# APPENDIX 12A
## Storm Drain Source Control Evaluation

# 1 Introduction

The State Sediment Management Standards (SMS; WAC 173-204) and related guidance state that source control evaluations should be conducted as part of the Remedial Investigation (RI)/ Feasibility Study (FS), allowing for demonstration that Potentially Liable Party (PLP) sources related to the Gas Works Park Site (GWPS) are controlled prior to active cleanup of the GWPS Sediment Cleanup Unit (SCU). This appendix addresses the potential for sediment recontamination from point source discharges (i.e., storm drains) discharging into the SCU., which include discharges from the GWPS Uplands. Other potential sources (e.g., groundwater discharge) are addressed in the body of the FS.

A potential pathway for recontamination of the SCU after cleanup construction is discharge of stormwater to the SCU. Contaminants entrained in stormwater, which are predominantly associated with particles suspended in the stormwater, could be conveyed to the sediment via storm drain discharges. The storm drains that discharge directly to the SCU (refer to Figure 3-21)[1] are owned and managed by the City of Seattle (City) and are covered by the 2019 Phase I Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) and State Discharge General Permit (Permit) for discharges from Municipal Separate Storm Sewer Systems (MS4). The City's storm drains that discharge to the SCU convey drainage from the street right-of-way, private facilities, the Seattle Police Department Harbor Patrol (Harbor Patrol), Gas Works Park, and other City properties. Private storm drains also discharge directly to Lake Union in areas immediately adjacent to Gas Works Park.

Contamination from two general types of sources could impact stormwater:

1. Contaminants from GWPS uplands-associated sources
2. Contaminants from non-GWPS uplands sources

In some situations, these two types of contamination could be commingled.

Potential sediment recontamination pathways associated with storm drain discharges are as follows:

- Subsurface migration of contaminated soils into on-site storm drain pipes and discharge to the cleanup area. This infiltration could occur via cracked or broken pipes, and faulty pipe connections in situations where the pipes are routed through contaminated GWPS soils.
- Migration via surface water runoff of contamination to a storm drain or swale and discharge to the cleanup area. Potential mechanisms for this pathway include, for example, discharge of contaminated stormwater from private facilities either through the City's MS4 Permit-covered infrastructure or directly to the SCU, general runoff from street rights-of-way, parking lot runoff, or runoff from the GWPS Uplands.

The remainder of this appendix is organized as follows:

- **Section 2 -** Describes the relevant storm conveyance systems and outfalls that discharge within the SCU.

[1] Unless otherwise indicated, figure and tables cited in this document refer to the *Gas Works Park Site Stakeholder Review Draft Remedial Investigation and Feasibility Study*, dated May 2, 2022.

- **Section 3 -** Evaluates the current physical condition of relevant storm drains
- **Section 4 -** Evaluates stormwater solids, actions taken, and next steps

# 2 Storm Drain Descriptions and Conditions

The City manages storm drains that discharge to Lake Union within the SCU . These storm drains are included in the City's MS4 Permit and are managed and maintained by one of three City departments: Seattle Public Utilities (SPU), Finance & Administrative Services (FAS), or Seattle Parks and Recreation (SPR). City catch basins connected to the MS4 are inspected annually, including catch basins at GWP. Inspectors check for the presence of an outlet trap, structural defects that could disrupt service (e.g., cracks wider than 0.5 inches and longer than 1 foot), and measure sediment/debris depth in the sump. If oil, paint, or unusual odors are evident, the inspector notifies the Crew Chief. Spills are reported to the SPU spill response team. Catch basins are scheduled for cleaning if accumulated solids exceed 50 percent of the sump depth. In addition, video inspections of storm drains and line cleaning are performed as needed. Additional information regarding municipal stormwater management and source control is provided in Appendix 14B.

## 2.1 Storm Drains Managed by SPU

SPU owns two storm drains that discharge to the SCU. One outfall discharges into Waterway 19 just east of GWP. The other outfall discharges into Waterway 20 located west of the Harbor Patrol facility. The locations of these outfalls are shown on Figure 3-21. Waterways 19 and 20 are state-owned aquatic lands. Figure 1-3 indicates the location of aquatic land ownership and aquatic leases.

### 2.1.1 Waterway 19 Outfall

The location and configuration of Waterway 19 is shown on Figure 3-21 and includes, at its northern end, Waterway 19 Park, a 1.9-acre City park. Waterway 19 Park is a habitat demonstration project located on the filled portion of the waterway that was jointly developed in 1991 by the Washington State Department of Fish and Wildlife, SPR, and the Washington State Department of Natural Resources.

Historical drawings indicate that the storm drain was present in 1963 and some portions of the drain are probably older. The drainage basin associated with this Waterway 19 outfall is very small and estimated to be 1.2 acres. The land uses are primarily roadways and commercial facilities without industrial contributions. The basin is composed of a portion of Meridian Avenue North and North Northlake Way, the Burke-Gilman Trail, a private patio and landscaped area, and a portion of roof drainage from a building complex, which includes condominiums and commercial facilities. The catch basins in this basin have outlet traps that prevent oils, greases, and debris from entering the storm drain.

Piped stormwater from this small basin discharges to a partially armored, approximately 80-foot-long drainage feature (ditch) located on a Seattle Department of Transportation right-of-way and the filled portion of Waterway 19 (refer to Figure 3-21). The ditch conveys flow toward Waterway 19 into a small depression near the shoreline, where it enters a 6-inch-diameter PVC culvert that is located under a foot path (part of Waterway 19 Park) near the shore and flows into Waterway 19. As shown on Figure 3-21, approximately 50 feet of the swale is located within GWP.

### 2.1.2 Waterway 20 Outfall

Waterway 20 is located between Harbor Patrol and the South Yard of the King County Metro facility, currently leased to the Center for Wooden Boats as their North Lake Union facility. A portion of the waterway is filled. An 8-inch-diameter stormwater outfall is located at the shoreline of this waterway and the location and configuration of this storm drain and outfall are shown on Figure 3-21. The original outfall and related piping were built prior to 1919. The drainage basin for this outfall is small, contributing stormwater from approximately 7 acres, with current inputs primarily from street rights-of-way, The Wallingford Steps Park, a condominium complex, and the majority of the former Metro Lake Union North Yard,[2] which has undergone separate redevelopment and cleanup.

Historically, the Waterway 20 storm drain conveyed stormwater discharges from the manufactured gas plant and tar refinery, the Nortar Site, and the North Yard of the Metro Lake Union Facility (formerly the Chevron Bulk Fueling Terminal). At present, there is no surface water runoff from within Gas Works Park that discharges to the Waterway 20 storm drain.

## 2.2 Seattle Police Department Harbor Patrol Storm Drain

The storm drain system at Harbor Patrol is managed by FAS. The storm drain captures and conveys stormwater from the impervious surfaces within Harbor Patrol and discharges to the SCU. Stormwater runoff is collected in three catch basins that contain source control best management practice (BMP) PVC elbow outlet traps. Stormwater is conveyed through a coalescing plate oil-water separator (OWS) before being discharged via an 8-inch-diameter PVC outfall pipe. The catch basins and OWS were installed in 2000.

## 2.3 Gas Works Park Storm Drains

SPR actively manages and maintains the storm drainage system within Gas Works Park as required under the City's MS4 Permit. Catch basins are inspected on a yearly basis and structures and drain lines are cleaned as needed. The paved parking lot is cleaned with a street sweeper on a regular basis consistent with the requirements of the City's MS4 Permit. With the exception of the area around the cracking tower and other limited areas in the park, the vast majority of the GWPS upland either has a vegetated soil cover consisting of 12 to 18 inches of clean material and grass or is covered with some form of impervious surface (refer to Figure 2-7). Irrigation is controlled by a Maxicom system, which integrates a soil moisture-sensing system to regulate the amount and duration of irrigation the lawn areas receive. The result is that the grass receives only the water it needs, limiting the potential for materials to enter the storm drainage system because of excess watering and erosion. Actively maintaining the grass cover further limits the potential for materials to enter the storm drainage system. Outfalls A, B, C, D, and E discharge along the eastern shoreline of the park to the SCU. Outfall F, the Kite Hill Outfall, and the Prow Outfall discharge along the southern and southwestern shoreline of the park to the SCU. The configuration of the park storm drains and location of outfalls are shown on Figure 3-21.

The park storm drains were constructed in the early to mid-1970's during development of GWP.

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[2] The Metro Lake Union North Yard parcel is a former Chevron Bulk Fueling Terminal and was redeveloped by Touchstone in 2016-2017 into a four-story office building called NorthEdge. Cleanup of the parcel is described in Section 1.4.3 of the GWPS RI.

**Outfall A** – This outfall has the largest drainage sub-basin within the park and discharges into Waterway 19 through a 10-inch-diameter pipe encased in a concrete box outlet structure. The drainage system captures and conveys stormwater runoff from the parking lot, the landscaped area north of the restroom/Play Barn facility, and the landscaped area to the west of the restroom facility. Approximately 14 catch basins are part of the storm drain. All of the catch basins within the Gas Works Park parking lot are equipped with a source control BMP that consists of a PVC elbow attached to the outlet pipe of the catch basins. The PVC elbow works to limit oils, greases, and solids/debris from entering the storm drains. Approximately 200 feet of the original Outfall A conveyance system consists of subsurface perforated pipe and was plugged by SPR in 2016. Figure 3-21 shows the configuration including plugged lines.

**Outfall B** – This outfall discharges into Lake Union through a 6-inch-diameter outlet pipe. The drainage system captures and conveys stormwater runoff from a portion of the paved area west of the restroom facility and the paved area north of the Play Barn. The drainage system may also capture and convey runoff from a portion of the paved walkway between the parking lot and the restroom facility. Originally, it included subsurface perforated piping, but approximately 160 feet of the conveyance system consisting of subsurface perforated pipe was plugged by SPR in 2016. Figure 3-21 shows the configuration and indicates plugged lines.

**Outfall C** – This outfall discharges into Lake Union through a 10-inch-diameter pipe. In the summer of 2018, SPR undertook a complete renovation of the Play Area that changed the way Outfall C stormwater is managed.

During the Play Area renovation, as shown on Figure 3-21, the original perforated underdrain pipes were capped off and the east-west mainline was lined. Subsurface and surface drainage in the renovated Play Area does not come into contact with underlying, potentially contaminated soils and is conveyed via the newly lined pipe. New underdrains have been installed above a vapor barrier within a layer of clean material and intercepts and conveys only rain water that falls on the Play Area. Runoff from a portion of the paved pathway located west of the Play Area will continue to discharge at Outfall C.

**Outfall D** – This outfall discharges into Lake Union through a 6-inch-diameter outlet pipe. The drainage system captures and conveys stormwater runoff from a portion of the paved pathway located south and west of the Play Area, as well as unpaved areas south of the Play Area. In December 2014, the alignment of the Outfall D storm drain pipe was field-located. Records and video inspections indicate that no perforated piping is associated with this storm drain.

**Outfall E** – This outfall discharges into Lake Union through a 6-inch-diameter outlet pipe. The drainage system captures and conveys stormwater runoff from the Play Barn area and areas directly south of the Play Barn. Records and video inspections indicate that no perforated piping is associated with this storm drain.

