

# Underground Injection Control Facility Closure Report

Bullseye Glass Company  
3722 SE 21<sup>st</sup> Avenue  
Portland, Oregon

December 2017

**Prepared For:**  
Bullseye Glass Company

**Submitted To:**  
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**Underground Injection Control Facility Closure Report  
Bullseye Glass Company  
3722 SE 21<sup>st</sup> Avenue  
Portland, Oregon**

*Bridgewater Group, Inc. certifies that the drywell closure documented in this report meets the Oregon Department of Environmental Quality's closure requirements (Oregon Administrative Rules [OAR] 340-044-0040) and Oregon Water Resources Department abandonment requirements (either OAR 690-240-0030 or 690-220-0030)*

**BRIDGEWATER GROUP, INC.**



*Expires December 31, 2019*

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**Jeffrey F. Dresser, P.E.**



*Expires October 31, 2018*

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# ACRONYMS AND ABBREVIATIONS

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Ag	silver
Apex	Apex Laboratories
As	arsenic
Ba	barium
bgs	below ground surface
Bridgewater	Bridgewater Group, Inc.
Bullseye	Bullseye Glass Company
Cd	cadmium
City	City of Portland
Co	cobalt
COC	chain of custody
COI	chemical of interest
Cr	chromium
Cr+6	hexavalent chromium
Cu	copper
°C	degrees Celsius
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
FSDS	field sampling data sheet
HDPE	High density polyethylene
Hg	mercury
IDW	investigation-derived waste
kg	kilogram
MCL	EPA Safe Drinking Water Act Maximum Contaminant Level
µg	microgram
µg/L	micrograms per liter
µm	Micrometer or micron
mg	milligram
mg/kg	milligrams per kilogram
mL	milliliter
Mn	manganese
Mo	molybdenum
OAR	Oregon Administrative Rules
oz.	ounce
Pb	lead
PPE	personal protective equipment
QA/QC	quality assurance/quality control
RBC	DEQ Risk-Based Concentration
RSL	regional screening level
Se	selenium
Site	3722 SE 21 <sup>st</sup> Avenue, Portland, Oregon
UIC	Underground Injection Control
USDOT	U.S. Department of Transportation
Zn	zinc

# SECTION 1 - INTRODUCTION AND PURPOSE

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On behalf of Bullseye Glass Company (Bullseye), Bridgewater Group, Inc. (Bridgewater) has prepared this Closure Report summarizing the decommissioning and closure of a registered Underground Injection Control (UIC) system (Drywell #1, Oregon Department of Environmental Quality [DEQ] UIC #11228-1) formerly used for the subsurface disposal of stormwater at Bullseye's glass manufacturing facility located at 3722 SE 21<sup>st</sup> Avenue, Portland, Oregon (Site).

Figure 1 shows the Site and vicinity. Figure 2 shows Drywell #1 located in the southwest corner of the Site.

This Closure Report summarizes the tasks that were performed to decommission Drywell #1 in accordance with Oregon Administrative Rules [OAR] 340-044-0040, including confirmation soil sampling and analysis. Closure activities were completed on October 28, 2017.

This Closure Report was prepared in accordance with the DEQ-approved *Draft Underground Injection Control Facility Investigation and Closure Plan* (Bridgewater, 2017b) and DEQ's September 26, 2017 approval letter.

# SECTION 2 - BACKGROUND

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## 2.1 Facility Description

Bullseye is a manufacturer of clear and colored glass for art and architectural uses with worldwide distribution. The Bullseye glassmaking facility is located in Multnomah County in a mixed industrial and commercial area of inner southeast Portland, Oregon (see Figure 1). The Bullseye properties are zoned IG1 (General Industrial 1) in the City of Portland's (City's) Comprehensive Plan, with surrounding properties zoned as IG1 or EG2 (General Employment). Single dwelling residential areas, most typically zoned as R2.5 (Residential 2,500), are within 1,200 feet to the east and southeast of Bullseye.

The Site lies in the southeast ¼ of Section 11, Township 1S, Range 1E of the Willamette Baseline and Meridian. Drywell #1 is located in the southwest corner of the Bullseye facility near the intersection of SE Bush Street and SE 21<sup>st</sup> Avenue.<sup>1</sup> The Site is at an elevation of approximately 60-64 feet above mean sea level.

Bullseye's main facility encompasses the entire block between SE Lafayette Street and SE Bush Street from north to south, and between SE 21<sup>st</sup> Avenue and SE 22<sup>nd</sup> Avenue from the west to east. The total Site area is approximately 2.75 acres. Facility buildings including offices, studios, warehouse, finished products storage, retail store, and glassmaking operations occupy approximately 1.75 acres and ground areas including parking, exterior work areas, etc., occupy approximately 1 acre.

Prior to October 2016, Site stormwater originating from all but two isolated roof areas discharged to the City of Portland combined sewer system located in SE Lafayette Street, SE Bush Street, SE 21<sup>st</sup> Avenue, and SE 22<sup>nd</sup> Avenue. Prior to October 2016, Drywell #1 received stormwater runoff from two (2) roof drain inlets servicing approximately 6,800 square feet of the facility's roof area. With approval from the City of Portland's Bureau of Environmental Services (BES)<sup>2</sup> in October 2016, stormwater from the facility roof that formerly discharged to Drywell #1 was redirected into the combined sewer located in SE Bush Street (City manhole ACD236) via a catch basin inlet located within the Bullseye facility and a second diversion was made directly into the combined sewer in SE 21<sup>st</sup> Avenue through an existing roof drain connection. A second drywell (Drywell #2, DEQ UIC #11228-2, see Figures 1 and 2), located in the northeast corner of the Bullseye facility receives runoff from approximately 4,300 square feet of roof area and remains in operation.<sup>3</sup>

Stormwater runoff originating from approximately one acre of ground area that is nearly all impervious (e.g., asphalt or concrete areas) discharges to the adjacent City streets and enters the combined sewer system through one of several curbside inlets located around the facility.

