SOURCE CONTROL EVALUATION REPORT

Sulzer Pumps Facility
2800 NW Front Avenue
Portland, Oregon
DEQ ECSI No. 1235

Prepared by LimnoTech and NV5

For
Sulzer Pumps (US) Inc.
November 2025

EXECUTIVE SUMMARY

On behalf of Sulzer Pumps (US) Inc. (Sulzer), LimnoTech and NV5 have prepared this SCE report for the Sulzer facility located at 2800 NW Front Avenue. The SCE was prepared under guidance of the DEQ VCP, which Sulzer entered in August 2002. The SCE was completed in accordance with DEQ's *Guidance for Evaluating the Stormwater Pathway at Upland Sites,* dated January 2009 (updated October 2010), and DEQ/EPA's *Portland Harbor Joint Source Control Strategy,* dated December 2005. The purpose of this SCE report is to summarize the results of the SCE as it relates to the identification, evaluation, and control of potential sources of contamination that may reach the Willamette River and to document that existing or potential sources of contamination at the project site have been addressed and no additional characterization efforts or source control measures are needed at this time. In addition, the SCE is intended to provide supporting documentation to assist DEQ in completing an uplands source control decision for the project site to satisfy the JSCS source control evaluation requirements.

Sulzer has characterized stormwater, groundwater, erosion, and overwater pathways. The conclusion of the SCE is that the project site is not a significant source of contamination to the Willamette River. Existing and potential contaminant sources at the site have been identified and characterized.

The groundwater, erosion, and overwater pathways were well characterized through previous submissions. Recently collected data is primarily related to the stormwater pathway. Although stormwater catch basin solids occasionally contain higher than typical levels of some constituents, the whole water samples are consistently lower than typical industrial concentrations. Recent catch-basin sampling results have lower concentrations of metals and Bis(2-ethylhexyl)phthalate after operations at the Sulzer facility have changed and vehicle traffic has been substantially reduced. The analytical results from the stormwater provide evidence that ongoing BMPs at the project site are effective and are limiting contaminant discharge to the Willamette River.

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1.0 INTRODUCTION

This SCE report is submitted by LimnoTech and NV5 on behalf of Sulzer Pumps (US) Inc. (Sulzer) under guidance of the DEQ VCP for the Sulzer facility located at 2800 NW Front Avenue and the Sulzer entered into the DEQ VCP in August 2002. The focus of this report presents a summary of stormwater and stormwater catch basins sampling activities conducted over the course of multiple years and the associated stormwater source tracking activities. The report also summarizes previously submitted data from 2011 bank soil sampling activities, and 2014 groundwater sampling data. The project site is shown relative to surrounding physical features on Figure 1. A schematic of the layout of the facility is presented as Figure 2. Acronym definitions are provided at the end of this document.

1.1 PURPOSE

The purpose of this SCE report is to provide a summary of the results of evaluation and control of potential sources of contamination on the project site that may discharge to the Willamette River. The SCE was completed in accordance with DEQ's Guidance for Evaluating the Stormwater Pathway at Upland Sites, dated January 2009 (updated October 2010), and DEQ/EPA's Portland Harbor Joint Source Control Strategy, dated December 2005 and with the specific directions of the DEQ provided in response to prior submissions. The SCE is intended to provide supporting documentation to assist DEQ in completing an uplands source control decision for the project site to satisfy the JSCS source control evaluation requirements.

2.0 PROJECT SITE BACKGROUND

2.1 PROJECT SITE DESCRIPTION

Sulzer acquired the plant and pump business assets located at 2800 N.W. Front Ave., Portland, Oregon in September 1986. Since that time, SPUSA has used this plant for the machining, finishing, assembly, and testing of industrial pumps. Sulzer began winding down manufacturing operations at the Portland facility in late 2021. A separate Sulzer business unit manufacturing products for the water market is now occupying the facility. They perform welding, grinding, and light machining onsite, in the presence of fume hoods and dust collectors. As of October 2025, approximately 33% of the usable indoor space is being utilized for production.

The plant area that Sulzer acquired in 1986 amounted to 22.57 acres. In 2004, Sulzer entered into an agreement to transfer ownership of a parcel of land to Dolan and Co. LLC (Dolan) in two separate conveyances. An 11.83-acre parcel was conveyed to Dolan on March 30, 2005. On February 14, 2008, granted to Dolan a "perpetual exclusive easement" of a 2.198-acre parcel along the waterfront (acreage is estimated and includes acreage under existing dock to UCE Harbor Lines est.1968). While Sulzer remains the fee title holder to the 12.14 parcel, since 2008 Sulzer's facility has consisted of 9.94 acres of property. This SCE pertains to this 9.94 acres parcel operated by Sulzer. However, some previously performed investigations also include data related to the Dolan parcel. A separate SCE is being performed for the Dolan property under an agreement with DEQ. Figure 3 shows the locations of the three parcels.

The project site is located at an approximate elevation of 30 feet above MSL. Topography at the project site is generally flat and topography in the general vicinity of the project site slopes gently downward to the northeast, toward the Willamette River. Groundwater at the project site has been encountered at depths of 20 feet BGS and greater. Groundwater seeps were not observed along the bank of the Willamette River during dry weather and wet weather inspections completed in the fall of 2011 and spring of 2013.

A large majority of the project site is impervious because of pavement or roofed structures. The current SWPCP for the Sulzer facility indicates that 88 percent of the surface area is impervious.

Prior to the wind down of pump manufacturing operations in 2021 the specific operations conducted at the Sulzer property and materials used in these operations are listed below.

1.Building "D"

Machine shop included the following:

- Water soluble coolant (cutting fluid), water soluble tapping fluid, and general cleaning materials, such as simple green.
- Welding materials, plasma transferred arc, tungsten inert gas, and metal inert gas. In addition to welding, heat treating is performed up to 1,700 degrees Fahrenheit.
- Hydro-Test materials: pressurized air, oil, surfactant (soap).
- Hand grinding using carbide burrs and sandpaper products.
- Support process evaporator to remove water from cutting fluids prior to disposal.
- Collection point for used oil.

2.Building "C"

Same as above with the addition of grinding (grinding fluids were the same water-soluble coolant)

- Dynamic balancing for rotating parts
- Hand grinding of rotating components

3.Building "S"

- Assembly building, mechanical assembly
- Welding and bending pipe
- Use of rust preventative "Cortex"
- Painting and sand blasting
- Pump Test process: water usage (heats water that must be cooled prior to disposal)
- Pump test: utilizes high voltage energy

In addition, pump tests occur in Building A and B and vertical pump tests were conducted in Building V. Office operations occur in Building T.

The COIs that may be associated with Sulzer operations include heavy metals and PAHs. Specific metals associated with Sulzer operations include chromium, cadmium, nickel, and zinc. Chromium and nickel are two of the materials in Super Duplex which is used in castings that make many of the Sulzer pumps. Zinc is associated with painting and sand blasting operations, as well as grinding of galvanized materials. Cadmium was used in fasteners prior to 2017. PAHs can be found in most petroleum products, including oils and lubricants used at Sulzer. Specific materials were tested for COIs as part of source tracing activities described in Section 6.2.

2.2 STORMWATER CONVEYANCE SYSTEM

Outfall B-1 is the only stormwater outfall to the river from the Sulzer property, draining approximately 3.7 acres of Basin B. Sampling point MP-1 is the sampling location for the B-1 outfall. Outfall A drains approximately 4 acres and discharges to the municipal gravity main at NW Front Avenue, which was diverted to the Columbia Boulevard Wastewater Treatment Plant in 2006 as part of the Portland BES CSO controls. Figure 2 shows the two stormwater basins on the Sulzer Property. Approximately 1.5 acres in the northern corner of the Sulzer property consist of direct drainage to the Willamette River (labeled NPS in Figure 2). In 1991, Sulzer was issued an NPDES Waste Discharge General Permit number 100-J (100-J permit) for the discharge of non-contact cooling water (transformers), pump test waters, defrost water, and heat pump transfer and cooling tower water. By 2018, all of the process waters had been re-routed to the sanitary sewer and the 100-J permit was no longer in effect.

2.3 PROJECT SITE OWNERSHIP AND OPERATING HISTORY

The Sulzer property ownership and operating history is summarized below. A more detailed history is presented in the December 10, 2002, *Preliminary Assessment*.

Willamette Iron and Steel owned the project site and leased adjacent property to the north from 1922 until 1945. During this period, Willamette Iron and Steel provided complete machine shop services with a focus on the fabrication of steam-powered locomotives and other equipment for the logging industry, equipment for the pulp and paper industry, water pipelines, penstocks, and repair of steel-hulled marine vessels.

Guy F. Atkinson purchased the physical assets of Willamette Iron and Steel in 1945 and began producing heavy machinery at the site in 1946. In 1952 Guy F. Atkinson purchased the Bingham Pump Company and Davis Valve Company and began to do business under the name Bingham-Willamette Company. The project site was then used for producing pumps, components for the aerospace industry, and overhauling marine vessels. Marine vessel work was discontinued in the 1970s and pump manufacturing became the primary operation at the project site in the late 1970s.

In September 1986, Bingham International, Inc. acquired assets of Guy F. Atkinson relating to the manufacturing of pumps and Sulzer Brothers Limited acquired 21 percent of the stock of Bingham International, Inc. In June 1988, Sulzer Brothers Limited acquired the remaining 79 percent stock interest in Bingham International, Inc., which then immediately changed its name to Sulzer Bingham Pump Inc., which name was changed to Sulzer Pumps (US) Inc. in July 1999. As described in Section 2.1, Sulzer sold a portion of the facility in 2005 and granted a perpetual easement in 2008, reducing its operating footprint to 9.94 acres.

Since 2021, Sulzer has been gradually decreasing the operations at the site. Operations are expected to cease in December 2022, though maintenance staff will remain on site until the facility is sold or leased.

2.4 REGULATORY HISTORY

In August 2002, Sulzer entered into a voluntary agreement with DEQ to conduct a PA of the project site. This was in response to the April 12, 2002, DEQ Site Assessment Program – Strategy Recommendation letter provided by DEQ. The PA was submitted to DEQ in December 2002 and included a review of historical site information, ownership and operating history, regulatory history, and an evaluation of sources and exposure pathways for potential contaminants. DEQ subsequently requested that an XPA be performed for the project site. The primary purpose of the XPA was to identify potential contaminant sources on the project site that may have impacted Willamette River sediments and surface water or have the potential to impact Willamette River sediments or surface water in the future. In May 2004, NV5 submitted the results of the XPA in a report to DEQ. The results of the XPA indicated that media impacted on the project site included subsurface soil, groundwater, and catch basin filter sediments.