**Outfall F** – This outfall discharges into Lake Union through a 6-inch-diameter outlet pipe. There are no surface inlets or catch basins associated with this outfall. A relatively short 6-inch-diameter subsurface perforated pipe approximately 40 feet in length connected to the outfall collects stormwater runoff that has infiltrated in areas upgradient of the outfall. Upgradient areas include the central portion of the park south of the parking lot, the eastern portion of Kite Hill, and the grassy area west of the Cracking Towers. Video inspections showed that the drain pipe for the outfall is 100% filled with dirt approximately 18 feet upstream of the outfall, indicating it is either crushed or otherwise not functioning. SPU staff observed no flow from the outfall during several storm events (Floyd|Snider 2011. Memorandum to Pete Rude, Seattle Public Utilities, re: Storm Drain Source Control Evaluation Phase 3 Data Report Addendum. 7 October).

**Prow Outfall** – It is unknown if this is still an active outfall; it has not been observed to discharge during a heavy rain event. The outfall is noted as an 8-inch-diameter outlet pipe and has been located by GeoEngineers subsequent to the City's original source control-related field efforts. The inlet associated with this storm drain has not been field-located. It appears the purpose of the drainage system was to capture and convey runoff from the paved area south of the Cracking Towers. Per GIS maps, it does not appear that any perforated piping is associated with this storm drain.

**Kite Hill Outfall** – This outfall consists of a 6-inch-diameter outlet pipe. The original design for the drainage system was to capture and convey runoff from the top of Kite Hill where a sundial is located; however, previous video inspections showed the outfall drain is crushed and twisted approximately 20 feet upstream of the outlet. SPU staff observed no flow from the outfall during several storm events (Floyd|Snider 2011). Records and video inspections indicate that no perforated piping is associated with this storm drain.

# 3 Storm Drain Evaluation

Based on the information presented in Section 2, the following storm drain conditions need to be evaluated as potential pathways for contaminated sediment to enter the storm drain lines and discharge to the SCU:

- Waterway 19 swale
- Waterway 20 piping
- Gas Works Park perforated piping

## 3.1 Waterway 19 Swale

Chemical testing results for surface soil samples located near or in the swale associated with the Waterway 19 outfall indicate that total polycyclic aromatic hydrocarbons (TPAHs) and carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxic equivalent (TEQ) concentrations are present at concentrations greater than the preliminary sediment cleanup levels (refer to Section 4.2.2 of this appendix).[3] There is the potential for recontamination of the sediment cleanup if such soils are entrained in the stormwater flow in the swale, discharged to Waterway 19, and deposited in the SCU. Options being considered to address this recontamination potential include remediating the surface soils in this area by extension of the vegetated soil cover already in place over much of Gas Works Park or extending the storm drain pipe all the way to the Waterway 19 outfall, thereby eliminating the potential for contaminated soil entrainment. SPU and SPR are evaluating these source control options in coordination with Puget Sound Energy (PSE).

## 3.2 Waterway 20 Piping

Portions of the piping of this storm drain go through contaminated GWPS subsurface soil. This fact and the age of the storm drain indicate that there is the potential for infiltration of

[3] These surface soil samples are WW-19-01 through WW-19-06. Sample locations are shown in RI Section 5 and chemical testing data are found in RI Appendix 5B, Attachment 5B1.

contaminated GWPS soils to the storm drain through cracks or other pipe defects and discharge of the contaminants to the SCU. Because of this potential recontamination concern, SPU performed a condition assessment of the Waterway 20 storm drain mainline in late 2014 and early 2015. SPU's pipe condition assessments involve completing a video inspection of the pipes and evaluation of the video data by an engineer. Based on observations of cracks in the pipes, pipe segment offsets, and other defects in the pipes, the condition assessment concluded that the Waterway 20 storm drain mainline needs to be repaired or replaced from N Northlake Way to the outfall to address the poor condition of the pipes and minimize the risk of recontamination via this pathway. Options under consideration for this drain include spot repairs of impacted portions of the pipe, in-place pipe lining, or pipe replacement. SPU is evaluating these source control options in coordination with PSE. The southeast branch of this storm drain, which historically conveyed runoff from the tar refinery and other facilities, is planned to be plugged because observations indicate it is no longer used.

## 3.3 Gas Works Park Perforated Piping

As described in Section 2.3, there are two subsurface perforated storm drain lines that drain interior areas of the park. One flows into structure SL-6 of the Outfall A storm drain, and one flows into SL-9 of the Outfall B storm drain (refer to Figure 3-21). These perforated lines were plugged in 2016 at the SL-6 and SL-9 maintenance structures so water no longer drains from the perforated piping into the storm drains, eliminating these potential recontamination pathways.

There is also a subsurface perforated pipe system within the existing Play Area location (Outfall C). As described in Section 2.3, this perforated piping system has been abandoned during Play Area renovation and replaced with a drainage system that prevents contact of runoff and piped drainage with Gas Works Park soils; the current configuration is shown in Figure 3-21.

## 3.4 Storm Drain Evaluation Summary

Table 1 summarizes the completed actions and actions being planned to address the on-site swale and the potential for subsurface migration of contaminated soils into storm drain pipes.

Potential additional actions at the Waterway 19 Swale and at Waterway 20 will occur prior to or as part of the implementation of the cleanup action for the SCU.

**Table 1**
**Proposed Gas Works Park Infrastructure Actions**

| Storm Drain | Potential Pathway | Completed Actions | Potential Additional Actions |
|---|---|---|---|
| Waterway 19 Swale | Entrainment of contaminated soil into stormwater | • Video inspection | • Extension of the vegetated soil cover to this area, or<br>• Extending the storm drain pipe |
| Waterway 20 | Infiltration of contaminated soil via | • Video inspection | • Spot repairs of impacted portions of |

| Storm Drain | Potential Pathway | Completed Actions | Potential Additional Actions |
|---|---|---|---|
| | cracks or other defects in pipes | | the pipe, in-place pipe lining, or pipe replacement, and<br>• Plugging of southeast branch of storm drain piping |
| Outfall A | Infiltration of contaminated soil through perforated pipe | • Video inspection<br>• Perforated pipe plugged in 2016 | • Ongoing inspections and maintenance as necessary |
| Outfall B | Infiltration of contaminated soil through perforated pipe | • Video inspection<br>• Perforated pipe plugged in 2016 | • Ongoing inspections and maintenance as necessary |
| Outfall C | Infiltration of contaminated soil | • Video inspection; existing drainage system abandoned in place during Play Area renovation; new drainage system installed above vapor barrier<br>• Additional inspection of SL-10 catch basin | • Ongoing inspections and maintenance as necessary |

# 4 Evaluation of Storm Drain Solids Samples, Actions Taken, and Next Steps

SPU conducts source sampling and related source tracing to determine the extent and location of contaminants within the City's drainage and wastewater systems. Sampling is designed to identify sources by sampling at key locations within these systems. In larger storm drain basins, sampling generally starts at the downstream end of the system or at key junctions within the system and systematically moves upstream, as necessary, to identify sources. In addition, inspectors also collect samples from catch basins on private property during business inspections if problems or unusual conditions are encountered during the inspection. SPU refers to these as "private onsite catch basin" samples.

## 4.1 Evaluation Criteria

There are no regulatory standards for samples of storm drain solids (i.e., catch basin, in-line, and sediment trap samples). SPU typically compares storm drain solids chemical testing results to the SMS numeric chemical criteria. Although these standards do not apply to storm drain solids, the RI includes sediment Cleanup Screening Levels (CSLs; refer to Table 4-4) that are available to facilitate prioritization of additional source evaluation and/or source control actions.

## 4.2 Storm Drain Solids Data and Screening

### 4.2.1 Data Collection

During the past nine years, 35 storm drain solids samples were collected from the storm drains that discharge to the SCU. In addition, five (including one duplicate) storm drain solids samples were collected from four private businesses. The samples collected from private on-site catch basins are part of private storm drains that either discharge through City-owned drains that ultimately discharge to the SCU or discharge directly to Lake Union in areas immediately adjacent to the SCU. All of these samples provide a basis for evaluation of whether City-owned or private storm drains have the potential to recontaminate the sediment cleanup via the stormwater runoff pathway and need to be addressed prior to cleanup.

Most of the storm drain solids were collected from catch basins covered by the MS4 Permit or other storm drain structures as part of source control investigations performed by the City between September 2008 and June 2010. Five additional samples were collected in 2017. Samples were collected from private on-site catch basins in early 2015 as part of the City's Business Inspection Program (BIP; refer to Appendix 14B for a description of the BIP). Sampling locations are shown on Figure 6-11, along with CSL screening results.

The 35 GWPS samples collected between 2008 and 2017 consisted of the following:

- Ten catch basin samples collected from the Outfall A, Outfall B, Outfall C, Outfall D, Outfall F, Waterway 19, and Waterway 20[4] storm drains during September 2008.
- Three catch basin or in-line grab samples collected from the Outfall A and Waterway 20 storm drains in 2009.
- Two samples of accumulated solids from filter fabrics installed in catch basins SL-7 and SL-8 in September 2009 and retrieved for analysis in May 2010.[5]
- Fifteen samples collected from Gas Works Park and Harbor Patrol in June 2010. These included samples collected from the Outfall A and Harbor Patrol storm drains. The samples from Harbor Patrol included the inlet and outlet pipe of the OWS.
- Five samples collected in 2017 that involved resampling of catch basins SL-7, SL-8, SL-10, SL-6.1, and SL-6.2.

The five samples collected as part of the BIP in early 2015 included the following:

- One catch basin sample at the Diver's Institute
- Two catch basin samples from the Fisheries Supply Co.
- One catch basin sample from the Gas Works Park Marina
- One catch basin composite sample from Harbor Patrol

[4] Samples SL4 Base and SL4 Pipe from the Waterway 20 storm drain are not included on Table 2 because rehabilitation or repair is planned for the pipes of this storm drain.

[5] These samples post-dated the cleaning of these catch basins in January 2009 but predate placement of the vegetated soil cover in this area in 2012. Earlier samples were collected from these catch basins in 2008 and are included on Table 2, which showed similar results to the filter fabric samples retrieved in May 2010. The filter fabric samples are not included on Table 2.

The results of the chemical testing of these samples are shown on Table 2 (of this appendix). Details of the sampling procedures and chemical testing methods are documented in various memoranda, including the 2008 Floyd|Snider memorandum entitled "Initial Screening Investigation Work Plan." Samples were typically analyzed for metals, semivolatile organic compounds (including polycyclic aromatic hydrocarbons [PAHs] and phthalates), polychlorinated biphenyls, and total organic carbon. Some samples were also tested for petroleum hydrocarbons and grain size.

The sediment CSLs as developed in the RI were used to evaluate the catch basin solids. Section 6.7 of the RI discusses the rationale for evaluation of storm solids relative to CSL. Generally, results from this screening process as described in Section 6.7 in the RI and depicted on Figure 6-11 indicate that all catch basin solids sampled within the park exceed the cPAH TEQ CSL except for SL-12 and SL-13, and some exceed the TPAH CSL, arsenic CSL, carbazole CSL, and dibenzofuran CSL. These results are discussed further in the following sections.

### 4.2.2 Catch Basin Solids Screening

As discussed in the Section 6.7 of the RI, GWPS sediment contaminants of concern (COCs) in catch basin solids are the following:

- TPAH
- cPAH TEQ
- Carbazole
- Dibenzofuran
- Arsenic
- Nickel

Table 3 includes the summary statistics for catch basin solids.