## 2.2 Drywell #1 Description

Drywell #1 included two chambers (as described below). No construction drawings were located depicting the original installation specifications. After installation, each chamber of Drywell #1 was fitted with a concrete lid and then covered over by approximately 12-15 inches of crushed aggregate and asphalt paving as part of final construction activities. Based on field observations (following removal of the asphalt paving), it was determined that Drywell #1 consisted of two (2) 5-foot-diameter precast concrete manhole sections extending to approximately 10 feet below

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<sup>1</sup> Drywell #1's approximate latitude and longitude coordinates are 45°29'44.64"N, 122°38'39.99"W.

<sup>2</sup> Discharge Authorization Number DA-2016-CS001.

<sup>3</sup> Drywell #2 was investigated by DEQ on June 23, 2016. Sediment and water samples were collected and analyzed by DEQ and found to be in compliance with the "rule authorization" requirements under OAR 340-044-018.

ground surface (bgs). Each drywell section consisted of a 2-foot tall solid precast concrete manhole section at the top and a 5-foot perforated precast manhole base section. The precast reinforced concrete manhole drywell tops were located approximately 12-15 inches below the paved asphalt surface. Each lid had a non-standard- sized concrete access port approximately 15-inches in diameter.

The drywell was cleaned in October 2016. During this cleaning, the “floor” of each drywell chamber was observed to be coarse aggregate with rock sized from 2-4 inches, which is typical for drywell construction. During excavation and removal of the drywell lids prior to cleaning, the pit backfill material appeared to be poorly-graded (with few fines) crushed aggregate sized between  $\frac{3}{4}$ - to 1-inch. Photographs of Drywell #1 and the cleaning operation that was completed on October 4, 2016 are included in Appendix A of *Underground Injection Control Facility Investigation Report* (Bridgewater, 2017a).



# **SECTION 3 - DRYWELL #1 UIC DECOMMISSIONING**

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## **3.1 Extent of Drywell #1 Closure**

The drywell pit area was approximately 10 feet by 15 feet, and was located in tight proximity to facility buildings, a buried active natural gas service line to the building, and the facility's liquid oxygen unloading station and storage tank farm. The goal of closure soil excavation activities within the drywell pit area was to meet published DEQ construction worker soil RBCs and EPA Industrial soil RSLs (where a DEQ RBC hasn't been published, e.g., selenium), to the extent practicable, while assuring that the excavation did not create potential slope stability, structural, or utility conflict issues.

Based on the previous soil investigation (*Underground Injection Control Facility Investigation Report* (Bridgewater, 2017a), soil in the drywell pit contained metal concentrations above DEQ construction worker RBCs to the depths noted below:<sup>4</sup>

- Arsenic – 15 feet bgs
- Cadmium – 10 feet bgs
- Selenium – 10 feet bgs (EPA RSL)
- Lead – 15 feet bgs (DEQ RBC for soil potential leaching to groundwater)

Terra Hydr, Inc., with oversight by Bridgewater and an observer from DEQ, removed the overlying asphalt concrete pavement, gravel backfill, two concrete drywell chambers, and underlying soil to a depth of 15.5 feet bgs. Appendix A contains photographs documenting the decommissioning and closure activities. The excavation extended at least one foot into the surrounding fine-grained, stiff, native perimeter soils. The areal extent of excavation was approximately 189 square feet. Approximately 78.65 tons of gravel/soil and 8.42 tons of concrete rubble were removed (see Table 2 and Appendix B for shipping documentation).

## **3.2 Submittal of Required Forms**

Pursuant to the Oregon's UIC Program regulations for UIC closure (OAR 340-044-0040), Bullseye completed a Class V Underground Injection Control Pre-Closure Notification form providing the required 30-day notice of Drywell #1 closure activities (see Appendix C).

## **3.3 Drywell Decommissioning Notice**

As contained in DEQ's September 26, 2017 approval letter, Bullseye was required to provide advance notice to its immediate neighbors including the nearby Children's Creative Learning Center and the adjacent Fred Meyer corporate office facility. Bullseye personnel visited immediate neighbors during the week of October 23, 2017 to provide advance notice of the planned closure and decommissioning work on October 28, 2017. Correspondence records are contained in Appendix D.

## **3.4 Site Preparation**

After obtaining written approval from DEQ to close the system on September 26, 2017, the excavation limits were pre-marked to facilitate clearance of the excavation for underground utilities by public and private utility locating services.

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<sup>4</sup> Table 3 includes sample results for borings completed around the perimeter of Drywell #1 in January 2017.

### 3.5 Drywell #1 Decommissioning

Drywell #1 was decommissioned in accordance with the UIC regulations. A track-mounted excavator equipped with a standard excavation bucket and thumb attachment was used to remove asphalt and gravel backfill to access the concrete drywell chambers. The pre-cast concrete drywell rings were removed, transferred to a wheeled front-end loader, placed in a lined 18 cubic yard (cy) roll-off box, and rubblized using a hydraulic hammer mounted to a small track-mounted backhoe for offsite transport and disposal. See Appendix A for photo documentation of the decommissioning activities.

Following removal of the drywell structures, the gravel backfill and soil was excavated to 15.5 feet bgs and loaded into 18 cy lined roll-off boxes (equipped with rigid covers) for offsite transport and disposal. Dust control measures were available on site, but moist soil conditions and excavation techniques mitigated ambient dust issues during excavation activities.<sup>5,6</sup> The angular gravel backfill extended to 9 feet bgs and was underlain by stiff silty clay/clay to 12.5 feet bgs at which depth the stiff silty clay/clay contained rounded gravel to 3-4 inches in diameter. The gravelly clay became moist to wet at 15.4 feet bgs. Upon reaching the target excavation depth, the excavator switched to standard excavation bucket a decontaminated smooth-lipped “mud bucket” to facilitate collection of confirmation samples as described in Section 4.

All Drywell #1 materials, gravel backfill, and soil removed during the closure operations were transported to a permitted Subtitle C hazardous waste management facility (Chemical Waste Management of the Northwest, Inc., Arlington, Oregon), based on material characterization and profiling completed prior to excavation (see Appendix B for the approved profiles).