In August 2005, GeoDesign (now NV5) submitted a draft SCE and SCP for the project site, and DEQ provided comments on September 8, 2005. Based on the comments provided by DEQ, GeoDesign incorporated updated screening levels for COIs at the facility. GeoDesign incorporated comments made for the SCP, and Sterling Technologies, LLC (Sterling) completed several field activities at the project site between September 2005 and June 2006, including site sweeping, identifying storm drain lines, sampling catch basin sediments, cleaning catch basins, jetting storm drain lines, disposing of remedial wastes, and stormwater sampling during a rain event. The samples obtained by Sterling were submitted to an analytical laboratory for chemical testing. The analytical results from these activities were screened using screening levels and methods from DEQ's December 2005 Final Portland Harbor JSCS document.

GeoDesign submitted a revised SCE report in June 2012. In its response, DEQ requested additional characterization of stormwater and groundwater pathways. Sulzer conducted additional stormwater sampling, installed and sampled groundwater wells, and conducted seep investigations.

Following additional investigation, another SCE Report was submitted in March 2015. In response to the report, DEQ suggested characterization of the bank erosion pathway and stormwater catch basin solids. Sulzer provided a bank erosion assessment memorandum in June 2017. Stormwater catch basin solids samples collected in 2016 contained higher than expected concentrations of some constituents – specifically, cadmium, PCBs, and bis(2-ethylhexyl)phthalate. Sulzer conducted multiple additional source tracking investigations and catch-basin solids sampling efforts while providing the results to DEQ. Although no clear source of these constituents has been identified, several additional rounds of stormwater sampling have demonstrated that the catch-basin filters have been effective at limiting the release of these constituents to the Willamette River. In December 2022, Sulzer submitted an updated Source

Control Document. DEQ suggested collecting two additional rounds of catch-basin sediment samples and catch-basin sediment accumulation measurements and one additional stormwater sample to understand how conditions changed with the change in operations at the site.

2.5 PREVIOUS INVESTIGATIONS

2.5.1 SCE Investigations

GeoDesign completed various investigations at the project site, which are summarized and presented in the following referenced documents that have been submitted to DEQ.

- Preliminary Assessment; Sulzer Pumps (US) Inc.; 2800 NW Front Avenue; Portland, Oregon. December 10, 2002.
- Expanded Preliminary Assessment; Sulzer Pumps Site; 2800 NW Front Avenue; Portland, Oregon. May 26, 2004.
- Technical Memorandum; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. November 12, 2004.
- Source Control Plan; Sulzer Pumps Site; 2800 NW Front Avenue; Portland, Oregon. August 1, 2005.
- Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. August 1, 2005.
- Source Control Plan; Sulzer Pumps Site; 2800 NW Front Avenue; Portland, Oregon. August 4, 2006.
- Supplemental Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. June 29, 2007.
- Supplemental Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. March 26, 2008.
- Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. June 1, 2012.
- Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. May 7, 2015.
- Technical Memorandum: Sulzer Stormwater Results. December 11, 2017.
- Technical Memorandum: Summary of Source Tracing Sampling Results for Sulzer Pumps (US). April 12, 2019.
- Technical Memorandum: Summary of Source Tracking Results for Sulzer Pumps (US). October 24, 2019.
- Source Control Evaluation; Sulzer Pumps Facility; 2800 NW Front Avenue; Portland, Oregon. December 19, 2022.

The data collected during the previous investigations as well as more recent stormwater and catch-basin solids investigations are summarized in Tables 1 through 5. These include data from the sampling of subsurface soils, groundwater, riverbank sediment, catch basin sediment (accumulation measurements included as Appendix A), stormwater, and historical stormwater and catch basin sediment samples collected by others. The data are screened against JSCS SLVs, PHSS PRGs, and typical industrial values for Portland Harbor.

2.5.2 Other Relevant Investigations

Environmental Site Assessments

GeoDesign performed a series of Environmental Site Assessments at the Sulzer Pumps facility in 2002 and 2003:

- Phase I Environmental Site Assessment; 3-acre Portion of the Sulzer Pumps Facility, 2800 NW Front Avenue; Portland, Oregon. January 22, 2002.
- Phase I Environmental Site Assessment; Approximate 6.72-acre Portion of the Sulzer Pumps Facility, 2800 NW Front Avenue; Portland, Oregon. May 30, 2002.
- Phase II Environmental Site Assessment; Sulzer Pumps Parcel 2; 2800 NW Front Avenue; Portland, Oregon. July 10, 2003.

The ESAs are summarized in the XPA and were used to inform the early source characterization activities.

UST Investigations

The site is registered in the DEQ's LUST database as file number 26-90-0334. In 1990, PEMCO removed 12 of 15 USTs from the site (*PEMCO, Environmental Site Assessment for the Property Located at 2800 NW Front, Portland, Oregon*. 1990). Figure 4 shows the locations of the 12 removed USTs (excerpted from the PEMCO report). The twelve tanks removed were:

- One unleaded gas tank (#1)
- One leaded gas tank (#2)
- One diesel tank (#3)
- One acetone tank (#7)
- One cold cleaner tank (#8)
- Two lacquer thinner tanks (#9 and #10)
- Three hydraulic oil tanks (#11, #12, and #13)
- One waste oil tank (#14), and
- One waste oil tank (#15)

Based on samples obtained from the tank cavities after soil removal activities, concentrations of petroleum hydrocarbons in remaining soil were less than DEQ Level 2 Soil Matrix Cleanup standards at locations except in the vicinity of the gasoline tanks (Tanks 1 and 2 on Figure 4). In the vicinity of the gasoline tanks, PEMCO recommended the installation of a recovery well and monitoring well system. a 1500J waste discharge permit was issued by DEQ in September 1991 to cover discharges from the treatment system. The system was operated from November 1991 to September 1993, with semi-annual monitoring performed from 1993 to 1996, until the issuance of an NFA.

Three of the 12 USTs in two areas contained waste oil, solvents, or acetone. Due to the presence of HVOCs in soil and groundwater, cleanup of impacts associated with the waste oil tank was referred to the DEQ's Site Assessment for further action. The DEQ issued an NFA determination for the removal of the 12 USTs on August 22, 1997. The NFA letter did not apply to the presence of residual chlorinated hydrocarbons in the vicinity of the solvent tanks and waste oil tanks which are not specifically addressed in the UST Program cleanup rules. The UST investigations are discussed in more detail in the April 12, 2002, DEQ Strategy Recommendation letter and the December 2002 PA.

A Phase II Environmental Site Assessment performed in 2003 characterized the areas in the vicinity of the former waste oil tank and solvent tank. The Phase II is included as Appendix B.

In 2005, a 15,000-gallon heating oil tank was decommissioned. Two additional 8,000-gallon heating oil tanks on what is now the Dolan property were pumped dry and cleaned (*Sterling Technologies, LLC, Heating Oil Underground Storage Tank Decommissioning and Risk-Based Closure Report, Sulzer Pump - Portland Facility, 2800 NW Front Street, Portland, Oregon, September 8, 2005*).

K&S Environmental, Inc. (K&S) completed a soil and groundwater investigation related to the permanent decommissioning activities for the two remaining 8,000 gallon heating oil tanks at the Dolan property in March 2011. Based on the results of the investigation, soil impacted with diesel-range hydrocarbons remains in place in the vicinity of the heating oil tanks, and the investigation results indicate that soil and groundwater concentrations of diesel-range hydrocarbons, VOCs, and PAHs are less than the applicable DEQ generic RBCs with the exception of benzo(a)pyrene, which slightly exceeds the excavation worker pathway. The K&S report indicates that concentrations of PAHs in groundwater decrease significantly in the down-gradient direction from the heating oil tanks. Groundwater samples T1W, T2W, and T3W collected by K&S are in similar locations to historical groundwater samples GP-5, GP-24, and GP-25, respectively. K&S certified the heating oil tank decommissioning as a risk-based cleanup and indicated that soil and groundwater delineation was completed in accordance with OAR 340-122-0240. DEQ provided a letter on April 1, 2011, indicating that it registered the report and certification provided by K&S and closed the DEQ file on the project (26-10-1102). A copy of the K&S report is provided in Appendix C.

<u>PGE/Clean Harbors Environmental Services</u>

In the spring of 2010, Sulzer began work on a transformer replacement project for substation No. 2. PGE (the electric power service provider) contracted with Clean Harbors Environmental Services (Clean Harbors) of Clackamas, Oregon, to conduct investigation and remedial services for surface soil impacted with TPH around the substation No. 2 area. Clean Harbors' scope of work included evaluating the presence and concentrations of TPH and PCBs in the soils within the fenced area of substation No. 2. Soil excavation and confirmation soil sampling was conducted to remove impacted soils to cleanup performance standards, including the generic RBC for generic mineral oil of 9,800 mg/kg, the OAR 340-122-0243 Soil Matrix Level 3 cleanup standard for diesel-range TPH of 1,000 mg/kg, and the OAR 340-122-0047 Oregon Generic Remedies for Soils Contaminated with PCBs at Active Electrical Substations of 25 mg/kg.

As described in the report provided by Clean Harbors, the substation includes three large transformers (TC-4, TC-5, and TC-6) that were retrofitted with non-PCB transformer oil in the 1970s by PGE. Observations at the beginning of the soil remediation project included visual staining on the concrete pad at the base of transformers TC-5 and TC-6 and in gravel at the edge of the concrete pad. Evidence of active leaks from the transformers or piping was not observed.

Initial soil samples were collected from stained soil near the transformer pad, and laboratory results indicated concentrations of diesel- and heavy oil-range hydrocarbons at 21,940 mg/kg and 1,840 mg/kg, respectively. PCBs and organochlorine pesticides were not detected at concentrations greater than the laboratory MRLs in the sample collected.

A remedial excavation was completed at the substation No. 2 area. The excavation ranged in depth between 3.5 and 6.0 feet BGS. Confirmation soil samples were collected at the base of the excavation for chemical analysis. The final confirmation soil sample results indicated that diesel-range hydrocarbons remained at the base of the remedial excavation at concentrations between 23.5 and 588 mg/kg and heavy oil-range hydrocarbons remained at concentrations up to 243 mg/kg. These concentrations are below the applicable cleanup concentrations. A total of 24.48 tons of impacted soil was removed for disposal at the Hillsboro Landfill Waste Management facility.

