---	---	---	---	---

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051041-BLK1)</b>	Prepared: 05/20/19 10:37					Analyzed: 05/20/19 13:17						
1,2-Dichloropropane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
1,3-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
2,2-Dichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
cis-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
trans-1,3-Dichloropropene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Ethylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Hexachlorobutadiene	ND	---	5.00	ug/L	1	---	---	---	---	---	---	
2-Hexanone	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Isopropylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
4-Isopropyltoluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Methylene chloride	ND	---	3.00	ug/L	1	---	---	---	---	---	---	
4-Methyl-2-pentanone (MiBK)	ND	---	10.0	ug/L	1	---	---	---	---	---	---	
Methyl tert-butyl ether (MTBE)	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Naphthalene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
n-Propylbenzene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Styrene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,1,2-Tetrachloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2,2-Tetrachloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Tetrachloroethene (PCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Toluene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trichlorobenzene	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,1,1-Trichloroethane	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloroethane	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
Trichloroethene (TCE)	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
Trichlorofluoromethane	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,3-Trichloropropane	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	ND	---	2.00	ug/L	1	---	---	---	---	---	---	
1,2,4-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
1,3,5-Trimethylbenzene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	
Vinyl chloride	ND	---	0.400	ug/L	1	---	---	---	---	---	---	
m,p-Xylene	ND	---	1.00	ug/L	1	---	---	---	---	---	---	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>Blank (9051041-BLK1)</b>		Prepared: 05/20/19 10:37 Analyzed: 05/20/19 13:17										
o-Xylene	ND	---	0.500	ug/L	1	---	---	---	---	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>102 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>103 %</i>		<i>80-120 %</i>		<i>"</i>						
<b>LCS (9051041-BS1)</b>		Prepared: 05/20/19 10:37 Analyzed: 05/20/19 12:23										
<b>EPA 8260C</b>												
Acetone	38.8	---	20.0	ug/L	1	40.0	---	97	80 - 120%	---	---	
Acrylonitrile	20.9	---	2.00	ug/L	1	20.0	---	104	80 - 120%	---	---	
Benzene	19.1	---	0.200	ug/L	1	20.0	---	95	80 - 120%	---	---	
Bromobenzene	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
Bromochloromethane	21.7	---	1.00	ug/L	1	20.0	---	109	80 - 120%	---	---	
Bromodichloromethane	20.1	---	1.00	ug/L	1	20.0	---	101	80 - 120%	---	---	
Bromoform	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
Bromomethane	18.9	---	5.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
2-Butanone (MEK)	40.5	---	10.0	ug/L	1	40.0	---	101	80 - 120%	---	---	
n-Butylbenzene	19.4	---	1.00	ug/L	1	20.0	---	97	80 - 120%	---	---	
sec-Butylbenzene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
tert-Butylbenzene	17.5	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
Carbon disulfide	19.1	---	10.0	ug/L	1	20.0	---	95	80 - 120%	---	---	
Carbon tetrachloride	16.9	---	1.00	ug/L	1	20.0	---	85	80 - 120%	---	---	
Chlorobenzene	19.4	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
Chloroethane	14.9	---	5.00	ug/L	1	20.0	---	<b>74</b>	<b>80 - 120%</b>	---	---	Q-55
Chloroform	20.0	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
Chloromethane	22.6	---	5.00	ug/L	1	20.0	---	113	80 - 120%	---	---	
2-Chlorotoluene	18.9	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
4-Chlorotoluene	18.5	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
Dibromochloromethane	17.7	---	1.00	ug/L	1	20.0	---	88	80 - 120%	---	---	
1,2-Dibromo-3-chloropropane	17.5	---	5.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
1,2-Dibromoethane (EDB)	20.2	---	0.500	ug/L	1	20.0	---	101	80 - 120%	---	---	
Dibromomethane	21.0	---	1.00	ug/L	1	20.0	---	105	80 - 120%	---	---	
1,2-Dichlorobenzene	19.5	---	0.500	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,3-Dichlorobenzene	19.1	---	0.500	ug/L	1	20.0	---	96	80 - 120%	---	---	
1,4-Dichlorobenzene	18.8	---	0.500	ug/L	1	20.0	---	94	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



<b><u>PBS Engineering and Environmental</u></b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b><u>East Gresham Elementary</u></b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> <b>A9E0583 - 05 24 19 1403</b>
----------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (9051041-BS1)</b>		Prepared: 05/20/19 10:37		Analyzed: 05/20/19 12:23								
Dichlorodifluoromethane	18.6	---	1.00	ug/L	1	20.0	---	93	80 - 120%	---	---	
1,1-Dichloroethane	19.4	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dichloroethane (EDC)	20.7	---	0.400	ug/L	1	20.0	---	104	80 - 120%	---	---	
1,1-Dichloroethene	18.6	---	0.400	ug/L	1	20.0	---	93	80 - 120%	---	---	
cis-1,2-Dichloroethene	19.8	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
trans-1,2-Dichloroethene	19.3	---	0.400	ug/L	1	20.0	---	97	80 - 120%	---	---	
1,2-Dichloropropane	19.8	---	0.500	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,3-Dichloropropane	19.7	---	1.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
2,2-Dichloropropane	15.5	---	1.00	ug/L	1	20.0	---	<b>78</b>	<b>80 - 120%</b>	---	---	Q-55
1,1-Dichloropropene	18.7	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
cis-1,3-Dichloropropene	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
trans-1,3-Dichloropropene	16.3	---	1.00	ug/L	1	20.0	---	82	80 - 120%	---	---	
Ethylbenzene	18.2	---	0.500	ug/L	1	20.0	---	91	80 - 120%	---	---	
Hexachlorobutadiene	20.0	---	5.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
2-Hexanone	38.8	---	10.0	ug/L	1	40.0	---	97	80 - 120%	---	---	
Isopropylbenzene	18.4	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
4-Isopropyltoluene	18.8	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
Methylene chloride	18.5	---	3.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
4-Methyl-2-pentanone (MiBK)	38.0	---	10.0	ug/L	1	40.0	---	95	80 - 120%	---	---	
Methyl tert-butyl ether (MTBE)	18.0	---	1.00	ug/L	1	20.0	---	90	80 - 120%	---	---	
Naphthalene	17.4	---	2.00	ug/L	1	20.0	---	87	80 - 120%	---	---	
n-Propylbenzene	17.9	---	0.500	ug/L	1	20.0	---	89	80 - 120%	---	---	
Styrene	19.9	---	1.00	ug/L	1	20.0	---	100	80 - 120%	---	---	
1,1,1,2-Tetrachloroethane	16.8	---	0.400	ug/L	1	20.0	---	84	80 - 120%	---	---	
1,1,1,2,2-Tetrachloroethane	20.6	---	0.500	ug/L	1	20.0	---	103	80 - 120%	---	---	
Tetrachloroethene (PCE)	18.9	---	0.400	ug/L	1	20.0	---	94	80 - 120%	---	---	
Toluene	18.3	---	1.00	ug/L	1	20.0	---	92	80 - 120%	---	---	
1,2,3-Trichlorobenzene	19.8	---	2.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2,4-Trichlorobenzene	18.8	---	2.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,1,1-Trichloroethane	18.2	---	0.400	ug/L	1	20.0	---	91	80 - 120%	---	---	
1,1,2-Trichloroethane	20.3	---	0.500	ug/L	1	20.0	---	102	80 - 120%	---	---	
Trichloroethene (TCE)	19.7	---	0.400	ug/L	1	20.0	---	99	80 - 120%	---	---	
Trichlorofluoromethane	23.3	---	2.00	ug/L	1	20.0	---	116	80 - 120%	---	---	
1,2,3-Trichloropropane	19.5	---	1.00	ug/L	1	20.0	---	98	80 - 120%	---	---	

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Lisa Domenighini, Client Services Manager



<b>PBS Engineering and Environmental</b>	Project: <b>East Gresham Elementary</b>	
4412 SW Corbett Ave	Project Number: <b>23767.204</b>	<b>Report ID:</b>
Portland, OR 97239	Project Manager: <b>Chris Sheridan</b>	<b>A9E0583 - 05 24 19 1403</b>

**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Volatile Organic Compounds by EPA 8260C**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 9051041 - EPA 5030B</b>						<b>Water</b>						
<b>LCS (9051041-BS1)</b>		Prepared: 05/20/19 10:37		Analyzed: 05/20/19 12:23								
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon-113)	19.9	---	2.00	ug/L	1	20.0	---	99	80 - 120%	---	---	
1,2,4-Trimethylbenzene	18.9	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
1,3,5-Trimethylbenzene	18.7	---	1.00	ug/L	1	20.0	---	94	80 - 120%	---	---	
Vinyl chloride	18.1	---	0.400	ug/L	1	20.0	---	91	80 - 120%	---	---	
m,p-Xylene	37.0	---	1.00	ug/L	1	40.0	---	92	80 - 120%	---	---	
o-Xylene	18.1	---	0.500	ug/L	1	20.0	---	91	80 - 120%	---	---	
<i>Surr: 1,4-Difluorobenzene (Surr)</i>		<i>Recovery: 103 %</i>		<i>Limits: 80-120 %</i>		<i>Dilution: 1x</i>						
<i>Toluene-d8 (Surr)</i>		<i>100 %</i>		<i>80-120 %</i>		<i>"</i>						
<i>4-Bromofluorobenzene (Surr)</i>		<i>96 %</i>		<i>80-120 %</i>		<i>"</i>						



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**SAMPLE PREPARATION INFORMATION**

**Diesel and/or Oil Hydrocarbons by NWTPH-Dx**

Prep: EPA 3510C (Fuels/Acid Ext.)

