102a – Status of Implementation Actions Taken Pursuant to S4.F.3.D

Introduction

On July 1, 2019, Ecology re-issued the Phase I Permit, including Appendix 13 – Adaptive Management Requirements. Appendix 13 requires adaptive management response plans for discharges from the City of Seattle's (City) municipal separate stormwater system (MS4) to the Lower Duwamish Waterway (LDW). In accordance with S4.F.3, the City must comply with the specific requirements identified in Appendix 13. Per the requirement of S4.F.3.d, Seattle is providing the status of implementation and the results of any monitoring, assessment, or evaluation efforts conducted during 2021 related to Appendix 13 Adaptive Management requirements.

This is the sixth Annual Report that combines the City's required source control activities for the LDW and related information related to these Adaptive Management Response Plans into one report. In December of 2020, SPU provided Ecology with the second Source Control Implementation Plan for the period 2021 to 2026. SPU began implementing the actions contained in the second SCIP (2021 SCIP) in January 2021.

The following sections describe the actions that the City has taken to implement the adaptive management plan as described in Appendix 13 of the 2019-2024 Phase I Municipal Stormwater Permit.

Background

An S4.F notification was submitted in 2007 to notify Ecology of potential water quality problems that may be related to discharges from the City's MS4 for the LDW. Ecology determined that a report under S4.F.2.a was not necessary, with that determination conditioned on certain City actions. Ecology required the City, beginning with its Phase I Permit Annual Report for 2008, to include a summary of its stormwater management efforts in basins that discharge to the LDW. The City was required to notify Ecology if Seattle's involvement in the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and associated Source Control Strategy processes changed, or if new information became available regarding phthalate recontamination in the LDW.

An S4F notification was submitted on December 5, 2013, to notify Ecology of potential sediment quality problems that may be related to discharges from the City's MS4 to the LDW. Ecology accepted the notification (June 4, 2014) as a general notification for all MS4 discharges to the LDW for all LDW sediment chemicals of concern (COC). The City's draft SCIP (November 2013) fulfilled the City's requirement for submittal under S4.F.3.a of an expanded adaptive

management response. The City revised the SCIP, and a final draft of the SCIP was submitted to Ecology on March 31, 2015.

Though not required for the LDW or adaptive management, an S4F notification was submitted on September 5, 2014, to notify Ecology of potential sediment quality problems that may be related to discharges from the City's MS4 to the East Waterway (EW) of the Duwamish Waterway. To satisfy the permit requirements, the City continues to engage in business inspections, source tracing, line cleaning, and other programs regarding the EW, as well as ongoing source control efforts to support the EW CERCLA cleanup.

Source Control Implementation Plan Update

SPU prepared and submitted an updated SCIP to Ecology on March 31, 2020. The updated SCIP expanded upon the 2015-2020 SCIP (2015 SCIP) with an updated assessment of source tracing and program effectiveness data along with updated operation and maintenance and capital projects. In addition, the 2021 SCIP was reformatted to be more user friendly to Ecology for their Sufficiency Evaluation for the Lower Duwamish Waterway Superfund Cleanup.

The 2021-2026 SCIP and Appendices can be viewed at the following web site: https://www.seattle.gov/utilities/neighborhood-projects/lower-duwamish-waterway.

Appendix 13 - Adaptive Management Reporting Requirements

Source Tracing and Sampling Activities

SPU collects samples of storm drain solids from with the City MS4 to characterize the quality of material discharged to and from the City's drainage system. Samples include 1) grabs from private onsite catch basins and catch basins located in the public right-of-way, 2) grabs from inline maintenance holes in the conveyance system, and 3) inline sediment trap samples. Data generated from these samples are used to identify potential contaminant sources and to prioritize source tracing/control activities. Between January and December 2021, SPU collected 28 samples of storm drain solids from the City's MS4 within the LDW.

Effectiveness Monitoring Program

SPU has committed to install or collect one sample per calendar year from each outfall and near-end-of-pipe location in Tables 1 and 2 of Appendix 13. In 2021, SPU was unable to sample all outfall or near-end-of-pipe locations due to residual impacts from COVID restrictions encountered in 2020. Sediment traps require roughly a year to accumulate sufficient stormwater solids to analyze for priority pollutants. In 2020, COVID restrictions delayed collection of samples from spring to the fall, requiring retrieval of follow up samples in the fall of 2021. Tidally influenced pipes and heavy rain events made retrieval during the fall of 2021 dangerous. In order to ensure staff safety during confined space activities and to maximize the

number of samples taken during this SCIP phase, the samples will be retrieved in spring of 2022. The source tracing data that was collected from January through December 2021 are provided in Attachment A of this report and will be loaded into EIM[1].

Operations & Maintenance

Line Cleaning

In 2021, SPU cleaned approximately 64,844 linear feet of pipe in the 7th Ave S storm drain (SD), upper Diagonal Drainage basin, and 17th Ave S SD. These basins were identified as priority basins in the City's 2021 SCIP. This work is conducted to remove solids that have accumulated in the MS4 to prevent them from discharging into the LDW and to facilitate source tracing efforts. Water generated during line cleaning operations was treated and discharged to the sanitary sewer under a discharge authorization with King County. Solids were dewatered and transported to Waste Management's reload facility in Seattle for eventual disposal.

S. Myrtle Street Basin

Weekly Sweeping

S. Myrtle St. was swept by SDOT 51 times (98%) in 2021 as part the Street Sweeping for Water Quality Program (SS4WQ). In January of 2022, the City became aware that due to snow and ice conditions there had been noncompliance during the last week of December 2021 with the weekly requirement to sweep S. Myrtle Street from 8th westward to the street end. Street sweeping resumed the first week of January, and S. Myrtle Street was swept on January 7, 2022. The City continues to implement its street sweeping program to maintain compliance with Appendix 13.

Catch Basin and Maintenance Hole Quarterly Inspections

SPU conducted quarterly inspections of catch basins and mainline maintenance holes from 2011 – 2021. The data for catch basin and mainline maintenance hole measurements from 2011 to 2021 are provided in Table 1. Measurement locations are shown in Figure 1. The data from 2011 to 2017 were evaluated as part of the evaluation of existing operation and maintenance work for catch basin and flow control/water quality facilities in the MS4 basins that discharge to the LDW, to determine if programmatic strategies could be implemented to assist with Source Control. The evaluation determined that the catch basins on S. Myrtle Street accumulate solids or require maintenance similar to those in the rest of the LDW MS4 basins. However, Per Ecology's direction, SPU will continue quarterly inspections of catch basins and mainline maintenance holes.

[1] Results for samples collected and validated since the 2018 annual report.

Table 1: S Myrtle St maintenance hole measurements.

EQNUM	576148	576126	576140	576158	576162	576145	576165	943593	599350	599353	599354
Location	S Myrtle St cul-de-sac, west	S Myrtle St cul-de-sac, north	north side S Myrtle St, west of SIM	south side S Myrtle St, west of SIM	south side S Myrtle St, east of SIM	S Myrtle St and Fox Ave S	south side S Myrtle St at 7th Ave S	north side S Myrtle St, east of SIM	S Myrtle St cul-de-sac	S Myrtle St at SIM	S Myrtle St at 7th Ave S
Type	CBL	CBL	CBL	CBL	CBL	CBL	CBL	CBL	MH	MH	MH
Outlet pipe size	8	8	8	8	8	8	8	8			
Casting Width	1'-4"	1'-4"	NA	1'-4"	1'-4"	1'-4"	1'-4"	1'-8"	NA	NA	NA
Casting Length	2'-7"	2'-7"	NA	2'-7"	2'-7"	2'-7"	2'-7"	2'-0"	NA	NA	NA
Structure Depth (ft)	6.45	7.90	NA	7.22	6.4	6.61	5.76	6.2	7.45	7.35	5.76
Sump Depth (ft)	3	2.4	2.6	2.4	2.9	2.9	2.5	2.3	NA	NA	NA
2011 percent full											
04/21/11	0%	0%	4%	0%	13%	3%	46%	11%	0%	0%	0%
07/14/11	0%	0%	3%	8%	29%	13%	1%	21%	0%	0%	0%
2012 percent full											
01/05/12	0%	1%	10%	11%	50%	13%	19%	27%	0%	0%	0%
06/22/12	1%	19%	11%	16%	57%	11%	41%	20%	0%	0%	0%
10/11/12	1%	9%	16%	27%	62%	14%	45%	27%	0%	0%	0%
2013 percent full											
02/11/13	9%	22%	22%	38%	69%	14%	53%	28%	0%	0%	0%
05/01/13	12%	24%	23%	48%	3%	23%	52%	33%	0%	0%	0%
10/28/13	2%	2%	29%	50%	8%	28%	49%	34%	0%	0%	0%
12/23/13	4%	5%	31%	58%	9%	17%	51%	29%	0%	0%	0%
2014 percent full											
03/14/14	4%	13%	30%	68%	19%	38%	49%	26%	0%	0%	0%
06/23/14	5%	15%	38%	73%	21%	27%	55%	37%	0%	0%	0%
09/29/14	6%	13%	42%	72%	22%	29%	55%	36%	0%	0%	0%
12/29/14	6%	15%	43%	81%	30%	28%	50%	36%	0%	0%	0%
2015 percent full											
03/27/15	7%	16%	43%	80%	33%	32%	53%	44%	0%	0%	0%
06/29/15	8%	17%	40%	2%	36%	32%	55%	41%	0%	0%	0%
09/22/15	10%	28%	50%	2%	37%	31%	0%	45%	0%	0%	0%
12/29/15	9%	15%	43%	12%	40%	39%	8%	37%	0%	0%	0%
2017 percent full											
02/22/17	14%	30%	56%	49%	63%	48%	34%	55%	0%	0%	0%
05/25/17	16%	30%	0%	5%	5%	45%	41%	0%	0%	0%	0%
08/17/17	20%	36%	0%	5%	0%	43%	38%	0%	0%	0%	0%
11/22/17	24%	38%	0%	14%	8%	48%	42%	0%	0%	0%	0%
2018 percent full											
03/12/18	20%	36%	1%	15%	4%	48%	38%	0%	0%	0%	0%
05/23/18	23%	37%	3%	21%	5%	28%	41%	-6%	0%	0%	0%
08/29/18	22%	40%	1%	24%	-1%	46%	33%	-5%	0%	0%	0%
12/07/18	23%	0%	13%	21%	8%	2%	20%	1%	0%	0%	0%
2019 percent full											
03/01/19	21%	0%	3%	22%	13%	-3%	39%	-7%	0%	0%	0%
5/22/2019	22%	0%	5%	29%	6%	-1%	33%	-6%	0%	0%	0%
8/29/2019	1%	-6%	5%	29%	11%	-1%	38%	-8%	0%	0%	0%
12/4/2019	23%	2%	0%	29%	3%	7%	42%	-7%	0%	0%	0%
2020 percent full											
2/26/2020	0%	-11%	3%	33%	14%	4%	-4%	-18%	0%	0%	0%
5/27/2020	0%	-3%	8%	36%	18%	7%	-5%	-1%	0%	0%	0%
8/26/2020	0%	-5%	6%	38%	14%	14%	-3%	-8%	0%	0%	0%
11/25/2020	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2021 percent full											
2/26/2021	1%	6%	2%	9%	5%	6%	3%	-4%	0%	0%	0%
5/26/2021	2%	-18%	-3%	4%	4%	5%	2%	-7%	0%	0%	0%
8/25/2021	0%	0%	-8%	1%	6%	5%	1%	-7%	0%	0%	0%
12/2/2021	0%	8%	-9%	0%	8%	5%	2%	-4%	0%	0%	0%
Times Exceeded Maintenance Threshold (60% full)	0 in 9 years	0 in 9 years[1]	0 in 9 years	2 in 9 years	3 in 9 years	0 in 9 years[2]	0 in 9 years[3]	0 in 9 years	0 in 9 years	0 in 9 years	0 in 9 years