Based on visual observations, the impacted soils remaining in place beneath the transformer pad did not extend beyond 4 or 5 feet BGS. The remaining soils are confined directly beneath the transformer pad. According to the report, groundwater was not encountered in any of the excavations. The report indicated that PGE was planning to install an impermeable liner around the transformer pad as a secondary oil containment system to address any potential future spills and to act as a surface water intrusion barrier. Follow-up correspondence with PGE indicated that the impermeable liner was installed with the containment system in February 2011. The liner is an XR-5 8130 reinforced geomembrane by Seaman Corporation. The Clean Harbors report is presented as Appendix D.

3.0 POTENTIAL SOURCES AND PATHWAYS

3.1 POTENTIAL CONTAMINANT SOURCES

As summarized in Section 2.4, the potential current sources of contaminants that could impact river sediments at the project site include particulate matter on paved and non-paved surfaces, the deterioration of old building materials, and riverbank soils/sediments. Site operations are currently limited, and sources from previous operations were controlled. Electrical substations at the project site were included as potential contaminant sources in previous documents. Substation 2 was reconfigured following a cleanup completed by Clean Harbors as previously discussed. The remaining substations are in locations that are within Drainage Basin A and do not have complete pathways to the river. Another potential historical and current potential source of contaminants is hazardous waste storage areas at the facility. These locations have secondary containment provided within the storage units and emergency spill kits are located in close proximity to each storage area in case of a spill.

Potential sources of contaminants that could affect groundwater at the project site include the former waste oil UST location between Buildings D and S, and the decommissioned heating oil tanks (HOTs) located between the former headquarters and former office building. The K&S Environmental report describes the remaining impacts at the locations of the HOTs, and the recent groundwater investigation described in Section 5.4 provides further information regarding potential impacts to groundwater related to the former waste oil UST.

3.2 EVALUATION OF PATHWAYS TO THE WILLAMETTE RIVER

The potential sources of project site contaminants that could impact Willamette River water include stormwater and groundwater discharging to the river. A discussion of the potential sources of contaminants, including a CSM developed for the project site, are included in the PA, XPA, and SCE reports previously submitted to DEQ. The JSCS document identified potential uplands contaminant pathways that may impact the river, including direct discharges, groundwater, erosion/leaching, and overwater activities. These potential uplands pathways for the Sulzer site are discussed in the following sections.

3.2.1 Direct Discharge

Direct discharges are a complete pathway at the project site because stormwater from the project site discharges directly through outfalls to the Willamette River. Sulzer has a current 1200-Z stormwater permit, as discussed in Section 2.5.2. The NPS areas at the project site have been observed during rain events for evidence of stormwater discharge. Sheet flow has not been observed and the stormwater appears to adequately infiltrate the soil and/or gravel areas.

3.2.2 Groundwater

The groundwater discharge to surface water pathway is likely complete based on the riverfront location of the project site. The direct discharge of groundwater to the bank is not complete based on the absence of bank seeps and depth to groundwater at the project site. Seeps were not observed during seep inspections at the project site in 2011 and 2013. During previous groundwater investigations, groundwater was encountered at depths of 20 feet BGS and greater, which is deeper than utilities at the project site and is deeper than the MHW. During the 2014 groundwater monitoring well installation activities, groundwater was encountered in the borings at depths ranging between 22.75 feet BGS and 26.35 feet BGS. Therefore, preferential pathways in utility corridors and/or stormwater conveyances are not likely.

3.2.3 Erosion/Leaching

A large majority of the project site is impervious. Upland surfaces that are not paved include the NPS area to the north of the NE operations office, some small, graveled areas in the parking for the NE operations office, and the large, compacted gravel area at the south end of the project site. The areas to the north are graveled and/or vegetated with grass and generally flat. Sheet flow has not been observed in the pervious areas of the project site during rain events. Based on visual observations, stormwater appears to infiltrate adequately enough to prevent overland sheet flow. A bank erosion assessment was performed to assess the likelihood of erosion along the bank, including along the neighboring Dolan property.

3.2.4 Overwater Activities

The dock structure at the project site has not been used in many years and is no longer in usable condition. There are no current overwater activities at the project site, and none have occurred for several years. This pathway is incomplete.The dock is secured so that it cannot be accessed from the facility.

4.0 COMPLETED AND ONGOING STORMWATER MANAGEMENT MEASURES

BMPs are employed at the project site to help minimize pollutant contact with stormwater runoff. The following summarizes the BMPs that have been completed at Sulzer:

- According to facility maintenance staff, several older catch basins were replaced with Lynch-style models around 2004 to 2005.
- In February 2006, MRP Services performed initial site sweeping, cleaning out of the subject property catch basins using a vacuum truck, and line jetting of accessible storm drainpipes. Debris and water generated during the cleaning were gathered into a storage vat and the water was separated from the solids prior to disposal. Approximately 25 tons of solids were disposed of at Hillsboro landfill under Permit #9653, and approximately 640 gallons of water generated from the cleaning activities were disposed of at Oil Re-Refining Company's (ORRCO's) Portland facility.
- On December 1, 2008, Water Truck Services performed sediment removal from catch basins and line jetting of accessible stormwater lines at the Sulzer Pumps facility with recovery of the water for disposal. The City of Portland Bureau of Environmental Services (BES) approved the decanting of water from the solids for disposal into the sanitary sewer on the subject property.
- In March 2010, StormFilter maintenance/replacement was completed at the subject property.
- On March 30 and 31, 2010 and January 24, 2011, additional catch basin cleaning was completed at the subject property.
- On December 7, 2012, catch basin clean outs and filter replacements were completed at the subject property by Water Truck Services.
- On November 1 and 8, 2013, Bravo Environmental of Portland, Oregon, conducted maintenance of the stormwater management and conveyance systems at the Sulzer Pumps facility, including the stormwater infrastructure serving Drainage Basin B. The maintenance included a clean out of the StormFilter SF-1 and SF-2 vaults and replacing the existing Contech filter cartridges with new Contech cartridges equipped with Metal Rx media. Sediment was removed from the vaults, and they were rinsed clean. Sediment and rinse water were removed from the vaults using a vacuum truck. The maintenance also included cleaning of catch basins with a vacuum truck, replacing the filter inserts, and installing oil absorbent socks in the inserts. Additionally, the conveyance line in Drainage Basin B was jetted from the access point at manhole MP-1 to StormFilter vault, SF-1. Approximately 2.44 tons of solids, and 3,458.7 gallons of liquid generated during the clean out activities were disposed of at Bravo Environmental NW, Inc.'s processing facility in Portland, Oregon.
- On January 21, 2015, Scott Warner Construction of Clackamas, Oregon, a Contech-authorized contractor, completed catch basin clean outs and filter insert replacements at the subject property. StormFilter vaults, SF-1 and SF-2 were also cleaned and the filter cartridges with Metal Rx media were replaced.

- On April 27 and 28, 2016, additional catch basin cleaning and insert replacements were completed.

Additional insert and oil-absorbent boom replacements were performed in July 2015, January 2016, March and June 2018, September 2020, August 2021, and most recently in September 2022.Ongoing BMPs implemented are summarized below:

- Catch basin filters are installed in the stormwater catch basins - the storm filter units are inspected monthly and are scheduled for maintenance per the manufacturer's recommendations.
- Regular surface sweeping using a ride-on sweeping machine occurs at the project site as needed – multiple times per month.
- A program of cleaning, maintaining, and repairing of materials handling and storage areas and stormwater control measures, structures, treatment facilities, and catch basins is conducted on an annual basis or more frequently as needed.
- Visual inspections of all stormwater controls present at the facility are conducted monthly.
- Regular catch basin cleaning is performed, based on the monthly inspections.

A timeline of source control measures, sample collection, and reporting is provided as Figure 5.

5.0 SAMPLING EVENTS

For the purposes of the SCE, Sulzer has completed thirteen rounds of stormwater sampling, nine catch basin sampling events, a bank soil sampling event, a bank stability assessment, subsurface soil sampling and two groundwater sampling events at the project site.

5.1 STORMWATER SAMPLING

5.1.1 JSCS Stormwater Sampling

First flush stormwater sampling events related to the SCE process were completed May 2006, December 2006, November 2007, October 2008, November 2013, July 2014, March 2017, June 2017, September 2019, December 2020, October 2021, May 2022, and May 2024.

Since 2013, samples have consistently been collected at outfall MP-1. Prior to 2013, samples were collected at other locations (Vault and SD-2) that also characterized the discharge from Sulzer Basin B.

Stormwater was collected directly into laboratory-supplied containers. Samples were temporarily stored on ice until transport to the laboratory under chain-of-custody documentation.

First flush stormwater samples were analyzed for TAL 23 total metals by EPA 6000/7000 Series Methods, PCBs by EPA Method 8082A, PAHs and phthalates by EPA Method 8270D, pH by EPA 150.1, TSS by SM2540, and oil and grease by EPA 1664A.

5.1.2 1200-Z Sampling

GeoDesign/NV5 conducted the 1200-Z stormwater permit sampling on behalf of Sulzer. The stormwater sampling requirements have varied. For the period from 2013 to 2017, the required parameters included cadmium, chromium, copper, cyanide, iron, lead, nickel, zinc, PCBs, PAHs, and Pesticides, pH, TSS, and oil and grease. After early 2017, cadmium, chromium, and nickel were removed from the analyte list. Beginning in 2021, the analysis was limited to pH, copper, lead, zinc, total iron, and TSS.

5.2 CATCH BASIN SOLIDS AND SOURCE TRACKING SAMPLES

Stormwater catch basin solids were first sampled in November 2008 – two composite samples were collected from multiple catch basins and submitted for analysis. Following the submission of the 2015 Source Control Evaluation report, DEQ requested additional catch basin sampling. In 2016, GeoDesign collected 10 catch basin solids samples from seven individual catch basins and three composites of seven additional basins. Elevated levels of certain constituents, discussed in Section 6.2, were detected in some of the catch basin solids samples. To confirm the presence of those contaminants and to assist in identifying the source, seven additional rounds of catch basin solids samples were collected between 2017 and 2025.

Varying catch basins were sampled across the events, depending on site access and the availability of solids materials for sampling. The catch basin locations are shown in Figure 6. At the time of each sampling event since 2016, the quantity of solids accumulated since the last filter cleaning, along with the date of the last cleaning was recorded. These values were used to calculate the accumulation rate in each catch basin. The solids accumulation tables are presented in Appendix A. The accumulation rates for the 2024 and 2025 events were generally lower than previous events, likely due to the reduction in vehicle traffic at the facility.