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9051129</u>							
A9E0583-01	Water	NWTPH-Dx	05/16/19 16:05	05/22/19 08:25	1060mL/2mL	1000mL/2mL	0.94
A9E0583-02	Water	NWTPH-Dx	05/16/19 16:35	05/22/19 08:25	1060mL/2mL	1000mL/2mL	0.94
A9E0583-03	Water	NWTPH-Dx	05/16/19 14:30	05/22/19 08:25	1060mL/2mL	1000mL/2mL	0.94
A9E0583-04	Water	NWTPH-Dx	05/16/19 12:20	05/22/19 08:25	1060mL/2mL	1000mL/2mL	0.94
A9E0583-06	Water	NWTPH-Dx	05/16/19 11:00	05/22/19 08:25	1070mL/2mL	1000mL/2mL	0.94
A9E0583-07	Water	NWTPH-Dx	05/16/19 12:00	05/22/19 08:25	1060mL/2mL	1000mL/2mL	0.94
<u>Batch: 9051224</u>							
A9E0583-05RE1	Water	NWTPH-Dx	05/16/19 12:55	05/23/19 15:12	1060mL/2mL	1000mL/2mL	0.94

**Gasoline Range Hydrocarbons (Benzene through Naphthalene) by NWTPH-Gx**

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9051001</u>							
A9E0583-01	Water	NWTPH-Gx (MS)	05/16/19 16:05	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-02	Water	NWTPH-Gx (MS)	05/16/19 16:35	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-03	Water	NWTPH-Gx (MS)	05/16/19 14:30	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-04	Water	NWTPH-Gx (MS)	05/16/19 12:20	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-05	Water	NWTPH-Gx (MS)	05/16/19 12:55	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
<u>Batch: 9051041</u>							
A9E0583-06	Water	NWTPH-Gx (MS)	05/16/19 11:00	05/20/19 13:17	5mL/5mL	5mL/5mL	1.00
A9E0583-07	Water	NWTPH-Gx (MS)	05/16/19 12:00	05/20/19 13:17	5mL/5mL	5mL/5mL	1.00

**Volatile Organic Compounds by EPA 8260C**

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9051001</u>							
A9E0583-01	Water	EPA 8260C	05/16/19 16:05	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-02	Water	EPA 8260C	05/16/19 16:35	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-03	Water	EPA 8260C	05/16/19 14:30	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-04	Water	EPA 8260C	05/16/19 12:20	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
A9E0583-05	Water	EPA 8260C	05/16/19 12:55	05/17/19 14:13	5mL/5mL	5mL/5mL	1.00
<u>Batch: 9051040</u>							
A9E0583-08	Water	EPA 8260C	05/16/19 17:00	05/20/19 12:40	5mL/5mL	5mL/5mL	1.00

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Lisa Domenighini, Client Services Manager



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6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
EPA ID: OR01039

<b><u>PBS Engineering and Environmental</u></b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b><u>East Gresham Elementary</u></b> Project Number: <b>23767.204</b> Project Manager: <b>Chris Sheridan</b>	<b>Report ID:</b> <b>A9E0583 - 05 24 19 1403</b>
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**SAMPLE PREPARATION INFORMATION**

**Volatile Organic Compounds by EPA 8260C**

Prep: EPA 5030B

Lab Number	Matrix	Method	Sampled	Prepared	Sample Initial/Final	Default Initial/Final	RL Prep Factor
<u>Batch: 9051041</u>							
A9E0583-06	Water	EPA 8260C	05/16/19 11:00	05/20/19 13:17	5mL/5mL	5mL/5mL	1.00
A9E0583-07	Water	EPA 8260C	05/16/19 12:00	05/20/19 13:17	5mL/5mL	5mL/5mL	1.00

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**PBS Engineering and Environmental**

4412 SW Corbett Ave  
Portland, OR 97239

Project: **East Gresham Elementary**

Project Number: **23767.204**

Project Manager: **Chris Sheridan**

**Report ID:**

**A9E0583 - 05 24 19 1403**

**QUALIFIER DEFINITIONS**

**Client Sample and Quality Control (QC) Sample Qualifier Definitions:**

**Apex Laboratories**

- F-18** Result for Diesel (Diesel Range Organics, C12-C24) is due to overlap from Gasoline or a Gasoline Range product.
- Q-05** Analyses are not controlled on RPD values from sample and duplicate concentrations that are below 5 times the reporting level.
- Q-19** Blank Spike Duplicate (BSD) sample analyzed in place of Matrix Spike/Duplicate samples due to limited sample amount available for analysis.
- Q-55** Daily CCV/LCS recovery for this analyte was below the +/-20% criteria listed in EPA 8260C, however there is adequate sensitivity to ensure detection at the reporting level.
- Q-56** Daily CCV/LCS recovery for this analyte was above the +/-20% criteria listed in EPA 8260C
- R-02** The Reporting Limit for this analyte has been raised to account for interference from coeluting organic compounds present in the sample.

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**REPORTING NOTES AND CONVENTIONS:**

**Abbreviations:**

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported.
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

**Detection Limits: Limit of Detection (LOD)**

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).  
If no value is listed ('----'), then the data has not been evaluated below the Reporting Limit.

**Reporting Limits: Limit of Quantitation (LOQ)**

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

**Reporting Conventions:**

- Basis: Results for soil samples are generally reported on a 100% dry weight basis. The Result Basis is listed following the units as "dry", "wet", or "" (blank) designation.
  - "dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")  
See Percent Solids section for details of dry weight analysis.
  - "wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
  - "" Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

**QC Source:**

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) are not included in this report. Please request a Full QC report if this data is required.

**Miscellaneous Notes:**

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " \*\*\* " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

**Blanks:**

Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).  
-For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.  
-For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.  
For further details, please request a copy of this document.



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**REPORTING NOTES AND CONVENTIONS (Cont.):**

**Blanks (Cont.):**

Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.

'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level.

**Preparation Notes:**

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

**Sampling and Preservation Notes:**

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

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**LABORATORY ACCREDITATION INFORMATION**

**TNI Certification ID: OR100062 (Primary Accreditation) - EPA ID: OR01039**

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

**Apex Laboratories**

Matrix	Analysis	TNI_ID	Analyte	TNI_ID	Accreditation
<u>All reported analytes are included in Apex Laboratories' current ORELAP scope.</u>					

**Secondary Accreditations**

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

**Subcontract Laboratory Accreditations**

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

**Field Testing Parameters**

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

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**PBS Engineering and Environmental**

Project: **East Gresham Elementary**

4412 SW Corbett Ave  
Portland, OR 97239

Project Number: **23767.204**

**Report ID:**

Project Manager: **Chris Sheridan**

**A9E0583 - 05 24 19 1403**

**CHAIN OF CUSTODY**

Lab # A9E0583 of 1

Company: PBS PO#                     

Address: 12232 S.W. Garden Place, Tigard, OR 97223 Ph: 503-718-2323 Fax: 503-718-0333

Project Name: East Gresham Elementary Project # 23767.204

Project Mgr: Chris Sheridan Email: Chris.Sheridan@PBSUSA.COM

Sampled by: Matt Randall Phone:                      Fax:                     

Site Location: Gresham WA

SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	ANALYSIS REQUEST			
						ML, SB, AS, BA, BE, CA, CR, CU, CO, FE, PB, PC, MN, NI, NL, V, ZN, TOTAL DISS, TCLP	TCLP Metals (8)	RCRA Metals (8)	600 TTO
MW2-GW		5/16/14	1605	GW	5	X	X		
MW3-GW		1655							
MW4-GW		0530							
MW5-GW		0720							
MW6-GW		1255							
MW7-GW		1100							
MWDUP-GW		1200							
TB-05162014		1700			1				