1. Cleaned multiple times due to spills and illicit discharges

2. Impacted by private construction flert sock

3.Impacted by private construction flert sock

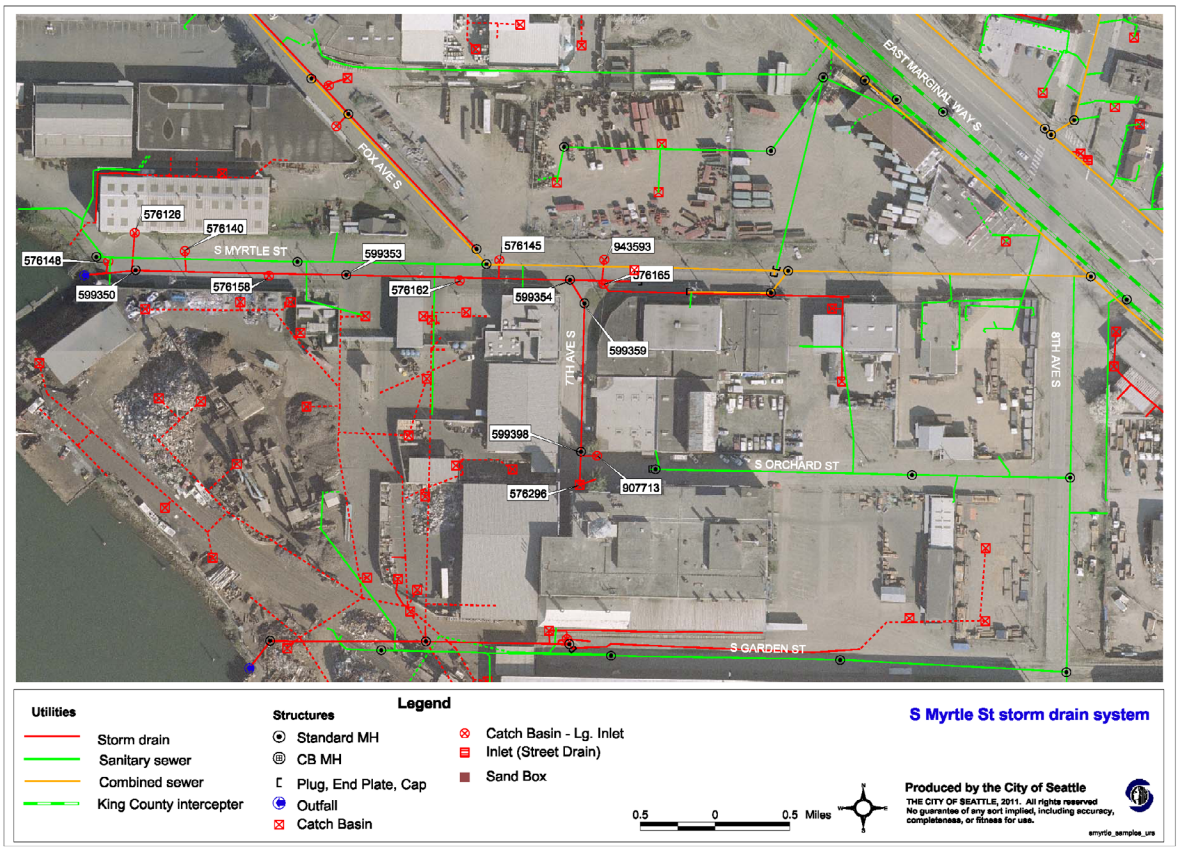

Figure 1: Catch basin and maintenance holes measuring locations on S. Myrtle St.

Structural Controls

South Park Water Quality Stormwater Treatment Facility

The South Park Water Quality Facility is one of the projects included in SPU's Integrated Plan approved by Ecology and EPA in 2015 as part of the City's Long-Term CSO Control Plan. It will treat runoff from the 230-acre 7th Ave S drainage system. SPU originally intended to build the water quality facility in conjunction with the South Park Pump Station on the 636/640 S Riverside Dr site. Unfortunately, SPU was unable to acquire the needed adjacent street end vacation to allow both the pump station and the water quality facility to be constructed at this location. SPU decided to construct the pump station on the two properties on S Riverside Dr. SPU continues to pursue acquisition of additional property for the water quality facility and analyze options for the project design. SPU has selected three consultant teams to support the site cleanup, water quality facility, and community investment aspects of the project. The project is currently engaging Ecology in discussions regarding remedial investigations on the identified property for purchase.

Street Sweeping Expansion – Arterials

This program has expanded the City's arterial street sweeping program, per commitments in the Plan to Protect Seattle's Waterways (aka Integrated Plan). The team began implementing the plan in 2016.

During 2021, the team continued to implement the plan and adapted as needed to meet the regulatory targets, which resulted in sweeping 23 routes an average of 34 times, covering 1,146 road miles in MS4 basins discharging to the Lower Duwamish Waterway.

In 2022, the program will focus on the following key tasks:

- Continue sweeping arterial routes.
- Use overtime as available to alleviate the current difficulty maintaining a night crew of six.

Annual Prioritization

The current SCIP describes the City's planned source control activities in the LDW for the period 2021-2026 and has been reformatted to better align with the sufficiency analysis that Ecology will be conducting as part of the LDW Superfund Cleanup. After annual prioritization, the City affirms its previous priorities and intends to take further actions as stated in this Annual Report.

SPU regularly collects near end of pipe and in basin samples to support source control activities throughout the LDW, and other MS4 basins within the City. These samples are used to guide the source control efforts including inspections, source tracing sampling, and line cleaning activities. These samples also provide annualized data that is utilized to determine the effectiveness of the SPU Source Control program over time. Samples taken are analyzed for numerous pollutants but three (arsenic, PCBs, and cPAH) are the primary focal point for SPU's LDW Source Control efforts, due to their environmental persistence and traceability.

Data Review

Comparisons for the major risk drivers in LDW sediment that are monitored in storm drain solids (arsenic, PCBs, and cPAH), are provided in the form of box plots in the 2021 SCIP. These box plots compare data from the pre-SCIP period (2003 through June 30, 2014) to the data collected during the SCIP reporting period (July 1, 2014 through Fall of 2020). New box plots are not presented in this annual report due to the previously described COVID-related delays in retrieving samples in 2021 and priorities in 2022 therefore remain the same.

The sample results that were collected in 2021 are compared to both the pre-SCIP period and the 2015 SCIP reporting period for effectiveness monitoring, source tracing, and drainage basin wide trend analysis. Results of this comparison are used to guide business inspection activity, determine line cleaning priorities, and to identify data gaps that need to be filled. For each priority pollutant (arsenic, PCBs, and cPAH), a summary of the previous data comparison of the

pre-SCIP and 2015 SCIP periods as well as a summary discussion of 2021 sample results are presented below.

Arsenic

The median concentrations of arsenic measured in each outfall between July 2014 and December 2020 were either slightly lower or similar to the concentrations reported in the 2015 SCIP for the pre-SCIP period. Exceedances of the sediment cleanup objective (SCO) for arsenic (57 mg/kg) were low in the older samples (2 percent exceeded the SCO). Only two of the 339 samples collected between July 2014 and December 2020 exceeded the SCO. One sample was collected in October 2017 from MH29, which is located just downstream of an old flush tank on the sanitary sewer which has since been converted to a storm drain[2]. The flush tank is old and no longer used. SPU cleaned this section of pipe in 2018 and 2020. The other was collected in February 2018 at a private catch basin in an area where scrap wood is stored. SPU required the company to cover treated lumber. No samples collected within the LDW exceeded the SCO for arsenic in 2021, with values ranging from 3.31 mg/kg to 21.1 mg/kg. Median of arsenic values in 2021 was 6.72 mg/kg with an n of 13.

PCBs

Median PCB concentrations in the prior SCIP phases fluctuated slightly, with some basins (7th Ave S SD, S River St SD, and SW Idaho St SD) seeing median PCB concentrations falling, with others (Diagonal Ave S CSO/SD and S Brighton St SD) seeing increased values. These changes in median PCB values are illustrated in Table 2. While LDW wide median concentrations of PCBs in samples from 2021 were fairly low, at 99.95 ug/kg dry weight, basin by basin assessment of data does not provide actionable source control effectiveness determinations. Sample results for 2021 provide useful but skewed data due to targeted sampling activities associated with the PCB Detection Dog grant, and a limited number of samples collected from the MS4 system. The majority of samples taken in the LDW, and city-wide, in 2021 were taken to support PCB tracing conducted by the University of Washington Conservation Canines olfactory tracing testing. These samples were taken of materials or drainage systems known or suspected to contain elevated PCBs, while non-targeted sampling activities were not conducted, meaning the sample pool for certain locations is not representative for the whole drainage basin.

[2] The 12-inch sanitary sewer was converted to a storm drain as part of the Diagonal Avenue S CSO Control Project constructed in the early 1990s.

Table 2: Outfalls where PCBs changed between 2015 SCIP and recent samples.

Outfall	Results from 2015 SCIP		Results from 2014-2020 samples		Results from 2021 samples	
	Median concentration (ug/kg dw PCBs)	n	Median concentration (ug/kg dw PCBs)	n	Median concentration (ug/kg dw PCBs	n
7th Ave S SD	379	6	96.35	34	20.6	3
S River St SD	291	3	116.8	10	-	0
SW Idaho St SD	103	6	39.5	16	99.8	1
S Brighton St SD	28.5	4	332.3	4	-	0
S Myrtle St SD	3,760	4	1,793.5	10	-	0
Diagonal Ave S CSO/SD	73	223	157.35	60	270.5	9

SPU attempted to sample the S River St SD in the fall of 2021, but insufficient stormwater solids were found. A sediment trap will be installed in this location in 2022 to ensure consistent sampling is possible. This was not done in 2020 or 2021 due to COVID work restrictions and the tidal inundation of the near end of pipe location. SPU attempted to sample the S Brighton St SD in the fall of 2021 and again found insufficient material for analysis. SPU will attempt to sample again in 2022 and plans to install a sediment trap in this location as necessary.

The S Myrtle St SD has sediment traps located in the most downstream maintenance hole, providing a regular data point for this basin. The trap was not removed for sampling in 2021 due to the sediment trap schedule reset discussed in the Effectiveness Monitoring section above. The sediment trap will be retrieved in the spring of 2022. This basin was fully cleaned in 2020 to address any PCB concentrations in the pipe to help prevent impacts to the river while source control efforts continue to eliminate the PCB contribution to the S Myrtle St SD. Pre-cleaning sample data is typically removed from data calculations and summaries, but a summary of data from prior to the November 2020 line cleaning is provided above in the 2021 SCIP column, due to a lack of post cleaning data available. Additional grab and source trace sampling will be conducted after additional source control actions required of Seattle Iron and Metals, Inc. are completed.

The median concentration of PCBs in the Diagonal Ave S CSO/SD has increased by a factor of two over the past five years. This change may be due to the emphasis on following up in areas where the detection dog detected PCBs or where SPU inspectors suspected potential PCB sources. SPU installed three additional traps in the S Snoqualmie sub-basin in 2018 to assist in tracing elevated levels of PCBs found in the maintenance hole located on S Snoqualmie St at 6th Ave S. At this point, these traps have not indicated the source of the PCBs in the area. SPU continues to conduct post cleanup sampling of the S Denver St PCB spill drainage sub-basin and the S Snoqualmie St PCB location to determine that PCBs in these known problem areas remain low. SPU targeted the S Denver St location for line cleaning again in 2021, and targeted the

Bush Pl, Poplar Pl, S Walker St, and 23rd Ave S sub-basins within the Diagonal Ave S SD to remove legacy stormwater solids in the system. SPU plans to continue to target the Diagonal Ave S SD through the line cleaning program to address the persistent PCBs found in samples taken.

cPAHs

With the exception of a few outfalls, median cPAH concentrations in the July 2014 – December 2020 samples were fairly similar to the concentrations reported in the SCIP (see Table 3).

Table 3: Outfalls where cPAHs changed between 2015 SCIP and recent samples.