**Table 3**
**GWPS Sediment COCs in Catch Basin Solids**

| COC | SCO (mg/kg) | CSL (mg/kg) | Median Detected Concentration (mg/kg) | Average Detected Concentration (mg/kg) |
|---|---|---|---|---|
| TPAH | 17 | 30 | 9.1 | 18 |
| cPAH TEQ | 0.021 | 0.21 | 0.92 | 1.9 |
| Carbazole | 0.90 | 1.1 | 0.27 | 0.30 |
| Dibenzofuran | 0.20 | 0.68 | 0.19 | 0.20 |
| Arsenic | 11 | 24 | 19 | 22 |
| Nickel | 50 | 110 | Not analyzed | |

Abbreviation:

SCO Sediment Cleanup Objective

### 4.2.3 Data Screening

Table 3 contains all of the storm drain solid data, with exceedances of the catch basin solids CSLs discussed above (TPAH, cPAH TEQ, carbazole, dibenzofuran, and arsenic). Although identified as a GWPS sediment COC, nickel was not analyzed in any catch basin samples.

The constituents that exceeded the CSL in the storm drains solids samples associated with the GWPS are identified in Table 3 and are further discussed in the following sections.

#### *4.2.3.1 TPAH and cPAHs*

Six locations exceeded the CSL for TPAH.[6] These locations consist of SL-7, SL-8, SL-10, SL-14, SL-6.1, and SL-6.2 and are identified on Figure 6-11. These catch basins are part of the Outfall A and Outfall C storm drains.

PAHs are frequently detected (95%) in storm drain solids within the City, are ubiquitous in urban areas, and continue to be released to the environment through various and multiple sources. Non-GWPS sources of PAHs include incomplete combustion of hydrocarbons (e.g., petroleum fuels) and wood treated with creosote. PAH releases related to transportation activities in urban areas (e.g., combustion of fossil fuels and leaking of lubricants) become associated with particulate material that is deposited onto impervious surfaces such as roads. This particulate material becomes incorporated into stormwater runoff and enters storm drains. Source control activities at the GWPS will address GWPS-specific sources of PAHs but will not be able to address these other non-GWPS sources.

The ambient level of TPAH in surface sediment of Lake Union outside of the AOI is 47 mg/kg (refer to Table 3-1).

For cPAHs, all but two locations exceeded the cPAH CSL; these locations only exceeded the SCO. Generally, the most elevated cPAH exceedances correspond to TPAH CSL exceedances and reflect the ubiquity of PAHs.

#### *4.2.3.2 Metals*

Arsenic in catch basin solids exceeds the CSL of 24 mg/kg at several locations. The majority of these exceedances occur in catch basins connected to Outfall A and Outfall C. Arsenic CSL exceedances are relatively widespread in the SCU (refer to Figure 5-3A) as well as in ambient Lake Union sediments (refer to Figure 5-20). Source control activities at the GWPS will address GWPS-specific sources of arsenic but not non-GWPS sources.

Nickel has been identified as a GWPS sediment COC. However, nickel was not analyzed in catch basin solids and is a data gap.

#### *4.2.3.3 Dibenzofuran and Carbazole*

Dibenzofuran and carbazole, although identified as GWPS sediment COCs, appear to have very limited and only slight exceedances, and only at locations identified as issues for other COCs. Therefore, dibenzofuran and carbazole distributions are not discussed further.

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[6] Dibenzofuran and carbazole exceed the CSL at some of these locations. Given their general correlation with TPAH, these two COCs are not discussed further.

### 4.2.4 Summary of Data Screening and Recommended Actions

The results of data screening are summarized in Table 2 (of this appendix), which includes the following:

- The storm drain solids sample locations organized by storm drain basin and outfall
- Storm drain solids sampling date
- Identification of the locations that exceed the CSL for TPAH, cPAHs, arsenic, dibenzofuran, and carbazole
- Source control actions completed in the storm drain

Discussions in the following sections focus on exceedances of TPAH and arsenic CSLs and follow-up actions. Table 4 summarizes storm drain solids CSL screening and runoff pathways.

#### *4.2.4.1 SL-7, SL-8, and SL-14*

CSL exceedances of TPAH at SL-7, SL-8, and SL-14 in samples from 2008 were addressed by placement of a vegetated soil cover in this area of the park in 2012. Resampling of accumulated storm drain solids from these structures occurred in January 2017, subsequent to cleaning in 2016. The resampling results show that TPAH concentrations have decreased significantly at SL-7. Concentrations at SL-8 and SL-14 have not changed significantly. TPAH concentrations at all three of these locations still exceed the CSL, but by less than a factor of 2. Resampling is planned for these three catch basins, and an upcoming SPR project will modify and improve the drainage in the vicinity of SL-14 (refer to Section 4.2.4.2). Resampling of SL-14 will take place after the SPR project.

#### *4.2.4.2 SL-6.1 and SL-6.2*

Exceedances of TPAH occurred at SL-6.1 and SL-6.2 in 2010. Resampling of accumulated storm drain solids from these structures occurred in December 2017, subsequent to cleaning in 2016. The resampling results show that TPAH concentrations have decreased significantly at both of the catch basins. The TPAH concentration at SL-6.2 has decreased significantly to less than the CSL. The TPAH concentration at SL-6.1 is still elevated greater than the CSL.

Arsenic also exceeds the CSL at SL-6.1 and SL-6.2; the storm drain solid cleaning did not significantly impact these exceedances.

Importantly, for SL-6.1 and SL-6.2, an upcoming SPR project to replace the old Comfort Station with a new station is anticipated to address drainage in this area. Improvements to drainage will include placement of clean materials around these catch basins. Sampling—after completion of the project—by the City will evaluate whether there have been improvements to catch basin solid quality. This project is anticipated in 2023.

#### *4.2.4.3 SL-10*

An exceedance of TPAH occurred at SL-10 in 2008. This catch basin was cleaned in 2016 and will be resampled once enough material has accumulated and during pre-design investigations. SL-10 also exceeds the arsenic CSL very slightly.

**Table 4**
**Summary of Storm Drain Solids CSL Screening and Planned Next Steps**

| Storm Drain[7] | Catch Basin or Maintenance Hole | Sample Date | TPAH Concentration mg/kg[8] | Arsenic Concentration mg/kg | Actions Taken and Planned Next Steps |
|---|---|---|---|---|---|
| Outfall A | SL-7 | 9/18/2008 | **473** | Less than CSL[9] | • Filter fabric samples collected in May 2010 confirmed 2008 results.<br>• Vegetated soil cover placed over soil in the northeast corner area in fall 2012.<br>• Catch basins cleaned in mid-April 2016.<br>• Resampled January 2017.<br>• Plan to resample, including for nickel, as part of pre-design investigations. |
| | | 5/19/2010[10] | **508** | Less than CSL | |
| | | 1/12/2017 | **41.7** | Less than CSL | |
| | SL-8 | 9/18/2008 | **32.4** | Less than CSL | |
| | | 5/19/2010 | **84.1** | Less than CSL | |
| | | 1/12/2017 | **31.6** | Less than CSL | |
| | SL-14 | 10/14/2009 | **46.6** | Less than CSL | • Vegetated soil cover placed in area in fall 2012.<br>• Catch basin cleaned February 2016.<br>• Resampled January 2017.<br>• Will be addressed by Comfort Station project in 2023 and resampled, including for nickel, as part of pre-design investigations. |
| | | 1/12/2017 | **50.9** | Less than CSL | |
| | SL-6.1 (CB 6.1) | 6/23/2010 | **118.2** | **40** | • Vegetated soil cover placed in area in 2000/2001.<br>• Catch basin cleaned April 27, 2016.<br>• Resampled December 2017.<br>• Will be addressed by Comfort Station project in 2023 and resampled, including for nickel, as part of pre-design investigations. |
| | | 12/28/2017 | **72.5** | **44.1** | |
| | SL-6.2 (CB 6.2) | 6/23/2010 | **47.5** | **60** | • Vegetated soil cover placed in area in 2000/2001.<br>• Catch basin cleaned April 27, 2016.<br>• Resampled December 2017.<br>• Will be addressed by Comfort Station project and resampled, including for nickel, as part of pre-design investigations. |
| | | 12/28/2017 | 6.1 | **52.5** | |
| Outfall C | SL-10 | 9/18/2008 | **55.1** | **26** | • Catch basin cleaned April 27, 2016.<br>• Planning to resample catch basin when enough material is present to reassess TPAH conditions, and analysis will include nickel, as part of pre-design investigations. |

[7] Refer to Figure 3-21 for location of storm drains and outfalls.
[8] TPAH CSL = 30 mg/kg. **Bold** font and shaded cells indicate exceedance of the CSL.
[9] Concentration measured at less than CSL.
[10] Filter fabrics were deployed at SL-7 and SL-8 on September 28, 2009, and solids samples were retrieved from the filters on May 19, 2010. The filter fabrics were installed to obtain sample material to confirm the results for catch basin solids samples collected in 2008 at these locations.

### 4.2.5 Additional Source Control Activities Related to Surface Runoff

The City, in coordination with PSE, is evaluating next steps to address the samples indicating that solids with elevated TPAH and in some cases arsenic are still entering the Outfall A and Outfall C storm drains. Table 4 documents planned next steps for resampling. In addition, the catch basins where TPAH or arsenic concentrations in the storm drain solids exceed the CSL will be inspected and cracks or defects in the structures will be repaired to eliminate the potential for migration of soil directly into the structures.

For all storm drains, the City will continue to comply with MS4 Permit requirements.