Samples were submitted to the laboratory for TAL 23 total metals by EPA 6000/7000 Series Methods, PCBs by EPA Method 8082A, PAHs and phthalates by EPA Method 8270D-SIM, and total organic carbon (TOC) by EPA Method SM5310B.

Following the identification of higher than typical concentrations of some constituents in the stormwater catch basin solids, Sulzer performed three rounds of source tracking activities.

- Wipe samples, one asphalt sample, and a sample of test pit solids collected in July 2016 (Figure 7)
- Materials and product samples collected in January 2019 (Figure 8), including:
    - Machining and cutting fluids
    - Paints and paint catalysts
    - Shrinkwrap
    - Asphalt sealants
    - Caulking
    - Roofing asphalt
    - Substation soils

- Materials and product samples collected in July 2019 (Figure 9), including:
    - Corrosion inhibitor products

- Gutter sediments
- Roofing materials
- Forklift tire shavings
- Asphalt and asphalt sealants
- Catch-basin filter material

Each of the product and material samples were submitted to the laboratory to be analyzed for TAL 23 total metals by EPA 6000/7000 Series Methods, PCBs by EPA Method 8082A, PAHs and phthalates by EPA Method 8270D. Wipe samples were submitted for analysis for PCBs using Method 8082A. Greater detail regarding the specific products and materials that were submitted for analysis is provided in the discussion of the analytical results (Section 6.2).

5.3 ERODIBLE SURACE SOIL SAMPLING AND SEEP INSPECTIONS

The purpose of the erodible surface sampling was to evaluate whether soils at the project site that are potentially erodible are impacted with contaminants of concern at concentrations greater than applicable screening levels. The erodible surface soils are considered a potential migration pathway to the Willamette River. The purpose of the seep inspection was to evaluate whether seeps are a potential contaminant migration pathway to the river and whether the water in seeps is impacted with contaminants of concern. The soil sampling and seep inspection was completed in accordance with the DEQ-approved *Revised Work Plan, Erodible Surface Soils and Seep Sampling and Analysis Plan* completed by GeoDesign, dated October 6, 2011. A third seep inspection was completed in accordance with the February 2013 work plan which utilized the same methodology per DEQ as described in Section 2.4. A bank erosion assessment was conducted in 2016 and 2017 to assess the likelihood of surface soil erosion.

5.3.1 Surface Soil Sampling

Bank soil sampling was performed on October 25, 2011. The MHW level was marked at the bank in several locations. This was accomplished by first running a closed bench loop using City of Portland benchmark #3548, elevation 32.822 feet (City of Portland datum). Next, GeoDesign personnel established a temporary benchmark on the bank and marked the MHW level at several locations along the bank sampling area. The approximate MHW level is shown on Figure 10. As part of remedial design activities, EPA has established the MHW (+13 ft NAVD88) as the upper boundary of in-river sediment. These samples collected in 2011 are now on the edge of being considered sediment and bank samples.

Four composite surface soil samples were collected (CBS-1 through CBS-4). The composite soil samples were collected from four areas depicted on Figure 11 and were comprised of 10 discrete soil subsamples (CBS-1 through CBS-3) and 5 discrete soil subsamples (CBS-4). The areas from which the samples were collected were generally oblong areas between 75 and 600 square feet in size, dependent on the availability of accessible soils located at a greater elevation than the MHW level of 10.92 feet (City of Portland datum, ~13 feet NAVD) and within 100 horizontal feet of that same elevation. Soil samples CBS-1 and CBS-2 were collected from areas that were observed to be at a greater elevation than the MHW but less than high water events, evident because of the observation of driftwood and other material deposited at greater elevation on the bank. Soils higher up the bank were covered with riprap. Soil sample CBS-3 was collected from beneath the dock structure on a sloping wall, and soil sample CBS-4 was collected from the top of bank. The discrete subsamples from each composite were collected from 0 to 6 inches BGS using a stainless-steel trowel. A portion of each discrete soil subsample was placed in a laboratory-supplied glass jar for archiving and a portion was placed in a stainless-steel bowl for homogenizing with the other discrete soil subsamples of that area to produce a composite soil sample.

Soils encountered at locations CBS-1, CBS-2, and CBS-3 were primarily sand. The CBS-4 location soils included sands and silts and was covered with grass and gravels.

5.3.2 Seep Inspections

Inspections of the bank for active seeps or dry weather outfall pipe flow were conducted from the north end of the project site to approximately 620 feet south, or approximately half of the river front, on October 25 and December 1, 2011. During the October 25, 2011, inspection, active seeps were not observed. One outfall pipe was observed to have minor flow, estimated at less than 0.25 gpm. The pipe was observed in the bank wall beneath the dock area and was not safely accessible and, therefore, not sampled. The pipe was observed to be the Outfall B-1. It was also observed that it had broken off at the seawall because of the dock collapse and was no longer connected to the remainder of the outfall pipe submerged in the Willamette River.

A follow-up bank inspection was completed on December 1, 2011. Seeps were not observed, and one dry weather outfall pipe flow was observed. The outfall pipe was the same one observed in the October inspection and had a similar flow (estimated at less than 0.25 gpm). Samples were not collected because the pipe was not safely accessible. The approximate location of the pipe seep is shown on Figure 10. Following the request from DEQ, NV5 completed a third dry weather seep inspection during the high-water table season on April 3, 2013. The seep inspection was completed along the riverbank from the northern edge of the project site moving south to approximately 80 feet south of Outfall C. No seeps were observed and therefore no seep samples were collected.

5.3.3 Bank Erosion Assessment

A bank erosion assessment was performed to understand the potential for streambank erosion along the Sulzer Bank. The assessment included both the Sulzer parcel and the portions of the bank owned and operated by Dolan. In the analysis, the Bank Assessment for Non-point source Consequences of Sediment (BANCS) model was utilized. The BANCS model incorporates the method of estimating the Bank Erosion Hazard Index (BEHI), as developed by Dave Rosgen, and estimates of Near Bank Stress (NBS).

The field efforts to support the assessment were conducted in December 2016 and March 2017. The field efforts included photographing portions of the bank, documentation of armoring features such as sheet pile and riprap, and measurements of key bank features such as bank toe and bankfull height.

5.4 GROUNDWATER SAMPLING

5.4.1 Historical Groundwater Sampling

Historical groundwater samples were collected as part of the recovery and monitoring system following the removal of tanks in 1990. Samples were collected at least semi-annually from 1992 to 1997. Additional samples were collected during 2003 and 2004 during a Phase II Environmental Site Assessment (included as Appendix B) and during the 2004 Expanded Preliminary Assessment. The samples include locations on the current Dolan parcel. The historic sampling results summarized in this report consists of:

- Monitoring from the 1990s in wells SB-1, SB-2, SB-3, and SB-4 (Figure 11).
- Grab samples from four temporary borings collected in the general vicinity of former heating oil USTs in the eastern part of the property during the 2003-2004 Phase II Environmental Site Assessment (GP-2, GP-3, GP-4, GP-5, GP-24, GP-25, and GP-26 shown in Figure 11);
- Grab samples collected at five locations, spaced at approximately 250-foot intervals along the top of the Willamette Riverbank during the 2003-2004 Phase II Environmental Site Assessment (GP-18 through GP-22 – Figure 11);
- A grab sample for GP-23, collected near former dry wells during a 2003-2004 Phase II Environmental Site Assessment (Figure 11);
- A grab sample from GP-27, collected near the southeast corner of the property near a former PGE Pipeline during a 2003-2004 Phase II Environmental Site Assessment (Figure 11); and,
- Grab samples from seven temporary borings collected in the general vicinity of a former waste oil heating oil USTs during the 2003-2004 Phase II Environmental Site Assessment (GP-11 through GP-17 - Figure 12).

Subsurface soil borings were also performed as part of the Phase II Environmental Site Assessment in locations shown on Figure 11 (e.g, GP-7 to GP-10). Those results are included in Appendix B.

5.4.2 Source Control Groundwater Sampling

NV5 completed additional groundwater sampling from monitoring wells MW-1 through MW-5 (Figure 13) on October 3, 2014, and January 20 and 21, 2015. These monitoring wells were installed as part of Source Control Evaluation activities in September 2014 (Boring logs are included as Appendix E). Three wells were installed on the current Sulzer parcel (MW-1, MW-2, and MW-3) and two wells were installed on the Dolan parcel (MW-4 and MW-5). The two sampling events were completed to collect representative groundwater samples during low (October 2014) and high groundwater table (January 2015) seasons, respectively. Although the January 2015 sample was collected during high water level conditions, even higher conditions may occur in the spring. The lack of a spring sample may represent a data gap.

Prior to sampling, depth-to-water measurements were collected at each monitoring well and recorded on a field sampling form. Measurements were collected using a decontaminated water level indicator with 0.01-foot graduations. Prior to sampling, each monitoring well was purged using a peristaltic pump and dedicated tubing. Groundwater field parameters, including pH, conductivity, dissolved oxygen, and temperature, were measured and recorded during the purging activities. Once the field parameters stabilized to less than 10 percent variation during three successive readings, the samples were collected into labelled laboratory-prepared containers. Groundwater samples were placed on ice and transported under chain-of-custody to Apex Laboratories, LLC of Tigard, Oregon, for analysis of volatile petroleum hydrocarbons and extractable petroleum hydrocarbons by Methods NWVPH and NWEPH; PAHs and phthalates by EPA Method 8270C-SIM; the total and dissolved (field filtered) metals arsenic, cadmium, chromium, copper, lead, and zinc by EPA 6000/7000 Series Methods; and VOCs by EPA Method 8062B.

6.0 DATA SUMMARY

6.1 STORMWATER ANALYTICAL RESULTS

6.1.1 JSCS Stormwater Results

First flush samples were targeted for collection during storm events consistent with the Joint Source Control Strategy criteria. The timing of the collection of the first flush samples is shown in Appendix F.