Outfall	Results from SCIP		Results from 2014—2020 samples		Results from 2021 Samples	
	Median cPAH (ug/ TEQ/kg)	n	Median cPAH (ug/ TEQ/kg)	n	Median cPAH (ug/ TEQ/kg)	n
7th Ave S SD	693	6	209.01	29	119.18	3
Norfolk CSO/EOF/SD	623.25	72	432.3	21	262.82	5
SW Kenny St SD	733.7	15	251.33	6	-	0
2nd Ave S SD	216.3	13	353.78	1	-	0
S Myrtle St SD	798.5	3	692.82	10	-	0

n = number of samples

Median concentrations of cPAH have declined in the 7th Ave S SD and S Norfolk CSO/EOF/SD, but with only one year of data these trends cannot be relied on. As mentioned above, the data presented in the 2021 SCIP table for the 7th Ave S, Norfolk CSO, and SW Idaho St storm drains included only post-cleaning samples, so the recent data may indicate that cPAH concentrations in these three systems are continuing to decline. During the July 2014 – December 2020 dataset, SPU conducted a focused investigation in the S Norfolk basin to identify source(s) of PAHs, which involved intensive inspections and sampling. Over the past six years, a number of PAH sources have been identified and controlled in this system; however, the data indicates that the specific source of cPAH in source control samples has not been found. Targeted sampling conducted in the fall of 2021 bracketed elevated cPAH contamination to a section of pipe located along S Norfolk St at the border with the City of Tukwila. This pipe conveys SPU's S Norfolk St CSO/EOF/SD flows, but samples collected upstream at the terminus of the City of Seattle MS4 indicate the cPAH contaminants are not coming from the SPU system. SPU will continue to assist Ecology and the City of Tukwila to trace the cPAH source.

The SW Kenny St SD and S Myrtle St SD both have sediment traps that provide reliable and consistent data points for cPAH analysis. Both trap pull schedules were impacted by COVID work restrictions in 2020 and 2021, and traps will be pulled in the spring of 2022. Additional samples will be taken in the S Myrtle St SD after modifications to the Seattle Iron and Metals facility come online, as required by their settlement with Puget Soundkeeper Alliance.

Outfall Sampling

Outfalls that have not been sampled since the 2015 SCIP include:

- I-5 SD at S Ryan St
- S 96th St SD

The I-5 SD at S Ryan S and the S 96th St storm drains were not identified as priorities in the 2021 SCIP. SPU plans to install a sediment trap into the S 96th St SD during the spring of 2022, as the pipe does not accumulate adequate sediment to facilitate regular grab sampling. The sediment trap will be left in place until the spring of 2023, at which time sufficient sediment for analysis should have accumulated. The I-5 at S Ryan St SD is a WSDOT outfall located within the City of Tukwila. SPU discharges stormwater drainage to this system, and SPU collects regular samples at end of the SPU drainage system, prior to the flow entering the WSDOT owned system, providing reliable data on SPU's pollutant loading to this basin. SPU is actively assisting the City of Tukwila and Ecology in investigating the I-5 at S Ryan St SD and S Norfolk St SD due to potential PCB discharges from these systems. During this investigation, SPU collected samples within the City of Seattle MS4 and assisted adjacent jurisdiction's sampling efforts to source trace these discharges. SPU has determined through targeted sampling that the PCBs are not entering the I-5 at S Ryan St SD drainage system from the City of Seattle MS4.

Citywide Programs that Support Source Control Efforts in the LDW

In addition to the specific adaptive management elements, SPU conducts other citywide programs that support these efforts. While not required by Appendix 13, the following is a summary of the 2021 accomplishments in these citywide programs:

- **Stormwater Facility Inspections**: While inspecting a business for source control BMPs, the flow control and/or treatment facility is also inspected. Within the LDW, 36 facilities were inspected for Code compliance with regard to flow control and treatment system code requirements during 2021.
- **Water Quality Complaints**: Inspectors respond to complaints as they are received through the water quality hotline, webpage, or agency referrals. In 2021, 102 water quality complaints were reported in the LDW and EW basins that resulted in 1 business inspection. When a complaint is reported at a business, a full business inspection is completed.
- **Spill Response**: Spills are dispatched through the SPU Operations Response Center to on-call Spill Coordinators as they are received. In 2021, SPU responded to 57 spills within the LDW and EW basins. SPU continues to monitor the cleanup of the major PCB spill on Denver Ave S in 2019, as described below.

Denver Ave S PCB Spill

In June 2019, an SPU inspector discovered a PCB spill from an unknown source in the right-of-way along Denver Ave S between 1st Ave S and 2nd Ave S. Sampling confirmed that surface soil along the north/west shoulder of Denver Ave S contained up to 40,300 mg/kg dw PCBs and solids in storm drain inlet on Denver Ave S contained 6,970 mg/kg dw PCBs. The affected soil was determined to encompass an area of about 38 feet by 530 feet with PCB concentrations ranging from 0.1 to 14 mg/kg in the top 0 to 6 inches of soil. PCBs in the storm drain downstream of the inlet where soil initially entered the drainage system ranged from about 4 to 69.4 mg/kg dw PCBs. Both Ecology and EPA were notified. In July and August 2019, SPU and SDOT conducted a cleanup under the Toxics Substance Control Act that was approved by EPA Region 10. Approximately 981 tons of non-regulated PCB-contaminated soil and 40 tons of regulated PCB-contaminated soil/storm drain solids were removed from the site and approximately 1,500 feet of pipe and associated structures (e.g., inlets, catch basins, maintenance holes, and vaults) on Denver Ave S were jetted and cleaned. Non-regulated waste was disposed at the Columbia Ridge Landfill and regulated waste was disposed at the Chemical Waste Management Landfill, both located in Arlington, Oregon. SDOT backfilled and paved the road shoulder after contaminated soil was removed. Soil samples collected at the bottom of the excavation prior to backfill contained <0.05 to 0.086 mg/kg dw PCBs.

SPU received approval from the EPA TSCA program that the upland cleanup and line cleaning of the Denver Ave S SD were complete. During 2020, SPU conducted in-water sampling of sediments in the vicinity of the Diagonal CSO/SD to determine if PCBs from the Denver Ave S spill impacted the sediments in the LDW. Sampling results from this effort indicated that there was no measurable impact to the sediments in the LDW off-shore of the Diagonal CSO/SD. EPA TSCA reviewed the report on the in-water sampling and approved and considered this task complete. Post cleanup reports were submitted to the EPA in Q1 of 2021, with EPA signed off on cleanup completion in Q3 2021.

Ongoing post completion sampling is occurring to verify that all PCBs associated with this incident have been removed from the system. Regular MS4 cleaning will continue to be conducted in the drainage system along Denver Ave S until PCB sampling indicate that no residual PCBs exist in the system in this location, and several years of post-cleanup sampling support stopping.

- **Education and Outreach**: SPU funds the Green Your Business Program, a conservation service for Seattle businesses, which provides free spill kits, assistance in developing a spill plan, and site-specific technical assistance. Seventeen businesses in the LDW MS4 basins received spill kits, either stemming from a business inspection or through targeted outreach. Surveys conducted of spill kit recipients statistically show that

businesses which participate in this program show an improved understanding of stormwater pollution prevention.

Priorities for 2022

Source Tracing/Sampling

Source tracing priorities for 2022 will largely remain the same as described in the 2021-2026 SCIP. Changes identified based on recent sampling and business inspections are summarized below:

- Sample to fill data gaps. Remaining data gaps are largely in smaller areas (1-5 acres) within the MS4 that discharge to other larger drainage systems (Rainier Valley areas of Diagonal Ave S SD) or areas that have been difficult to sample due to lack of solids in the system (e.g., I-5 SD at S Ryan St). In 2022, SPU will sample areas in the upper reach of the LDW with MS4 conveyance that lack data or need a data refresh.
- Install new low-profile sediment traps in basins with persistent concentrations of target pollutants, such as PCBs to aid in source tracing efforts.
- Conduct targeted sampling in locations with persistent priority pollutants, such as S Myrtle St SD, S Norfolk St SD at the Tukwila border, and Denver Ave S Sub Basin to verify that cleaning has removed concentrations of pollutants of concern.

Line Cleaning

For several years, SPU utilized the 636/640 S Riverside Dr site for the temporary decant facility for line cleaning. This site is no longer available as construction of the South Park pump station has begun. SPU utilized a temporary decant facility established at 4700 Myers Way S. This temporary site will continue to be used until a permanent decant facility can be established for this work.

MTCA grant funding for line cleaning ran out in 2017. SPU continued to fund line cleaning efforts using funds provided through standard budgetary allocation. Line cleaning scope will vary as dictated by available funds.

Line cleaning in 2022 will focus on the following priority areas as identified in the 2021 SCIP:

- 7th Ave S SD
- Diagonal Ave S SD – Rainier Valley sub-basins
- S Hinds St SD (EWW)
- Georgetown SD

SPU intends to clean at least 4,000 linear feet of storm drain lines in 2022 to comply with Appendix 13 requirements.

Attachment A: Source tracing data collected from January 2021 through December 2021

	Location	1ST-ST1	1ST-ST2
	Sample Date	20 May 2021	20 May 2021
	Sample Name	1ST-ST2-052021	1ST-ST1-052021
	Drainage Type	SD	SD
	Sample Method	SedTrap	SedTrap
	Location Type	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
	Project	Lower Duwamish Waterway	Lower Duwamish Waterway
	Outfall	1st Ave S SD (west)	1st Ave S SD (west)
Analyte	Unit	Result	Result
1,2,4-Trichlorobenzene	ug/kg	100 U N	100 U N
1,2-Dichlorobenzene	ug/kg	100 U N	100 U N
1,3-Dichlorobenzene	ug/kg	100 U N	100 U N
1,4-Dichlorobenzene	ug/kg	100 U N	100 U N
1-Methylnaphthalene	ug/kg	52.6 J Y	100 U N
2,2'-Oxybis(1-chloropropane)	ug/kg	100 U N	100 U N
2,4,5-Trichlorophenol	ug/kg	500 U N	500 U N
2,4,6-Trichlorophenol	ug/kg	500 U N	500 U N
2,4-Dichlorophenol	ug/kg	500 U N	500 U N
2,4-Dimethylphenol	ug/kg	500 U N	500 U N
2,4-Dinitrophenol	ug/kg	1000 U N	1000 U N
2,4-Dinitrotoluene	ug/kg	500 U N	500 U N
2,6-Dinitrotoluene	ug/kg	500 U N	500 U N
2-Chloronaphthalene	ug/kg	100 U N	100 U N
2-Chlorophenol	ug/kg	100 U N	100 U N
2-Methylnaphthalene	ug/kg	91.8 J Y	100 U N
2-Methylphenol	ug/kg	90.7 J Y	100 U N
2-Nitroaniline	ug/kg	500 U N	500 U N
2-Nitrophenol	ug/kg	100 U N	100 U N
3,3`-Dichlorobenzidine	ug/kg	500 U N	500 U N
3-Nitroaniline	ug/kg	500 U N	500 U N
4,6-Dinitro-2-Methylphenol	ug/kg	1000 U N	1000 U N
4-Bromophenyl phenyl ether	ug/kg	100 U N	100 U N
4-Chloro-3-Methylphenol	ug/kg	500 U N	500 U N
4-Chloroaniline	ug/kg	500 U N	500 U N
4-Chlorophenyl Phenylether	ug/kg	100 U N	100 U N
4-Methylphenol	ug/kg	802 Y	182 Y
4-Nitroaniline	ug/kg	500 U N	500 U N
4-Nitrophenol	ug/kg	500 U N	500 U N
Acenaphthene	ug/kg	100 U N	100 U N
Acenaphthylene	ug/kg	69.4 J Y	100 U N
Anthracene	ug/kg	116 Y	100 U N
Aroclor 1016	ug/kg	100 UJ N	99.9 U N
Aroclor 1221	ug/kg	100 UJ N	99.9 U N
Aroclor 1232	ug/kg	100 UJ N	99.9 U N
Aroclor 1242	ug/kg	100 UJ N	99.9 U N
Aroclor 1248	ug/kg	100 UJ N	99.9 U N
Aroclor 1254	ug/kg	100 UJ N	99.9 U N
Aroclor 1260	ug/kg	100 UJ N	99.9 U N
Arsenic	mg/kg	14.2 J Y	6.47 J Y
Benzo(A)anthracene	ug/kg	274 Y	110 Y
Benzo(A)pyrene	ug/kg	345 Y	118 Y
Benzo(G,H,I)perylene	ug/kg	334 Y	145 Y
Benzofluoranthenes, Total	ug/kg	823 Y	274 Y