The former 6-inch diameter PVC inlet discharge pipe from the (former) contributing roof area downspouts was abandoned in-place and permanently sealed with non-shrink masons grout (see Appendix A for photographs).<sup>7</sup> The grout plug extended a minimum of 16-inches into the abandoned PVC pipe.

After the drywell decommissioning activities were completed, the excavation was backfilled to the existing ground/asphalt surface with clean, imported, crushed rock aggregate, and compacted to City Code requirements. The source of the imported clean fill was from Knife River and Mt. Scott Fuel.

The entire surface of the excavation, oxygen unloading station, and surrounding building access area was “capped” with new 4-inch thick layer of asphalt concrete paving in December 2017. Paving was completed by Terra Hydr and Rose City Paving.

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<sup>5</sup> All excavated backfill and native soil materials were moist during closure activities; therefore no dust control measures such as wetting or water misting were necessary, though Terra Hydr had made provisions for dust control had it been necessary (i.e., water sprayers and a pressure washer that could have been adjusted to spray a fine water mist were available during excavation work). As soon as each rolloff box was filled with excavated materials, the plastic sheeting was folded and overlapped over itself to completely cover the contents prior to placing and securing the heavy duty cover on the rolloff box. Water sprays were used to control fugitive dust during concrete drywell rubblizing. Rubblizing was performed directly inside a rolloff box using a hydraulic hammer device attached to a small track-mounted backhoe.

<sup>6</sup> Based on review of boring logs for Drywell #1 perimeter borings B2, B3, B4, and B5 prior to commencing excavation, Terra Hydr’s field manager and Bridgewater’s field geologist concurred that shoring would not be necessary for the excavation to the planned depth due to the cohesive strength of the surrounding native soil (fine-grained, stiff silty clay/clay).

<sup>7</sup> The drain line from the roof downspouts to Drywell #1 was cleaned (jet-rodged) in October 2016 during drywell cleaning.

## 3.6 Other Decommissioning-Related Documentation

DEQ requested in the September 26, 2017 approval letter that Bullseye address the following:

- Subsurface cross-sections and results from a utility survey along with an evaluation of the potential for, and significance of, any preferential flow pathways along utility lines for contaminated groundwater. See Section 3.6.1, below.
- Updates to groundwater elevation and flow direction based on data from installed monitoring wells. See Section 3.6.2, below.
- “As-built” information on the monitoring wells, including installation depths of the screened intervals. See Section 3.6.2, below.
- Documentation of soil and solids disposal including receipts, bills of lading, where appropriate, and volume calculations. See Sections 3.1 through 3.5, above.
- Documentation of a completed door-to-door survey for any potentially unregistered wells immediately adjacent to the locality of facility (LOF) to the south and west of the Bullseye Glass facility. See Section 3.6.3, below.

### 3.6.1 Potential for Preferential Flow Pathways in Groundwater

Using the City of Portland’s online GIS utility, *Portlandmaps.com*, underground utilities that could potentially exist at or below the seasonally high static groundwater elevation, or may be situated at, or within, the normal groundwater zone in the vicinity of the southwest corner of the Bullseye facility (i.e., near the intersection of SE 21<sup>st</sup> Ave and SE Bush St) were inventoried. Shown on Figure 3 are plan and cross-section views of the SE 21<sup>st</sup>-SE Bush intersection (see also Appendix E). Two underground utilities were identified that may potentially be situated in seasonal or annual groundwater:

- An 8-inch diameter combined sewer that flows from manhole ACD227 east to west approximately 12-13 feet deep (elevations 50 to 46.2 ft) beneath SE Bush St; and transitions to a 10-inch diameter pipe at manhole ACD237 (elevation 46.2); then flows a short distance to manhole ACD194 (elevation 45.8) roughly in the middle of the SE 21<sup>st</sup>-SE Bush intersection; then flows 520 feet north beneath SE 21<sup>st</sup> Ave to manhole ACD189 (elevation 40.9). These lines were originally constructed circa 1911, but were partially reconstructed/relocated in 1990 (manholes and pipe runs between manhole ACD236 downstream to manhole ACD194) during construction of the “Southeast Relieving Interceptor” as discussed below (see Appendix E).

During reconnaissance groundwater sampling from temporary well points drilled around Drywell #1 during January-February 2017, the static water elevation was approximately 44-45 ft. As depicted on Figure 3, the estimated static water level during January-February 2017 may have been in contact with the pipe bedding material near the bottom of the trench in the vicinity of manholes ACD237 and ACD194. As-built drawings from the relocation of these lines during 1990 indicate that Class C bedding was used for the pipeline (typically consisting of a compacted granular material to bed the pipe and densely compacted select backfill material that can include replacing native material if free of rocks and other debris that could damage the pipe during compaction).

Video inspection records compiled by the City in 2012 and 2014 indicate these pipelines were in fair condition and did not reveal any notations major pipeline defects or notations of groundwater intrusion into the pipelines themselves (see Appendix E).

The potential for groundwater interception and longitudinal transport within the 8 and 10-inch diameter combined sewer pipe trenches, while feasible, is likely not probable given that the invert elevations of these pipeline segments are within 1-2 feet of the measured static water levels observed in temporary monitoring wells during January-February 2017. The key factors that might create a preferential pathway for groundwater migration do not appear to be present. A significant hydraulic pressure/head to create a driving migration force is not present (i.e., pipeline depths are nearly the same as the static water level elevation); the pipe bedding/trench materials used during construction likely do not have a significantly higher permeability than the surrounding native materials (i.e., Class C bedding); and the trenches are only several feet wide for small diameter pipelines. In conclusion, conditions necessary to create any significant preferential migration pathway do not appear to be present.

- A 72-inch diameter sanitary sewer referred to as the “Southeast Relieving Interceptor” flows from east to west approximately 31-32 feet beneath SE Bush St; then transitions to a south to north direction beneath SE 21<sup>st</sup> Ave. At manhole ACD228, the interceptor transitions to 78-inches in diameter. This large interceptor project was completed in southeast Portland in multiple phases during the early late 1980s through the early 1990s.