First flush stormwater sampling analytical results are shown in Table 1a. The analytical results for both stormwater sediments and whole-water stormwater samples were compared to the PHSS both JSCS SLVs. Measurements exceeding certain thresholds are highlighted as follows:

- Exceeds threshold by less than one order of magnitude – yellow
- Exceeds threshold by an order of magnitude – blue
- Exceeds threshold by two orders of magnitude – green
- Exceeds threshold by three orders of magnitude - orange

Additionally, the stormwater results were compared to typical industrial values for Portland Harbor. The DEQ developed a Tool for Evaluating Stormwater to compare the concentration ranges found at individual sites to the range that is typical for industrial to the data collected at the project site. Charts provided in the tool show stormwater contaminant concentrations at industrial sites in the Portland Harbor area. The concentration distributions are charted in a curve, which includes a flat area and also a steep area. The transition area is called the “knee” of the curve. Concentrations within the flat area of the curve are considered typical of industrial sites, while concentrations that are higher than the knee may represent elevated concentrations. The distributions are provided for arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, bis(2-ethylhexyl)phthalate, total PAHs, total PCBs, and TSS. An approximation of the flat area of the curve is provided for these constituents in Table 1a and plots of the Sulzer first flush samples on the typical industrial curves are included as Appendix G.

A total of 13 rounds of first flush stormwater samples have been collected from an Outfall representative of Basin B since 2006. Across all of the samples collected in Sulzer Basin B since 2006, the mean concentration of every stormwater constituent for which a typical industrial curve has been developed is below the flat part of the curve, with the exception of cadmium. This demonstrates that over an extended period, the Sulzer stormwater concentrations are lower than typical Portland Harbor industrial levels. In recent samples, cadmium concentrations have also decreased to below the flat part of the curve. No cadmium source specific to Sulzer operations was ever identified. The recent decrease may be due to a decrease in the presence of cadmium in brake pads – particularly in the brakes of the shipping trucks that frequently visited the site. It may also be due to improved stormwater management practices at Sulzer, such as increased sweeping as the decrease is also reflected in other constituent, such as lead and bis(2-ethylhexyl)phthalate.

The five first-flush stormwater samples collected since 2019 have demonstrated decreased concentrations for nearly all stormwater constituents of concern. Specifically:

- The mean concentration decreased compared to the previous four samples (2013-2017) for each metal and phthalate constituent with detected levels, including:
    - Mean cadmium decreased from 1.52 µg/L (2013-2017) to 0.352 µg/L (2019-2024)
    - Mean copper decreased slightly from 15.9 µg/L to 15.7 µg/L
    - Mean lead decreased from 5.72 µg /L to 0.71 µg/L
    - Mean zinc decreased from 197 µg /L to 112 µg/L
    - Bis(2-ethylhexyl)phthalate decreased from 5.83 µg/L to 0.98 µg/L
- No PCBs were detected in any samples.
- No PAHs were detected in any samples, with the exception of two phenanthrene detections below the relevant screening value.
- No concentration of any constituent exceeded the flat part of the typical industrial curve in any sample.
- All stormwater constituents were within one order of magnitude of the relevant screening criteria (PHSS PRGs or JSCS SLVs).

6.1.2 1200-Z Sample Results

The 1200-Z sample results are presented in Tables 1b and 1c. Like the first flush samples, the 1200-Z samples generally have concentrations at or below typical industrial concentrations for Portland Harbor. Specifically:

- The only metal constituent with a mean concentration higher than the flat part of the JSCS curve was cadmium (cadmium was not analyzed in 1200-Z samples after 2017, the period where the first flush samples showed a decline in concentrations).
- PCB results were all below the laboratory detection limits.
- PAH results were all below the laboratory detection limits.
- Pesticide results were all below the laboratory detection limits.

6.2 STORMWATER CATCH BASINS SOLIDS AND SOURCE TRACKING

Stormwater catch basin solids concentrations are presented in Tables 2a, 2b, 2c, and 2d. Like the JSCS first flush samples, the results are compared to JSCS SLVs and PHSS PRGs for sediment. The results in Tables 2a, 2b, 2c, and 2d are color coded as follows:

- Exceeds threshold by less than one order of magnitude – yellow
- Exceeds SLVs by an order of magnitude – blue
- Exceeds SLVs by two orders of magnitude – green
- Exceeds SLVs by three orders of magnitude - orange

Appendix G shows the Sulzer catch basin filter values on the Portland Harbor typical industrial curves.

Stormwater catch basin solids were first sampled in November in 2008 – two composite samples were submitted for analysis. Following the submission of the 2015 Source Control Evaluation report, DEQ requested additional catch basin sampling.

In 2016, Sulzer began collecting the solids that have accumulated on the catch-basin filters. GeoDesign collected 10 catch basin filter solids samples from seven individual catch basins and three composites of seven additional basins. In one catch basin (CB-13), PCBs were detected at 19,430 ug/kg – much higher than had previously been detected and much higher than what was found in any other catch basin.

A series of follow up investigations was performed to assess possible sources of PCBs to that catch basin. Immediately after the receipt of the result, Sulzer conducted activities including a visual investigation of the area, collection of wipe samples of various areas within the CB-13 catchment, analysis of a selection of the asphalt in this area, and analysis of test pit solids that may have been released to the catch basin.

The visual investigation included a site visit and examination of aerial photos. A transformer was identified in the general vicinity of CB-13, although Sulzer records indicate this transformer (Substation 7) contains non-PCB oils – documented by SD Myers in 2010. A defunct rail line also runs through the drainage area of the catch basin. Additionally, the aerial photos were evaluated to identify potential sources of solids in general to the catch basin. No clear areas of solids sources were identified. However, a downspout from Building S, which concentrates the flow from a large area, drains to CB-13.

Subsequent to the investigation of aerial photos and site records, in June 2016 a series of supplemental samples were collected to evaluate the potential PCB sources. Eight wipe samples plus a field blank were collected and submitted. Wipe sample areas included:

- Pavement of Substation 7
- Two areas of pavement in the drainage path from Substation 7 towards CB-13
- Rim of CB-13
- Rail line and adjacent asphalt
- Pavement directly beneath the downspout near CB-13
- The building’s metal siding
- Area up gradient from CB-13 near the entrance to Building S

In addition to the wipe samples, samples of the asphalt in CB-13 and a sample of test pit solids were submitted for analysis.

The asphalt was collected from an area of broken asphalt near CB-13. The testing laboratory ground the asphalt sample prior to analysis. Much of the CB-13 area had been recently resurfaced with new asphalt. The analysis was performed to determine if PCB-containing oil in the asphalt could have led to the elevated PCB levels.

The test-pit solids sample was from a basin where pumps manufactured by Sulzer were tested at a facility in the Ice House (Building V). The solids from this basin were drained as part of preparations for construction activities. Analysis was collected from one of the barrels prior to offsite disposal.

Table 3a shows the result of the PCB analysis of the wipe samples, asphalt, and test pit solids. All of the wipe samples, with the exception of the catch basin rim were below detection limits. The asphalt and test pit solids contained PCBs above detection limits but well below the levels found in the CB-13 solids. No clear source of the elevated PCBs was identified through the supplemental sampling effort.

Following completion of the construction activities at Sulzer, two additional rounds of catch basin filter sediment samples were collected on April 11, 2017 and July 17, 2017 to determine if the source of elevated PCBs was ongoing. The construction activities modified which catch basins are accessible for sample collection. Therefore, a somewhat different set of catch basins was sampled in the 2017 sampling events than in the 2016 sampling. The PCBs, bis(2-ethylhexyl)phthalate, and cadmium results were all lower than the 2016 samples.

In October 2018, Sulzer provided a work plan to DEQ for additional catch-basin sediment sampling and materials sampling as part of source tracking activities, with an emphasis on identifying sources of PCBs, bis(2-ethylhexyl)phthalate, and cadmium. Prior to submitting the sampling work plan, Sulzer conducted non-sampling source identification activities to better assess potential sources of contaminants in the stormwater system. Based on the activities to identify potential sources, Sulzer identified building, parking lot, and operations materials for follow-up sampling. The table below shows the materials selected for sampling and the locations are provided in Figure 8.

Product	Description
Cimtech 410 Blue	Machining/cutting fluid
Cimstar 40F Pink	Machining/cutting fluid
Devran 261	Paint, two-part paint for pumps/bases
Devran 261 Catalyst	Catalyst for paint, two-part paint for pumps/bases
Cathcoat 302H	Paint, two-part paint for pumps/bases
Cathcoat 302H Catalyst	Catalyst for paint, two-part paint for pumps/bases
Devran 349	Paint, two-part paint for paint/bases
Devran 349 Catalyst	Catalyst for paint, two-part paint for pumps/bases
Yellow 4318	Paint, outdoor uses
Shrinkwrap White	Shrinkwrap for pumps/bases
Shrinkwrap Clear	Shrinkwrap for pumps/bases
Asphalt Seal-1	Sealant taken from asphalt joint near substation #2
Asphalt Seal-2	Sealant taken from asphalt joint near CB-17
Caulking-1	Caulking taken from side of building above CB-9
Roofing-1	Roofing asphalt shingle from south side of Building S
Substation-1	Soil from inside fenced area of substation #1
Substation-3	Soil from beneath gravel in area of former substation #3

Samples were collected in January 2019 – the catch-basin filter solids results are included in Table 2b, and the source tracking results are presented in Table 3b. In the catch basin solids, none of the PCB results were as high as the 19,430 ug/kg sample collected in 2016. However, two catch-basin solids samples in the same area (CB-10 and CB-12) had concentrations greater than 3,000 ug/kg due primarily to Aroclor 1268. Additionally, one catch basin (CB-12) had a notably high concentration of bis(2-ethylhexyl)phthalate (185,000 ug/kg).

The source tracking sampling did not indicate a clear source for PCBs or bis(2-ethylhexyl)phthalate – none of the materials had contaminant concentrations as high as what was detected in the catch basin solids.

The caulking sample did contain somewhat elevated concentrations of PCBs (655 ug/kg); however it did not contain Aroclor 1268. In subsequent inspections, no additional caulk was found on site.

Because no clear contaminant sources were identified in the initial source tracking efforts, an additional round of source tracking sample collection was performed. A supplemental work plan was submitted to DEQ in June 2019 and samples were collected in July 2019. The table below shows the additional materials that were sampled. The locations are shown in Figure 9.