Location		1ST-ST1	1ST-ST2
Sample Date		20 May 2021	20 May 2021
Sample Name		1ST-ST2-052021	1ST-ST1-052021
Drainage Type		SD	SD
Sample Method		SedTrap	SedTrap
Location Type		Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
Project		Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		1st Ave S SD (west)	1st Ave S SD (west)
Analyte	Unit	Result	Result
Benzoic acid	ug/kg	3150 Y	1000 Y
Benzyl alcohol	ug/kg	1140 Y	456 Y
bis(2-Chloroethoxy) methane	ug/kg	100 U N	100 U N
Bis-(2-chloroethyl) ether	ug/kg	100 U N	100 U N
Bis(2-ethylhexyl)phthalate	ug/kg	14400 Y	3110 Y
Butylbenzylphthalate	ug/kg	288 Y	161 Y
Carbazole	ug/kg	63.9 J Y	100 U N
Chrysene	ug/kg	836 Y	220 Y
Coarse Sand	%	3.3 Y	3 Y
Copper	mg/kg	301 Y	81.5 Y
cPAH	ug/kg	501.1 J Y	185.78 J Y
Dibenzo(A,H)anthracene	ug/kg	60.1 J Y	100 U N
Dibenzofuran	ug/kg	57.7 J Y	100 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg	2130 Y	259 Y
Diethylphthalate	ug/kg	100 U N	100 U N
Dimethylphthalate	ug/kg	100 U N	100 U N
Di-N-Butylphthalate	ug/kg	108 Y	99.9 J Y
Di-N-Octylphthalate	ug/kg	2380 Y	127 Y
Fine Gravel	%	0.3 Y	0.1 Y
Fine Sand	%	2.1 Y	26.7 Y
Fluoranthene	ug/kg	545 Y	249 Y
Fluorene	ug/kg	65.8 J Y	100 U N
Hexachlorobenzene	ug/kg	100 U N	100 U N
Hexachlorobutadiene	ug/kg	100 U N	100 U N
Hexachlorocyclopentadiene	ug/kg	500 U N	500 U N
Hexachloroethane	ug/kg	100 U N	100 U N
HPAH	ug/kg	4218.1 J Y	1463.8 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg	140 Y	71.8 J Y
Isophorone	ug/kg	100 U N	100 U N
Lead	mg/kg	106 Y	63.7 Y
LPAH	ug/kg	978.2 J Y	190.3 J Y
Medium Sand	%	2.3 Y	3.5 Y
Mercury	mg/kg	0.33 Y	0.112 Y
Motor Oil (Silica and Acid Cleaned)	mg/kg	10500 Y	2100 Y
Naphthalene	ug/kg	163 Y	40.3 J Y
Nitrobenzene	ug/kg	100 U N	100 U N
N-Nitroso-Di-N-Propylamine	ug/kg	100 U N	100 U N
N-Nitrosodiphenylamine	ug/kg	161 Y	100 U N
Pentachlorophenol	ug/kg	500 U N	500 U N
Phenanthrene	ug/kg	564 Y	150 Y
Phenol	ug/kg	281 Y	112 Y
Polychlorinated Biphenyls	ug/kg	100 N	99.9 U N
Pyrene	ug/kg	861 Y	276 Y
Solids, Total	%	32.36 Y	40.21 Y

	Location	1ST-ST1	1ST-ST2
	Sample Date	20 May 2021	20 May 2021
	Sample Name	1ST-ST2-052021	1ST-ST1-052021
	Drainage Type	SD	SD
	Sample Method	SedTrap	SedTrap
	Location Type	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
	Project	Lower Duwamish Waterway	Lower Duwamish Waterway
	Outfall	1st Ave S SD (west)	1st Ave S SD (west)
Analyte	Unit	Result	Result
Total Organic Carbon	%	21.2 Y	9.64 Y
Very Coarse Sand	%	3.8 Y	1.6 Y
Very Fine Sand	%	2 Y	24.5 Y
Zinc	mg/kg	1520 Y	410 Y

Location		RCB343	RCB344	RCB345
Sample Date		17 Jun 2021	17 Jun 2021	17 Jun 2021
Sample Name		MKJ-061721-1	MKJ-061721-2	MKJ-061721-3
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual
Location Type		RCB	RCB	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		7th Ave S SD	7th Ave S SD	7th Ave S SD
Analyte	Unit	Result	Result	Result
1,2,4-Trichlorobenzene	ug/kg	100 U N	100 U N	100 U N
1,2-Dichlorobenzene	ug/kg	100 U N	100 U N	100 U N
1,3-Dichlorobenzene	ug/kg	100 U N	100 U N	100 U N
1,4-Dichlorobenzene	ug/kg	100 U N	100 U N	100 U N
1-Methylnaphthalene	ug/kg	100 U N	100 U N	100 U N
2,2'-Oxybis(1-chloropropane)	ug/kg	100 U N	100 U N	100 U N
2,4,5-Trichlorophenol	ug/kg	500 U N	500 U N	500 U N
2,4,6-Trichlorophenol	ug/kg	500 U N	500 U N	500 U N
2,4-Dichlorophenol	ug/kg	500 U N	500 U N	500 U N
2,4-Dimethylphenol	ug/kg	500 U N	500 U N	500 U N
2,4-Dinitrophenol	ug/kg	1000 U N	1000 U N	1000 U N
2,4-Dinitrotoluene	ug/kg	500 U N	500 U N	500 U N
2,6-Dinitrotoluene	ug/kg	500 U N	500 U N	500 U N
2-Chloronaphthalene	ug/kg	100 U N	100 U N	100 U N
2-Chlorophenol	ug/kg	100 U N	100 U N	100 U N
2-Methylnaphthalene	ug/kg	100 U N	100 U N	100 U N
2-Methylphenol	ug/kg	100 U N	100 U N	100 U N
2-Nitroaniline	ug/kg	500 U N	500 U N	500 U N
2-Nitrophenol	ug/kg	100 U N	100 U N	100 U N
3,3`-Dichlorobenzidine	ug/kg	500 U N	500 U N	500 U N
3-Nitroaniline	ug/kg	500 U N	500 U N	500 U N
4,6-Dinitro-2-Methylphenol	ug/kg	1000 U N	1000 U N	1000 U N
4-Bromophenyl phenyl ether	ug/kg	100 U N	100 U N	100 U N
4-Chloro-3-Methylphenol	ug/kg	500 U N	500 U N	500 U N
4-Chloroaniline	ug/kg	500 U N	500 U N	500 U N
4-Chlorophenyl Phenylether	ug/kg	250 U N	250 U N	250 U N
4-Methylphenol	ug/kg	95.6 J Y	2090 Y	100 U N
4-Nitroaniline	ug/kg	500 U N	500 U N	500 U N
4-Nitrophenol	ug/kg	500 U N	500 U N	500 U N
Acenaphthene	ug/kg	100 U N	100 U N	100 U N
Acenaphthylene	ug/kg	100 U N	100 U N	100 U N
Anthracene	ug/kg	100 U N	100 U N	100 U N
Aroclor 1016	ug/kg	20 U N	19.9 U N	20 U N
Aroclor 1221	ug/kg	20 U N	19.9 U N	20 U N
Aroclor 1232	ug/kg	20 U N	19.9 U N	20 U N
Aroclor 1242	ug/kg	20 U N	19.9 U N	20 U N
Aroclor 1248	ug/kg	20 U N	19.9 U N	20 U N
Aroclor 1254	ug/kg	36.5 Y	20.6 Y	20 U N
Aroclor 1260	ug/kg	116 Y	19.9 U N	20 U N
Arsenic	mg/kg	6.06 J Y	14.4 Y	6.72 Y
Benzo(A)anthracene	ug/kg	31.8 J Y	100 U N	100 U N
Benzo(A)pyrene	ug/kg	74 J Y	83.7 J Y	42.9 J Y
Benzo(G,H,I)perylene	ug/kg	85.4 J Y	100 U N	100 U N
Benzofluoranthenes, Total	ug/kg	154 J Y	169 J Y	113 J Y
Benzoic acid	ug/kg	205 J Y	251 J Y	1000 U N
Benzyl alcohol	ug/kg	110 Y	100 U N	100 U N
bis(2-Chloroethoxy) methane	ug/kg	100 U N	100 U N	100 U N
Bis-(2-chloroethyl) ether	ug/kg	250 U N	250 U N	250 U N
Bis(2-ethylhexyl)phthalate	ug/kg	1460 Y	899 Y	477 Y
Butylbenzylphthalate	ug/kg	80 J Y	52 J Y	51.6 J Y
Carbazole	ug/kg	100 U N	100 U N	100 U N
Chrysene	ug/kg	160 Y	216 Y	135 Y
Coarse Sand	%	9.7 Y	8 Y	8.3 Y
Copper	mg/kg	77.7 Y	51.3 Y	37.7 Y
cPAH	ug/kg	119.18 J Y	132.76 J Y	85.55 J Y
Dibenzo(A,H)anthracene	ug/kg	100 U N	100 U N	100 U N
Dibenzofuran	ug/kg	100 U N	100 U N	100 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg	772 Y	403 Y	244 Y

Location		RCB343	RCB344	RCB345
Sample Date		17 Jun 2021	17 Jun 2021	17 Jun 2021
Sample Name		MKJ-061721-1	MKJ-061721-2	MKJ-061721-3
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual
Location Type		RCB	RCB	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		7th Ave S SD	7th Ave S SD	7th Ave S SD
Analyte	Unit	Result	Result	Result
Diethylphthalate	ug/kg	250 U N	250 U N	250 U N
Dimethylphthalate	ug/kg	100 U N	100 U N	100 U N
Di-N-Butylphthalate	ug/kg	143 Y	139 Y	104 Y
Di-N-Octylphthalate	ug/kg	100 U N	100 U N	100 U N
Fine Gravel	%	2 Y	1.6 Y	1.8 Y
Fine Sand	%	5.2 Y	4.1 Y	9.7 Y
Fluoranthene	ug/kg	78.6 J Y	73.7 J Y	39.4 J Y
Fluorene	ug/kg	100 U N	100 U N	100 U N
Hexachlorobenzene	ug/kg	100 U N	100 U N	100 U N
Hexachlorobutadiene	ug/kg	100 U N	100 U N	100 U N
Hexachlorocyclopentadiene	ug/kg	500 U N	500 U N	500 U N
Hexachloroethane	ug/kg	100 U N	100 U N	100 U N
HPAH	ug/kg	712.8 J Y	707.4 J Y	431.3 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg	100 U N	100 U N	100 U N
Isophorone	ug/kg	100 U N	100 U N	100 U N
Lead	mg/kg	44.5 Y	21.2 Y	12.4 Y
LPAH	ug/kg	116 Y	61 J Y	100 U N
Medium Sand	%	14.8 Y	6.3 Y	10.7 Y
Mercury	mg/kg	0.0735 Y	0.0552 Y	0.0338 Y
Motor Oil (Silica and Acid Cleaned)	mg/kg	1420 Y	1680 Y	1010 Y
Naphthalene	ug/kg	100 UJ N	100 UJ N	100 UJ N
Nitrobenzene	ug/kg	100 U N	100 U N	100 U N
N-Nitroso-Di-N-Propylamine	ug/kg	100 U N	100 U N	100 U N
N-Nitrosodiphenylamine	ug/kg	100 U N	100 U N	100 U N
Pentachlorophenol	ug/kg	500 U N	500 U N	500 U N
Phenanthrene	ug/kg	116 Y	61 J Y	100 U N
Phenol	ug/kg	73.6 J Y	139 Y	100 U N
Polychlorinated Biphenyls	ug/kg	152.5 Y	20.6 Y	20 U N
Pyrene	ug/kg	129 Y	165 Y	101 Y
Solids, Total	%	60.85 Y	66.02 Y	85.31 Y
Total Organic Carbon	%	3.21 Y	3.39 Y	2.67 Y
Very Coarse Sand	%	7 Y	10.3 Y	7.4 Y
Very Fine Sand	%	4.8 Y	5.4 Y	9.2 Y
Zinc	mg/kg	298 Y	96 Y	76.4 Y