Normal Turn Around Time (TAT) = 10 Business Days  
 1 Day 2 Day 3 Day 4 DAY 5 DAY Other:                       
 TAT Requested (circle) YES NO

SPECIAL INSTRUCTIONS:                     

RELINQUISHED BY:                      RECEIVED BY:                     

Signature:                      Date: 5/16/14 Signature:                      Date:                     

Printed Name:                      Time: 1825 Printed Name:                      Time:                     

Company: PBS Company: APEX LABS

*Lisa Domenighini*



<b>PBS Engineering and Environmental</b> 4412 SW Corbett Ave Portland, OR 97239	Project: <b>East Gresham Elementary</b> Project Number: 23767.204 Project Manager: Chris Sheridan	<b>Report ID:</b> A9E0583 - 05 24 19 1403
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**APEX LABS COOLER RECEIPT FORM**

Client: PBS Element WO#: A9 E0583

Project/Project #: East Gresham Elementary 23767.204

**Delivery Info:**  
Date/time received: 5-17-19 @ 1012 By: EJ  
Delivered by: Apex  Client  ESS  FedEx  UPS  Swift  Senvoy  SDS  Other

**Cooler Inspection** Date/time inspected: 5-17-19 @ 1045 By: EJ

Chain of Custody included? Yes  No  Custody seals? Yes  No

Signed/dated by client? Yes  No

Signed/dated by Apex? Yes  No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>1.6</u>	<u>1.8</u>					
Received on ice? (Y/N)	<u>Y</u>	<u>Y</u>					
Temp. blanks? (Y/N)	<u>Y</u>	<u>Y</u>					
Ice type: (Gel/Real/Other)	<u>Real</u>	<u>Real</u>					
Condition:	<u>Good</u>	<u>Good</u>					

Cooler out of temp? (Y/N)  Possible reason why: \_\_\_\_\_  
If some coolers are in temp and some out, were green dots applied to out of temperature samples? Yes/No/NA

Out of temperature samples form initiated? Yes/No/NA

**Samples Inspection:** Date/time inspected: 5/17/19 @ 11:33 By: WS

All samples intact? Yes  No  Comments: \_\_\_\_\_

Bottle labels/COCs agree? Yes  No  Comments: \_\_\_\_\_

COC/container discrepancies form initiated? Yes  No  NA

Containers/volumes received appropriate for analysis? Yes  No  Comments: \_\_\_\_\_

Do VOA vials have visible headspace? Yes  No  NA

Comments: \_\_\_\_\_

Water samples: pH checked: Yes  No  NA  pH appropriate? Yes  No  NA

Comments: \_\_\_\_\_

Additional information: TIB # 2018.

Labeled by: WS Witness: TAM Cooler Inspected by: WS See Project Contact Form: Y

# **Appendix B**

## **Standard Operating Procedures**

## **STANDARD OPERATING PROCEDURE**

### **Development of a Groundwater Monitoring Well**

---

#### **1 PURPOSE**

The purpose of monitoring well development is to remove drilling fluids or other fluids introduced during drilling or well installation, stabilize the filter pack, and remove fine-grained sediment entering the well. This is typically done following groundwater monitoring well construction, no sooner than 24 hours following setting of a bentonite seal. If a dry granular bentonite seal is placed, you may begin development as soon as 12 hours (OAR 690-240-0485) following completion. US EPA recommends waiting at least 48 hours, especially if vigorous surging methods are to be used during well construction.

#### **2 EQUIPMENT LIST**

- Well lock keys
- Field book
- Electronic water level probe
- Interface probe (if dense or light non-aqueous phase liquids are [DNAPL or LNAPL] is present)
- Knife or scissors
- Decontamination equipment
- Site map and health and safety plan
- Personal Protection Equipment (PPE) appropriate for the site
- Submersible pump, air lift pump or other appropriate pump and associated equipment
- Surge block
- Polyvinyl Chloride (PVC) or stainless steel bailer (close in size to inside diameter of well)
- Disposable tubing, if necessary
- Field water quality monitoring equipment
- Turbidity meter
- Containers for purge water

#### **3 PROCEDURE**

The diameter of the well, the total depth of the well, and depth to water will determine the type of pump and equipment used for well development. Surging of the well can be done with a surge block tool or with a submersible pump if it is close in size to the inside diameter of the well. A PVC or stainless steel bailer may work if it is close in size to the inside diameter of the well. The purpose of surging is to suspend as much sediment as possible in the water column so it can be pumped out of the well. It also helps to get the filter pack and aquifer settled and cleaned of fine-grained sediment. The filter pack should have been surged during well construction, prior to placing the overlying seal in the well.

1. Note the general condition of the well. Check the well for damage or evidence of tampering and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
2. Open the well and wait a sufficient period of time for the atmospheric pressure to equalize, allowing the water levels to approach an equilibrium state before taking any measurements.
3. Measure the depth to water (DTW), (and DNAPL or LNAPL if present) relative to the marking on the well casing. If there is no mark, use the north side of the casing. Record the water level in the field book.

4. Measure and record the total depth of the well, making note if the bottom of the well is "soft" and compare it to the finished depth of the well from the well log. Also note the total screen length from the well log.
5. Subtract DTW from total depth for length of water column (WC).
6. Calculate one casing volume as follows:

**CF x WC = Number of gallons in one casing volume**

CF = conversion factor (dependent on well diameter listed in table below)

WC = length of water column in feet.

Well Diameter (inches)	Conversion Factor (gallons/foot)
1	0.04
2	0.17
4	0.65

Annular space is calculated as follows:

$[(\text{Borehole diameter} - \text{casing diameter} / 2)^2] H * N = \text{Number of gallons in annular space}$

H = length of wetted filter pack in feet

N = porosity of filter pack (0.3 to 0.5)

7. Start by surging the well, moving a surge block tool or bailer up and down the length of the screened interval. Following surging (5 to 10 minutes), remove the surge block and install the pump. Place the pump in the bottom half of the screen and pump at a fairly high rate.
8. After the pump has been pumping for a while, measure turbidity and record it. If water begins to clear, measure turbidity, again. Also, surge the well using the pump. If the water becomes more turbid, continue to pump. Record the time, amount pumped and turbidity in the field book.
9. The amount of water required to be pumped from the well is equal the amount of water put into the boring during well drilling and/or construction plus a minimum of 5 to 10 well bore volumes.

Bore hole volume = Number of gallons in annular space + casing volume

At least five well bore volumes need to be removed for monitoring wells set in silty, clayey sands, or silts. If there are coarse-grained soils in the screened interval such as sands and gravels, then 10 well bore volumes should be removed from the boring.

10. After the bottom portion of the water column clears, move the pump up in the well screen and continue to pump. As the water clears, surge using the pump.
11. An alternative to surge and pump would be to use a PVC or stainless steel bailer, close in size to the inside diameter of the well. The bailer could be used as a surge block, catching both sediment and removal of turbid water. It is particularly effective to bounce the bailer off the bottom of the well casing when there is sediment on the bottom of the well, in order to stir up the sediment and get it re-suspended so it can be removed. Sometimes a combination of both pumping and a bailer may be used.

12. Following development, record total depth of well and compare it to initial measurement and total depth at construction. Any sediment in the bottom of the well should be removed during well development, as much as possible. Also record the final water level and turbidity.
13. Decontaminate all pumps and equipment prior to moving to the next well.
14. All water should be stored in drums, tanks or other container, as appropriate.
15. Wells should be allowed to rest and recover at least 24 to 48 hours prior to sampling.

### References

Oregon Department of Environmental Quality. (1992). Groundwater Monitoring Well Drilling, Construction, and Decommissioning. DEQ Guidance Document. August 24, 1992.

OAR 690-240 Construction, Maintenance, Alteration, Conversion and Abandonment of Monitoring Wells, Geotechnical holes and Other Holes in Oregon, (as of October 15, 2007).

US Environmental Protection Agency. (2001). Standard Operating Procedure 2044, Revision 0.1, Monitor Well Development. October 23, 2001.

## **STANDARD OPERATING PROCEDURE**

### **Sampling Groundwater Monitoring Wells**

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#### **1 BACKGROUND AND PURPOSE**

Groundwater samples are collected from monitoring wells for analysis of physical and chemical parameters, either by using field observations and portable equipment and/or using established laboratory analytical methods. The goal of this process is to obtain groundwater samples that are representative of the aquifer (i.e., avoiding a sample that has been impacted by surface or atmospheric conditions).