## Table 2
## Storm Solids Data Table

| | | Location Name | HP-CB-123 | CB249 | CB257 | CB258 | CB259 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS | | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | HP-CB-123-012115 | CB249-020415 | CB257-021215 | CB258-021215 | CB259-021215 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS-Inlet | HP-OWS-Outlet | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
| | | Sample Date | 1/21/2015 | 2/4/2015 | 2/12/2015 | 2/12/2015 | 2/12/2015 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 |
| Analytes | Units | Screening Level Criteria | | | | | | | | | | | | | | |
| **Conventionals** | | | | | | | | | | | | | | | | |
| Total Organic Carbon | % | -- | 17.9 | 10.9 | 5.6 | 7.2 | 19.4 | 12 | 14.7 | 16.8 | 19.4 | 25.5 | 23 | 14.8 | 16.2 | 15.4 |
| Total Solids | % | -- | 40.2 | 38.7 | 47.4 | 48.7 | 61.8 | 51.7 | 39.1 | 37.3 | 25.1 | 22.7 | 15 | 26 | 20.1 | 38.3 |
| **Metals** | | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 24 | 10 | 30 | 11 | 8.0 U | 10 | 13 | 10 | 10 U | 20 | 20 | *30 U* | 20 U | 20 U | 10 U |
| Barium | mg/kg | -- | 153 | 609 | 79.5 | 74.7 | 50.2 | | | | | | | | | |
| Cadmium | mg/kg | -- | 4.5 | 5.8 | 1.2 | 0.60 | 0.50 | 3.2 | 5.7 | 2.0 | 9.3 | 7.9 | 1.0 | 1.3 | 1.2 | 0.50 |
| Chromium | mg/kg | -- | 66 | 84 | 80.6 | 26.8 | 27 | 65.2 | 99 | 65 | 96 | 175 | 38 | 46 | 38 | 21 |
| Copper | mg/kg | -- | 685 | 4,650 | 167 | 87.8 | 50.5 | 281 | 327 | 321 | 648 | 605 | 165 | 152 | 105 | 48.6 |
| Lead | mg/kg | -- | 196 | 239 | 165 | 30 | 46 | 148 | 179 | 204 | 346 | 319 | 120 J | 112 | 80 | 38 |
| Mercury | mg/kg | -- | 0.15 | 0.18 | 0.35 | 0.040 | 0.070 | 0.10 | 0.44 | 0.11 | 0.37 J | 0.39 J | 0.10 U | 0.10 U | 0.12 | 0.060 U |
| Selenium | mg/kg | -- | 10 U | 10 U | 9.0 U | 8.0 U | 10 U | | | | | | | | | |
| Silver | mg/kg | -- | 0.70 U | 0.70 U | 0.60 U | 0.50 U | 0.60 U | 0.60 | 0.70 U | 0.80 U | 0.80 U | 0.70 U | 2.0 U | 1.0 U | 1.0 U | 0.70 U |
| Zinc | mg/kg | -- | 1,130 | 2,230 | 2,060 | 188 | 1,380 | 934 | 1,020 | 899 | 14,400 | 6,920 | 446 J | 449 | 325 | 152 |
| **Total Petroleum Hydrocarbons (TPH)** | | | | | | | | | | | | | | | | |
| Diesel-range organics | mg/kg | -- | 1,300 | 2,000 | 770 | 420 | 1,500 | | | | | | | | | |
| Oil-range organics | mg/kg | -- | 5,200 | 7,800 | 2,100 | 1,800 | 4,400 | | | | | | | | | |
| **Polychlorinated Biphenyl (PCB) Aroclors** | | | | | | | | | | | | | | | | |
| Aroclor 1016 | mg/kg | -- | 0.019 U | 0.019 U | 0.018 U | 0.019 U | 0.039 U | 0.032 U | 0.032 U | 0.032 U | 0.065 U | 0.065 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U |
| Aroclor 1221 | mg/kg | -- | 0.019 U | 0.019 U | 0.018 U | 0.019 U | 0.039 U | 0.032 U | 0.032 U | 0.032 U | 0.065 U | 0.065 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U |
| Aroclor 1232 | mg/kg | -- | 0.019 U | 0.019 U | 0.018 U | 0.047 U | 0.039 U | 0.032 U | 0.032 U | 0.032 U | 0.065 U | 0.065 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U |
| Aroclor 1242 | mg/kg | -- | 0.019 U | 0.019 U | 0.018 U | 0.019 U | 0.039 U | 0.032 U | 0.032 U | 0.032 U | 0.065 U | 0.065 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U |
| Aroclor 1248 | mg/kg | -- | 0.019 U | 0.019 U | 0.018 U | 0.019 U | 0.098 U | 0.032 U | 0.041 UY | 0.032 U | 0.065 U | 0.065 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U |
| Aroclor 1254 | mg/kg | -- | 0.041 | 0.12 | 0.072 J | 0.051 J | 0.25 | 0.036 | 0.088 | 0.041 | 0.11 | 0.10 | 0.033 U | 0.041 | 0.033 U | 0.032 U |
| Aroclor 1260 | mg/kg | -- | 0.018 J | 0.066 | 0.023 | 0.029 J | 0.095 | 0.032 U | 0.037 | 0.032 U | 0.065 U | 0.065 U | 0.034 | 0.044 | 0.033 U | 0.032 U |
| PCBs (Total, Aroclors) | mg/kg | -- | 0.059 J | 0.186 | 0.095 J | 0.080 J | 0.345 | 0.036 | 0.125 | 0.041 | 0.11 | 0.10 | 0.034 | 0.085 | 0.033 U | 0.032 U |
| **Semivolatile Organic Compounds- (SVOCs-) Aromatic Compounds** | | | | | | | | | | | | | | | | |
| Naphthalene | mg/kg | -- | 0.42 | 0.57 | 0.074 J | 0.15 U | 0.051 J | 0.24 J | 0.66 J | 0.64 UJ | 1.4 J | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Acenaphthylene | mg/kg | -- | 0.42 U | 0.39 U | 0.023 J | 0.15 U | 0.054 U | 0.19 UJ | 0.19 UJ | 0.64 UJ | 0.39 UJ | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Acenaphthene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.19 UJ | 0.19 UJ | 0.64 UJ | 0.39 UJ | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Fluorene | mg/kg | -- | 0.21 J | 0.27 J | 0.092 U | 0.15 U | 0.030 J | 0.20 J | 0.30 J | 0.64 UJ | 0.44 J | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Phenanthrene | mg/kg | -- | 1.5 | 2.1 | 0.20 | 0.18 | 0.17 | 1.2 J | 2.0 J | 1.5 J | 2.5 J | 3.0 J | 0.59 J | 0.46 J | 0.68 J | 0.44 J |
| Anthracene | mg/kg | -- | 0.25 J | 0.29 J | 0.037 J | 0.15 U | 0.054 U | 0.24 J | 0.27 J | 0.64 UJ | 0.39 UJ | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Total LPAH | mg/kg | -- | 2.38 J | 3.57 J | 0.334 J | 0.18 | 0.338 J | 2.49 J | 4.46 J | 1.5 J | 8.04 J | 3.0 J | 0.59 J | 0.46 J | 0.68 J | 0.44 J |
| Fluoranthene | mg/kg | -- | 1.7 | 2.1 | 0.35 | 0.24 | 0.24 | 1.8 J | 2.5 J | 1.8 J | 3.2 J | 4.3 J | 0.85 J | 0.71 J | 1.0 J | 0.96 J |
| Pyrene | mg/kg | -- | 1.9 | 2.3 | 0.32 | 0.24 | 0.27 | 2.3 J | 3.3 J | 2.1 J | 3.6 J | 5.2 J | 1.0 J | 0.78 J | 1.3 J | 0.91 J |
| Benzo(a)anthracene | mg/kg | -- | 0.54 | 0.74 | 0.15 | 0.084 J | 0.054 | 0.62 J | 0.81 J | 0.64 UJ | 1.1 J | 1.3 J | 0.24 J | 0.21 J | 0.30 J | 0.40 J |
| Chrysene | mg/kg | -- | 1.2 | 1.4 | 0.56 | 0.19 | 0.55 | 1.0 J | 1.4 J | 1.1 J | 2.3 J | 2.8 J | 0.67 J | 0.54 J | 0.70 J | 0.57 J |
| Benzofluoranthenes (total) | mg/kg | -- | 1.3 | 1.3 | 1.2 | 0.24 J | 0.78 | 1.5 J | 2.0 J | 1.7 J | 2.9 J | 4.3 J | 0.75 J | 0.68 J | 0.91 J | 0.92 J |
| Benzo(a)pyrene | mg/kg | -- | 0.63 | 0.68 | 0.28 | 0.099 J | 0.16 | 0.70 J | 0.91 J | 0.64 UJ | 1.4 J | 1.6 J | 0.37 J | 0.29 J | 0.38 J | 0.44 J |
| Indeno(1,2,3-c,d)pyrene | mg/kg | -- | 0.44 | 0.45 | 0.37 | 0.15 U | 0.13 | 0.26 J | 0.37 J | 0.64 UJ | 0.50 J | 1.3 UJ | 0.22 J | 0.19 UJ | 0.20 J | 0.19 UJ |
| Dibenzo(a,h)anthracene | mg/kg | -- | 0.42 U | 0.39 U | 0.12 | 0.15 U | 0.040 J | 0.19 UJ | 0.19 UJ | 0.64 UJ | 0.39 UJ | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Benzo(g,h,i)perylene | mg/kg | -- | 0.63 J | 0.59 | 0.44 | 0.13 J | 0.17 | 0.38 J | 0.55 J | 0.64 UJ | 0.73 J | 1.3 UJ | 0.32 J | 0.24 J | 0.31 J | 0.22 J |
| Total HPAH | mg/kg | -- | 8.34 J | 9.56 | 3.79 | 1.22 J | 2.39 J | 8.56 J | 11.8 J | 6.7 J | 15.7 J | 19.5 J | 4.42 J | 3.45 J | 5.1 J | 4.42 J |
| 1-Methylnaphthalene | mg/kg | -- | 0.42 U | 0.14 J | 0.092 U | 0.15 U | 0.030 J | 0.26 J | 0.54 J | 0.64 UJ | 1.4 J | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| 2-Methylnaphthalene | mg/kg | -- | 0.42 U | 0.20 J | 0.092 U | 0.15 U | 0.057 | 0.35 J | 0.69 J | 0.64 UJ | 2.3 J | 1.3 UJ | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Total PAH | mg/kg | 30 | 10.7 J | 13.1 J | 4.12 J | 1.4 J | 2.73 J | 11.1 J | 16.3 J | 8.2 J | 23.8 J | 22.5 J | 5.01 J | 3.91 J | 5.78 J | 4.86 J |
| cPAHs (MTCA TEQ-HalfND) | mg/kg | 0.21 | 0.891 | 0.963 | 0.47 | 0.148 J | 0.266 J | 0.958 J | 1.25 J | 0.597 J | 1.89 J | 2.32 J | 0.508 J | 0.403 J | 0.538 J | 0.597 J |

**Table 2**
**Storm Solids Data Table**

| | | Location Name | HP-CB-123 | CB249 | CB257 | CB258 | CB259 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS | | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | HP-CB-123-012115 | CB249-020415 | CB257-021215 | CB258-021215 | CB259-021215 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS-Inlet | HP-OWS-Outlet | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
| | | Sample Date | 1/21/2015 | 2/4/2015 | 2/12/2015 | 2/12/2015 | 2/12/2015 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 |
| **Analytes** | **Units** | **Screening Level Criteria** | | | | | | | | | | | | | | |
| **SVOCs-Chlorinated Benzenes** | | | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 1,3-Dichlorobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 1,4-Dichlorobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 1,2,4-Trichlorobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Hexachlorobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| **SVOCs-Phthalate Esters** | | | | | | | | | | | | | | | | |
| Dimethyl phthalate | mg/kg | -- | 1.6 | 8.2 | 0.092 U | 0.11 J | 0.054 U | 0.37 U | 0.95 U | 0.24 | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Diethylphthalate | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Di-n-butyl phthalate | mg/kg | -- | 0.42 U | 1.2 | 0.092 U | 0.15 U | 0.28 | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Butyl benzyl phthalate | mg/kg | -- | 0.50 | 0.55 | 0.74 | 0.15 U | 21 | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Bis(2-ethylhexyl)phthalate | mg/kg | -- | 31 | 24 | 7.0 | 4.6 | 75 | 57 | 48 | 29 | 90 | 79 | 17 | 20 | 20 | 7.4 |
| Di-n-octyl phthalate | mg/kg | -- | 0.65 J | 1.8 | 5.9 | 0.21 | 27 | 2.3 | 0.95 U | 1.3 | 11 | 7.5 | 0.77 | 1.2 | 0.53 | 0.38 U |
| **SVOCs-Miscellaneous SMS** | | | | | | | | | | | | | | | | |
| Dibenzofuran | mg/kg | 0.68 | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.19 UJ | 0.24 J | 0.64 UJ | 0.39 UJ | *1.3 UJ* | 0.20 UJ | 0.19 UJ | 0.19 UJ | 0.19 UJ |
| Hexachlorobutadiene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| N-Nitrosodiphenylamine | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| **SVOCs-Ionizable Organic Compounds** | | | | | | | | | | | | | | | | |
| Phenol | mg/kg | -- | 0.33 J | 0.72 | 0.62 J | 0.17 J | 5.3 | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 2-Methylphenol | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 4-Methylphenol | mg/kg | -- | 0.38 J | 1.5 | 1.6 | 0.35 | 1.8 | 0.37 U | 0.95 U | 0.90 | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 2,4-Dimethylphenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Pentachlorophenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| Benzyl alcohol | mg/kg | -- | 0.42 UJ | 3.4 | 1.2 J | | 0.38 J | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| Benzoic acid | mg/kg | -- | 2.0 J | 4.1 | 1.8 J | 1.5 U | 1.0 J | 3.7 U | 9.5 U | 1.9 U | 23 U | 20 U | 4.4 U | 7.5 U | 4.0 U | 3.8 U |
| **SVOCs-Other** | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2,4,6-Trichlorophenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2,4-Dichlorophenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2,4-Dinitrophenol | mg/kg | -- | 4.2 UJ | 3.9 U | 0.92 U | 1.5 U | 0.54 U | 3.7 U | 9.5 U | 1.9 U | 23 U | 20 U | 4.4 U | 7.5 U | 4.0 U | 3.8 U |
| 2,4-Dinitrotoluene | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2,6-Dinitrotoluene | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2-Chloronaphthalene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 2-Chlorophenol | mg/kg | -- | 0.42 UJ | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 2-Nitroaniline | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 2-Nitrophenol | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 3,3'-Dichlorobenzidine | mg/kg | -- | | 2.0 U | | | | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 3-Nitroaniline | mg/kg | -- | 2.1 UJ | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 4,6-Dinitro-o-cresol | mg/kg | -- | 4.2 U | 3.9 U | 0.92 U | 1.5 U | 0.54 U | 3.7 U | 9.5 U | 1.9 U | 23 U | 20 U | 4.4 U | 7.5 U | 4.0 U | 3.8 U |
| 4-Chloro-3-methylphenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 4-Chloroaniline | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 4-Chlorophenyl phenyl ether | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| 4-Nitroaniline | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| 4-Nitrophenol | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| Bis(2-chloroethoxy)methane | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Bis(2-chloroethyl)ether | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Bis-chloroisopropyl ether | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |

## Table 2
## Storm Solids Data Table

| | | Location Name | HP-CB-123 | CB249 | CB257 | CB258 | CB259 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS | | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | HP-CB-123-012115 | CB249-020415 | CB257-021215 | CB258-021215 | CB259-021215 | HP-CB-01 | HP-CB-02 | HP-CB-03 | HP-OWS-Inlet | HP-OWS-Outlet | PA-CB-01 | PA-CB-02 | PA-CB-03 | PA-CB-04 |
| | | Sample Date | 1/21/2015 | 2/4/2015 | 2/12/2015 | 2/12/2015 | 2/12/2015 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 |
| **Analytes** | **Units** | **Screening Level Criteria** | | | | | | | | | | | | | | |
| **SVOCs-Other (cont.)** | | | | | | | | | | | | | | | | |
| Carbazole | mg/kg | 1.1 | 0.42 U | 0.39 UJ | 0.092 J | 0.15 J | 0.051 J | 0.37 U | 0.95 U | 0.19 U | *2.3 U* | *2.0 U* | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Hexachlorocyclopentadiene | mg/kg | -- | 2.1 U | 2.0 U | 0.46 U | 0.76 U | 0.27 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| Hexachloroethane | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Isophorone | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| Nitrobenzene | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |
| N-Nitroso-di-n-propylamine | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 1.9 U | 4.8 U | 0.95 U | 12 U | 10 U | 2.2 U | 3.8 U | 2.0 U | 1.9 U |
| PBDE-003 | mg/kg | -- | 0.42 U | 0.39 U | 0.092 U | 0.15 U | 0.054 U | 0.37 U | 0.95 U | 0.19 U | 2.3 U | 2.0 U | 0.44 U | 0.75 U | 0.40 U | 0.38 U |

Notes:

Blank cells are intentional.
-- Not applicable.
*Italics* Reporting limit exceeds screening criteria.
Detected exceedance of the screening criteria.

Abbreviations:

cPAH Carcinogenic polycyclic aromatic hydrocarbon
HPAH High molecular weight polycyclic aromatic hydrocarbon
LPAH Low molecular weight polycyclic aromatic hydrocarbon
mg/kg Milligrams per kilogram
PAH Polycyclic aromatic hydrocarbon
SMS Sediment Management Standards

Qualifiers:

J Analyte was detected, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit which is considered to be an estimate.
UY Analyte was not detected at the given reporting limit which is elevated due to chromatic overlap with detected compounds.

## Table 2
## Storm Solids Data Table

| | | Location Name | PA-CB-05 | | PA-CB-06 | PA-CB-07 | SL-02 | SL-03 | SL-04 | | SL-05 | SL-06 | CB6.1 | | CB6.2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | PA-CB-05 | PA-CB-DUP | PA-CB-06 | PA-CB-07 | 02-ROW-CB-091908 | 03-ROW-CB-091908 | SL-04(D029-002)B | SL-04(D029-002)P | 05-ROW-CB-091908 | SL6-BASE | SL6.1 | CB6.1-122817 | SL6.2 | CB6.2-122817 |
| | | Sample Date | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 9/19/2008 | 9/19/2008 | 7/14/2009 | 7/14/2009 | 9/19/2008 | 6/23/2010 | 6/23/2010 | 12/28/2017 | 6/23/2010 | 12/28/2017 |
| Analytes | Units | Screening Level Criteria | | | | | | | | | | | | | | |
| **Conventionals** | | | | | | | | | | | | | | | | |
| Total Organic Carbon | % | -- | 17.6 | 14.4 | 26.9 | 25.5 | 13.3 | 10.8 | 12 | 2.61 | 18.1 | | 6.3 | 9.22 J | 19.9 | 12.4 J |
| Total Solids | % | -- | 20.3 | 26.8 | 9.8 | 19.7 | 34 | 57.3 | 46.6 | 69.4 | 33.6 | | 34.5 | 16.5 | 28.9 | 10.5 |
| **Metals** | | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 24 | 20 U | 20 U | *50 U* | 20 U | 10 U | 9.0 U | 20 | 39 | 20 | | 40 | 44.1 | 60 | 52.5 |
| Barium | mg/kg | -- | | | | | | | | | | | | | | |
| Cadmium | mg/kg | -- | 0.90 U | 0.70 U | 2.0 U | 1.0 | 1.2 | 1.4 | 2.5 | 2.8 | 1.6 | | 3.8 | | 4.4 | |
| Chromium | mg/kg | -- | 66 | 24 | 35 | 41 | 28 | 56.9 | 69 | 43 | 51 | | 42 | | 34 | |
| Copper | mg/kg | -- | 97.4 | 65.1 | 122 | 131 | 117 | 191 | 301 | 159 | 184 | | 68.1 | 66.7 | 69.5 | 68.5 |
| Lead | mg/kg | -- | 65 | 50 | 120 | 120 | 56 | 137 | 183 | 456 | 187 | | 59 | 35.7 | 44 | 32.1 |
| Mercury | mg/kg | -- | 0.10 U | 0.090 U | 0.20 U | 0.10 U | 0.10 U | 0.11 | 0.20 | 0.22 | 0.30 | | 0.31 | 0.198 | 0.18 | 0.204 |
| Selenium | mg/kg | -- | | | | | | | | | | | | | | |
| Silver | mg/kg | -- | 1.0 U | 1.0 U | 3.0 U | 1.0 U | 0.80 U | 0.50 U | 0.60 U | 0.40 U | 0.80 U | | 2.0 | | 0.90 U | |
| Zinc | mg/kg | -- | 279 | 199 | 420 | 416 | 384 | 651 | 851 | 507 | 379 | | 308 | 212 | 334 | 254 |
| **Total Petroleum Hydrocarbons (TPH)** | | | | | | | | | | | | | | | | |
| Diesel-range organics | mg/kg | -- | | | | | | | | | | | | 933 | | 146 |
| Oil-range organics | mg/kg | -- | | | | | | | | | | | | 737 | | 461 |
| **Polychlorinated Biphenyl (PCB) Aroclors** | | | | | | | | | | | | | | | | |
| Aroclor 1016 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.064 U | 0.064 U | 0.033 U | | 0.032 U | 0.058 U | 0.033 U | 0.188 U |
| Aroclor 1221 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.064 U | 0.064 U | 0.033 U | | 0.032 U | 0.058 U | 0.033 U | 0.188 U |
| Aroclor 1232 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.064 U | 0.064 U | 0.033 U | | 0.032 U | 0.058 U | 0.033 U | 0.188 U |
| Aroclor 1242 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.064 U | 0.064 U | 0.033 U | | 0.032 U | 0.058 U | 0.033 U | 0.188 U |
| Aroclor 1248 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.13 UY | 0.48 UY | 0.033 U | | 0.17 | 0.124 | 0.033 U | 0.188 U |
| Aroclor 1254 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.036 | 0.032 U | 0.039 | 0.16 | 0.33 | 0.051 | | 0.21 | 0.154 | 0.053 | 0.188 U |
| Aroclor 1260 | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.033 U | 0.032 U | 0.033 U | 0.12 | 0.21 J | 0.033 U | | 0.14 | 0.151 | 0.033 U | 0.188 U |
| PCBs (Total, Aroclors) | mg/kg | -- | 0.033 U | 0.033 U | 0.033 U | 0.036 | 0.032 U | 0.039 | 0.28 | 0.54 J | 0.051 | | 0.52 | 0.429 | 0.053 | 0.188 U |
| **Semivolatile Organic Compounds- (SVOCs-) Aromatic Compounds** | | | | | | | | | | | | | | | | |
| Naphthalene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.46 J | 1.2 | 0.43 | 0.081 | 2.0 | 3.13 | 0.52 | 0.363 |
| Acenaphthylene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 1.2 | 3.2 | 0.63 | 0.097 | 1.4 | 1.25 | 0.47 | 0.378 U |
| Acenaphthene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.65 U | 1.9 | 0.19 U | 0.063 U | 1.5 | 0.804 | 0.14 | 0.378 U |
| Fluorene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.65 U | 2.4 | 0.21 | 0.063 U | 2.7 | 1.46 | 0.49 | 0.105 |
| Phenanthrene | mg/kg | -- | 0.39 J | 0.68 J | 0.47 J | 0.84 J | 0.38 | 0.82 | 3.0 | 13 | 1.7 | 0.51 | 14 | 8.98 | 3.6 | 0.665 |
| Anthracene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.62 J | 6.1 | 0.43 | 0.091 | 3.4 | 2.21 | 0.90 | 0.169 |
| Total LPAH | mg/kg | -- | 0.39 J | 0.68 J | 0.47 J | 0.84 J | 0.38 | 0.82 | 5.63 J | 29 J | 4.16 | 0.779 | 29.1 | 20 | 6.78 | 1.44 |
| Fluoranthene | mg/kg | -- | 0.58 J | 0.82 J | 0.74 J | 1.4 J | 0.78 | 1.5 | 5.6 | 27 | 3.0 | 1.4 | 21 | 10.6 | 9.4 | 0.72 |
| Pyrene | mg/kg | -- | 0.71 J | 1.1 J | 1.2 J | 1.8 J | 0.62 | 1.1 | 7.3 | 27 | 2.8 | 2.2 | 25 | 13.1 | 11 | 0.995 |
| Benzo(a)anthracene | mg/kg | -- | 0.20 UJ | 0.26 J | 0.22 J | 0.50 J | 0.28 U | 0.47 | 2.8 | 13 | 1.3 | 0.66 | 6.3 | 3.31 J | 3.1 | 0.309 |
| Chrysene | mg/kg | -- | 0.42 J | 0.55 J | 0.56 J | 1.0 J | 0.55 | 0.78 | 5.3 | 17 | 1.7 | 0.82 | 8.7 | 5.02 | 3.5 | 0.527 |
| Benzofluoranthenes (total) | mg/kg | -- | 0.60 J | 0.84 J | 0.79 J | 1.5 J | 0.47 | 1.29 | 5.6 | 22 | 3.2 | 1.3 | | 6.65 | | 0.773 |
| Benzo(a)pyrene | mg/kg | -- | 0.23 J | 0.34 J | 0.31 J | 0.67 J | 0.28 U | 0.49 | 3.4 | 15 | 1.6 | 1.0 | 9.4 | 4.78 | 4.8 | 0.405 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 J | 0.39 UJ | 0.28 U | 0.26 U | 1.4 | 5.7 | 0.54 | 0.68 | 6.5 | 3.54 | 0.25 | 0.374 |
| Dibenzo(a,h)anthracene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.65 U | 1.1 | 0.19 U | 0.078 | 1.1 | 0.769 | 0.52 | 0.378 U |
| Benzo(g,h,i)perylene | mg/kg | -- | 0.20 UJ | 0.25 J | 0.30 J | 0.45 J | 0.28 U | 0.26 U | 1.6 | 5.8 | 0.62 | 1.0 | 9.7 | 4.67 | 2.7 | 0.559 |
| Total HPAH | mg/kg | -- | 2.54 J | 4.16 J | 4.32 J | 7.32 J | 2.42 | 5.63 | 33 | 134 | 14.76 | 9.14 | 98.9 | 52.4 J | 40.7 | 4.66 |
| 1-Methylnaphthalene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.65 U | 0.58 J | 0.34 | 0.063 U | 2.3 | 0.904 | 0.29 | 0.378 U |
| 2-Methylnaphthalene | mg/kg | -- | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.35 J | 0.62 | 0.42 | 0.063 U | 1.8 | 1.31 | 0.37 | 0.142 |
| Total PAH | mg/kg | 30 | 2.93 J | 4.84 J | 4.79 J | 8.16 J | 2.8 | 6.45 | 38.6 J | 163 J | 18.9 | 9.92 | 128 | 72.5 J | 47.5 | 6.11 |
| cPAHs (MTCA TEQ-HalfND) | mg/kg | 0.21 | 0.324 J | 0.476 J | 0.447 J | 0.919 J | 0.235 | 0.70 | 4.47 | 19.4 | 2.13 | 1.28 | 12 | 6.26 J | 5.76 | 0.575 |