Location		MH73	MH73
Sample Date		07 Oct 2021	10 Jun 2021
Sample Name		MKJ-100721-2	MKJ-061021-2
Drainage Type		SD	SD
Sample Method		Grab-Manual	Grab-Manual
Location Type		Inline	Inline
Project		East Waterway	East Waterway
Outfall		B-36, S Spokane St	B-36, S Spokane St
Analyte	Unit	Result	Result
1,2,4-Trichlorobenzene	ug/kg	567 U N	
1,2-Dichlorobenzene	ug/kg	567 U N	
1,3-Dichlorobenzene	ug/kg	567 U N	
1,4-Dichlorobenzene	ug/kg	567 U N	
1-Methylnaphthalene	ug/kg	567 U N	
2,2'-Oxybis(1-chloropropane)	ug/kg	567 U N	
2,4,5-Trichlorophenol	ug/kg	2840 U N	
2,4,6-Trichlorophenol	ug/kg	2840 U N	
2,4-Dichlorophenol	ug/kg	2840 U N	
2,4-Dimethylphenol	ug/kg	2840 U N	
2,4-Dinitrophenol	ug/kg	5670 U N	
2,4-Dinitrotoluene	ug/kg	2840 U N	
2,6-Dinitrotoluene	ug/kg	2840 U N	
2-Chloronaphthalene	ug/kg	567 U N	
2-Chlorophenol	ug/kg	567 U N	
2-Methylnaphthalene	ug/kg	567 U N	
2-Methylphenol	ug/kg	567 U N	
2-Nitroaniline	ug/kg	2840 U N	
2-Nitrophenol	ug/kg	567 U N	
3,3`-Dichlorobenzidine	ug/kg	2840 U N	
3-Nitroaniline	ug/kg	2840 U N	
4,6-Dinitro-2-Methylphenol	ug/kg	5670 U N	
4-Bromophenyl phenyl ether	ug/kg	567 U N	
4-Chloro-3-Methylphenol	ug/kg	2840 U N	
4-Chloroaniline	ug/kg	2840 U N	
4-Chlorophenyl Phenylether	ug/kg	1420 U N	
4-Methylphenol	ug/kg	750 Y	
4-Nitroaniline	ug/kg	2840 U N	
4-Nitrophenol	ug/kg	2840 U N	
Acenaphthene	ug/kg	567 U N	
Acenaphthylene	ug/kg	567 U N	
Anthracene	ug/kg	567 U N	
Aroclor 1016	ug/kg	191 U N	19.8 U N
Aroclor 1221	ug/kg	191 U N	19.8 U N
Aroclor 1232	ug/kg	191 U N	19.8 U N
Aroclor 1242	ug/kg	191 U N	19.8 U N
Aroclor 1248	ug/kg	191 U N	8.8 J Y
Aroclor 1254	ug/kg	191 U N	19.8 U N
Aroclor 1260	ug/kg	191 U N	19.8 U N
Arsenic	mg/kg	21 J Y	
Benzo(A)anthracene	ug/kg	567 U N	
Benzo(A)pyrene	ug/kg	139 J Y	
Benzo(G,H,I)perylene	ug/kg	567 U N	
Benzofluoranthenes, Total	ug/kg	427 J Y	

Location		MH73	MH73
Sample Date		07 Oct 2021	10 Jun 2021
Sample Name		MKJ-100721-2	MKJ-061021-2
Drainage Type		SD	SD
Sample Method		Grab-Manual	Grab-Manual
Location Type		Inline	Inline
Project		East Waterway	East Waterway
Outfall		B-36, S Spokane St	B-36, S Spokane St
Analyte	Unit	Result	Result
Benzoic acid	ug/kg	3010 J Y	
Benzyl alcohol	ug/kg	640 Y	
bis(2-Chloroethoxy) methane	ug/kg	567 U N	
Bis-(2-chloroethyl) ether	ug/kg	1420 U N	
Bis(2-ethylhexyl)phthalate	ug/kg	2240 Y	
Butylbenzylphthalate	ug/kg	567 U N	
Carbazole	ug/kg	567 U N	
Chrysene	ug/kg	301 J Y	
Coarse Sand	%	2.6 Y	
Copper	mg/kg	174 J Y	
cPAH	ug/kg	354.81 J Y	
Dibenzo(A,H)anthracene	ug/kg	567 U N	
Dibenzofuran	ug/kg	567 U N	
Diesel Range (Silica and Acid Cleaned)	mg/kg	317 Y	
Diethylphthalate	ug/kg	1800 Y	
Dimethylphthalate	ug/kg	567 U N	
Di-N-Butylphthalate	ug/kg	567 U N	
Di-N-Octylphthalate	ug/kg	567 U N	
Fine Gravel	%	0.4 Y	
Fine Sand	%	4.2 Y	
Fluoranthene	ug/kg	336 J Y	
Fluorene	ug/kg	567 U N	
Hexachlorobenzene	ug/kg	567 U N	
Hexachlorobutadiene	ug/kg	567 U N	
Hexachlorocyclopentadiene	ug/kg	2840 U N	
Hexachloroethane	ug/kg	567 U N	
HPAH	ug/kg	1561 J Y	
Indeno(1,2,3-Cd)pyrene	ug/kg	567 U N	
Isophorone	ug/kg	567 U N	
Lead	mg/kg	60.1 J Y	
LPAH	ug/kg	272 J Y	
Medium Sand	%	12.7 Y	
Mercury	mg/kg	0.244 Y	
Motor Oil (Silica and Acid Cleaned)	mg/kg	1160 Y	
Naphthalene	ug/kg	567 U N	
Nitrobenzene	ug/kg	567 U N	
N-Nitroso-Di-N-Propylamine	ug/kg	567 U N	
N-Nitrosodiphenylamine	ug/kg	567 U N	
Pentachlorophenol	ug/kg	2840 U N	
Phenanthrene	ug/kg	272 J Y	
Phenol	ug/kg	425 J Y	
Polychlorinated Biphenyls	ug/kg	191 U N	8.8 J Y
Pyrene	ug/kg	358 J Y	
Solids, Total	%	10.81 Y	

	Location	MH73	MH73
	Sample Date	07 Oct 2021	10 Jun 2021
	Sample Name	MKJ-100721-2	MKJ-061021-2
	Drainage Type	SD	SD
	Sample Method	Grab-Manual	Grab-Manual
	Location Type	Inline	Inline
	Project	East Waterway	East Waterway
	Outfall	B-36, S Spokane St	B-36, S Spokane St
Analyte	Unit	Result	Result
Total Organic Carbon	%	16.1 Y	
Very Coarse Sand	%	2 Y	
Very Fine Sand	%	4.4 Y	
Zinc	mg/kg	1180 Y	

Location		MH52	MH58	MH71	ODS124
Sample Date		14 Jan 2021	07 Jun 2021	14 Jan 2021	18 May 2021
Sample Name		AGP-011421-8	NCH-06721-2	AGP-011421-5	MKJ-051821-1
Drainage Type		SD	SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual	Grab-Manual
Location Type		Inline	Inline	Inline	ODS
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result	Result
>10 Phi Clay	%				
1,2,4-Trichlorobenzene	ug/kg		20 U N		
1,2-Dichlorobenzene	ug/kg		20 U N		
1,3-Dichlorobenzene	ug/kg		20 U N		
1,4-Dichlorobenzene	ug/kg		20 U N		
1-Methylnaphthalene	ug/kg		20 U N		
2,2'-Oxybis(1-chloropropane)	ug/kg		20 U N		
2,4,5-Trichlorophenol	ug/kg		100 U N		
2,4,6-Trichlorophenol	ug/kg		100 U N		
2,4-Dichlorophenol	ug/kg		100 U N		
2,4-Dimethylphenol	ug/kg		100 U N		
2,4-Dinitrophenol	ug/kg		200 U N		
2,4-Dinitrotoluene	ug/kg		100 U N		
2,6-Dinitrotoluene	ug/kg		100 U N		
2-Chloronaphthalene	ug/kg		20 U N		
2-Chlorophenol	ug/kg		20 U N		
2-Methylnaphthalene	ug/kg		20 U N		
2-Methylphenol	ug/kg		20 U N		
2-Nitroaniline	ug/kg		100 U N		
2-Nitrophenol	ug/kg		20 U N		
3,3`-Dichlorobenzidine	ug/kg		100 U N		
3-Nitroaniline	ug/kg		100 U N		
4,6-Dinitro-2-Methylphenol	ug/kg		200 U N		
4-Bromophenyl phenyl ether	ug/kg		20 U N		
4-Chloro-3-Methylphenol	ug/kg		100 U N		
4-Chloroaniline	ug/kg		100 U N		
4-Chlorophenyl Phenylether	ug/kg		20 U N		
4-Methylphenol	ug/kg		20 U N		
4-Nitroaniline	ug/kg		100 U N		
4-Nitrophenol	ug/kg		100 U N		
8-9 Phi Clay	%				
9-10 Phi Clay	%				
Acenaphthene	ug/kg		20 U N		
Acenaphthylene	ug/kg		20 U N		
Anthracene	ug/kg		6.7 J Y		
Aroclor 1016	ug/kg	200 U N	20 U N	99.5 U N	
Aroclor 1221	ug/kg	200 U N	20 U N	99.5 U N	
Aroclor 1232	ug/kg	200 U N	20 U N	99.5 U N	
Aroclor 1242	ug/kg	200 U N	20 U N	99.5 U N	
Aroclor 1248	ug/kg	4750 Y	20 U N	1280 Y	
Aroclor 1254	ug/kg	3140 Y	20 U N	712 Y	117000000 J Y
Aroclor 1260	ug/kg	1410 Y	20 U N	323 Y	15400000 Y
Arsenic	mg/kg		6.41 U N		
Benzo(A)anthracene	ug/kg		10.2 J Y		
Benzo(A)pyrene	ug/kg		20.1 Y		
Benzo(G,H,I)perylene	ug/kg		30.1 Y		
Benzofluoranthenes, Total	ug/kg		31.8 J Y		
Benzoic acid	ug/kg		213 Y		
Benzyl alcohol	ug/kg		43.3 Y		
bis(2-Chloroethoxy) methane	ug/kg		20 U N		
Bis-(2-chloroethyl) ether	ug/kg		20 U N		
Bis(2-ethylhexyl)phthalate	ug/kg		333 Y		
Butylbenzylphthalate	ug/kg		20 U N		
Carbazole	ug/kg		20 U N		
Chrysene	ug/kg		29.3 Y		
Clay	%				
Coarse Sand	%		2.7 Y		
Coarse Silt	%				
Copper	mg/kg		22.3 Y		
cPAH	ug/kg		29.453 J Y		
Dibenzo(A,H)anthracene	ug/kg		20 U N		
Dibenzofuran	ug/kg		20 U N		
Diesel Range (Silica and Acid Cleaned)	mg/kg		72.7 Y		
Diethylphthalate	ug/kg		20 U N		
Dimethylphthalate	ug/kg		20 U N		
Di-N-Butylphthalate	ug/kg		12.3 J Y		
Di-N-Octylphthalate	ug/kg		20 U N		
Fine Gravel	%		7.4 Y		
Fine Sand	%		0.4 Y		
Fine Silt	%				
Fluoranthene	ug/kg		44.1 Y		
Fluorene	ug/kg		20 U N		

Location		MH52	MH58	MH71	ODS124
Sample Date		14 Jan 2021	07 Jun 2021	14 Jan 2021	18 May 2021
Sample Name		AGP-011421-8	NCH-06721-2	AGP-011421-5	MKJ-051821-1
Drainage Type		SD	SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual	Grab-Manual
Location Type		Inline	Inline	Inline	ODS
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result	Result
Gravel	%				
Hexachlorobenzene	ug/kg		20 U N		
Hexachlorobutadiene	ug/kg		20 U N		
Hexachlorocyclopentadiene	ug/kg		100 U N		
Hexachloroethane	ug/kg		20 U N		
HPAH	ug/kg		296.2 J Y 296.2 J Y		
Indeno(1,2,3-Cd)pyrene	ug/kg		8.6 J Y		
Isophorone	ug/kg		20 U N		
Lead	mg/kg		3.26 Y		
LPAH	ug/kg		33 J Y		
Medium Sand	%		0.4 Y		
Medium Silt	%				
Mercury	mg/kg		0.285 J N		
Motor Oil (Silica and Acid Cleaned)	mg/kg		238 Y		
Motor Oil Range	mg/kg				
Naphthalene	ug/kg		20 U N		
Nitrobenzene	ug/kg		20 U N		
N-Nitroso-Di-N-Propylamine	ug/kg		20 U N		
N-Nitrosodiphenylamine	ug/kg		20 UJ N		
Pentachlorophenol	ug/kg		100 U N		
Phenanthrene	ug/kg		26.3 Y		
Phenol	ug/kg		115 Y		
Polychlorinated Biphenyls	ug/kg	9300 Y	20 U N	2315 Y	132400000 J Y
Pyrene	ug/kg		122 Y		
Sand	%				
Silt	%				
Solids, Total	%	47.82 Y	74.09 Y	60.93 Y	
Total Organic Carbon	%	4.45 Y	1.04 Y	0.9 Y	
Very Coarse Sand	%		19.8 Y		
Very Fine Sand	%		0.3 Y		
Very Fine Silt	%				
Zinc	mg/kg		55.3 Y		