Low-flow or zero volume purging and sampling methods were developed to produce samples with the least amount of interference resulting from the collection method. Low-flow purging techniques became the industry standard for collecting a groundwater sample because the methods slow groundwater velocity to the well, minimize turbidity and agitation in the water column, and reduce the volume of purged groundwater requiring disposal. These techniques include the use of pumps dedicated to specific wells or the use of a portable pump system. A zero volume/no purging method requires installation of a collection vessel within the well prior to the sample collection event, allowing the water column within the well to equilibrate with the aquifer prior to retrieving the sample. The appropriate technique is dependent on project-specific goals and data quality requirements. Sampling methodology should be confirmed with the PBS project manager (PM) prior to preparing for groundwater monitoring.

The procedures in this Standard Operating Procedure (SOP) are specific to standard monitoring wells with a single-slotted interval. It is assumed that low-flow purging and sampling protocols are used, although these protocols can be easily adjusted for other sampling methods. Temporary borings advanced for a single field event may be sampled using the techniques presented in this SOP.

#### **2 EQUIPMENT AND SUPPLY LIST**

- Well lock keys
- Groundwater Sampling Field Form and Depth to Groundwater Field Form
- Copies of field forms and data tables from previous groundwater monitoring event
- Electronic water level probe or interface probe (if dense or light non-aqueous phase liquids [DNAPL or LNAPL] are potentially present)
- Tubing cutters, knife or scissors (note: some sites do not allow the use of a knife on-site)
- Decontamination equipment
- Measuring cup
- Safety cones
- Bolt cutters
- Replacement well caps, bolts, and padlocks
- Small cup, turkey baster, or large sponge to purge standing water inside well monument
- Fish hooks, stainless steel weight, and fishing line to retrieve objects in the well
- Site map and health and safety plan

- Personal protection equipment (PPE) required for the site, including nitrile gloves (confirm with site-specific health and safety plan)
- Submersible pump or peristaltic pump and associated equipment
- Compressed gas source (nitrogen or air compressor), battery source, or generator and fuel
- Control box
- Disposable tubing, if necessary
- Flow-through cell and water quality parameter meter (e.g. YSI model)
- Buckets or containers for purge water and drum labels
- Sample containers, labels, packaging material
- Coolers and ice for samples

### 3 PROCEDURE

This section outlines standard procedures used for collecting groundwater samples from a monitoring well. Project Managers may modify or remove tasks as dictated by project needs; for example, turbidity or depth-to-bottom measurements may not be warranted at a site with sufficiently developed wells.

Preparation for a monitoring event begins in the office. The first step is to read the scope of work (e.g., proposal, sampling and analysis plan (SAP), work plan) to determine the number and location of monitoring wells to be sampled, health and safety considerations, quality control (QC) samples needed, sample containers required, and equipment needed for the site (peristaltic pump, bladder pump, both, etc.). Recommended preplanning procedures are as follows:

- Prepare, review, or update Health and Safety Plan (HASP) for the site.
- Obtain appropriate PPE for the site (e.g., hard hat, safety vest, gloves, safety glasses, life vest, flame retardant [FR] shirt or other client-required PPE).
- Determine number and type of samples to be collected.
- Determine which laboratory can meet analytical requirements (required analysis, screening levels).
- Order sample containers from laboratory, making sure to order QC sample containers and at least one extra set of containers. Ensure that a Safety Data Sheet (SDS) is provided for any sample preservative supplied by the laboratory.
- Print all forms needed for sampling event (work plan, HASP, depth to water forms, groundwater sampling forms, labels, chain of custody, etc.).
- Schedule PBS vehicle and equipment use on PBS calendars, as warranted.
- Order rental equipment for sampling event, if not available internally.

After arriving at the site, the following procedures should be followed:

- Don appropriate PPE and place safety cones around the work zone, if required by the HASP or deemed necessary by site conditions.
- Open all of the monitoring wells on-site and wait a minimum of 15 minutes for water levels to approach an equilibrium state with atmospheric pressure before taking any measurements.

- Note the general condition of the well on the depth to groundwater field form. Check well for damage or evidence of tampering, and record pertinent observations. Note any maintenance tasks that should be completed, such as well cap or padlock replacement.
- Collect depth to water measurements from each monitoring well, decontaminating the probe between locations. If possible, gauging should be conducted in order from the least to the most contaminated well. The measurements should be collected from all wells prior to beginning sample collection, unless project scope or site conditions indicate otherwise.
- Measure the depth to water relative to the marking on the well casings. If there is no mark, use the north side of the casing. Record the water level on the depth to groundwater field form. Note if DNAPL or LNAPL is present (this typically requires a meter capable of detecting NAPL-water interfaces). If NAPL is present, additional decontamination procedures will be warranted.
- Measure depth to bottom of well to record if sedimentation in the well has occurred.
- Make sure all information is completed on the depth to groundwater field form and sign and date it.

Sampling a groundwater monitoring well utilizing low-flow techniques relies on stabilization of field water quality parameters to determine when groundwater is representative of aquifer conditions. Measurement of groundwater quality parameters with a water quality parameter meter occurs in a closed system in which groundwater does not come in contact with open air; this is important for valid measurements because dissolved oxygen (DO), oxidation-reduction potential (ORP), and pH measurements can be sensitive to reactions with the atmosphere. A flow-through cell (flow cell) connected to the water quality parameter meter provides this closed system and is used to measure field parameters prior to collecting groundwater samples. Stabilization of selected parameters indicates that collected groundwater is representative of the aquifer and conditions are suitable for sampling to begin. See protocol below for stabilization parameters.

Low-flow purge and sample methods require care when placing a portable pump and/or tubing in the well to minimize disturbance to the water column. Pumping rates must be maintained at 0.1 to 0.5 liter per minute to reduce drawdown; the pump should never be run higher than 0.5 liters per minute prior to sampling.

For monitoring wells, sampling should proceed as follows:

- If using a portable pump setup, slowly lower the pump or tubing to the midpoint of the screen or sample interval. Secure the pump or tubing at the surface to prevent it from moving (not applicable if using dedicated pumps).
- Connect the bladder pump (attaching control box, compressor or nitrogen tank with regulator) or peristaltic pump to flow cell containing water quality parameter probes. Place the water level probe in the well so water levels can be measured as you are pumping. Start the pump and adjust the pumping rate to between 0.1 and 0.5 liters per minute (using a measuring cup to calculate the flow rate). Begin recording readings on the groundwater sampling field form. Be sure to purge the initial volume of water in the tubing before taking a reading.
- During purging, record readings of groundwater parameters (listed below) and water level every 3 to 5 minutes on the groundwater sampling field form. A drawdown of less than 0.3 feet in the water column, once the pumping rate has stabilized, is desirable; however, less permeable aquifer material or a clogged well filter pack may result in a deeper drawdown. At a minimum, the depth-to-water should be stabilized for three consecutive readings taken between 3 to 5 minutes apart (in conjunction with the stabilization of the other parameters). Visually describe and record turbidity. Purging is considered complete when the groundwater parameters have stabilized for three consecutive readings.

Field Parameter	Stabilization Goal
Temperature	+/-3%
Specific Conductance	+/- 3% mS/cm
pH	+/- 0.1 pH units
DO	+/- 10% or +/- 0.3 mg/L
ORP	+/- 10 millivolts
Depth to Water	+/- 0.3 feet

Please note that multi-parameter meters may have a resolution greater than the stabilization goal. Note the meter capabilities. If the field parameters do not stabilize within the stabilization goal, but are within the resolution of the meter, it may be acceptable to collect a sample in this scenario. This MUST be noted on the field form.

- Measure turbidity of the sample water using field instruments prior to sample collection and upon any obvious visual changes in turbidity during sample collection.
- Prior to collecting the water sample, the tubing originating in the well must be disconnected from the influent (inflow) side of the flow cell.
- Directly fill the sample containers from the tubing originating in the well. If you are collecting samples for volatile organic compound (VOC) analysis, you may need to decrease the pump rate to minimize volatilization of compounds from the sample; if this is the case, other samples should be collected first. You may restore the flow rate upon completion of filling sample containers for VOC analysis. Fill unpreserved bottles first. Filtered samples should be collected after all other samples have been collected.
- Groundwater samples collected for VOC analysis must be collected with zero headspace in the sample vial. This can be confirmed by gently tapping the sealed vial against a gloved hand to ensure that air bubbles are not present.
- If a duplicate sample is required for the well, it should be filled concurrently with the regular sample. This is accomplished by alternating bottles of the same type during sample collection (e.g., filling one bottle from each sample, then the second bottle from each sample.)
- Groundwater samples for dissolved metals analysis must be field filtered with a 0.45 micron filter directly connected to the tubing. Mark "field filtered" or "FF" on the bottle label, field form, and chain of custody.
- Prior to filling or just after filling, label each bottle with the project name, sample name, and sample date and time, and make sure it is properly sealed. The sample containers may also be labeled with what analysis will be performed (confirm with Project Manager). Place in a cooler with ice and pack for transportation.
- As necessary, pull pump and discard tubing. Decontaminate the pump based on the decontamination procedures established for the site.
- Make sure all information is completed on the groundwater field form and sign and date it.
- Close and lock the well.
- Contain purge and decontamination water in the appropriate containers as established for the project.
- Dispose of used sampling supplies and other waste in appropriate container as established for the project.