From review of as-built drawings available on *Portlandmaps.com*, at manhole ACD228 and flowing north from there, the pipeline was constructed as a bored tunnel (see Appendix E). That is, the pipeline was drilled and cased through native material without traditional crushed aggregate or granular trench bedding and backfill materials. That is, the types of trench backfill materials are typically associated with potential groundwater interception and preferential transport longitudinally in relatively porous backfill materials are not present north of manhole ACD228.

As-built drawings for the 72-inch line beneath SE Bush St indicate that this pipeline segment was constructed using traditional open-cut trenching techniques. The drawings indicate that the reinforced concrete pipe was bedded in Class B bedding material (typically ¾-inch minus crushed aggregate with well-graded distribution of fines to promote good compaction and structural support up to the spring-line of the pipe). Inasmuch as the pipe bedding and backfill material for the 72-inch pipeline might serve as a preferential pathway for groundwater movement, this movement will be stopped at manhole ACD228 from further downpipe (northward) transport since the tunneled pipeline has no preferential migration pathway around the pipe circumference, and no backfilled trench materials exist.

The City completed a video inspection of the 300 linear foot long pipeline section beneath SE Bush St between manhole ACD227 downpipe (east to west) to manhole ACD228 in July 1997. The inspection comments were “The pipe is in excellent structural condition with minor surface cracks and white deposits. The pipe is in good operational condition with sediment along the invert.” From these comments, it infers that direct infiltration of groundwater was not observed at the time of inspection.

From review of available construction as-built drawings and video inspection documentation, it is concluded that the Southeast Relieving Interceptor does not serve as a preferential groundwater migration pathway in the vicinity of Bullseye’s former Drywell #1.

### **3.6.2 Updated Groundwater Conditions and Monitoring Well Information**

The groundwater investigation described in Section 4 - Additional Groundwater Investigation in *Draft Underground Injection Control Facility Investigation and Closure Plan* (Bridgewater,

2017b) is scheduled to begin in January 2018. Bullseye will include additional information, as appropriate, in accordance with Section 4.15 – Reporting of that document.

### ***3.6.3 Survey of Potentially Unregistered Wells***

Bullseye personnel visited immediate neighbors to the south and west of the Site during the week of October 23, 2017 to determine whether any unregistered wells were present adjacent to the locality of facility (LOF). No unregistered wells were noted. Documentation of the completed door-to-door survey is contained in Appendix D.

# SECTION 4 - CONFIRMATION SOIL SAMPLING, ANALYSES, AND RESULTS

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## 4.1 Sampling and Analyses

To document post-closure soil conditions within the final limits of the excavation, confirmation soil samples were collected from the midpoint of each excavation sidewall (about 10 feet bgs) and five samples were collected from the floor of former drywell chamber at the final excavation depth. Samples were collected from the excavator bucket using clean Nitrile gloves and decontaminated spoons and placed in laboratory-supplied, clean, 8-ounce glass jars. Each sample consisted of 10 equal aliquots of soil from the backhoe bucket. Sample locations are depicted on Figure 4.

Each sidewall sample was analyzed. A single laboratory composite sample was prepared and analyzed for the five excavation floor samples. Soil sample preparation methods followed the procedures described in Section 4.1.2 (Representative Sampling Methods) of the *Work Plan for Underground Injection Control Facility Investigation* (Bridgewater, 2016a).

Samples were shipped under chain-of-custody (COC) to Apex Laboratories in Tigard, Oregon, for analysis.

Processed soil samples were analyzed using EPA Method 6020A for the following metals:

- Arsenic
- Cadmium
- Lead
- Selenium

In addition, samples were analyzed for the above metals using the Synthetic Precipitation Leaching Procedure (SPLP, EPA Method 1312, 6020A) to provide comparison to DEQ's soil leaching to groundwater RBC for lead and indirect comparison to EPA drinking water MCLs for the other three metals.<sup>8</sup>

## 4.2 Confirmation Sample Results

Tables 3 and 4 summarize the analytical results for confirmation soil samples. Sample results are also included on Figure 4. Appendix F contains the laboratory analytical and data validation report.

Total metal results and SPLP for lead were first received and reviewed on November 17, 2017. After review of the data, follow-up SPLP analyses for arsenic, cadmium, and selenium were requested to assist in further assessment of potential leaching of metals to groundwater. Final results were received on December 1, 2017 and amended on December 26, 2017 to include Method Detection Limits (MDLs) for total metal and SPLP analytes.

Metals concentrations were compared to the Portland Basin background soil concentrations, DEQ RBCs for direct contact with soil by construction workers, and EPA RSLs for direct contact with industrial soil in instances where a DEQ RBC has not been developed.

- **Arsenic.** As shown on Table 3 and Figure 4, the reported concentrations of As in the confirmation soil samples were greater than the Portland area background and the DEQ construction worker RBC, except in the west sidewall sample. The maximum observed

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<sup>8</sup> The DEQ-approved Work Plan only required SPLP analysis for lead. As noted in Section 4.2, As, Cd, and Se SPLP were added after receipt and review of total metal results.

soil concentration was 69.6 mg/kg in the north sidewall soil sample. Arsenic was not detected in any SPLP sample result greater than an MDL of 0.05 mg/L; the EPA MCL is 0.100 mg/L. In addition, As was not detected in reconnaissance groundwater samples above the EPA MCL (see Table 4 in the *Underground Injection Control Facility Investigation Report* [Bridgewater, 2017a]).

As further described in *Underground Injection Control Facility Investigation Report* (Bridgewater, 2017a) and shown on Figure 4, As concentrations in soil samples collected from borings located around the perimeter of Drywell #1 were generally detected at or below Portland Basin background concentrations and well below DEQ's RBC for construction workers and the EPA RSL for industrial soil. Any residual As in the soils is limited.

Lastly, while residual As concentrations were greater than the DEQ construction worker RBC in all but one of the verification samples, the entire area has been repaved with 4-inch thick asphalt concrete, thereby eliminating any direct-contact exposure pathway.