**Table 2**
**Storm Solids Data Table**

| | | Location Name | PA-CB-05 | | PA-CB-06 | PA-CB-07 | SL-02 | SL-03 | SL-04 | | SL-05 | SL-06 | CB6.1 | | CB6.2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | PA-CB-05 | PA-CB-DUP | PA-CB-06 | PA-CB-07 | 02-ROW-CB-091908 | 03-ROW-CB-091908 | SL-04(D029-002)B | SL-04(D029-002)P | 05-ROW-CB-091908 | SL6-BASE | SL6.1 | CB6.1-122817 | SL6.2 | CB6.2-122817 |
| | | Sample Date | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 9/19/2008 | 9/19/2008 | 7/14/2009 | 7/14/2009 | 9/19/2008 | 6/23/2010 | 6/23/2010 | 12/28/2017 | 6/23/2010 | 12/28/2017 |
| **Analytes** | **Units** | **Screening Level Criteria** | | | | | | | | | | | | | | |
| **SVOCs-Chlorinated Benzenes** | | | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 1,3-Dichlorobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 1,4-Dichlorobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 1,2,4-Trichlorobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Hexachlorobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| **SVOCs-Phthalate Esters** | | | | | | | | | | | | | | | | |
| Dimethyl phthalate | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.51 | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Diethylphthalate | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Di-n-butyl phthalate | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Butyl benzyl phthalate | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.52 J | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Bis(2-ethylhexyl)phthalate | mg/kg | -- | 28 | 7.5 | 18 | 19 | 12 | 7.8 | 16 | 4.1 | 1.5 | | 0.62 | 0.465 | 0.54 | 0.946 U |
| Di-n-octyl phthalate | mg/kg | -- | 0.65 | 0.85 | 0.90 | 0.90 | 0.88 | 0.26 U | 0.88 | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| **SVOCs-Miscellaneous SMS** | | | | | | | | | | | | | | | | |
| Dibenzofuran | mg/kg | 0.68 | 0.20 UJ | 0.20 UJ | 0.20 UJ | 0.39 UJ | 0.28 U | 0.26 U | 0.65 U | 1.3 | 0.21 | 0.063 U | 0.69 | 0.335 | 0.079 | 0.378 U |
| Hexachlorobutadiene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| N-Nitrosodiphenylamine | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| **SVOCs-Ionizable Organic Compounds** | | | | | | | | | | | | | | | | |
| Phenol | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.431 | 0.065 U | 0.742 |
| 2-Methylphenol | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 4-Methylphenol | mg/kg | -- | 0.38 U | 0.42 | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.38 | | 0.18 U | 0.227 | 0.52 | 0.378 U |
| 2,4-Dimethylphenol | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.604 U | 0.065 U | 1.89 U |
| Pentachlorophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| Benzyl alcohol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.121 U | 0.33 U | 0.378 U |
| Benzoic acid | mg/kg | -- | 3.8 U | 3.9 U | 5.9 U | 4.5 U | 2.8 U | 2.6 U | 6.5 U | 6.2 U | 1.9 U | | 1.8 U | 2.63 | 0.65 U | 4.31 |
| **SVOCs-Other** | | | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2,4,6-Trichlorophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2,4-Dichlorophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2,4-Dinitrophenol | mg/kg | -- | 3.8 U | 3.9 U | 5.9 U | 4.5 U | 2.8 U | 2.6 U | 6.5 U | 6.2 U | 1.9 U | | 1.8 U | 1.21 U | 0.65 U | 3.78 U |
| 2,4-Dinitrotoluene | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2,6-Dinitrotoluene | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2-Chloronaphthalene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 2-Chlorophenol | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 2-Nitroaniline | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 2-Nitrophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.121 U | 0.33 U | 0.378 U |
| 3,3'-Dichlorobenzidine | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 3-Nitroaniline | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 22 |
| 4,6-Dinitro-o-cresol | mg/kg | -- | 3.8 U | 3.9 U | 5.9 U | 4.5 U | 2.8 U | 2.6 U | 6.5 U | 6.2 U | 1.9 U | | 1.8 U | 1.21 U | 0.65 U | 3.78 U |
| 4-Chloro-3-methylphenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 4-Chloroaniline | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 4-Chlorophenyl phenyl ether | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| 4-Nitroaniline | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| 4-Nitrophenol | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| Bis(2-chloroethoxy)methane | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Bis(2-chloroethyl)ether | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Bis-chloroisopropyl ether | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |

**Table 2**
**Storm Solids Data Table**

| | | Location Name | PA-CB-05 | | PA-CB-06 | PA-CB-07 | SL-02 | SL-03 | SL-04 | | SL-05 | SL-06 | CB6.1 | | CB6.2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | PA-CB-05 | PA-CB-DUP | PA-CB-06 | PA-CB-07 | 02-ROW-CB-091908 | 03-ROW-CB-091908 | SL-04(D029-002)B | SL-04(D029-002)P | 05-ROW-CB-091908 | SL6-BASE | SL6.1 | CB6.1-122817 | SL6.2 | CB6.2-122817 |
| | | Sample Date | 6/23/2010 | 6/23/2010 | 6/23/2010 | 6/23/2010 | 9/19/2008 | 9/19/2008 | 7/14/2009 | 7/14/2009 | 9/19/2008 | 6/23/2010 | 6/23/2010 | 12/28/2017 | 6/23/2010 | 12/28/2017 |
| **Analytes** | **Units** | **Screening Level Criteria** | | | | | | | | | | | | | | |
| **SVOCs-Other (cont.)** | | | | | | | | | | | | | | | | |
| Carbazole | mg/kg | 1.1 | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.33 J | 1.3 | 0.19 U | | 0.34 | 0.315 | 0.13 | 0.378 U |
| Hexachlorocyclopentadiene | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.604 U | 0.33 U | 1.89 U |
| Hexachloroethane | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Isophorone | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| Nitrobenzene | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |
| N-Nitroso-di-n-propylamine | mg/kg | -- | 1.9 U | 2.0 U | 3.0 U | 2.2 U | 1.4 U | 1.3 U | 3.3 U | 3.1 U | 0.96 U | | 0.93 U | 0.121 U | 0.33 U | 0.378 U |
| PBDE-003 | mg/kg | -- | 0.38 U | 0.39 U | 0.59 U | 0.45 U | 0.28 U | 0.26 U | 0.65 U | 0.62 U | 0.19 U | | 0.18 U | 0.121 U | 0.065 U | 0.378 U |

Notes:
Blank cells are intentional.
-- Not applicable.
*Italics* Reporting limit exceeds screening criteria.
Detected exceedance of the screening criteria.

Abbreviations:
cPAH Carcinogenic polycyclic aromatic hydrocarbon
HPAH High molecular weight polycyclic aromatic hydrocarbon
LPAH Low molecular weight polycyclic aromatic hydrocarbon
mg/kg Milligrams per kilogram
PAH Polycyclic aromatic hydrocarbon
SMS Sediment Management Standards

Qualifiers:
J Analyte was detected, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit which is considered to be an estimate.
UY Analyte was not detected at the given reporting limit which is elevated due to chromatic overlap with detected compounds.