If low-flow sampling is not used at the site, these procedures should be modified as appropriate. The objective is to provide high-quality groundwater samples representative of the aquifer. Modifications to this SOP should keep this objective in mind at all times.

After fieldwork is completed:

- Ensure that chain-of-custody form has necessary information including site name, project manager, sample names, date and time collected, requested analysis, special notes (field filtered, MS/MSD, etc.).
- Scan and save field sheets to project folder on server. Retain original field copies in project folder; these are legal documents and should be retained as per PBS guidelines for document retention.
- Report any sampling or well maintenance issues to the project manager for evaluation and remedy.
- Clean and store PBS equipment for use on next project. Report any equipment damage or malfunctions or missing/depleted calibration solutions to the office equipment manager.
- Ship rental equipment back to vendor immediately to minimize project costs. Borrowed PBS equipment should be returned promptly to the lending office.

## References

Puls, R.W. and M.J. Barcelona. *Groundwater Issue Paper: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. US Environmental Protection Agency, EPA 540-S-95-504 (1996).

Yeskis, D. and Bernard Zavala. *Groundwater Issue Paper: Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers*. US Environmental Protection Agency, EPA 542-S-02-001 (May 2002).

## STANDARD OPERATING PROCEDURE Sub-Slab Vapor and Soil Gas Sampling

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### PURPOSE

Vapor intrusion of volatile organic compounds (VOCs) into occupied structures is considered a critical migration pathway requiring assessment at contaminated sites. Specifically, regulators may require property owners to sample soil gas, sub-slab vapor, or indoor air to assess risk to building occupants.

This standard operating procedure (SOP) is intended to guide soil gas or sub-slab vapor sampling efforts when creating temporary sampling points when Method TO-15 or other analytical methods utilizing a Summa canister as the sampling media are required. The sampling points can be modified to produce a permanent sampling location. The sampling protocols for analysis of soil gas or sub-slab vapor by Method TO-17, which utilizes a sorbent tube as the sampling media (instead of a Summa canister), as well as the sampling of indoor air are presented as separate SOPs.

Soil gas and sub-slab vapor sampling is typically conducted based on prior results from other environmental studies, such as soil or groundwater sampling, or if historical uses indicate a human health risk could be present. A variety of issues can significantly affect the results of soil gas and sub-slab vapor sampling. Adherence to this SOP will help ensure that sampling results are valid and reliable. This SOP assumes that samples will be collected in Summa canisters. If other sampling media is used (such as tedlar bags), some of the steps in this SOP may not apply or may need to be modified.

*Use one of the following two methods to conduct the sub-slab vapor or soil gas sampling*

### METHOD 1 – VAPOR PIN

#### 1 EQUIPMENT LIST

The following table lists standard equipment and tools needed for soil gas and sub-slab vapor sampling. When renting a helium meter, ask the vendor for one that is intended for use in leak detection testing (e.g., MGD-2002 multi-gas leak locator). It should have the ability to purge the line quickly (the equipment company may provide a special filter for this), and preferably, a meter with an active pump (as opposed to passive venting). It does not need to be intrinsically safe UNLESS site conditions require this feature.

<p><b>Equipment to get from lab</b></p>	<ul style="list-style-type: none"> <li>• 1 or 6 liter (L) Summa canister.</li> <li>• One extra Summa canister in the event that a canister fails in the field.</li> <li>• Flow regulator (also known as critical orifice) preset by lab for pre-determined sampling time, not to exceed a flow rate of 200 mL/min.</li> <li>• Vacuum gauge (for verifying vacuum prior to sampling, flow regulator may act in this role).</li> <li>• Tubing (new for each sample location). Must be Teflon, Nylaflo, Peek, or stainless tubing. Do NOT use polyethylene tubing.</li> <li>• Chain of custody and identification tags.</li> <li>• T-fitting (need one for each sampling location, including ferrules and hex nuts for each leg of T).</li> </ul>
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<p><b>Other equipment</b></p>	<ul style="list-style-type: none"> <li>• Purging syringe (calibrated, typically for 50 to 60 milliliters [mL]).</li> <li>• Granular bentonite.</li> <li>• Disposable or washable containers (~16 ounces) for mixing bentonite and/or cement.</li> <li>• Water for mixing bentonite and cement.</li> <li>• Sand.</li> <li>• Silicone tubing.</li> <li>• Helium gas tank with regulator.</li> <li>• Helium meter (make sure that it measures in ppm by volume).</li> <li>• On-off valve (two per sampling location).</li> <li>• Vapor Pin with a silicon sleeve (or similar equipment).</li> <li>• Vapor Pin tool and hammer for installation and removal (or similar equipment).</li> <li>• Vapor Pin drill guide (for permanent installations).</li> <li>• Field notebook and/or field forms.</li> <li>• Helium shroud.</li> <li>• Weight for shroud, if needed.</li> <li>• Nuts and ferrules (if you did not receive from lab).</li> <li>• Cap for "shroud air tubing."</li> <li>• Water dam (e.g., 1.5-inch PVC coupler).</li> </ul>
<p><b>Tools</b></p>	<ul style="list-style-type: none"> <li>• Scissors.</li> <li>• Rotohammer/drill for drilling through concrete.</li> <li>• Drill bits (0.625-inch, 1.5-inch).</li> <li>• Crescent wrench (1/2 and 9/16 inch).</li> <li>• Whisk broom/dust pan.</li> <li>• Wet-dry vacuum.</li> <li>• Extra-thin knife/screwdriver.</li> <li>• Extension cord for rotohammer.</li> <li>• Wrench for helium regulator.</li> <li>• Generator (if power is not available)</li> </ul>
<p><b>Supplemental supplies</b></p>	<ul style="list-style-type: none"> <li>• Teflon tape (if seal leaks are sustained).</li> <li>• Purging pump with tubing (if purging syringe not used) and charging cord.</li> <li>• Fast setting concrete to patch floor.</li> <li>• Adhesive to repair carpet or tile.</li> </ul>

## 2 LABORATORY

The lab will supply the Summa canisters, flow regulators, gauges, and tubing, and can also provide the purging syringe, if needed. Have the equipment arrive TWO business days prior to sampling, if possible. This allows the lab time to express-mail any additional, broken, or forgotten equipment.

As soon as the shipment is received, ensure that all equipment was provided and verify the vacuum of all Summa canisters. Order an extra gauge, if needed, to check the canisters for pressure prior to leaving the office. Knowing that the canister has sufficient initial vacuum allows for better trouble shooting in the field.

The following information must be provided to the lab to ensure shipment of the correct equipment:

- Size of canister (400 mL, 1 L, 6 L). A 1 L Summa will require a minimum of two times dilution of reporting limits. If this will cause your sample reporting limits to exceed screening criteria, use a larger Summa canister. You MUST know your reporting limits to determine the canister size.
- Type of canister certification (batch vs. individual). Batch certification is usually sufficient for sub-slab vapor and soil gas sampling projects.
- Method reporting limits.
- Tracer gas to be used (the lab must certify container for this prior to shipping). PBS uses Helium as a tracer gas.
- Sample time/flow rate.

Samples should be collected at a rate between 100 and 175 mL per minute (most guidance documents recommend that samples not be collected faster than 200 mL per minute). A flow rate greater than 200 mL/min runs the risk of introducing ambient air dilution to the sample. The sample time for grab samples is calculated by determining an acceptable sample flow rate (perhaps 150 mL/min) and multiplying that by the sample container size. For a 150 mL/min rate, a 1 L Summa canister would require approximately seven minutes. A 6 L Summa canister would require 40 minutes.

### 3 SUB-SLAB VAPOR INITIAL PROCEDURES

Order equipment as previously identified, and do the following prior to field activities:

- Determine the proposed locations for each sample. Locations should be located at a minimum of 3 feet inside foundation edges or exterior walls to obtain the most representative results.
- Confirm with the property owner/occupant that subsurface utilities will not be impacted when drilling through the slab in these locations.
- Conduct a private utility locates for your locations to check for subslab or subgrade obstructions.
- If possible, determine the slab thickness to confirm that a hand-operated drill can drill through it.
- Determine if carpeting or other flooring will need to be removed prior to drilling, or will require patching.
- Have the helium meter arrive the day before sampling.

Once at the site, sampling should occur as described below.