Location		RCB328	RCB329	RCB339
Sample Date		14 Jan 2021	14 Jan 2021	22 Jul 2021
Sample Name		AGP-011421-7	AGP-011421-6	MKJ-072221-6
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual
Location Type		RCB	RCB	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result
>10 Phi Clay	%			0.5 Y
1,2,4-Trichlorobenzene	ug/kg			100 U N
1,2-Dichlorobenzene	ug/kg			100 U N
1,3-Dichlorobenzene	ug/kg			100 U N
1,4-Dichlorobenzene	ug/kg			100 U N
1-Methylnaphthalene	ug/kg			100 U N
2,2'-Oxybis(1-chloropropane)	ug/kg			100 U N
2,4,5-Trichlorophenol	ug/kg			500 U N
2,4,6-Trichlorophenol	ug/kg			500 U N
2,4-Dichlorophenol	ug/kg			500 U N
2,4-Dimethylphenol	ug/kg			500 U N
2,4-Dinitrophenol	ug/kg			1000 U N
2,4-Dinitrotoluene	ug/kg			500 U N
2,6-Dinitrotoluene	ug/kg			500 U N
2-Chloronaphthalene	ug/kg			100 U N
2-Chlorophenol	ug/kg			100 U N
2-Methylnaphthalene	ug/kg			100 U N
2-Methylphenol	ug/kg			47.5 J Y
2-Nitroaniline	ug/kg			500 U N
2-Nitrophenol	ug/kg			100 U N
3,3`-Dichlorobenzidine	ug/kg			500 U N
3-Nitroaniline	ug/kg			500 U N
4,6-Dinitro-2-Methylphenol	ug/kg			1000 U N
4-Bromophenyl phenyl ether	ug/kg			100 U N
4-Chloro-3-Methylphenol	ug/kg			500 U N
4-Chloroaniline	ug/kg			500 U N
4-Chlorophenyl Phenylether	ug/kg			250 U N
4-Methylphenol	ug/kg			665 Y
4-Nitroaniline	ug/kg			500 U N
4-Nitrophenol	ug/kg			500 U N
8-9 Phi Clay	%			1.7 Y
9-10 Phi Clay	%			0.8 Y
Acenaphthene	ug/kg			100 U N
Acenaphthylene	ug/kg			100 U N
Anthracene	ug/kg			207 Y
Aroclor 1016	ug/kg	20 UJ N	20 U N	20 U N
Aroclor 1221	ug/kg	20 UJ N	20 U N	20 U N
Aroclor 1232	ug/kg	20 UJ N	20 U N	20 U N
Aroclor 1242	ug/kg	20 UJ N	20 U N	20 U N
Aroclor 1248	ug/kg	98.4 J Y	87.6 Y	20 U N
Aroclor 1254	ug/kg	78.9 J Y	230 Y	40.4 Y
Aroclor 1260	ug/kg	93.2 J Y	93.7 Y	20.6 Y
Arsenic	mg/kg			5.42 J Y
Benzo(A)anthracene	ug/kg			241 Y
Benzo(A)pyrene	ug/kg			172 Y
Benzo(G,H,I)perylene	ug/kg			180 Y
Benzofluoranthenes, Total	ug/kg			532 Y
Benzoic acid	ug/kg			199 J Y
Benzyl alcohol	ug/kg			100 U N
bis(2-Chloroethoxy) methane	ug/kg			100 U N
Bis-(2-chloroethyl) ether	ug/kg			250 U N
Bis(2-ethylhexyl)phthalate	ug/kg			9380 Y
Butylbenzylphthalate	ug/kg			123 Y
Carbazole	ug/kg			66.3 J Y
Chrysene	ug/kg			530 Y
Clay	%			3 Y
Coarse Sand	%			10.6 Y
Coarse Silt	%			3.2 Y

Location		RCB328	RCB329	RCB339
Sample Date		14 Jan 2021	14 Jan 2021	22 Jul 2021
Sample Name		AGP-011421-7	AGP-011421-6	MKJ-072221-6
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual
Location Type		RCB	RCB	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result
Copper	mg/kg			74.9 Y
cPAH	ug/kg			282.92 J Y
Dibenzo(A,H)anthracene	ug/kg			100 U N
Dibenzofuran	ug/kg			100 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg			1030 Y
Diethylphthalate	ug/kg			250 U N
Dimethylphthalate	ug/kg			42.1 J Y
Di-N-Butylphthalate	ug/kg			59.1 J Y
Di-N-Octylphthalate	ug/kg			1010 Y
Fine Gravel	%			2.2 Y
Fine Sand	%			12.5 Y
Fine Silt	%			4.7 Y
Fluoranthene	ug/kg			629 Y
Fluorene	ug/kg			100 U N
Gravel	%			21.5 Y
Hexachlorobenzene	ug/kg			100 U N
Hexachlorobutadiene	ug/kg			100 U N
Hexachlorocyclopentadiene	ug/kg			500 U N
Hexachloroethane	ug/kg			100 U N
HPAH	ug/kg			3094.2 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg			83.2 J Y
Isophorone	ug/kg			100 U N
Lead	mg/kg			31.4 Y
LPAH	ug/kg			537 J Y
Medium Sand	%			18.5 Y
Medium Silt	%			4.6 Y
Mercury	mg/kg			0.0692 Y
Motor Oil (Silica and Acid Cleaned)	mg/kg			
Motor Oil Range	mg/kg			7420 Y
Naphthalene	ug/kg			31 J Y
Nitrobenzene	ug/kg			100 U N
N-Nitroso-Di-N-Propylamine	ug/kg			100 U N
N-Nitrosodiphenylamine	ug/kg			100 U N
Pentachlorophenol	ug/kg			500 U N
Phenanthrene	ug/kg			299 Y
Phenol	ug/kg			100 U N
Polychlorinated Biphenyls	ug/kg	270.5 J Y	411.3 Y	61 Y
Pyrene	ug/kg			727 Y
Sand	%			58.5 Y
Silt	%			16.8 Y
Solids, Total	%	36.9 Y	34.69 Y	60.01 Y
Total Organic Carbon	%	9.74 Y	13.7 Y	6.48 Y
Very Coarse Sand	%			8.8 Y
Very Fine Sand	%			8.1 Y
Very Fine Silt	%			4.3 Y
Zinc	mg/kg			396 Y

Location		RCB92	ST1	ST1
Sample Date		14 Jan 2021	10 Jun 2021	10 Jun 2021
Sample Name		AGP-011421-4	ST1-061021	ST1-061021-G
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual		
Location Type		RCB	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result
>10 Phi Clay	%			
1,2,4-Trichlorobenzene	ug/kg		99.8 U N	100 U N
1,2-Dichlorobenzene	ug/kg		99.8 U N	100 U N
1,3-Dichlorobenzene	ug/kg		99.8 U N	100 U N
1,4-Dichlorobenzene	ug/kg		99.8 U N	100 U N
1-Methylnaphthalene	ug/kg		99.8 U N	100 U N
2,2'-Oxybis(1-chloropropane)	ug/kg		99.8 U N	100 U N
2,4,5-Trichlorophenol	ug/kg		499 U N	500 U N
2,4,6-Trichlorophenol	ug/kg		499 U N	500 U N
2,4-Dichlorophenol	ug/kg		499 U N	500 U N
2,4-Dimethylphenol	ug/kg		499 U N	500 U N
2,4-Dinitrophenol	ug/kg		998 U N	1000 U N
2,4-Dinitrotoluene	ug/kg		499 U N	500 U N
2,6-Dinitrotoluene	ug/kg		499 U N	500 U N
2-Chloronaphthalene	ug/kg		99.8 U N	100 U N
2-Chlorophenol	ug/kg		99.8 U N	100 U N
2-Methylnaphthalene	ug/kg		99.8 U N	100 U N
2-Methylphenol	ug/kg		99.8 U N	100 U N
2-Nitroaniline	ug/kg		499 U N	500 U N
2-Nitrophenol	ug/kg		99.8 U N	100 U N
3,3`-Dichlorobenzidine	ug/kg		499 U N	500 U N
3-Nitroaniline	ug/kg		499 U N	500 U N
4,6-Dinitro-2-Methylphenol	ug/kg		998 U N	1000 U N
4-Bromophenyl phenyl ether	ug/kg		99.8 U N	100 U N
4-Chloro-3-Methylphenol	ug/kg		499 U N	500 U N
4-Chloroaniline	ug/kg		499 U N	500 U N
4-Chlorophenyl Phenylether	ug/kg		99.8 U N	100 U N
4-Methylphenol	ug/kg		127 Y	100 U N
4-Nitroaniline	ug/kg		499 U N	500 U N
4-Nitrophenol	ug/kg		499 U N	500 U N
8-9 Phi Clay	%			
9-10 Phi Clay	%			
Acenaphthene	ug/kg		43.6 J Y	100 U N
Acenaphthylene	ug/kg		31.8 J Y	100 U N
Anthracene	ug/kg		113 Y	100 U N
Aroclor 1016	ug/kg	19.9 U N	19.9 U N	19.9 U N
Aroclor 1221	ug/kg	19.9 U N	19.9 U N	19.9 U N
Aroclor 1232	ug/kg	19.9 U N	19.9 U N	19.9 U N
Aroclor 1242	ug/kg	19.9 U N	19.9 U N	19.9 U N
Aroclor 1248	ug/kg	722 Y	51.6 Y	19.9 U N
Aroclor 1254	ug/kg	224 Y	55.4 Y	19.9 U N
Aroclor 1260	ug/kg	97.7 Y	64.3 J Y	19.9 U N
Arsenic	mg/kg			
Benzo(A)anthracene	ug/kg		329 Y	39 J Y
Benzo(A)pyrene	ug/kg		363 Y	56.8 J Y
Benzo(G,H,I)perylene	ug/kg		270 Y	77 J Y
Benzofluoranthenes, Total	ug/kg		885 Y	117 J Y
Benzoic acid	ug/kg		977 J Y	1000 U N
Benzyl alcohol	ug/kg		160 Y	100 U N
bis(2-Chloroethoxy) methane	ug/kg		99.8 U N	100 U N
Bis-(2-chloroethyl) ether	ug/kg		99.8 U N	100 U N
Bis(2-ethylhexyl)phthalate	ug/kg		4730 Y	1090 Y
Butylbenzylphthalate	ug/kg		196 Y	100 U N
Carbazole	ug/kg		118 Y	100 U N
Chrysene	ug/kg		580 Y	96.2 J Y
Clay	%			
Coarse Sand	%		6.3 Y	24.2 Y
Coarse Silt	%			