- **Cadmium.** As shown on Table 3 and Figure 4, the reported concentrations of Cd in the confirmation samples were greater than the Portland Basin background. The concentration of Cd reported in the north sidewall sample was above the DEQ construction worker RBC for cadmium, but was below EPA's industrial soil RSL. All other Cd confirmation sample results were below the DEQ construction worker RBC.

The laboratory MDLs for Cd SPLP results were greater than the EPA MCL of 0.005 mg/L. Four of five SPLP extracts had estimated Cd concentrations greater than the MCL. However, if a similar methodology to that noted below for Pb (DEQ, 2017) was used to incorporate a standard attenuation/dilution factor of 100, all SPLP results would be less than the MCL. Detections of Cd in groundwater were localized to the drywell area during initial reconnaissance sampling in Jan-Feb 2017 (see Table 4 in the *Underground Injection Control Facility Investigation Report* [Bridgewater, 2017a]). Concentrations of Cd are expected to decrease in the future because (a) the drywell backfill materials and five feet of underlying soil have been removed, (b) post-drywell removal input of additional metals and water is no longer occurring, and (c) the entire area is now capped with 4-inches of asphalt concrete paving, effectively eliminating future land surface-related infiltration.

- **Lead.** As shown on Table 3 and Figure 4, the closure verification soil samples for Pb were below the Portland Basin background concentration and below the DEQ construction worker RBC. The total lead concentrations were also below DEQ's soil to groundwater leaching RBC of 30 mg/kg and the SPLP concentrations were less than 1.5 mg/L, thereby making the 30 mg/kg RBC not applicable or relevant (i.e., lead would not be considered a leaching issue to groundwater) as described in Appendix B.3.4.3 (Special Procedures for Lead - Leaching to Groundwater) in DEQ's guidance document *Risk-Based Decision Making for the Remediation of Contaminated Sites* (DEQ, 2017).
- **Selenium.** DEQ has not established a construction worker RBC for Se. As shown on Table 3 and Figure 4, concentrations of Se in all confirmation soil samples were below EPA's industrial soil RSL.

All six SPLP analyses had Se concentrations greater than the EPA MCL (see Table 4). If a similar methodology to that noted for Pb (DEQ, 2017), above, was used to incorporate a standard attenuation/dilution factor of 100, all SPLP results for Se would be less than the MCL. Concentrations of Se are expected to decrease in the future because (a) the drywell backfill materials and five feet of underlying soil have been removed, (b) post-drywell removal input of additional metals and water is no longer occurring, and (c) the

entire area is now capped with 4-inches of asphalt concrete paving, effectively eliminating future land surface-related infiltration.



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## Tables

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Table 1

**UIC Closure - Drywell #1 Pre-Closure Analytical Results**

Bullseye Glass Company

Portland, Oregon

				Total Metal Concentration (mg/kg Dry Wt Basis, EPA Method 6020A, EPA 7199 for Cr+6)													
Sample ID	Date Sampled	Sample Depth (ft)	Lab ID	Arsenic	Barium	Cadmium	Chromium (total)	Chromium (+6)	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Zinc
Portland Area Background (DEQ, March 2013)				8.8	790	0.63	76	--	--	34	79	1,800	--	47	0.71	0.82	180
DEQ RBC - Construction Worker Soil (DEQ, November 2015)				14	69,000	350	530,000	49	--	14,000	800	8,200	--	7,000	--	1,800	--
USEPA Industrial Soil RSL (EPA, May 2016)				3	220,000	980	1,800,000	6.3	350	47,000	800	26,000	5800	12,000	5,800	5,800	350,000
Drywell #1 Inlet Side (w/Duplicate)	9/1/16	Drywell Sediment	A6I0056-01/02	4,565	166	16,100	1,170	15.6	599	1,955	21,150	1,010	--	1,060	5,640	120	10,400
Drywell #1 Infiltration Side	10/4/16	Drywell Sediment	A6J0122-02	4,340	209	10,200	1,570	--	995	2,230	20,100	907	--	1,130	4,980	187	7,490

Table 2

**UIC Closure - Soils and Debris Shipped Offsite for Treatment and Disposal**

Bullseye Glass Company

Portland, Oregon

Manifest ID	Date Shipped	CWMNW, Inc. Profile #	Drop Box #	Net Weight (lbs)	
011946120JK	10/30/17	OR335523	512-18	27,760	
011946121JK	10/30/17	OR335523	508-18	28,320	
011946131JK	10/30/17	OR335523	503-18	28,840	
011946125JK	11/1/17	OR335523	514-18	27,140	
011946126JK	11/2/17	OR335523	501-18	12,080	
011946128JK	11/3/17	OR335523	511-18	33,160	
				<b>Total (lbs)</b>	<b>157,300</b>
				<b>Total (tons)</b>	<b>78.65</b>
011946132JK	10/31/17	OR335602	513-18	9,840	
011946131JK	10/31/17	OR335602	506-18	7,000	
				<b>Total (lbs)</b>	<b>16,840</b>
				<b>Total (tons)</b>	<b>8.42</b>

Profiles: (Chemical Waste Management of the Northwest, Inc.)