#### Drill Hole and Seal Tubing

These instructions assume that all samples will be collected using a Vapor Pin or similar equipment.

- Confirm concrete thickness, if possible, so you'll know when to expect the drill bit to break through bottom of slab.
- If the Vapor Pin will be installed for on-going monitoring (i.e., permanent installation), begin by drilling a hole 2 inches into the concrete using the 1.5-inch drill bit. This larger hole will be used to install a flush-

mount cover. Then insert the Vapor Pin drill guide into this hole so that the smaller diameter drill hole will be centered. Continue with the directions below.

- Drill a hole through the slab using the 0.625-inch drill bit. Drill 1 to 3 inches into backfill or native material beneath the concrete slab.
- Use a 0.625-inch tube brush to clean concrete dust from the hole.
- Use the whisk broom or vacuum to remove concrete dust or loose material from around the drill hole.
- Install a Vapor Pin with a silicon sleeve (the silicon sleeve provides the seal) into the 0.625-inch drilled hole utilizing a dead weight hammer and the Vapor Pin installation/extraction tool (or similar equipment).
- If not drilling the 1.5-inch hole, place a small amount of hydrated bentonite on the concrete surface around the Vapor Pin and insert a water dam into the bentonite.
- Place a silicon mat with a circular cut-out for the Vapor Pin on the concrete surface around the sample point and water dam.
- Add a small piece of silicone tubing to the top of the Vapor Pin for attaching tubing later.
- Add a small amount of water to the inside of the water dam to ensure a good seal is in place.
- Place the shroud over the sample point and thread 0.25-inch tubing through a stopper in the shroud.
- Place a weight on the shroud to prevent it from being moved and compromising the seal integrity, if needed.

For temporary holes, allow 20 to 30 minutes for the hole to equilibrate. If collecting sub-slab gas samples at multiple locations, consider performing these initial activities at each location prior to continuing with the sampling.

#### **4 SOIL GAS INITIAL PROCEDURES**

Order equipment as previously identified. Prior to field activities, the following should occur:

- Determine the locations and depths for each sample. Locations should be located at a minimum of 3 feet inside foundation edges or exterior walls to obtain the most representative results.
- Determine if equipment, vehicles, or other stored items will need to be moved prior to the field event.
- Call in a public utility notification.
- Conduct a private utility locates for your locations to check for subgrade utilities/obstructions.
- Arrange for a driller to deploy a Post Run Tubing (PRT) sample system, or equivalent, or arrange with the driller to install a sample point using a hand auger.

Once at the site, sampling should occur as described below.

##### **Drill Hole and Seal Tubing**

- Drill a borehole hole using a PRT system, or equivalent. The bottom of the hole should be at least 5.5 feet below ground surface (bgs), as long as this is above the water table.
- Lift up on the drilling rod approximately 6 inches to create a void in the subsurface.
- Insert the PRT fitting to the 0.25-inch tubing and place down the hole. Once it reaches the bottom, screw the fitting onto the PRT sample point (note: the fitting uses left-hand threads).

- Determine the length of 0.25-inch tubing needed to conduct sampling at this location and cut it to that length. Do not forget that there must be enough tubing to go through the helium shroud, connect to the purging T-valve and connect to the Summa canister. Be sure to cut the ends straight with no burrs or jagged edges.
- Mix bentonite with water for sealing.
- Place bentonite around the rod protruding from the ground.
- Insert bentonite evenly around tubing exiting the drill rod, making sure it penetrates fully into the rod. Thread the other tubing end through the helium shroud/stopper. Cover the loose tubing end with a plastic bag or cap to ensure it remains clean until it is connected to the Summa canister.
- Place the shroud over the drill rod and place more bentonite around the base to seal the shroud to the ground.

### Sample Train Assembly

- Place the shroud over the sample point, and thread tubing through the shroud and shroud stopper.
- Place a weight on the shroud to prevent it from being moved and compromising the seal integrity, if needed.
- Attach an on-off valve to the end of the tubing, then place additional tubing on the other side of the valve. Turn the valve off.
- Install a T-fitting and a second on-off valve in-line with the sample tubing to allow for purging. Add tubing from the third leg of the T-fitting to the Summa canister.
- Connect the gauge and flow regulator to the Summa canister and tubing. Do not over tighten the fittings.
- Record the canister and flow regulator serial numbers on the field form.
- Ensure that all connections are tight and all valves are closed.

For temporary holes, wait 20 to 30 minutes to allow the hole to equilibrate. If a hand auger was used to install the sample point you must wait 48 hours.

## 5 LEAK DETECTION TESTING

Shut-in test and field/laboratory test for helium are two testing methods performed for leak detection.

### Shut-in Test

Evaluate the integrity of the sample train by performing a vacuum shut-in test. Remove a sufficient volume of air from the sample train using the purging syringe to provide a vacuum of at least -15 inches of mercury (Hg). Observe the gauge for at least two minutes to detect any decrease in measured vacuum. The vacuum must be maintained for at least two minutes. If the vacuum is not maintained, check the fittings and retest.

### Helium Test

At this point, you should have the shroud in place with the tubing from the Vapor Pin or soil gas sample point extending from the shroud, and the inlet hose from the helium tank extending into the shroud. Perform these actions:

- Fill the shroud with helium for several seconds and turn off the tank.

- Using the helium meter (meter), measure and record the helium concentration in the shroud in percent (%) or parts-per-million-volume (ppmv) (1% is equivalent to 10,000 ppmv). The target helium concentration is 70 to 90%. Remove the meter from the shroud air tubing and cap the tubing. *Allow meter to clear back to zero.*

### Sample Train Purging

- Open the on-off valve to the Vapor Pin or PRT sampling point tubing. The Summa canister remains closed.
- Determine the amount of air that requires purging within the sampling tubing.
  - Determine how much tubing you need to purge (round up to whole feet).
  - Multiply the number of feet by the volume of air within one unit foot of tubing (see multipliers below for various tubing sizes).
  - Determine how much you need to purge from the hole drilled through the concrete slab or PRT sampler (usually 6 inch length).
  - Add the tubing and hole purge volumes together.
  - You want to remove a minimum of two purge volumes, so multiply volume calculated by two.

Size of tubing (inches)	Air volume in mL per one unit foot
1/4	9.7
3/8	21.7
1/2	38.6
5/8	60.3
3/4	86.9
1	154.4

- Connect the purging syringe and turn the on-off valve to ON.
- Purge the calculated volume of air. Draw the air slowly through the syringe, approximating the sample collection flow rate, to minimize the effect of creating a vacuum that could compromise the connections or seals. If your sample collection rate is 150 mL/min, and you need to purge 50 mL, then take approximately 20 seconds to purge the 50 mL or as slowly as possible.
- If you need to purge more than one syringe volume, complete the first purge, turn the valve on the syringe to OFF, depress the syringe to purge the air out of the syringe, turn syringe valve to ON and repeat the purging process.
- When done purging, turn the on-off valve to OFF.
- Connect the meter to the sample point tubing (Vapor Pin or PRT) and allow the meter to run for approximately one minute. Measure the helium concentration.
- If elevated readings on the helium meter (greater than 5,000 ppmv [0.5%]) are detected, make adjustments to seals.
- Once all necessary adjustments have been made, record the helium measurement in the shroud on field sheet following adjustment to seals.

Once the leak detection testing has confirmed the Vapor Pin or PRT seal is sufficient, proceed to sample collection.

## 6 SAMPLE COLLECTION

- Confirm that all connections remain tight and all valves are closed.
- Close the on-off valve connected to the purging syringe.
- Open the Summa canister by turning its valve approximately one-half turn.
- Immediately record the vacuum on the gauge (it should stabilize very quickly) and the time. The gauge should measure approximately -30 inches Hg (please note that some gauges may read greater than -30 inches Hg). If the vacuum is less than -27 inches Hg, the canister may not have sufficient vacuum for sampling. In this case, select another canister. If another canister is not available, call the project manager and ask how they would like you to proceed.
- Allow the Summa canister to fill, keeping in mind the amount of time determined for sample collection (i.e., what you told the lab to set for a flow regulator time)
- At the mid-point of the sample collection, record the helium concentration in the shroud. Add additional helium if shroud concentration is below 50%, and record the new reading.
- The vacuum gauge should never drop below -5 inches Hg. If the vacuum readings are not matching up with the expected sampling time (the gauge is dropping faster or slower than expected), you will need to use your best judgment as to when to stop the sample collection (or call the lab or project manager to discuss).
- Once the sample has been collected, close the canister valve, be sure it is tightly closed (but do not over tighten), and record the vacuum reading and time.
- Record the helium concentration in the shroud.
- Remove the gauge and flow regulator and replace the canister fitting.
- Fill out the chain of custody and return the containers to the lab with the original chain of custody. Retain a copy of the chain of custody for the project files.