Product	**Description**
CORTEC-368	Corrosion inhibitor product
CORTEC-377	Corrosion inhibitor product
CORTEC-329	Corrosion inhibitor product
Ice-House-Gutter-Sediment	Gutter sediment
BLDG-D-1	Gutter sediment
BLDG-D-2	Gutter sediment
BLDG-D-Roofing	Roofing material
BLDG-S-Low-Roofing	Roofing shingle
BLDG-S-High-Roofing	Roofing shingle
BLDG-S-Low-1	Gutter sediment
Fork-Lift-Tire-2	Forklift tire shavings
Hyster-Tire	Forklift tire shavings
Asphalt-Seal #1	Asphalt sealant
CB-Insert-1	Unused catch-basin filter material
CB-Insert-2	Unused catch-basin filter material
Asphalt-1	Asphalt pavement in the area between Substation 2 and catch basin CB-23
Asphalt-2	Asphalt pavement in the area between Substation 2 and catch basin CB-23

Asphalt-3	Asphalt pavement in the area between Substation 2 and catch basin CB-23
Asphalt-4	Asphalt pavement in the area between Substation 2 and catch basin CB-23
Asphalt-5	Asphalt pavement in the area between Substation 2 and catch basin CB-23
Asphalt-6	Asphalt pavement in the area between Substation 2 and catch basin CB-23

Results of the supplemental source tracking are presented in Table 3c. The results of the materials sampling did not point to clear sources of PCBs, bis(2-ethylhexyl)phthalate, or cadmium to the catch basin sediments. Once again, none of the materials had concentrations of those constituents that were as high as what was detected in the catch-basin solids. The highest PCB levels were found in select asphalt samples. However, it was not clear if asphalt was serving as a source or a sink.

Additional rounds of catch-basin solids samples were collected in December 2020, January 2022, September 2024, and March 2025. The concentrations of metals and bis(2-ethylhexyl)phthalate in the catch-basin solids were lowest in the most recent sampling event, suggesting that the reduced vehicle traffic has led to lower stormwater solids concentrations in these constituents. The PCB concentrations continue to occasionally be elevated in certain catch basins, particularly CB-10.

6.3 SOIL EROSION

6.3.1 Soil Analytical Results

GeoDesign completed bank soil sampling activities on October 25, 2011. Four composite surface soil samples were collected (CBS-1 through CBS-4) at the MHW. In addition, twenty-four discrete soil samples were collected and submitted to the analytical laboratory for possible chemical analysis. The samples were collected at the MHW; according to the EPA definition as part of remedial design, these samples would now be considered in-river sediment samples rather than bank samples.

Each composite soil sample was submitted for analysis of PCBs by EPA Method 8082A, PAHs by EPA Method 8270D-SIM, and TAL 23 total metals by EPA Method 6020 (ICPMS). Based on the laboratory results, PCB Aroclor 1260 was detected in each composite soil sample CBS-1, CBS-2, CBS-3, and CBS-4 at concentrations of 141, 195, 86.7, and 23.5 µg/kg, respectively. In addition, Aroclor 1254 was detected in composite soil sample CBS-4 at a concentration of 14.9 µg/kg. No other Aroclors were detected at concentrations greater than the laboratory MRLs. The detected PCB Aroclors were less than the corresponding JSCS SLVs for soils. Following the receipt of initial composite soil sample results, DEQ was contacted. It was determined that the discrete samples from CBS-2 should be analyzed for PCBs. The PCB results of the 10 discrete samples CBS-2-D1 through CBS-2-D10 indicated concentrations of Aroclor 1260 between 45.5 and 217 µg/kg. No other Aroclors were detected at concentrations greater than the laboratory MRLs.

Various PAHs were detected in composite soil samples CBS-1 through CBS-4. Indeno(1,2,3-cd)pyrene was detected at a concentration of 135 µg/kg, which is greater than the corresponding JSCS SLV for soils of 100 µg/kg. No other PAHs were detected at concentrations greater than JSCS SLVs. DEQ did not request PAH analysis for discrete samples.

Various metals, including arsenic, copper, lead, manganese, mercury, nickel, and zinc, were detected at concentrations greater than the corresponding JSCS SLVs for soil. Based on correspondence with DEQ following their review of composite sample results, it was determined that the discrete samples from CBS-1 (CBS-1-D1 through CBS-1-D10) should be analyzed for total arsenic, copper, lead, manganese, and zinc. The results of the discrete soil samples analysis indicated that arsenic and copper exceeded the respective SLVs by an order of magnitude in each sample, while lead, manganese, and zinc typically exceeded the SLVs within the same order of magnitude. The results of the PCB, PAH, and TAL 23 total metals analyses from the bank soil sampling event are summarized in Tables 4a and 4b.

In soils, the detected concentrations of PCBs were below JSCS Upland SLVs for each composite sample collected during the 2011 sampling event. However, three of the four samples exceed the PHSS sediment RAL of 75 ug/kg and all exceed the CUL of 9 ug/kg. One of the 10 discrete samples analyzed had a concentration of Aroclor 1260 slightly exceeding the SLV and PHSS threshold for principal threat waste (217 µg/kg compared to 200 µg/kg). PAHs were either not detected or, with one exception, detected at concentrations less than the JSCS Upland SLVs. Metals detected in one or more composite bank soil samples at the same or one order of magnitude greater than the SLVs were similar metals as seen in catch basin sediments. Bank soils analytical results indicated some data exceptions. For example, the concentrations of PAHs in the duplicate sample were approximately double the sample concentrations (CBS-1); however, even if the sample concentration were double, it would be less than each applicable JSCS Upland SLV. Manganese concentrations are estimates as the QA protocol has not been met. The detected concentrations of manganese are greater than JSCS Upland SLVs.

6.3.2 Soil Erosion Assessment

The BANCS model was utilized to evaluate the erosion potential along the Sulzer streambank. The BANCS model integrates an assessment of the erodibility of the bank, using a BEHI assessment, and an assessment of the erosive forces influencing the bank, using an estimate of NBS. The full results of the assessment are provided in Appendix H.

For the purpose of evaluating the BEHI, the Sulzer streambank was divided into zones based on the degree of bank protection.

- Zone 1 - Under the dock where the dock extends completely back to the streambank:
    - Zone 1a – section with stepped sheet-pile or vertical wood lagging, starting at the water line, with riprap between the stepped walls
    - Zone 1b – section with riprap piled back at an angle to the vertical wood wall at the back of the dock

- Zone 2 - The section with a dock surface that does not extend all the way back to the bank.
- Zone 3 - The most downstream section, with no dock surface, only remnant pilings.

The streambank in Zones 1a and 1b is well protected by sheet pile and concrete riprap. The BEHI risk rating for these areas was categorized as LOW. The streambank in Zone 2 does not have sheet pile or complete riprap coverage, but it does have some concrete riprap and some vegetated cover. The bank angle is lower in this area than elsewhere along the bank, reducing the erosion potential. The BEHI risk for this area is MODERATE. The streambank in Zone 3 in the erosive zone is covered with riprap. The BEHI risk for Zone 3 is LOW.

The NBS can be determined using multiple approaches. Based on both the channel pattern and the near bank to mean depth ratio, the NBS for the entire bank near Sulzer is VERY LOW.

Based on BER curves combining BEHI and NBS, the combined erosion potential for Zones 1a, 1b, and 3 is negligible and the erosion potential for Zone 2 is in the range of 0.01 to 0.05 ft/yr, without accounting for the additional protection offered by the wood pilings along the bank. Overall, there is very limited potential for erosion from the Sulzer bank.

In comments on the bank erosion assessment, EPA and DEQ noted that the assessment did not include boat wakes and wind, overland flow, or flooding from the Willamette River. Sulzer agrees that boat wakes and wind were not considered and could be considered a data gap. Overland flow at the site is very limited and is not expected to generate erosion – the portion of the site that does not flow to storm sewer is limited to approximately 3 acres of gravel. The NBS implicitly considers high channel flow conditions – the area near Sulzer is not expected to experience high shear stress due to flooding.

6.4 GROUNDWATER ANALYTICAL RESULTS

6.4.1 Historical Groundwater Sampling Analytical Results

Both historical and more recent groundwater analytical results are presented below. The historical results were collected in the immediate vicinity of sources and demonstrate releases have occurred. However, they are not representative of current conditions nor are they indicative of releases to the Willamette River. The Source Control Evaluation samples collected along the bank are more current and representative of discharges from the site.

<u>Former Solvent and Waste Oil UST Area</u>

Following the tank removal in 1990, Sulzer implemented a recovery and monitoring well program for several years. Samples were collected at four wells (SB-1, SB-2, SB-3, and SB-4 shown in Figure 11). Samples were collected at least twice per year and up to four times per year from 1992 to 1997. Samples from SB-1, SB-2, and SB-3 were analyzed for petroleum contamination (BTEX and TPH) while samples from SB-4 were analyzed for solvents. Results from the monitoring program are presented in Tables 5a through 5d.

The DEQ issued an NFA determination for the removal of the 12 USTs on August 22, 1997. The NFA letter did not apply to the presence of residual chlorinated hydrocarbons in the vicinity of the solvent tanks and waste oil tanks which are not specifically addressed in the UST Program cleanup rules.

Results from the 2003 groundwater samples collected in the vicinity of the former waste oil tank area are presented in Table 5e. The results of the 2003 sampling indicate residual low level chlorinated hydrocarbon and petroleum groundwater contamination in the former waste oil UST area based on data from GP-11 through GP-17, and well SB-4. VOCs such as PCE and vinyl chloride occasionally exceeded JSCS SLVs for groundwater based on PRGs for drinking water. The maximum chlorinated hydrocarbon concentration was 1.14 µg/L of PCE in the deepest sample (36-40 feet) collected from GP-15. Only one concentration of carbon disulfide (1.63 µg/L in GP-12) exceeded the ecological surface water screening concentration. VOCs in GP-16 and GP-17, located about 40 feet downgradient of the former tank excavation, were detected at lower frequency and concentration, with only two contaminants detected above JSCS SLVs at GP-16 (no VOC detections in GP-17). Compared to the historical data for SB-4, VOC concentrations generally have decreased by an order of magnitude.

PAHs were detected at relatively high concentrations in GP-12 and GP-15, located near the former tank excavation, with benzo(a)pyrene and/or benzo(a)anthracene concentrations 100 times their respective JSCS SLVs. Elevated concentrations were detected in downgradient wells GP-16 and GP-17, and while at lower concentrations than GP-12 or GP-15, are still commonly 10 times greater than JSCS SLVs.

GP-19 is located further downgradient near the bank of the river, and PAH concentrations are much lower, with only four PAH compounds detected at greater than the SLV. None of the PAH concentrations in GP-19 exceed JSCS SLVs by a factor of 10.

<u>Heating Oil USTs</u>

Sampling of Heating Oil USTs was conducted as part of the Phase II ESA in 2003. Borings GP-2 and GP-4 through GP-6 were completed to depths of up to 30 feet BGS on each of the four sides of the heating oil UST pair. Soils encountered in the borings consisted of brown, well-graded sand to a depth of approximately 20 feet BGS. In borings GP-4 though GP-6, a sandy gravel was encountered below the sand that extended to the total depth of the borings.