OR335523 = Soil

OR335602 = Debris, Concrete, and Asphalt

Table 3

**UIC Closure - Total Metals in Confirmation Soil Samples**Bullseye Glass Company  
Portland, Oregon

Sample ID	Date Sampled	Sample Depth (ft)	Lab ID	Total Metal Concentration (mg/kg Dry Wt Basis, EPA Method 6020A)			
				Arsenic	Cadmium	Lead	Selenium
Portland Area Background (DEQ, March 2013)				8.8	0.63	79	0.71
DEQ RBC - Construction Worker Soil (DEQ, November 2015)				14	350	800	--
USEPA Industrial Soil RSL (EPA, May 2016)				3	980	800	5,800
<b>Drywell #1 - Closure Verification Samples</b>							
Floor-102817	10/28/17	15.5	A7J0959-11	37.9	207 Q42	27.7 Q39, Q42	65.9
Sidewall SW-E	10/28/17	10	A7J0959-12	35.1	349	18.5	52.0
Sidewall SW-W	10/28/17	10	A7J0959-13	12.5	72.4	13.1	24.6
Sidewall SW-N	10/28/17	10	A7J0959-14	69.6	803	12.7	202
Sidewall SW-S	10/28/17	10	A7J0959-15	41.1	332	15.1	103
<b>Drywell #1 - Soil Investigation / Pre-Closure Samples</b>							
B1-S-10	1/25/17	10	A7A0686-52	127	1700	151	728
B1-S-12.5	1/25/17	12.5	A7A0686-53	93.2	148	202	168
B1-S-15	1/25/17	15	A7A0686-54	29.9	68.9	80.2	41.1
B1-S-17.5	1/25/17	17.5	A7A0686-55	4.60	1.92 J+	5.58	1.70
B2-S-5	1/25/17	5	A7A0686-32	8.94	0.367 J+	12.9	1.02 U
B2-S-10	1/25/17	10	A7A0686-33	8.67	1.84 J+	21.8	1.15 U
B2-S-12.5	1/25/17	12.5	A7A0686-34	6.75	1.06 J+	14.3	1.10 U
B2-S-15	1/25/17	15	A7A0686-35	3.73	0.255 J+	3.42	1.02 U
B2-S-17.5	1/25/17	17.5	A7A0686-36	2.43	0.294 J+	3.38	1.01 U
B2-S-20	1/25/17	20	A7A0686-37	3.73	0.250 J+	2.84	1.09 U
B3-S-5	1/25/17	5	A7A0686-47	8.52	0.503 J+	12.9	1.09 U
B3-S-10	1/25/17	10	A7A0686-48	7.78	0.646 J+	10.7	1.13 U
B3-S-12.5	1/25/17	12.5	A7A0686-49	3.78	0.722 J+	10.7	1.11 U
B3-S-15	1/25/17	15	A7A0686-50	4.69	0.339 J+	3.21	1.09 U
B3-S-17.5	1/25/17	17.5	A7A0686-51	2.09	0.428 J+	3.12	1.10 U
B4-S-10	1/25/17	10	A7A0686-43	5.12	0.467 J+	10.4	1.09 U
B4-S-12.5	1/25/17	12.5	A7A0686-44	2.69	0.588 J+	8.88	1.11 U
B4-S-15	1/25/17	15	A7A0686-45	2.63	2.21 J+	3.29	1.10 U
B4-2-17.5	1/25/17	17.5	A7A0686-46	3.26	0.846 J+	4.02	1.03 U
B5-S-5	1/25/17	5	A7A0686-38	5.54	0.846 J+	7.63	1.51
B5-S-10	1/25/17	10	A7A0686-39	8.64	0.503 J+	15.4	1.05 U
B5-S-12.5	1/25/17	12.5	A7A0686-40	9.05	0.417 J+	13.0	1.13 U
B5-S-15	1/25/17	15	A7A0686-41	3.17	0.289 J+	3.49	1.11 U
B5-2-17.5	1/25/17	17.5	A7A0686-42	2.20	0.285 J+	2.66	1.06 U

**Notes**

-- = No value available.

Q39 = Results for sample duplicate are significantly higher than the sample results. See duplicate results in QC section of the report.

Q42 = Matrix Spike and/or Duplicate analysis was performed on this sample. % Recovery or Relative Percent Difference (RPD) for this analyte is outside laboratory control limits.

Table 4

**UIC Closure - Synthetic Precipitation Leaching Procedure Analytical Results**

Bullseye Glass Company

Portland, Oregon

				<b>Synthetic Precipitation Leaching Procedure (SPLP) (mg/L, EPA Method 1312, 6020A)</b>			
Sample ID	Date Sampled	Sample Depth (ft)	Lab ID	Arsenic	Cadmium	Lead	Selenium
USEPA Drinking Water MCL (mg/L)				0.100	0.005	0.015	0.05
Floor-102817	10/28/17	15.5	A7J0959-11	0.0500 U,Q44 TCLPa	0.0340 J,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.218 Q44 TCLPa
Sidewall SW-E	10/28/17	10	A7J0959-12	0.0500 U,Q44 TCLPa	0.0475 J,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.268 Q44 TCLPa
Sidewall SW-W	10/28/17	10	A7J0959-13	0.0500 U,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.142 Q44 TCLPa
Sidewall SW-N	10/28/17	10	A7J0959-14	0.0500 U,Q44 TCLPa	0.0425 J,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.384 Q44 TCLPa
Sidewall SW-S	10/28/17	10	A7J0959-15	0.0500 U,Q44 TCLPa	0.0430 J,Q44 TCLPa	0.0250 U,Q44 TCLPa	0.464 Q44 TCLPa

**Notes**

U = Constituent not detected at the indicated Method Detection Limit (MDL).

J = Estimated Result. Result detected below the lowest point of the calibration curve, but above the Method Detection Limit (MDL).