When collecting 6 L Summa canister samples, it is recommended that you monitor the vacuum gauge during the entire sample duration, which can take up to 50 minutes. If the gauge should drop below -5 inches Hg, the sample may be considered void; this can be prevented by watching the gauge. If the gauge drops to 0 inches Hg the sample will need to be re-taken using a new canister.

### Drill Hole Abandonment

Once soil gas sampling is completed, the boring will be abandoned by the licensed drilling subcontractor who completed the borehole following applicable state requirements.

Once sub-slab vapor sampling is completed, the following should occur:

- Remove the water from the water dam.
- Clean out the remaining bentonite, cleaning as much as possible from the floor.
- If the sampling location is for one-time use, deploy the Vapor Pin extraction tool to remove the pin.

- Add a small amount of sand to fill the drill hole approximately 1 to 2 inches below the concrete surface (approximately 1 to 2 inches below the bottom of the “seat”). Do NOT overfill with sand as this may compromise your patch.
- Use the whisk broom to remove any loose material at the surface.
- Fill the upper 1 to 2 inches with a quick setting cement grout. Smooth or feather the surface to help create a bond between the slab and the grout.

If the Vapor Pin or similar equipment is for a permanent installation, the following should occur:

- Place a white cap over the tip of the Vapor Pin.
- Install a permanent cover over the capped Vapor Pin (plastic or metal).

**7 POST FIELD ACTIVITIES**

- Retain all paperwork provided by the lab, including the packing list and certifications. This information must be retained in the permanent project file.
- Decontaminate reusable fittings owned by PBS following the *Standard Operating Procedure for Vapor Pin Decontamination for Vapor Intrusion Assessments*. This includes the Vapor Pin drill guide and any brushes or other tools used for cleaning.
- Return all rental equipment.

**Confirming Helium Detections Meet Regulatory Requirements**

- Calculate average helium concentration in shroud by taking two or more readings before, during, and after sampling (be sure that meter is reading in ppm by volume).
- When lab results are received, if helium is detected, use this formula to confirm level of leakage:  
**Level of leakage** = lab-detected concentration / shroud concentration
- Be sure you are using the same units (ppm may not always equal ppmv – check your units).
- Some regulatory guidance documents allow up to 5 to 10% helium within a sample. Be sure to check your state’s guidance for allowable levels. Oregon and Washington both allow up to 5% helium for a valid sample.

**METHOD 2 – SEALED TUBING**

**1 EQUIPMENT LIST**

The following table lists standard equipment and tools needed for soil or sub-slab gas sampling. When renting a helium meter, ask the vendor for one that is intended for use in leak detection testing. It should have the ability to purge line quickly (the equipment company may provide a special filter for this) and preferably, a meter with an active pump (as opposed to passive venting). It does not need to be intrinsically safe UNLESS site conditions require this feature.

<b>Equipment to get from lab</b>	<ul style="list-style-type: none"> <li>• 1 or 6 liter (L) Summa canister.</li> <li>• One extra Summa canister in the event that a canister fails in the field.</li> <li>• Flow regulator (also known as critical orifice) preset by lab for pre-determined</li> </ul>
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	<p>sampling time.</p> <ul style="list-style-type: none"> <li>• Vacuum gauge (for verifying vacuum prior to sampling).</li> <li>• Tubing (new for each sample location). Must be Teflon, Nylaflow, Peek, or stainless tubing. Do NOT use polyethylene, silicone, or any other type.</li> <li>• Chain of custody and identification tags.</li> <li>• T-valve (need one for each sampling location, including ferrels and hex nuts for each end of T).</li> </ul>
<b>Other equipment</b>	<ul style="list-style-type: none"> <li>• Purging syringe (calibrated, typically for 50 to 60 milliliters [mL]).</li> <li>• Granular bentonite.</li> <li>• Disposable or washable containers (~16 ounces) for mixing bentonite and/or cement.</li> <li>• Water for mixing bentonite and cement.</li> <li>• Sand.</li> <li>• Silicone tubing.</li> <li>• Weight for shroud.</li> <li>• Helium gas with regulator.</li> <li>• Helium meter (make sure that it measures in ppm by volume).</li> <li>• On-off valve (two per sampling location).</li> <li>• Vapor Pin with a silicon sleeve (or similar equipment).</li> <li>• Vapor Pin tool and hammer for installation and removal (or similar equipment).</li> <li>• Field notebook or field forms.</li> <li>• Helium shroud.</li> <li>• Nuts and ferrels (if you did not receive from lab).</li> <li>• Cap for "shroud air tubing."</li> <li>• Water dam (1.5-inch PVC coupler).</li> </ul>
<b>Tools</b>	<ul style="list-style-type: none"> <li>• Scissors.</li> <li>• Rotohammer/drill for drilling through concrete.</li> <li>• Drill bits (0.625-inch, 1.5-inch).</li> <li>• Crescent wrench (9/16 inch).</li> <li>• Whisk broom/dust pan.</li> <li>• Wet-dry vacuum.</li> <li>• Extra-thin knife/screwdriver.</li> <li>• Extension cord for rotohammer.</li> <li>• Plumber's wrench for helium regulator.</li> </ul>
<b>Supplemental</b>	<ul style="list-style-type: none"> <li>• Teflon tape (if seal leaks are sustained).</li> </ul>

**supplies**

- Purging pump with tubing (if purging syringe not used) and charging cord.

**2 LABORATORY**

The lab will supply the Summa canisters, flow regulators, gauges, and tubing, and can also provide the purging syringe, if needed. Have the equipment arrive TWO business days prior to sampling, if possible. This allows the lab time to express-ship any additional or forgotten equipment.

As soon as the shipment is received, ensure that all equipment was provided and verify the vacuum of all Summa canisters. Order an extra gauge, if needed, to check the canisters for pressure prior to leaving the office. Knowing that the canister has sufficient initial vacuum allows for better trouble shooting in the field.

The following information must be provided to the lab to ensure shipment of the correct equipment.

- Size of canister (400 mL, 1 L, 6 L). A 1 L Summa will require a minimum of two times dilution of reporting limits. If this will cause your sample reporting limits to exceed screening criteria, use a larger Summa canister. You MUST know your reporting limits to determine the canister size.
- Type of canister certification (batch vs individual). Batch certification is usually sufficient for sub-slab or soil gas sampling projects.
- Method reporting limits.
- Tracer gas to be used (the lab must certify container for this prior to shipping).
- Sample time.

Samples should be collected at a rate between 100 and 175 milliliters (mL) per minute (most guidance documents recommend that samples not be collected faster than 200 mL per minute). A flow rate greater than 200 mL/min runs the risk of introducing ambient air dilution to the sample. The sample time for grab samples is calculated by determining an acceptable sample flow rate (perhaps 150 mL per minute) and multiplying that by the sample container size. For a 150 mL per minute rate, a 1 L Summa canister would require approximately seven minutes. A 6 L Summa canister would require 40 minutes.

**3 SUB-SLAB GAS INITIAL PROCEDURES**

Order equipment as previously identified, and do the following prior to field activities:

- Determine the proposed locations for each sample. Locations should be located at a minimum of 3 feet inside foundation edges or exterior walls to obtain the most representative results.
- Confirm with the property owner/occupant that subsurface utilities will not be impacted when drilling through the slab in these locations.
- Conduct a private utility locates for your locations to check for sub-slab or sub-grade obstructions.
- If possible, determine the slab thickness to confirm that a hand-operated drill can drill through it.
- Determine if carpeting or other flooring will need to be removed prior to drilling, or will require patching.
- Get the lab equipment delivered two days prior to sampling and ensure that all equipment was provided.

Once at the site, sampling should occur as described below.