Field screening evidence of petroleum hydrocarbons was observed in boring GP-4 through GP-6, In these borings, petroleum hydrocarbon staining and odor were observed between approximately 21 feet and 28 feet bs. Groundwater was encountered in the borings at an approximate depth of 22 feet BGS; therefore, the petroleum hydrocarbon staining and odor are likely the result of smearing associated with seasonal fluctuations in groundwater elevations.

Groundwater samples were obtained from borings GP-4 and GP-5 at a depth of 20.0 to 24.0 feet BGS. The sample from GP-4 was submitted for analysis of VOCs and SVOCs, and the sample from GP-5 was submitted for analysis of BTEX and PAHs. Groundwater sample analytical results from 2003 are summarized in Table 5f.

In the groundwater sample obtained from GP-4, the only VOC detected was 2-Butanone at a concentration of 41.4 micrograms per liter (µg/L), Bis(2-ethylhexyl)phthalate and several PAHs were the only SVOCs detected in the groundwater sample. Bis(2-ethylhexy)phthalate was detected at a concentration of 3.59 pg/L. Of the PAHs, pyrene was detected at the greatest concentration, which was 11.2 µg/L.

In the groundwater sample obtained from GP-5, BTEX and every PAH except indeno(1,2,3- cd)pyrene were detected, Benzene was detected at a concentration of 7.83 µg/L, and PAHs were detected at concentrations up to 320 µg/L.

Three additional shallow groundwater samples (GP-24, GP-25, and GP-26) were obtained from the up- and down-gradient direction of the heating oil UST pair. The groundwater samples were submitted to a laboratory for analysis of diesel- and oil-range petroleum hydrocarbons, BTEX, and PAHs.

Diesel- and oil-range petroleum hydrocarbons were detected only in the groundwater samples obtained from GP-24 and GP-26. Diesel-range petroleum hydrocarbons were detected in GP-24 and GP-26 at concentrations of 0.350 and 0.401 mg/L, respectively. Oil-range petroleum hydrocarbons were detected in GP-24 and GP-26 at concentrations of 0.420 and 0.463 mg/L, respectively.

BTEX were not detected in either of the three groundwater samples. PAHs were detected in each of the three samples. The groundwater sample obtained from GP-24 was the only sample that contained four PAHs at concentrations greater than the lowest generic risk-based criteria. The concentrations of PAHs detected in GP-24 were one to two orders of magnitude less than the concentrations detected in the samples obtained adjacent to the USTs (GP-4 and GP-5).

Former PGE Pipeline

GP-27, advanced near the southeast corner of the site, had elevated detections Total petroleum hydrocarbons (Diesel-18.9 mg/L; heavy oil-25 mg/L) and PAHs. Benzene, toluene, ethylbenzene and xylenes were not detected. The detected PAHs were consistently 10 x greater than JSCS SLVs, and the chrysene concentration exceeds its JSCS by a factor of 100. However, this area is isolated from source areas at the site and contamination is not contiguous with contamination detected at the eastern heating oil tank area. The source of the contamination does not appear to be related to Sulzer operations and is likely attributable to the former PGE pipeline that ran from the river to the PGE substation across NE Front Street to the south. Investigations conducted by PGE showed that the contamination was localized.

In 2003, to assess the potential contributions from groundwater discharge to surface water, samples from groundwater wells located near or along the riverbank (GP-18, GP-19, GP-21 GP-22 and GP-23) were evaluated.

All samples were analyzed for volatile organic compounds (VOCs). All samples except GP-23 were also analyzed for PAHs. Most of the PAH compounds were detected in each sample. Exceedances of JSCS SLVs were common for detected concentrations. However, none of the concentrations in the four-sample collected along the riverbank were greater than 10 times the SLV.

Given that the groundwater samples were collected from temporary borings it is likely that suspended soil particulates in the sample biased the associated groundwater results high. GP-18 and GP-19 are located in the expected downgradient area from GP-16 and GP-17, and thus demonstrate significant attenuation between the former UST area and the river. Given the marginal exceedances of JSCS SLVs in the near bank samples, the likelihood that these concentrations are biased high due to the sample collection methodology, the lack of free phase petroleum product on groundwater, and the general low environmental mobility of PAHs, it does not appear that there is significant discharge of PAH-contaminated groundwater to surface water of the Willamette River.

6.4.2 Source Control Groundwater Sampling Analytical Results

GeoDesign completed two groundwater sampling events at the project site in 2014 and 2015. The results of the groundwater sampling events are presented in Table 5g. Based on the laboratory reports VOCs were detected in monitoring wells MW-3, located at the former waste oil UST location and in MW-2, located down gradient from the former waste oil UST nest. The VOCs detected included PCE and vinyl chloride detected at concentrations exceeding the EPA tap water PRGs but not exceeding other SLVs, and cis-1,2-DCE which did not exceed JSCS SLVs in either well. VOCs were not detected at concentrations greater than the laboratory MDLs in the groundwater samples collected from the other monitoring wells. Various PAHs were detected in groundwater samples collected from monitoring wells MW-3. The PAHs exceeded JSCS SLVs by generally the same order of magnitude or one order of magnitude greater with the exception of benzo(a)pyrene. PAHs were not detected at concentrations greater than JSCS SLVs in monitoring wells MW-1, MW-2, and MW-4 with the exception of benz(a)anthracene in monitoring wells MW-2 and MW-4 during the October 2014 sampling event which exceeded the JSC SLV within the same order of magnitude. PAHs were not detected at concentrations greater than the JSCS SLVs in MW-5 with the exception of phenanthrene which exceeded the JSCS SLV within the same order of magnitude. Various total and dissolved metals exceeded JSCS SLVs within the same order of magnitude in monitoring wells MW-2 through MW-4, and arsenic exceeded the JSCS SLV in total and dissolved forms in each of the monitoring wells in each sampling event by one to two orders of magnitude with the exception of the groundwater sample from MW-2 during the January 2015 event when arsenic was not detected at a concentration greater than the laboratory MDL. Extractable petroleum hydrocarbons in the C-12 to C-21 range were detected in groundwater samples collected from MW-2 through MW-5. No other extractable or volatile petroleum hydrocarbons were detected at concentrations greater than the laboratory MRLs in any of the monitoring wells.

Groundwater samples have not been collected at the site since 2015, potentially representing a data gap. However, the primary tank sources were removed from the site in 1990 and any releases likely occurred even earlier. Given the high conductivity of gravel found in the aquifer material (see the boring logs in Appendix E), it is unlikely that a plume originating prior to 1990 would take more than 25 years to travel the approximately 100 yards from the former tanks to the riverbank. If that were the case, the groundwater Darcy velocity would be less than 1 cm/day and the groundwater flux to the river would be low.

7.0 SOURCE CONTROL EVALUATION

These source control evaluation activities were completed in accordance with DEQ's *Guidance for Evaluating the Stormwater Pathway at Upland Sites,* dated January 2009 (updated October 2010), DEQ/EPA's *Portland Harbor Joint Source Control Strategy*, dated December 2005, and to address comments provided by DEQ over the course of multiple investigations. The analytical data are appropriate and sufficient for the intended purpose. Analytical data not previously included in an SCE Report are included as Appendix I.

Previous submissions to DEQ have documented the control of the groundwater and bank erosion pathways. Several years of additional stormwater and catch-basin solids sampling have been performed and are summarized in this Source Control Report.

The results of the SCE activities indicate the following:

1. Existing and potential facility-related contaminant sources have been identified and characterized:

    - The potential sources to impact river sediments are: 1) particulates on the site surfaces; 2) sediments in the stormwater conveyance system; 3) riverbank soils; and 4) groundwater. Each potential source has been characterized or assessed by investigations performed pursuant to DEQ-approved workplans.
        - Particulates on site surfaces have been characterized by multiple rounds of stormwater sampling and catch basin sediment sampling, including during first flush events. In addition, potential source areas for surface particulates have been characterized by soil sampling, including at electrical substations.
        - The stormwater conveyance system and the sediments within the system have been characterized by multiple rounds of catch basin sediment sampling, dye tracer tests, and camera surveys.
        - Potential source areas have been characterized by wipe sampling, product sampling, and building material sampling.
        - Riverbank soils above the MHW line have been sampled. Some additional samples have been collected as part of remedial design. However, those PDI samples are either angled borings, which may not be representative of the bank surface, or were collected at an elevation which is now considered in-river sediment. It is expected that bank samples will be identified as a data gap and additional samples will be collected as part of supplemental remedial design sampling.
        - The potential for riverbank erosion has been assessed through a bank erosion evaluation.
        - Groundwater has been characterized by samples collected from a series of monitoring wells installed along the river wall and at the former locations of

USTs removed from the site in the early 1990s. In addition, soil samples were collected at depth in the vicinity of former USTs and HOTs for comparison to DEQ leaching-to-groundwater criteria.

2. Contaminant sources are being controlled to the extent feasible.

- Particulate matter on paved surfaces is controlled by regular site sweeping and housekeeping practices described in the SWPCP. New pavement in high truck traffic areas has reduced particulates and provided a better surface for effective sweeping. Catch basin sediments are controlled by catch basin cleanouts and storm filter maintenance. Catch basin replacements with Lynch style basins and the addition of filter fabric inserts and oil booms has decreased particulate matter entering the conveyance.
- Groundwater sources have been historically delineated and removed.

3. The analytical data supports the conclusion that source control measures and BMPs are effective:

- Elevated concentrations of PCBs were occasionally found in some stormwater catch basin solids samples. This is likely the result of the deterioration of some older building materials. However, the whole water PCB samples were consistently below detection limits, indicating those solids were being retained in the filters and not discharged to the river.
- The most recent first flush stormwater samples (2019-2024) show a decrease in a range of contaminant concentrations compared to earlier samples (2013-2017), indicating that the stormwater BMPs have been effective.
- The 2025 catch-basin sediment samples contained lower concentrations of metals and BEHP than previous sampling events, suggesting that heavy vehicle traffic likely contributed to the previously observed concentrations of those constituents.
- In groundwater, multiple PAH and several VOC parameters were detected exceeding SLVs in samples from a monitoring well installed in the vicinity of former UST locations within the interior of the Site approximately 300 feet from the river. However, data establish that VOCs and PAHs in groundwater do not represent an ongoing source of impact to river sediment:
    - In the series of monitoring wells installed along the river, the concentrations are substantially reduced from those in the interior, source-area well.
    - None of the VOCs detected in these wells are present at concentrations above ecological receptor SLVs.
    - One PAH, benz(a)anthracene, was detected in one of two sampling events in one well at an estimated (J) value exceeding the ecological SLV by only 0.0001 µg/L.
- In riverbank soils, PCBs (together with some metals) were detected above the PHSS RAL. In one location, the sample exceed the PHSS PTW threshold. The Sulzer riverbank is being further evaluated as part of the Portland Harbor Superfund Site remedial action.