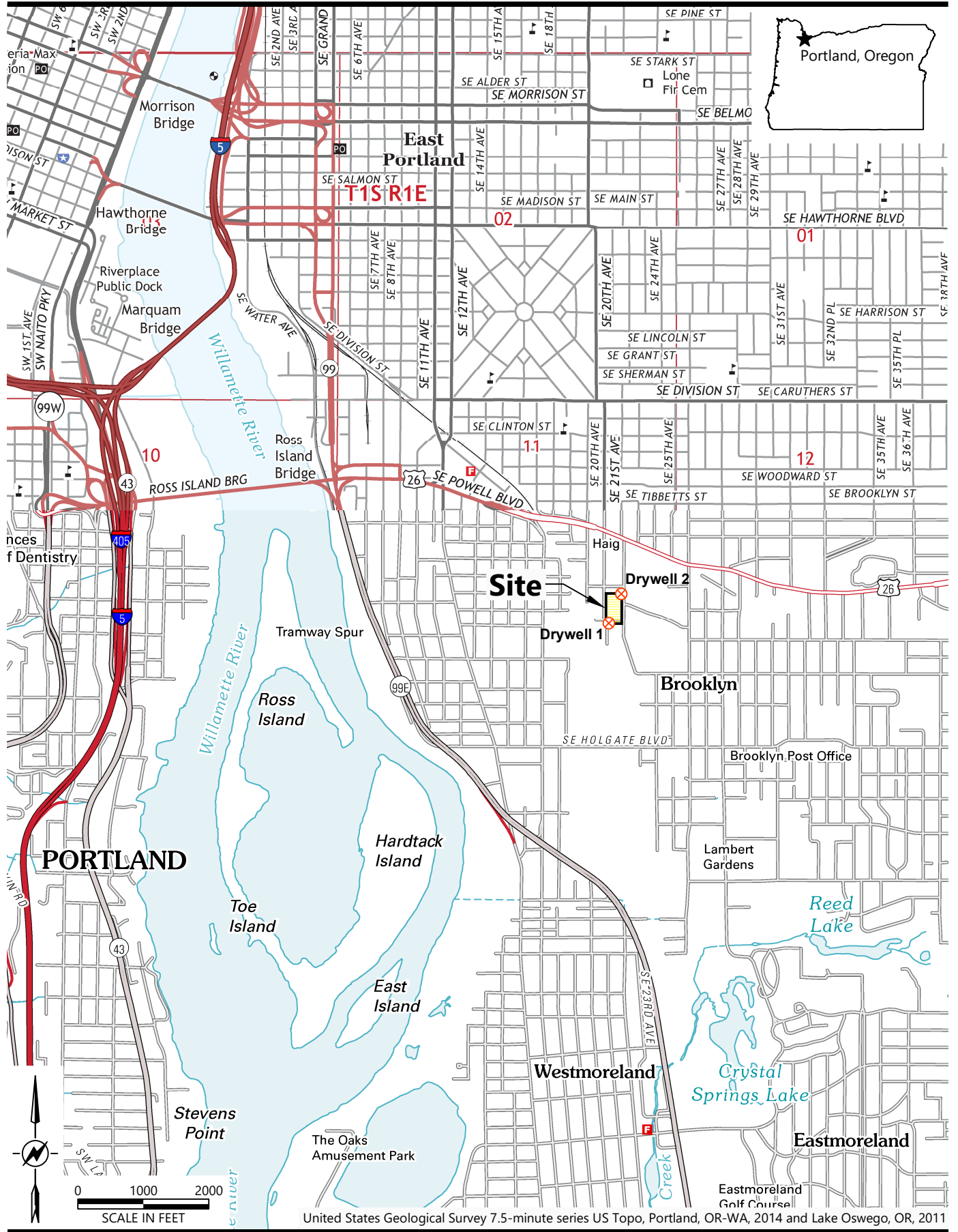
Q44 = Room temperature during the 18 hr TCLP tumbling procedure exceeded EPA recommended temperature range by no more than +/-2 degrees C for a maximum of 4 hours.

TCLPa = Limited sample volume. Leachate was prepared using less than the recommended amount of sample per EPA 1311 or 1312. To maintain consistency in leaching, the standar ratio of sample to leachate fluid was maintained.

## **Figures**

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**Drywell #1 Closure Report**



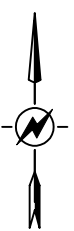
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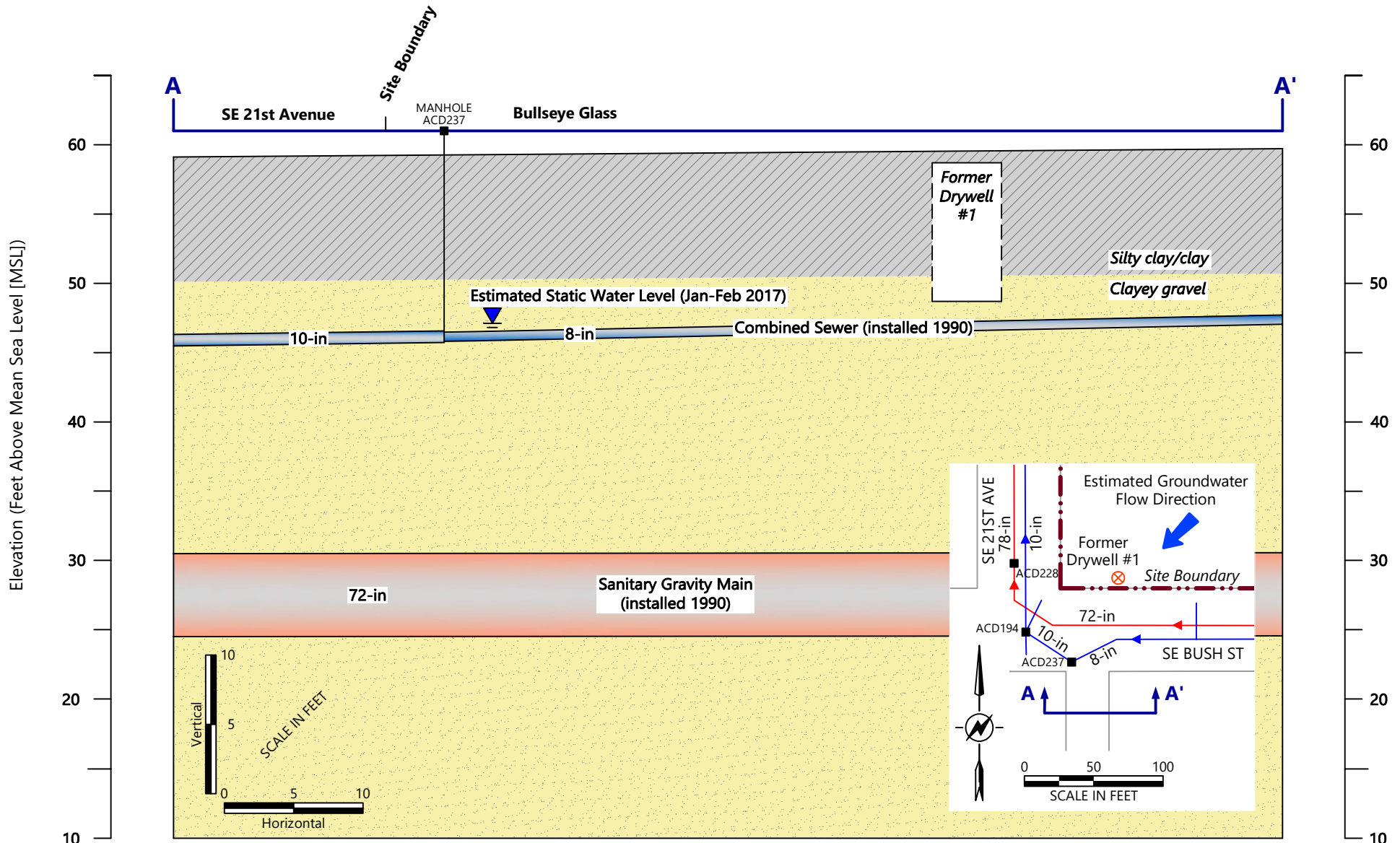
United States Geological Survey 7.5-minute series US Topo, Portland, OR-WA, 2014 and Lake Oswego, OR, 2011