Location		RCB92	ST1	ST1
Sample Date		14 Jan 2021	10 Jun 2021	10 Jun 2021
Sample Name		AGP-011421-4	ST1-061021	ST1-061021-G
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual		
Location Type		RCB	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD	Diagonal Ave S CSO/SD
Analyte	Unit	Result	Result	Result
Copper	mg/kg		541 Y	30.7 Y
cPAH	ug/kg		538.72 J Y	97.112 J Y
Dibenzo(A,H)anthracene	ug/kg		73.3 J Y	100 U N
Dibenzofuran	ug/kg		99.8 U N	100 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg		425 Y	45.2 Y
Diethylphthalate	ug/kg		99.8 U N	100 U N
Dimethylphthalate	ug/kg		61.4 J Y	100 U N
Di-N-Butylphthalate	ug/kg		107 Y	114 Y
Di-N-Octylphthalate	ug/kg		480 Y	100 U N
Fine Gravel	%		0.7 Y	3.2 Y
Fine Sand	%		14.6 Y	1.6 Y
Fine Silt	%			
Fluoranthene	ug/kg		904 Y	89.4 J Y
Fluorene	ug/kg		57.5 J Y	100 U N
Gravel	%			
Hexachlorobenzene	ug/kg		99.8 U N	100 U N
Hexachlorobutadiene	ug/kg		99.8 U N	100 U N
Hexachlorocyclopentadiene	ug/kg		499 U N	500 U N
Hexachloroethane	ug/kg		99.8 U N	100 U N
HPAH	ug/kg		4466.3 J Y	626.9 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg		192 Y	37.5 J Y
Isophorone	ug/kg		99.8 U N	100 U N
Lead	mg/kg		437 Y	6.5 Y
LPAH	ug/kg		996.8 J Y	45 J Y
Medium Sand	%		20.8 Y	12.4 Y
Medium Silt	%			
Mercury	mg/kg		0.608 U N	0.284 U N
Motor Oil (Silica and Acid Cleaned)	mg/kg		2790 Y	386 Y
Motor Oil Range	mg/kg			
Naphthalene	ug/kg		69.9 J Y	100 U N
Nitrobenzene	ug/kg		99.8 U N	100 U N
N-Nitroso-Di-N-Propylamine	ug/kg		99.8 U N	100 U N
N-Nitrosodiphenylamine	ug/kg		99.8 U N	100 U N
Pentachlorophenol	ug/kg		499 U N	500 U N
Phenanthrene	ug/kg		681 Y	45 J Y
Phenol	ug/kg		142 Y	100 U N
Polychlorinated Biphenyls	ug/kg	1043.7 Y	171.3 J Y	19.9 U N
Pyrene	ug/kg		870 Y	114 Y
Sand	%			
Silt	%			
Solids, Total	%	69.31 Y	7.22 Y	80.15 Y
Total Organic Carbon	%	3.53 Y	50.5 Y	0.62 Y
Very Coarse Sand	%		3.4 Y	26.2 Y
Very Fine Sand	%		6.9 Y	0.7 Y
Very Fine Silt	%			
Zinc	mg/kg		2750 Y	85.4 Y

Location		ODS92	ODS93	ODS94
Sample Date		14 Jan 2021	14 Jan 2021	14 Jan 2021
Sample Name		AGP-011421-1	AGP-011421-2	AGP-011421-3
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual	Grab-Manual	Grab-Manual
Location Type		ODS	ODS	ODS
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Nevada St SD	S Nevada St SD	S Nevada St SD
Analyte	Unit	Result	Result	Result
Aroclor 1016	ug/kg	20 U N	19.8 U N	20 U N
Aroclor 1221	ug/kg	20 U N	19.8 U N	20 U N
Aroclor 1232	ug/kg	20 U N	19.8 U N	20 U N
Aroclor 1242	ug/kg	20 U N	19.8 U N	20 U N
Aroclor 1248	ug/kg	28.1 Y	24 Y	28.6 Y
Aroclor 1254	ug/kg	49.1 Y	44.1 Y	71 Y
Aroclor 1260	ug/kg	163 Y	136 Y	177 Y
Polychlorinated Biphenyls	ug/kg	240.2 Y	204.1 Y	276.6 Y

Location		MH74	NST3	NST4
Sample Date		07 Oct 2021	10 Jun 2021	24 Nov 2021
Sample Name		MKJ-100721-3	NST3-061021	NST4-112421
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual		SedTrap
Location Type		Inline	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD
Analyte	Unit	Result	Result	Result
1,2,4-Trichlorobenzene	ug/kg	1560 U N	99.8 U N	20 U N
1,2-Dichlorobenzene	ug/kg	1560 U N	99.8 U N	20 U N
1,3-Dichlorobenzene	ug/kg	1560 U N	99.8 U N	20 U N
1,4-Dichlorobenzene	ug/kg	1560 U N	99.8 U N	20 U N
1-Methylnaphthalene	ug/kg	418 J Y	99.8 U N	46.3 Y
2,2'-Oxybis(1-chloropropane)	ug/kg	1560 U N	99.8 U N	20 U N
2,4,5-Trichlorophenol	ug/kg	7810 U N	499 U N	99.8 U N
2,4,6-Trichlorophenol	ug/kg	7810 U N	499 U N	99.8 U N
2,4-Dichlorophenol	ug/kg	7810 U N	499 U N	99.8 U N
2,4-Dimethylphenol	ug/kg	7810 U N	499 U N	99.8 U N
2,4-Dinitrophenol	ug/kg	15600 U N	998 U N	200 U N
2,4-Dinitrotoluene	ug/kg	7810 U N	499 U N	99.8 U N
2,6-Dinitrotoluene	ug/kg	7810 U N	499 U N	99.8 U N
2-Chloronaphthalene	ug/kg	1560 U N	99.8 U N	20 U N
2-Chlorophenol	ug/kg	1560 U N	99.8 U N	20 U N
2-Methylnaphthalene	ug/kg	787 J Y	99.8 U N	59.4 Y
2-Methylphenol	ug/kg	1560 U N	99.8 U N	10.6 J Y
2-Nitroaniline	ug/kg	7810 U N	499 U N	99.8 U N
2-Nitrophenol	ug/kg	1560 U N	99.8 U N	20 U N
3,3`-Dichlorobenzidine	ug/kg	7810 U N	499 U N	99.8 U N
3-Nitroaniline	ug/kg	7810 U N	499 U N	99.8 U N
4,6-Dinitro-2-Methylphenol	ug/kg	15600 U N	998 U N	200 U N
4-Bromophenyl phenyl ether	ug/kg	1560 U N	99.8 U N	20 U N
4-Chloro-3-Methylphenol	ug/kg	7810 U N	499 U N	99.8 U N
4-Chloroaniline	ug/kg	7810 U N	499 U N	99.8 U N
4-Chlorophenyl Phenylether	ug/kg	3910 U N	99.8 U N	49.9 U N
4-Methylphenol	ug/kg	1030 J Y	7070 Y	42.9 Y
4-Nitroaniline	ug/kg	7810 U N	499 U N	99.8 U N
4-Nitrophenol	ug/kg	7810 U N	499 U N	99.8 U N
Acenaphthene	ug/kg	1560 U N	99.8 U N	39 Y
Acenaphthylene	ug/kg	705 J Y	26.9 J Y	19.8 J Y
Anthracene	ug/kg	1590 Y	35.8 J Y	84.1 Y
Aroclor 1016	ug/kg	521 UJ N	19.8 U N	20 U N
Aroclor 1221	ug/kg	521 UJ N	19.8 U N	20 U N
Aroclor 1232	ug/kg	521 UJ N	19.8 U N	20 U N
Aroclor 1242	ug/kg	521 UJ N	19.8 U N	20 U N
Aroclor 1248	ug/kg	521 UJ N	19.8 U N	20 U N
Aroclor 1254	ug/kg	1170 J Y	19.8 U N	20 U N
Aroclor 1260	ug/kg	1690 J Y	19.8 U N	20 U N
Arsenic	mg/kg	9.12 Y	3.31 Y	21.1 Y
Benzo(A)anthracene	ug/kg	5860 Y	145 Y	110 Y
Benzo(A)pyrene	ug/kg	8370 Y	264 Y	165 Y
Benzo(G,H,I)perylene	ug/kg	9430 Y	246 Y	172 Y
Benzofluoranthenes, Total	ug/kg	25500 Y	792 Y	432 Y
Benzoic acid	ug/kg	8670 J Y	1560 Y	139 J Y
Benzyl alcohol	ug/kg	1560 U N	513 Y	20 U N
bis(2-Chloroethoxy) methane	ug/kg	1560 U N	99.8 U N	20 U N
Bis-(2-chloroethyl) ether	ug/kg	3910 U N	1280 Y	49.9 U N
Bis(2-ethylhexyl)phthalate	ug/kg	81500 Y	1590 Y	478 Y
Butylbenzylphthalate	ug/kg	16000 Y	128 Y	48.9 Y
Carbazole	ug/kg	1880 Y	54.4 J Y	45.7 Y
Chrysene	ug/kg	16800 Y	408 Y	356 Y
Coarse Sand	%	7.4 Y	21.1 Y	9.2 Y
Copper	mg/kg	171 J Y	73.9 Y	26.4 Y
cPAH	ug/kg	13355 Y	404.38 J Y	262.82 Y
Dibenzo(A,H)anthracene	ug/kg	2390 Y	64 J Y	56.9 Y
Dibenzofuran	ug/kg	1560 U N	99.8 U N	56.9 Y
Diesel Range (Silica and Acid Cleaned)	mg/kg	48600 Y	178 Y	117 Y
Diethylphthalate	ug/kg	3910 U N	99.8 U N	28 J Y
Dimethylphthalate	ug/kg	3790 Y	99.8 U N	25 Y
Di-N-Butylphthalate	ug/kg	734 J Y	75.2 J Y	20 U N

Location		MH74	NST3	NST4
Sample Date		07 Oct 2021	10 Jun 2021	24 Nov 2021
Sample Name		MKJ-100721-3	NST3-061021	NST4-112421
Drainage Type		SD	SD	SD
Sample Method		Grab-Manual		SedTrap
Location Type		Inline	Inline w/Active SPU Sed Trap	Inline w/Active SPU Sed Trap
Project		Lower Duwamish Waterway	Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD
Analyte	Unit	Result	Result	Result
Di-N-Octylphthalate	ug/kg	10900 Y	99.8 U N	20 U N
Fine Gravel	%	0.8 Y	0.8 Y	0.2 Y
Fine Sand	%	7.6 Y	9.5 Y	19.1 Y
Fluoranthene	ug/kg	15700 Y	501 Y	328 Y
Fluorene	ug/kg	1560 U N	99.8 U N	55.3 Y
Hexachlorobenzene	ug/kg	1560 U N	99.8 U N	20 U N
Hexachlorobutadiene	ug/kg	1560 U N	99.8 U N	20 U N
Hexachlorocyclopentadiene	ug/kg	7810 U N	499 U N	99.8 U N
Hexachloroethane	ug/kg	1560 U N	99.8 U N	20 U N
HPAH	ug/kg	108000 Y	3112 J Y	2122.9 Y
Indeno(1,2,3-Cd)pyrene	ug/kg	7250 Y	170 Y	173 Y
Isophorone	ug/kg	1560 U N	99.8 U N	20 U N
Lead	mg/kg	344 J Y	33.7 Y	79 Y
LPAH	ug/kg	12215 J Y	344.1 J Y	512.5 J Y
Medium Sand	%	16.4 Y	21.2 Y	35.4 Y
Mercury	mg/kg	0.113 Y	0.47 U N	0.0327 Y
Motor Oil (Silica and Acid Cleaned)	mg/kg	155000 Y	1910 Y	391 Y
Naphthalene	ug/kg	1300 J Y	53.4 J Y	90.3 Y
Nitrobenzene	ug/kg	1560 U N	99.8 U N	20 U N
N-Nitroso-Di-N-Propylamine	ug/kg	1560 U N	99.8 U N	20 U N
N-Nitrosodiphenylamine	ug/kg	1560 U N	99.8 U N	20 U N
Pentachlorophenol	ug/kg	7810 U N	499 U N	99.8 U N
Phenanthrene	ug/kg	8620 Y	228 Y	224 Y
Phenol	ug/kg	1900 Y	854 Y	15.9 J Y
Polychlorinated Biphenyls	ug/kg	2860 J Y	19.8 U N	20 U N
Pyrene	ug/kg	16700 Y	522 Y	330 Y
Solids, Total	%	56.11 Y	39.82 Y	71.33 Y
Total Organic Carbon	%	9.4 Y	12.3 Y	2.34 Y
Very Coarse Sand	%	45.3 Y	13.8 Y	3.6 Y
Very Fine Sand	%	4.8 Y	7 Y	13.6 Y
Zinc	mg/kg	995 Y	372 Y	99.8 Y