4. Adequate measures are in place to ensure good source control and good stormwater management measures occur in the future.

    - The updated SWPCP as well as regular site maintenance will ensure the particulate matter on paved surfaces and in stormwater conveyance lines remains controlled.
    - Catch basin filters remain in place and will continue to be inspected regularly and changed as needed.
    - The existing 1200-Z permit ensures that these stormwater control practices will continue to occur.
    - Although the legacy manufacturing operations have been discontinued, certain buildings (part of Buildings A, V and S) on the property have been leased to the Water Business Unit of Sulzer. Additional buildings at the site are available for lease. Sulzer Pumps (US) Inc. remains responsible for overall site maintenance including stormwater management practices.

More detailed evaluation of each of the individual constituents that show exceedances of the Portland Harbor CUL/PRG or the JSCS SLV is presented below. The most likely source of heavy metals was truck traffic. Buildings are thought to be the source of PCBs. However, for both metals and PCBs, the catch-basin filters appear to be effective – the levels of those contaminants in first flush stormwater samples are generally below the knee of the curve for typical industrial values in Portland Harbor.

<u>Arsenic</u>

Arsenic exceeds the PHSS PRG for most first flush stormwater and catch basin filter sediment samples. However, the PHSS PRG for water (0.02 ug/L) is well below the typical detection limit for water samples (0.5 ug/L). Arsenic was only detected in two of the nine first flush stormwater samples. The overall distribution of arsenic levels in catch basin filter sediment samples is consistent with typical industrial values in Portland Harbor. However, the first flush stormwater values are consistently below the knee-of-the-curve for industrial areas.

Arsenic in the riverbank samples also typically exceed the PHSS PRG sediment PRG.

Arsenic was not a part of any Sulzer operations. The observed levels could be due to heavy truck traffic, as arsenic has been found as a result of exhaust from fuel combustion (Pulles et al, *Atmospheric Environment*, 2012).

<u>Cadmium</u>

Cadmium levels typically exceed the JSCS SLVs for catch basin filter solids and first flush stormwater samples. Cadmium concentrations are higher than typical PHSS industrial values in catch-basin filter solid samples, but the 2025 samples were the lowest concentrations to date. In the first-flush stormwater samples, they were higher than the knee-of-the-curve prior to 2019, but have been below the knee-of-the-curve in the samples collected since 2019.

Cadmium in the bank samples did not exceed the PHSS PRGs or JSCS screening values.

Cadmium has not been used in Sulzer operations since 2017. Prior to 2017, cadmium was present in some fasteners used in pump manufacturing. Cadmium is also a contaminant from vehicles, including brake pads (McKenzie et al, 2009) and lubricant combustion (Pulles et al, 2012). The first-flush stormwater samples collected at Sulzer since 2019 all have cadmium levels below median (0.69 ug/L) for freeways from the National Stormwater Quality Database (Pitt, *The National Stormwater Quality Database – Version 4.02*, 2018). All of the first-flush samples are below the freeway mean from that database (3.19 ug/L).

<u>Chromium</u>

Chromium levels in the catch basin filter samples exceed the JSCS SLVs, occasionally by more than an order of magnitude. However, none of the first flush stormwater samples exceed the PHSS PRG and they are all below typical industrial levels for Portland Harbor – indicating that the catch-basin filters are effective at limiting the chromium discharge. Chromium did not exceed the relevant thresholds in either bank samples or groundwater samples.

Chromium was used in Sulzer operations in certain castings that require exceptional strength and corrosion resistance. Chromium is also associated with automobiles emissions (Pulles et al, 2012). All but one of the first-flush samples is below the median freeway value (8.3 ug/L) from the NSQD (Pitt, 2018) and all samples are below the mean (10.3 ug/L).

<u>Copper</u>

Copper concentrations exceed the PHSS PRG in the first-flush stormwater samples and occasionally exceed the JSCS SLVs and the PHSS PRG in catch basin filter sediments samples. Both the stormwater and catch basin sediment samples are generally below the knee-of-the-curve for typical industrial facilities. Copper concentrations in the bank samples. The copper levels in the 2025 catch-basin sediment samples were lower than in previously collected samples. Only one catch-basin exceeded the JSCS SLV and the PHSS PRG.

Copper is part of the pump components that Sulzer manufactured on site. However, copper is also a very common contaminant associated with vehicle traffic, being a component in brakes (McKenzie et al, *Science of the Total Environment*, 2009) and fuel oil combustion (Pulles et al, 2012). All stormwater samples except a 2006 sample were below the median freeway value (24.0 ug/L) from the NSQD.

<u>Lead</u>

Lead concentrations typically exceed (10 of 12 samples) the JSCS SLVs in the first-flush stormwater samples, though the concentrations are lower in more recent samples. The stormwater samples are all well below the knee-of-the-curve for typical industrial facilities.The catch-basin filter samples also occasionally exceed the PHSS PRG and JSCS SLV. The lead concentrations from the 2025 catch-basin sediment sampling were lower than from previous events – none of the samples exceeded the PHSS PRG or SLV.

Lead concentrations exceed JSCS SLVs in the bank samples but they do not exceed the PHSS PRG. Lead concentrations do not exceed the PHSS PRG in groundwater samples.

Manganese

Manganese concentrations occasionally exceed the JSCS SLVs in both first-flush stormwater and catch-basin sediment samples, though they have not exceeded the JSCS SLV for catch-basin sediment samples in either the 2024 or 2025 samples The typical industrial curves are not available for manganese, nor are summary stats in the NSQD. Manganese exceeded the JSCS SLV in one of the four bank samples – the same bank sample that has the highest concentrations of other metals such as arsenic, copper, lead, and zinc. Like those other metals, manganese is associated with automobiles, including brake pads (McKenzie et al, 2009). Manganese was not analyzed in the bank groundwater samples.

Automobiles may also be a source of manganese in stormwater (https://stormwater.pca.state.mn.us/index.php/Common_pollutants_of_concern_and_sources_in_stormwater_runoff) , though the NSQD does not include manganese in its summaries. The reduction in manganese in catch-basin sediment samples as vehicle traffic has been reduced at the site suggests manganese was likely related to vehicle traffic.

Zinc

Zinc concentrations exceed the PHSS PRG in the first-flush stormwater samples and catch-basin filter sediments. The distribution of concentrations in the catch-basin sediments are consistent with the typical industrial values in Portland Harbor. The 2025 zinc concentrations are lower than what has been measured in past sampling events – only one location exceeded the PHSS PRG. However, the first-flush stormwater sample concentrations are all well below the knee-of-the-curve. Zinc was detected just above the PHSS PRG in two of the ten bank groundwater samples.

Zinc was a component in some Sulzer manufacturing operations, which involved grinding of galvanized materials. Zinc sources may also include corrosion of galvanized building materials. Like the other heavy metals, automobiles also contribute zinc to stormwater – including tires, brakes, and lubricant combustion (McKenzie et al, 2009; Pulles et al, 2012).

Other metals

Selenium and silver were both occasionally detected above JSCS SLVs in catch-basin filter sediment samples. Neither metal was ever detected in a first-flush stormwater sample. These metals were not detected in bank samples or first-flush stormwater samples.

PCBs

Some of the individual Aroclors exceeded the JSCS SLVs in first-flush stormwater samples collected in 2017. The total PCB concentration also exceeded the PHSS PRG in those samples. Many of the catch-basin filter samples contain total PCBS greater than the knee-of-the-curve for typical industrial facilities, including in the 2025 sampling event. PCBs have not been detected in first-flush stormwater samples since 2019.

PCBs have never been a part of Sulzer operations. Sulzer began operations at the facility in 1986, long after the use of PCBs was restricted. The highest concentrations of PCBs found in the catch basin filter sediments are Aroclor 1268, which was used in some building materials. Sulzer believes this is likely from older building materials. However, the substantial source tracking activities performed by Sulzer have not identified a specific source. The non-detects in the first-flush stormwater samples demonstrate that the catch-basin filters are effective at limiting the discharge of PCBs to the Willamette River.

ACRONYMS

AST	aboveground storage tank
ASTM	American Society for Testing and Materials
AWQC	Ambient Water Quality Criteria
BANCS	Bank Assessment for Non-point source Consequences of Sediment
BEHI	Bank Erosion Hazard Index
BES	Bureau of Environmental Services
BGS	below ground surface
BMP	best management practices
BTEX	benzene, toluene, ethylbenzene, and total xylenes
COD	chemical oxygen demand
COI	contaminant of interest
CSM	Conceptual Site Model
CSO	combined sewer overflow
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DEQ	Oregon Department of Environmental Quality
ECSI	Environmental Cleanup Site Information
ESA	Environmental Site Assessment
EPA	U.S. Environmental Protection Agency
gpm	gallons per minute
I.D.	identification
ICPMS	inductively coupled plasma – mass spectrometry
JSCS	Joint Source Control Strategy
LGW	Lower Willamette Group
MCL	maximum contaminant level
MDL	method detection limit
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MHW	mean high water
MRL	method reporting limit
MSL	mean sea level
NAPL	non-aqueous phase liquid
NBS	Near Bank Stress
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NPS	non-point source
NSQD	National Stormwater Quality Database
OAR	Oregon Administrative Rule
PA	Preliminary Assessment
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PDI	pre-design investigation
PEC	probable effects concentration

PGE	Portland General Electric
PHSS	Portland Harbor Superfund Site
PRG	preliminary remediation goal
PTW	principal threat waste
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RAL	Remedial Action Level
RBC	risk-based concentration
SCE	Source Control Evaluation
SCP	Source Control Plan
SLV	screening level value
SQV	sediment quality values
SWPCP	Stormwater Pollution Control Plan
TAL	target analytes list
TCLP	Toxicity Characteristic Leaching Procedure
TOC	total organic carbon
TPH	total petroleum hydrocarbon
TSS	total suspended solids
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
UST	underground storage tank
VCP	Voluntary Cleanup Program
VOC	volatile organic compound
XPA	Expanded Preliminary Assessment