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		Total Metal Concentration (mg/kg Dry Wt Basis, EPA Method 6020A)					
		Sample	Depth	Arsenic	Cadmium	Lead	Selenium
Drywell #1 Closure Verification Samples (Oct 28, 2017)	Floor-102817	15.5	37.9	207 Q42	27.7 Q39, Q42	65.9	
	Sidewall SW-E	10	35.1	349	18.5	52.0	
	Sidewall SW-W	10	12.5	72.4	13.1	24.6	
	Sidewall SW-N	10	69.6	803	12.7	202	
	Sidewall SW-S	10	41.1	332	15.1	103	
Drywell #1 Soil Investigation Program (Jan-Feb 2017)	B1-S-10	10	127	1700	151	728	
	B1-S-12.5	12.5	93.2	148	202	168	
	B1-S-15	15	29.9	68.9	80.2	41.1	
	B1-S-17.5	17.5	4.60	1.92 J+	5.58	1.70	
	B2-S-5	5	8.94	0.367 J+	12.9	1.02 U	
	B2-S-10	10	8.67	1.84 J+	21.8	1.15 U	
	B2-S-12.5	12.5	6.75	1.06 J+	14.3	1.10 U	
	B2-S-15	15	3.73	0.255 J+	3.42	1.02 U	
	B2-S-17.5	17.5	2.43	0.294 J+	3.38	1.01 U	
	B2-S-20	20	3.73	0.25 J+	2.84	1.09 U	
	B3-S-5	5	8.52	0.503 J+	12.9	1.09 U	
	B3-S-10	10	7.78	0.646 J+	10.7	1.13 U	
	B3-S-12.5	12.5	3.78	0.722 J+	10.7	1.11 U	
	B3-S-15	15	4.69	0.339 J+	3.21	1.09 U	
	B3-S-17.5	17.5	2.09	0.428 J+	3.12	1.10 U	
	B4-S-10	10	5.12	0.467 J+	10.4	1.09 U	
	B4-S-12.5	12.5	2.69	0.588 J+	8.88	1.11 U	
	B4-S-15	15	2.63	2.21 J+	3.29	1.10 U	
	B4-2-17.5	17.5	3.26	0.846 J+	4.02	1.03 U	
	B5-S-5	5	5.54	0.846 J+	7.63	1.51	
B5-S-10	10	8.64	0.503 J+	15.4	1.05 U		
B5-S-12.5	12.5	9.05	0.417 J+	13.0	1.13 U		
B5-S-15	15	3.17	0.289 J+	3.49	1.11 U		
B5-2-17.5	17.5	2.20	0.285 J+	2.66	1.06 U		

Portland Background	8.8	0.63	79	0.71
RBC - Construction	14	350	800	--
EPA Industrial Soil RSL	3	980	800	5800

U = not detected at or above the stated method reporting limit  
 Q-39 = associated laboratory duplicate pair exceeds acceptance limits for relative percent difference  
 Q-42 = associated matrix spike (MS) recoveries were above the recovery limit  
 J+ = Blank Contamination. Constituent detected above reporting limit but <10x the Metals Grind Blank value.

		Synthetic Precipitation Leaching Procedure (SPLP) (mg/L, EPA Method 1312, 6020A)					
		Sample	Depth	Arsenic	Cadmium	Lead	Selenium
Drywell #1 Closure Verification Samples (Oct 28, 2017)	Floor-102817	15.5	0.0500 U	0.0340 J	0.0250 U	0.218	
	Sidewall SW-E	10	0.0500 U	0.0475 J	0.0250 U	0.268	
	Sidewall SW-W	10	0.0500 U	0.0250 U	0.0250 U	0.142	
	Sidewall SW-N	10	0.0500 U	0.0425 J	0.0250 U	0.384	
	Sidewall SW-S	10	0.0500 U	0.0430 J	0.0250 U	0.464	
EPA Drinking Water MCL		10	0.005	0.015	0.05		

U = not detected at or above the stated method reporting limit  
 See Table 4 for additional data qualifiers



- Legend**
- Site Boundary
  - Tax Lot Boundaries
  - - - Excavation Boundary
  - 1 ⊗ Drywell Location
  - B-2 ○ Boring Location
  - SW-W ◆ Excavation Sample Location
- Notes:
- (1) The laboratory combined five excavation floor samples into composite sample Floor-102817 for analysis.
  - (2) Depth in feet below ground surface
  - (3) -- = background or screening level not established
  - (4) Portland Background from "Development of Oregon Background Metals Concentrations in Soil," Oregon Department of Environmental Quality (DEQ), March 2013.
  - (5) RBC = Oregon DEQ Risk-Based Concentrations, revision: November 1, 2015
  - (6) EPA Industrial Soil RSL = United States Environmental Protection Agency Regional Screening Levels, May 2016
  - (7) MCL = maximum contaminant level
  - (8) Boring B-1 advanced in center of Drywell 1 location.

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Portland Metro image dated December 31, 2012 from Google Earth Pro © 2017 Google © 2016 Metro