Location		NST5	RCB130
Sample Date		24 Nov 2021	07 Oct 2021
Sample Name		NST5-112421	MKJ-100721-1
Drainage Type		SD	SD
Sample Method		SedTrap	Grab-Manual
Location Type		Inline w/Active SPU Sed Trap	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD
Analyte	Unit	Result	Result
1,2,4-Trichlorobenzene	ug/kg	20 U N	60 U N
1,2-Dichlorobenzene	ug/kg	20 U N	60 U N
1,3-Dichlorobenzene	ug/kg	20 U N	60 U N
1,4-Dichlorobenzene	ug/kg	20 U N	60 U N
1-Methylnaphthalene	ug/kg	46.1 Y	60 U N
2,2'-Oxybis(1-chloropropane)	ug/kg	20 U N	60 U N
2,4,5-Trichlorophenol	ug/kg	99.8 U N	300 U N
2,4,6-Trichlorophenol	ug/kg	99.8 U N	300 U N
2,4-Dichlorophenol	ug/kg	99.8 U N	300 U N
2,4-Dimethylphenol	ug/kg	99.8 U N	300 U N
2,4-Dinitrophenol	ug/kg	200 U N	600 U N
2,4-Dinitrotoluene	ug/kg	99.8 U N	300 U N
2,6-Dinitrotoluene	ug/kg	73.5 J Y	300 U N
2-Chloronaphthalene	ug/kg	20 U N	60 U N
2-Chlorophenol	ug/kg	20 U N	60 U N
2-Methylnaphthalene	ug/kg	65.4 Y	60 U N
2-Methylphenol	ug/kg	20 U N	60 U N
2-Nitroaniline	ug/kg	99.8 U N	300 U N
2-Nitrophenol	ug/kg	20 U N	60 U N
3,3`-Dichlorobenzidine	ug/kg	99.8 U N	300 U N
3-Nitroaniline	ug/kg	99.8 U N	300 U N
4,6-Dinitro-2-Methylphenol	ug/kg	200 U N	600 U N
4-Bromophenyl phenyl ether	ug/kg	20 U N	60 U N
4-Chloro-3-Methylphenol	ug/kg	99.8 U N	300 U N
4-Chloroaniline	ug/kg	99.8 U N	300 U N
4-Chlorophenyl Phenylether	ug/kg	49.9 U N	150 U N
4-Methylphenol	ug/kg	20 U N	60 U N
4-Nitroaniline	ug/kg	99.8 U N	300 U N
4-Nitrophenol	ug/kg	99.8 U N	300 U N
Acenaphthene	ug/kg	16.7 J Y	60 U N
Acenaphthylene	ug/kg	12.4 J Y	60 U N
Anthracene	ug/kg	23.9 Y	23 J Y
Aroclor 1016	ug/kg	19.9 U N	19.8 U N
Aroclor 1221	ug/kg	19.9 U N	19.8 U N
Aroclor 1232	ug/kg	19.9 U N	19.8 U N
Aroclor 1242	ug/kg	19.9 U N	19.8 U N
Aroclor 1248	ug/kg	29.6 Y	19.8 U N
Aroclor 1254	ug/kg	55.4 Y	19.8 U N
Aroclor 1260	ug/kg	34.9 Y	19.8 U N
Arsenic	mg/kg	3.82 J Y	
Benzo(A)anthracene	ug/kg	47.2 Y	72.6 Y
Benzo(A)pyrene	ug/kg	79.5 Y	60.6 Y
Benzo(G,H,I)perylene	ug/kg	84.2 Y	60 U N
Benzofluoranthenes, Total	ug/kg	211 Y	164 Y
Benzoic acid	ug/kg	84.5 J Y	600 U N

Location		NST5	RCB130
Sample Date		24 Nov 2021	07 Oct 2021
Sample Name		NST5-112421	MKJ-100721-1
Drainage Type		SD	SD
Sample Method		SedTrap	Grab-Manual
Location Type		Inline w/Active SPU Sed Trap	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD
Analyte	Unit	Result	Result
Benzyl alcohol	ug/kg	26.3 Y	60 U N
bis(2-Chloroethoxy) methane	ug/kg	20 U N	60 U N
Bis-(2-chloroethyl) ether	ug/kg	49.9 U N	150 U N
Bis(2-ethylhexyl)phthalate	ug/kg	461 Y	110 J Y
Butylbenzylphthalate	ug/kg	20 U N	60 U N
Carbazole	ug/kg	22.1 Y	60 U N
Chrysene	ug/kg	135 Y	186 Y
Coarse Sand	%		
Copper	mg/kg	29.2 Y	
cPAH	ug/kg	117.51 Y	102.6 J Y
Dibenzo(A,H)anthracene	ug/kg	20 U N	60 U N
Dibenzofuran	ug/kg	56.2 Y	60 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg	184 Y	
Diethylphthalate	ug/kg	37.4 J Y	150 U N
Dimethylphthalate	ug/kg	34.3 Y	46 J Y
Di-N-Butylphthalate	ug/kg	20 U N	60 U N
Di-N-Octylphthalate	ug/kg	20 U N	60 U N
Fine Gravel	%		
Fine Sand	%		
Fluoranthene	ug/kg	140 Y	220 Y
Fluorene	ug/kg	22.7 Y	60 U N
Hexachlorobenzene	ug/kg	20 U N	60 U N
Hexachlorobutadiene	ug/kg	20 U N	60 U N
Hexachlorocyclopentadiene	ug/kg	99.8 U N	300 U N
Hexachloroethane	ug/kg	20 U N	60 U N
HPAH	ug/kg	905.3 Y	966 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg	68.4 Y	44.8 J Y
Isophorone	ug/kg	20 U N	60 U N
Lead	mg/kg	105 Y	
LPAH	ug/kg	517.7 J Y	131 J Y
Medium Sand	%		
Mercury	mg/kg	0.0787 Y	
Motor Oil (Silica and Acid Cleaned)	mg/kg	535 Y	
Naphthalene	ug/kg	230 Y	60 U N
Nitrobenzene	ug/kg	20 U N	60 U N
N-Nitroso-Di-N-Propylamine	ug/kg	20 U N	60 U N
N-Nitrosodiphenylamine	ug/kg	20 U N	60 U N
Pentachlorophenol	ug/kg	99.8 U N	300 U N
Phenanthrene	ug/kg	212 Y	108 Y
Phenol	ug/kg	14.6 J Y	60 U N
Polychlorinated Biphenyls	ug/kg	119.9 Y	19.8 U N
Pyrene	ug/kg	140 Y	218 Y
Solids, Total	%	64.31 Y	87.45 Y
Total Organic Carbon	%	1.37 Y	1.21 Y
Very Coarse Sand	%		

Location		NST5	RCB130
Sample Date		24 Nov 2021	07 Oct 2021
Sample Name		NST5-112421	MKJ-100721-1
Drainage Type		SD	SD
Sample Method		SedTrap	Grab-Manual
Location Type		Inline w/Active SPU Sed Trap	RCB
Project		Lower Duwamish Waterway	Lower Duwamish Waterway
Outfall		S Norfolk St CSO/PS17 EOF/SD	S Norfolk St CSO/PS17 EOF/SD
Analyte	Unit	Result	Result
Very Fine Sand	%		
Zinc	mg/kg	97.2 Y	

	Location	ID-ST3
	Sample Date	20 May 2021
	Sample Name	NCH-052021
	Drainage Type	SD
	Sample Method	SedTrap
	Location Type	Inline w/Active SPU Sed Trap
	Project	Lower Duwamish Waterway
	Outfall	SW Idaho St SD
Analyte	Unit	Result
1,2,4-Trichlorobenzene	ug/kg	100 U N
1,2-Dichlorobenzene	ug/kg	100 U N
1,3-Dichlorobenzene	ug/kg	100 U N
1,4-Dichlorobenzene	ug/kg	100 U N
1-Methylnaphthalene	ug/kg	100 U N
2,2'-Oxybis(1-chloropropane)	ug/kg	100 U N
2,4,5-Trichlorophenol	ug/kg	500 U N
2,4,6-Trichlorophenol	ug/kg	500 U N
2,4-Dichlorophenol	ug/kg	500 U N
2,4-Dimethylphenol	ug/kg	500 U N
2,4-Dinitrophenol	ug/kg	1000 U N
2,4-Dinitrotoluene	ug/kg	500 U N
2,6-Dinitrotoluene	ug/kg	500 U N
2-Chloronaphthalene	ug/kg	100 U N
2-Chlorophenol	ug/kg	100 U N
2-Methylnaphthalene	ug/kg	100 U N
2-Methylphenol	ug/kg	100 U N
2-Nitroaniline	ug/kg	500 U N
2-Nitrophenol	ug/kg	100 U N
3,3`-Dichlorobenzidine	ug/kg	500 U N
3-Nitroaniline	ug/kg	500 U N
4,6-Dinitro-2-Methylphenol	ug/kg	1000 U N
4-Bromophenyl phenyl ether	ug/kg	100 U N
4-Chloro-3-Methylphenol	ug/kg	500 U N
4-Chloroaniline	ug/kg	500 U N
4-Chlorophenyl Phenylether	ug/kg	100 U N
4-Methylphenol	ug/kg	273 Y
4-Nitroaniline	ug/kg	500 U N
4-Nitrophenol	ug/kg	500 U N
Acenaphthene	ug/kg	100 U N
Acenaphthylene	ug/kg	100 U N
Anthracene	ug/kg	100 U N
Aroclor 1016	ug/kg	99.8 U N
Aroclor 1221	ug/kg	99.8 U N
Aroclor 1232	ug/kg	99.8 U N
Aroclor 1242	ug/kg	99.8 U N
Aroclor 1248	ug/kg	99.8 U N
Aroclor 1254	ug/kg	99.8 U N
Aroclor 1260	ug/kg	99.8 U N
Arsenic	mg/kg	10.2 Y
Benzo(A)anthracene	ug/kg	100 U N
Benzo(A)pyrene	ug/kg	100 U N
Benzo(G,H,I)perylene	ug/kg	49.6 J Y
Benzofluoranthenes, Total	ug/kg	66.7 J Y

	Location	ID-ST3
	Sample Date	20 May 2021
	Sample Name	NCH-052021
	Drainage Type	SD
	Sample Method	SedTrap
	Location Type	Inline w/Active SPU Sed Trap
	Project	Lower Duwamish Waterway
	Outfall	SW Idaho St SD
Analyte	Unit	Result
Benzoic acid	ug/kg	1000 Y
Benzyl alcohol	ug/kg	1350 Y
bis(2-Chloroethoxy) methane	ug/kg	100 U N
Bis-(2-chloroethyl) ether	ug/kg	100 U N
Bis(2-ethylhexyl)phthalate	ug/kg	464 Y
Butylbenzylphthalate	ug/kg	100 U N
Carbazole	ug/kg	100 U N
Chrysene	ug/kg	45 J Y
Coarse Sand	%	8.6 Y
Copper	mg/kg	41.8 Y
cPAH	ug/kg	87.12 J Y
Dibenzo(A,H)anthracene	ug/kg	100 U N
Dibenzofuran	ug/kg	100 U N
Diesel Range (Silica and Acid Cleaned)	mg/kg	48.7 Y
Diethylphthalate	ug/kg	100 U N
Dimethylphthalate	ug/kg	100 U N
Di-N-Butylphthalate	ug/kg	101 Y
Di-N-Octylphthalate	ug/kg	100 U N
Fine Gravel	%	0.3 Y
Fine Sand	%	18.6 Y
Fluoranthene	ug/kg	40.2 J Y
Fluorene	ug/kg	100 U N
Hexachlorobenzene	ug/kg	100 U N
Hexachlorobutadiene	ug/kg	100 U N
Hexachlorocyclopentadiene	ug/kg	500 U N
Hexachloroethane	ug/kg	100 U N
HPAH	ug/kg	247.8 J Y
Indeno(1,2,3-Cd)pyrene	ug/kg	100 U N
Isophorone	ug/kg	100 U N
Lead	mg/kg	52.9 Y
LPAH	ug/kg	30.3 J Y
Medium Sand	%	21.2 Y
Mercury	mg/kg	0.145 Y
Motor Oil (Silica and Acid Cleaned)	mg/kg	392 Y
Naphthalene	ug/kg	100 U N
Nitrobenzene	ug/kg	100 U N
N-Nitroso-Di-N-Propylamine	ug/kg	100 U N
N-Nitrosodiphenylamine	ug/kg	100 U N
Pentachlorophenol	ug/kg	500 U N
Phenanthrene	ug/kg	30.3 J Y
Phenol	ug/kg	100 U N
Polychlorinated Biphenyls	ug/kg	99.8 U N
Pyrene	ug/kg	46.3 J Y
Solids, Total	%	53.54 Y

	Location	ID-ST3
	Sample Date	20 May 2021
	Sample Name	NCH-052021
	Drainage Type	SD
	Sample Method	SedTrap
	Location Type	Inline w/Active SPU Sed Trap
	Project	Lower Duwamish Waterway
	Outfall	SW Idaho St SD
Analyte	Unit	Result
Total Organic Carbon	%	7.68 Y
Very Coarse Sand	%	6.9 Y
Very Fine Sand	%	8.8 Y