### Drill Hole and Seal Tubing

- Confirm concrete thickness, if possible, so you'll know when to expect the drill bit to break through the bottom of slab.
- Drill a hole using the 0.25-inch or 0.5-inch drill bit. Drill approximately two inches into slab backfill or native material beneath the concrete slab.
- Using a 0.5-inch or 0.75-inch drill bit, overdrill the hole by approximately one inch to create a "seat" for sealing the tubing. The drill bit used for overdrilling should be one size larger than the original hole (0.5-inch for a 0.25-inch initial hole, etc.).
- Use the whisk broom to remove concrete dust or loose material from around the drill hole.
- Test the 0.25-inch tubing to ensure it can be pushed completely down the hole. Once it reaches the bottom, keep track of that tubing length as you pull it back out. Ensure there is no material stuck in the bottom of the tubing (if there is, cut the tubing end off and repeat this step). Re-insert the tubing so that the bottom rests approximately one inch from the drilled bottom, making sure it is below the bottom of the slab. If the tubing rests at the bottom of the hole that is okay.
- Determine the length of 0.25-inch tubing needed to conduct sampling at this location and cut it to that length. Do not forget that there must be enough tubing to go through helium shroud, connect to the purging T-valve and connect to the Summa canister. Be sure to cut the ends straight with no burrs or jagged edges.
- Thread the other tubing end through the helium shroud/stopper, leaving enough tubing within the shroud to allow you to install the sealing material. Cover the loose tubing end with a plastic bag to ensure it remains clean until it is connected to the Summa canister.
- Mix bentonite to an appropriate consistency for sealing.
- Insert bentonite evenly around tubing, making sure it penetrates fully into the larger drill hole. Push down with fingers or appropriate tool to ensure a good seal. Take care not to scrape or puncture the tubing.
- At the surface, mound the bentonite against the tubing and smooth away from it to create a tight seal. It is appropriate to moisten the top of the bentonite mound to aid in creating a good seal.

For temporary holes, allow approximately 20 to 30 minutes for the bentonite to seal and the hole to equilibrate. If collecting sub-slab gas samples at multiple locations, consider performing these initial activities at each location prior to continuing with the sampling.

## 4 SOIL GAS INITIAL PROCEDURES

Order equipment as previously identified. Prior to field activities, the following should occur:

- Determine the locations and depths for each sample. Locations should be located at a minimum of 3 feet inside foundation edges or exterior walls to obtain the most representative results.
- Determine if equipment, vehicles, or other stored items will need to be moved prior to the field event.
- Arrange for a utility locate.
- Arrange for a driller to deploy a Post Run Tubing (PRT) sample system, or equivalent.

Once at the site, sampling should occur as described below.

### **Drill Hole and Seal Tubing**

- Drill a hole using a PRT system, or equivalent. The bottom of the hole should be at least 5.5 feet below ground surface (bgs).
- Lift up on the drilling rod approximately 6 inches to create a void in the subsurface.
- Insert the screw on end to the 0.25-inch tubing and place down the hole. Once it reaches the bottom, screw the fitting onto the PRT sample point (note: the fitting uses left-hand threads).
- Determine the length of 0.25-inch tubing needed to conduct sampling at this location and cut it to that length. Do not forget that there must be enough tubing to go through the helium shroud, connect to the purging T-valve, and connect to the Summa canister. Be sure to cut the ends straight with no burrs or jagged edges.
- Mix bentonite to appropriate thickness for sealing.
- Insert bentonite evenly around tubing exiting the drill rod, making sure it penetrates fully into the rod. Thread the other tubing end through the helium shroud/stopper. Cover the loose tubing end with a plastic bag to ensure it remains clean until it is connected to the Summa canister.
- Place the shroud over the drill rod and place more bentonite around the base to seal the shroud to the ground.

For temporary holes, allow approximately 20 to 30 minutes for the bentonite to seal and the hole to equilibrate.

## **5 LEAK DETECTION TESTING**

In order to perform the leak detection testing, have the shroud in place with the following setup and procedure:

- Tubing from drill hole.
- Tubing for measuring air within shroud (attach tubing onto appropriate fitting if not attached previously).
- Inlet hose from helium tank.
- If needed, place a brick or other weight on the shroud to prevent it from being moved and compromising the seal integrity.
- Fill the shroud with helium for several seconds and turn off the tank.
- Using the helium meter (meter), measure and record the helium concentration through the shroud air tubing in parts-per-million-volume (ppmv) (or know how to readily convert the reading to ppmv). The target helium concentration is 70 to 90 percent. Remove the meter from the shroud air tubing and cap the tubing. Allow meter to clear back to zero.
- Remove the helium tubing from the shroud and put a cap on the brass air fitting immediately.
- Connect the meter to the drill hole tubing and allow the meter to run for approximately a minute. Measure the helium concentration.
- Spray helium around fittings (T, on-off valve and flow regulator connections to Summa canister) and use the helium meter to monitor if any leaks are associated with these fittings.
- If indicated by elevated readings on the helium meter, make adjustments to seals.

- Once all necessary adjustments have been made, record the helium measurement in the shroud on field sheet following adjustment to seals.

Once the leak detection testing has confirmed the drill-hole seal is sufficient, proceed to sample collection.

## 6 SAMPLE COLLECTION

### Sample Train Assembly and Purging

- Install the T-valve and on-off switch in-line with the sample tubing to allow for purging.
- Connect the gauge and flow regulator to the Summa canister and tubing. Do not overtighten the fittings.
- Record the can and flow regulator serial numbers on the field form.
- Ensure that all connections are tight and all valves are closed.
- Determine the amount of air that requires purging within the sampling tubing.
  - Determine how much tubing you need to purge (round up to whole feet).
  - Multiply the number of feet by the volume of air within one unit foot of tubing (see multipliers below for various tubing sizes).
  - You want to remove a minimum of two purge volumes, so multiply volume calculated by two.

Size of tubing (inches)	Air volume in mL per one unit foot
1/4	9.7
3/8	21.7
1/2	38.6
5/8	60.3
3/4	86.9
1	154.4

- Connect the purging syringe and turn the on-off switch to ON.
- Purge the calculated volume of air. Draw the air slowly through the syringe to minimize the effect of creating a vacuum that could compromise the connections or seals. If your sample collection rate is 150 mL per minute, and you need to purge 50 mL, then take approximately 20 seconds to purge the 50 mL or as slowly as possible.
- If you need to purge more than one syringe volume, complete the first purge, turn the switch on the syringe to OFF, depress the syringe to purge the air out of the syringe, turn syringe valve to ON and repeat the purging process.
- When done purging, turn the on-off switch to OFF.

### Sample Collection

- Confirm that all connections remain tight and all valves are closed.
- Open the Summa canister by turning its valve approximately one-half turn.

- Immediately record the vacuum on the gauge (it should stabilize very quickly) and the time. The gauge should measure approximately -30 inches mercury (Hg). If the reading is not close to this value, the canister may not have sufficient vacuum for sampling. In this case, call the lab or select another canister.
- Allow the Summa canister to fill, keeping in mind the amount of time determined for sample collection (i.e., what you told the lab to set for a flow regulator time).
- The vacuum gauge should not drop below 3 inches Hg. If the vacuum readings are not keeping pace with the expected sampling time (either the gauge is dropping faster or slower than expected), you will need to use your best judgment as to when to stop the sample collection (or call the lab or project manager to discuss).
- Once the sample has been collected, record the vacuum reading and time.
- Close the canister valve. Be sure it is tightly closed (do not overtighten).
- Remove the gauge and flow regulator and replace the canister fitting.
- Fill out the chain of custody and return the containers to the lab with the original chain of custody. Retain a copy of the chain of custody for the project files.

When collecting 6L Summa canister samples, it is recommended that you watch the vacuum gauge the entire time (which can be up to 50 minutes). If the gauge should drop below 3 inches Hg, the sample may be considered void; this can be prevented by watching the gauge during sampling. If the gauge drops to 0 inches Hg the sample will need to be re-taken using a new canister.

### **Drill Hole Abandonment**

Once sampling is completed at a sub-slab gas location, the following should occur:

- Clean out the remaining bentonite, scraping as much as possible from the drill hole "seat" and sidewalls (do not push down hole but instead place in bag for disposal).
- Add a small amount of sand to fill the drill hole to approximately two inches below the concrete surface (approximately two inches below the bottom of the "seat"). Do NOT overfill with sand as it may compromise your seal.
- Use the whisk broom to remove any loose material at the surface.
- Fill the upper three inches with a quick setting cement grout. Smooth or feather the surface to help create a bond between the slab and the grout.

For soil gas sampling locations, the drill rig operator should abandon the sample point as required by state regulations (Oregon Administrative Rule 690-240 or Washington Administrative Code 173-160).

### **POST FIELD ACTIVITIES**

Retain all paperwork provided by the lab, including the packing list and certifications. This information must be retained in the permanent project file.

Reusable fittings owned by PBS must be decontaminated following PBS' *Standard Operating Procedure for On-Off Valve Decontamination for Vapor Intrusion Assessments*.

### **ASSESSING LEAK DETECTION RESULTS**

Regulatory guidance in Oregon and Washington allow up to 5 percent helium within a sample. To confirm that helium detections meet this regulatory requirement, the following will occur:

- Calculate average helium concentration in shroud ("shroud concentration") by taking two or more readings before and after sampling (the measurements should have been recorded in ppmv).
- When we receive lab results, if helium is detected, use this formula to confirm level of leakage.  
**Level of leakage** = lab-detected concentration / shroud concentration
- Be sure you are using the same units (ppm may not always equal ppmv: check your units).