## Table 2
## Storm Solids Data Table

| | | Location Name | SL-07 | | SL-08 | | SL-09 | SL-10 | SL-11 | SL-12 | SL-13 | | SL-14 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | 07-ONSITE-CB-091908 | AMB-011217-SL-7 | 08-ONSITE-CB-091908 | AMB-011217-SL-8 | 09-ONSITE-CB-091908 | 10-ONSITE-CB-091908 | 11-ONSITE-CB-091908 | 12-ONSITE-CB-091908 | 13-ROW-MH-091908 | 13-ROW-MH-091908-DUP | SL14-101409 | AMB-011217-SL-14 |
| | | Sample Date | 9/19/2008 | 1/12/2017 | 9/19/2008 | 1/12/2017 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 10/14/2009 | 1/12/2017 |
| **Analytes** | **Units** | **Screening Level Criteria** | | | | | | | | | | | | |
| **Conventionals** | | | | | | | | | | | | | | |
| Total Organic Carbon | % | -- | 15.6 | 2.5 | 7.05 | 10.3 | 8.77 | 6.17 | 4.14 | 8.49 | 7.13 | 6.8 | | 13.6 |
| Total Solids | % | -- | 30 | 65.5 | 45.5 | 68.5 | 33.3 | 53.3 | 42.6 | 43.1 | 54 | 52 | | 38.3 |
| **Metals** | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 24 | 10 U | 16.8 | 20 U | 15 | 20 U | 26 | 20 | 10 U | 9.0 U | 9.0 U | 10 U | 19.1 |
| Barium | mg/kg | -- | | | | | | | | | | | | |
| Cadmium | mg/kg | -- | 3.1 | | 7.6 | | 1.6 | 1.8 | 1.4 | 0.70 | 1.6 | 1.8 | 0.90 | |
| Chromium | mg/kg | -- | 78 | | 105 | | 33 | 60.4 | 35 | 27 | 47.5 | 57.2 | 47 | |
| Copper | mg/kg | -- | 90.1 | 26.3 | 143 | 29.6 | 112 | 102 | 148 | 27 | 75.9 | 74.2 | 73.9 | 55.6 |
| Lead | mg/kg | -- | 103 | 10.1 | 181 | 25.2 | 156 | 243 | 51 | 7.0 | 174 | 54 | 68 | 54.7 |
| Mercury | mg/kg | -- | 0.60 | 0.066 | 1.4 | 0.177 | 0.20 | 0.43 | 0.15 | 0.080 U | 0.060 U | 0.080 U | 0.25 | 0.311 |
| Selenium | mg/kg | -- | | | | | | | | | | | | |
| Silver | mg/kg | -- | 5.4 | | 10 | | 1.0 U | 2.8 | 0.70 U | 0.60 U | 0.50 U | 0.50 U | 0.80 U | |
| Zinc | mg/kg | -- | 210 | 61.8 | 377 | 71.8 | 781 | 250 | 299 | 102 | 536 | 668 | 428 | 368 |
| **Total Petroleum Hydrocarbons (TPH)** | | | | | | | | | | | | | | |
| Diesel-range organics | mg/kg | -- | | 76.9 | | 33.6 | | | | | | | | 108 |
| Oil-range organics | mg/kg | -- | | 325 | | 80.7 | | | | | | | | 299 |
| **Polychlorinated Biphenyl (PCB) Aroclors** | | | | | | | | | | | | | | |
| Aroclor 1016 | mg/kg | -- | 0.033 U | 0.0193 U | 0.032 U | 0.0193 U | 0.032 U | 0.032 U | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0196 U |
| Aroclor 1221 | mg/kg | -- | 0.033 U | 0.0193 U | 0.032 U | 0.0193 U | 0.032 U | 0.032 U | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0196 U |
| Aroclor 1232 | mg/kg | -- | 0.033 U | 0.0193 U | 0.032 U | 0.0193 U | 0.032 U | 0.032 U | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0196 U |
| Aroclor 1242 | mg/kg | -- | 0.033 U | 0.0193 U | 0.032 U | 0.0193 U | 0.032 U | 0.032 U | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0196 U |
| Aroclor 1248 | mg/kg | -- | 0.082 UY | 0.0193 U | 0.048 UY | 0.0193 U | 0.032 U | 0.032 U | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0196 U |
| Aroclor 1254 | mg/kg | -- | 0.20 | 0.0201 | 0.16 | 0.0706 | 0.049 | 0.25 | 0.093 | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0549 |
| Aroclor 1260 | mg/kg | -- | 0.13 | 0.0193 U | 0.12 | 0.0614 | 0.032 U | 0.15 | 0.063 U | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.0721 |
| PCBs (Total, Aroclors) | mg/kg | -- | 0.33 | 0.0201 | 0.28 | 0.132 | 0.049 | 0.40 | 0.093 | 0.033 U | 0.031 U | 0.031 UJ | 0.033 U | 0.127 |
| **Semivolatile Organic Compounds- (SVOCs-) Aromatic Compounds** | | | | | | | | | | | | | | |
| Naphthalene | mg/kg | -- | 2.4 | 2.69 | 0.36 | 1.36 | 0.30 | 1.4 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.48 | 2.75 |
| Acenaphthylene | mg/kg | -- | 4.9 | 0.461 | 0.96 | 0.54 | 0.41 | 1.7 | 0.26 | 0.064 U | 0.20 U | 0.19 U | 0.51 | 0.758 |
| Acenaphthene | mg/kg | -- | 1.8 | 0.555 | 0.18 U | 0.133 | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.159 |
| Fluorene | mg/kg | -- | 3.0 | 0.595 | 0.18 U | 0.189 | 0.20 U | 0.48 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.19 | 0.247 |
| Phenanthrene | mg/kg | -- | 33 | 4.48 | 1.3 | 1.83 | 1.7 | 4.8 | 0.69 | 0.076 | 0.22 | 0.19 U | 2.1 | 3.22 |
| Anthracene | mg/kg | -- | 10 | 0.937 | 0.48 | 0.578 | 0.22 | 0.84 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.43 | 0.851 |
| Total LPAH | mg/kg | -- | 57.2 | 10.8 | 3.1 | 5.08 | 2.63 | 9.84 | 0.95 | 0.076 | 0.22 | 0.19 U | 4.06 | 8.76 |
| Fluoranthene | mg/kg | -- | 93 | 5.73 | 4.2 | 3.48 | 2.9 | 7.2 | 1.3 | 0.20 | 0.40 | 0.44 | 7.3 | 6.21 |
| Pyrene | mg/kg | -- | 140 | 7.26 | 5.7 | 4.84 | 3.8 | 11 | 1.6 | 0.26 | 0.42 | 0.37 | 8.4 | 8.26 |
| Benzo(a)anthracene | mg/kg | -- | 30 | 1.96 | 2.0 | 1.61 | 0.88 | 2.8 | 0.41 | 0.084 | 0.20 U | 0.19 U | 2.6 | 2.65 |
| Chrysene | mg/kg | -- | 37 | 2.65 | 2.8 | 2.12 | 1.6 | 4.1 | 0.64 | 0.096 | 0.32 | 0.32 | 3.6 | 3.75 |
| Benzofluoranthenes (total) | mg/kg | -- | 49 | 4.21 | 7.4 | 4.33 | 2.9 | 9.7 | 1.5 | 0.201 | 0.69 | 0.71 | 6.4 | 6.72 |
| Benzo(a)pyrene | mg/kg | -- | 38 | 2.81 | 3.7 | 2.8 | 1.3 | 5.0 | 0.71 | 0.087 | 0.20 U | 0.23 | 5.1 | 4.0 |
| Indeno(1,2,3-c,d)pyrene | mg/kg | -- | 12 | 2.4 J | 1.4 | 2.83 J | 0.54 | 2.2 | 0.31 | 0.064 U | 0.20 U | 0.19 U | 3.5 | 4.12 J |
| Dibenzo(a,h)anthracene | mg/kg | -- | 2.5 | 0.58 | 0.31 | 0.718 | 0.20 U | 0.24 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.27 | 0.828 |
| Benzo(g,h,i)perylene | mg/kg | -- | 14 | 3.26 J | 1.8 | 3.83 J | 0.67 | 3.0 | 0.44 | 0.064 U | 0.20 U | 0.19 U | 5.4 | 5.59 J |
| Total HPAH | mg/kg | -- | 416 | 30.9 J | 29.31 | 26.6 J | 14.59 | 45.24 | 6.91 | 0.928 | 1.83 | 2.07 | 42.57 | 42.1 J |
| 1-Methylnaphthalene | mg/kg | -- | 0.87 | 0.497 | 0.18 U | 0.154 | 0.20 U | 0.30 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.15 | 0.242 |
| 2-Methylnaphthalene | mg/kg | -- | 1.2 | 0.612 | 0.18 U | 0.297 | 0.20 U | 0.32 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.20 | 0.532 |
| Total PAH | mg/kg | 30 | 473 | 41.7 J | 32.4 | 31.6 J | 17.2 | 55.1 | 7.86 | 1.00 | 2.05 | 2.07 | 46.6 | 50.9 J |
| cPAHs (MTCA TEQ-HalfND) | mg/kg | 0.21 | 47.7 | 3.75 J | 4.84 | 3.77 J | 1.76 | 6.54 | 0.948 | 0.123 | 0.202 | 0.333 | 6.41 | 5.47 J |

**Table 2**
**Storm Solids Data Table**

| | | Location Name | SL-07 | | SL-08 | | SL-09 | SL-10 | SL-11 | SL-12 | SL-13 | | SL-14 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | 07-ONSITE-CB-091908 | AMB-011217-SL-7 | 08-ONSITE-CB-091908 | AMB-011217-SL-8 | 09-ONSITE-CB-091908 | 10-ONSITE-CB-091908 | 11-ONSITE-CB-091908 | 12-ONSITE-CB-091908 | 13-ROW-MH-091908 | 13-ROW-MH-091908-DUP | SL14-101409 | AMB-011217-SL-14 |
| | | Sample Date | 9/19/2008 | 1/12/2017 | 9/19/2008 | 1/12/2017 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 10/14/2009 | 1/12/2017 |
| Analytes | Units | Screening Level Criteria | | | | | | | | | | | | |
| **SVOCs-Chlorinated Benzenes** | | | | | | | | | | | | | | |
| 1,2-Dichlorobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 1,3-Dichlorobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 1,4-Dichlorobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 1,2,4-Trichlorobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| Hexachlorobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| **SVOCs-Phthalate Esters** | | | | | | | | | | | | | | |
| Dimethyl phthalate | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0408 |
| Diethylphthalate | mg/kg | -- | 0.20 U | | 0.18 U | | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | |
| Di-n-butyl phthalate | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.21 | 0.28 | 0.13 U | 0.0198 U |
| Butyl benzyl phthalate | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.26 | 0.19 U | 0.13 U | 0.0172 J |
| Bis(2-ethylhexyl)phthalate | mg/kg | -- | 0.35 | 0.38 | 0.26 | 0.104 | 18 | 3.9 | 2.0 | 0.25 | 7.8 | 12 | 6.0 | 1.16 |
| Di-n-octyl phthalate | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.30 | 0.46 | 0.13 U | 0.0197 J |
| **SVOCs-Miscellaneous SMS** | | | | | | | | | | | | | | |
| Dibenzofuran | mg/kg | 0.68 | 0.32 | 0.176 | 0.18 U | 0.0623 | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.116 |
| Hexachlorobutadiene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| N-Nitrosodiphenylamine | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| **SVOCs-Ionizable Organic Compounds** | | | | | | | | | | | | | | |
| Phenol | mg/kg | -- | 0.20 U | 0.0415 | 0.18 U | 0.0257 | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.315 |
| 2-Methylphenol | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 4-Methylphenol | mg/kg | -- | 0.20 U | 0.247 | 0.18 U | 0.0942 | 0.20 U | 0.18 U | 0.20 U | 0.086 | 0.20 U | 0.19 U | 1.4 | 5.34 |
| 2,4-Dimethylphenol | mg/kg | -- | 0.20 U | 0.0982 U | 0.18 U | 0.0954 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0992 U |
| Pentachlorophenol | mg/kg | -- | 0.98 U | 0.0441 J | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| Benzyl alcohol | mg/kg | -- | 0.98 U | 0.0176 J | 0.92 U | 0.0191 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 6.4 | 0.95 U | 0.64 U | 0.102 |
| Benzoic acid | mg/kg | -- | 2.0 U | 0.445 | 1.8 U | 0.209 | 2.0 U | 1.8 U | 2.0 U | 0.64 U | 2.0 U | 1.9 U | 1.3 U | 1.18 |
| **SVOCs-Other** | | | | | | | | | | | | | | |
| 2,4,5-Trichlorophenol | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2,4,6-Trichlorophenol | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2,4-Dichlorophenol | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2,4-Dinitrophenol | mg/kg | -- | 2.0 U | 0.196 U | 1.8 U | 0.191 U | 2.0 U | 1.8 U | 2.0 U | 0.64 U | 2.0 U | 1.9 U | 1.3 U | 0.198 U |
| 2,4-Dinitrotoluene | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2,6-Dinitrotoluene | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2-Chloronaphthalene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 2-Chlorophenol | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| 2-Nitroaniline | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 2-Nitrophenol | mg/kg | -- | 0.98 U | 0.0196 U | 0.92 U | 0.0191 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0198 U |
| 3,3'-Dichlorobenzidine | mg/kg | -- | 0.98 U | | 0.92 U | | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | |
| 3-Nitroaniline | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 4,6-Dinitro-o-cresol | mg/kg | -- | 2.0 U | 0.196 U | 1.8 U | 0.191 U | 2.0 U | 1.8 U | 2.0 U | 0.64 U | 2.0 U | 1.9 U | 1.3 U | 0.198 U |
| 4-Chloro-3-methylphenol | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 4-Chloroaniline | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 4-Chlorophenyl phenyl ether | mg/kg | -- | 0.20 U | | 0.18 U | | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | |
| 4-Nitroaniline | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| 4-Nitrophenol | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| Bis(2-chloroethoxy)methane | mg/kg | -- | 0.20 U | | 0.18 U | | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | |
| Bis(2-chloroethyl)ether | mg/kg | -- | 0.20 U | | 0.18 U | | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | |
| Bis-chloroisopropyl ether | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |

## Table 2
## Storm Solids Data Table

| | | Location Name | SL-07 | | SL-08 | | SL-09 | SL-10 | SL-11 | SL-12 | SL-13 | | SL-14 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sample Name | 07-ONSITE-CB-091908 | AMB-011217-SL-7 | 08-ONSITE-CB-091908 | AMB-011217-SL-8 | 09-ONSITE-CB-091908 | 10-ONSITE-CB-091908 | 11-ONSITE-CB-091908 | 12-ONSITE-CB-091908 | 13-ROW-MH-091908 | 13-ROW-MH-091908-DUP | SL14-101409 | AMB-011217-SL-14 |
| | | Sample Date | 9/19/2008 | 1/12/2017 | 9/19/2008 | 1/12/2017 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 9/19/2008 | 10/14/2009 | 1/12/2017 |
| Analytes | Units | Screening Level Criteria | | | | | | | | | | | | |
| **SVOCs-Other (cont.)** | | | | | | | | | | | | | | |
| Carbazole | mg/kg | 1.1 | 0.68 | 0.52 | 0.18 U | 0.214 | 0.20 U | 0.27 | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.256 |
| Hexachlorocyclopentadiene | mg/kg | -- | 0.98 U | 0.0982 U | 0.92 U | 0.0954 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0992 U |
| Hexachloroethane | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| Isophorone | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| Nitrobenzene | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |
| N-Nitroso-di-n-propylamine | mg/kg | -- | 0.98 U | 0.0196 U | 0.92 U | 0.0191 U | 0.97 U | 0.90 U | 0.98 U | 0.32 U | 0.99 U | 0.95 U | 0.64 U | 0.0198 U |
| PBDE-003 | mg/kg | -- | 0.20 U | 0.0196 U | 0.18 U | 0.0191 U | 0.20 U | 0.18 U | 0.20 U | 0.064 U | 0.20 U | 0.19 U | 0.13 U | 0.0198 U |

Notes:
Blank cells are intentional.
-- Not applicable.
*Italics* Reporting limit exceeds screening criteria.
Detected exceedance of the screening criteria.

Abbreviations:
cPAH Carcinogenic polycyclic aromatic hydrocarbon
HPAH High molecular weight polycyclic aromatic hydrocarbon
LPAH Low molecular weight polycyclic aromatic hydrocarbon
mg/kg Milligrams per kilogram
PAH Polycyclic aromatic hydrocarbon
SMS Sediment Management Standards

Qualifiers:
J Analyte was detected, concentration is considered to be an estimate.
U Analyte was not detected at the given reporting limit.
UJ Analyte was not detected at the given reporting limit which is considered to be an estimate.
UY Analyte was not detected at the given reporting limit which is elevated due to chromatic overlap with detected compounds.

# APPENDIX 12B
## Municipal Stormwater Management and Sediment Source Control

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## APPENDIX 12B
## MUNICIPAL STORMWATER MANAGEMENT AND SEDIMENT SOURCE CONTROL

City of Seattle (City) storm drain outfalls within the Gas Works Park Site (GWPS) are covered by the 2019 Phase I Municipal Stormwater National Pollutant Discharge Elimination System (NPDES) and State Discharge General Permit for discharges from Municipal Separate Storm Sewer Systems[1] (Permit). The Permit requires the development and implementation of a stormwater management program for separate storm drain systems owned or operated by the City. Implementation of the stormwater management program required under the permit constitutes reduction of pollutants to the maximum extent practicable during the life of the permit, as required in Section 402(p)(3)(B) of the Clean Water Act (Ecology 2006).

The remainder of this appendix describes how the City manages stormwater within the context of the Permit, the City's stormwater code, and the business inspection program. Business inspections conducted recently in the GWPS are also summarized.

### Municipal Stormwater Management

The Permit requires the City to develop a stormwater management program plan (SWMP; SPU 2020), which describes the City-wide stormwater programs. The SWMP addresses the following objectives:

- Protect water quality,
- Reduce the discharge of pollutants to the "maximum extent practicable,"
- Satisfy appropriate requirements of the Clean Water Act, and
- Meet state requirements to use all known, available, and reasonable methods to prevent and control pollution to waters of the state.

There are six City departments primarily responsible for implementing the SWMP components and associated activities and projects. Seattle Public Utilities (SPU) has the designated lead role for managing stormwater, conducting water quality programs, and managing drainage-related capital projects. Other departments with major Permit-related responsibilities include the Seattle Department of Construction and Inspections (SDCI), Seattle Parks and Recreation (SPR), Seattle Department of Finance and Administrative Services (FAS), Seattle City Light (SCL), and Seattle Department of Transportation (SDOT).

At the GWPS site, SPU manages the municipal storm drains that discharge to Waterways 19 and 20, FAS manages storm drains at Seattle Police Harbor Patrol, and Parks manages the storm drains within Gas Works Park.

Under the City's Stormwater Code (Seattle Municipal Code [SMC] 22.800-22.808) the City has authority to control discharges to the public drainage system, as well as direct discharges[2] to the receiving water bodies in Seattle. SPU and SDCI share responsibility for implementing the code. The code prohibits illicit

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[1] The City's Municipal Separate Storm Sewer System is known as the MS4.

[2] Direct discharges in this context means stormwater discharged to a receiving water body through a non-municipal pipe (e.g., a privately owned storm drain).

discharges, spills, and illegal dumping; regulates stormwater discharges from new and redevelopment projects; and authorizes inspections, surveillance, and monitoring to determine compliance. The City has also developed four Directors Rules that provide technical guidance on implementing the code (City of Seattle 2009a, b, c, d). Key elements of the City Stormwater Code and specific city-wide programs that support source control in the GWPS are summarized below.

**Source control/pollution prevention** – The Stormwater Code requires responsible parties to implement source controls to prevent or minimize the amount of pollutants leaving a site or property. Source control requirements include eliminating illicit connections to storm drains, performing routine maintenance for storm drain systems, properly disposing of fluids and wastes, properly storing solid wastes, implementing spill prevention and cleanup programs, and training staff. Specific requirements are described in the City of Seattle's Source Control Manual (City of Seattle 2009b). This portion of the code forms the basis for the business inspection program that SPU implements, including in the vicinity of the GWPS.

**Stormwater controls for new and redevelopment projects** – New and redevelopment projects, including public projects, are subject to the green stormwater infrastructure, water quality, and construction site stormwater pollution prevention requirements of the code. Code requirements for qualifying projects include:

- Green stormwater infrastructure – Projects with 7,000 square feet or more of land disturbing activity or 2,000 square feet or more of new plus replaced impervious surface must implement green stormwater infrastructure to the maximum extent feasible. Green stormwater infrastructure includes small on-site facilities that use infiltration, evapotranspiration, or stormwater reuse to control runoff.
- Stormwater treatment – New and redevelopment projects that generate more than 5,000 square feet of new or replaced pollution-generating impervious surfaces are required under the above-cited code to install stormwater treatment facilities such as wet/infiltration ponds, vaults, media filters, and biofiltration swales/strips, which focus on removal of particulate material form the stormwater. Because many of the pollutants found in urban stormwater tend to adhere to particles, these facilities are also effective in reducing the pollutant load.
- Controls during construction – All construction projects are required to implement effective best management practices (BMPs) to control erosion, sediment transport, and other pollutant discharges during construction (City of Seattle 2009b).

**Illicit Discharge Detection and Elimination Program** – The Illicit Discharge Detection and Elimination (IDDE) Program began in 2007 to detect and remove non-permissible discharges to the separated storm drain system in the City. The program is implemented through ongoing business inspections, water quality complaint response, and spill response programs, as well as source-tracing activities. SPU also attempts to prevent illicit discharges through public education and outreach and building code enforcement. In 2009, SPU added a dry-weather field screening element to the IDDE Program to aid in locating illicit connections/discharges to the City storm drain system.

**Spill Kit Program** – In 2004, SPU began a city-wide program offering free spill kits to local businesses that manufacture, store, use, or transport liquids as an incentive to improve on-site spill prevention and cleanup practices.

**Street Sweeping** – Another activity that generally supports source control is the City's street sweeping program. The City has been sweeping streets in Seattle since the turn of the century. In 2011, SPU and SDOT modified the street sweeping program to achieve higher water quality benefits.

### City of Seattle Business Inspection Program

The source control team within SPU conducts business inspections within areas of the City served by the MS4. The team works with businesses and residents to provide education and technical assistance regarding stormwater pollution prevention and enforce the City's Stormwater Code. A progressive enforcement process is in place to address non-compliance and egregious violations.

Education and technical assistance provided by the source control team is delivered during site visits, inspections, or complaint investigations and also through outreach materials, such as BMP sheets. Enforcement is used when the inspection process has failed to gain compliance voluntarily. The SPU Green Business Program, a free resource conservation program for Seattle businesses, provides outreach and education to the business community regarding stormwater pollution prevention.

SPU uses a suite of inspection types to conduct inspections of business that drain to the City's MS4 areas. The suite of inspection types was developed to address the complexity in achieving permit compliance and utilizing limited resources to achieve maximum water quality benefit. The first is an "audit" inspection, whereby businesses are visited by an SPU inspector who conducts a site inspection and informs the business of their source control requirements and relevant Code changes. The business is left with a copy of required corrective actions.

The second inspection type is a "stormwater compliance inspection," whereby businesses are visited by an SPU inspector and informed of the corrective actions necessary for their site to come into compliance with the City's Stormwater Code. This type of inspection is used for water quality complaint response at businesses or if an egregious violation is found during an "audit" inspection. Inspectors follow up with the business after the compliance deadline to confirm that the necessary corrective actions have been implemented and will proceed with progressive enforcement when necessary.

The City's source control team uses a progressive enforcement program to achieve source control compliance at inspected businesses. The following describes the typical steps in enforcement, though cases vary. Source control inspectors start by issuing a corrective action letter, which provides 30 days for businesses to comply with source control requirements, at which time a re-inspection is conducted to ensure implementation. If the site remains out of compliance, a Notice of Violation is issued. A penalty may also be issued at the same time or may be suspended pending implementation of the requirements by the deadline provided in the Notice of Violation. Egregious violations and illicit discharge violations typically receive a penalty at the issuance of the Notice of Violation.

The source control program tracks its inspection and enforcement records through a database and file management system. The inspection database is based in Microsoft Dynamics and tracks information for both source control inspections and private drainage system maintenance inspections. The database records all site inspection information, generates corrective action letters, tracks compliance deadlines and reports inspections outcomes and other information. The database also has a quality assurance/quality control (QA/QC) element. In general, the file includes all previous inspection information, correspondence, maps, and other relevant site information. Records are managed in accordance with the state record keeping requirements.

### Business Inspections in the Gas Works Park Site Vicinity

In early 2015, 40 businesses in the GWPS vicinity were evaluated for potential inspection within the City's business inspection program. Of these businesses, 13 underwent business inspections. The remaining 17 businesses did not undergo inspection because they were minor businesses (e.g., only offices) or were tenants of a larger property owner that did undergo inspection.

Approximately 20 businesses in the GWPS area underwent business inspections in 2006 and early 2007.

### Operations and Maintenance Programs

The SPU Field Operations Division is responsible for operating and maintaining much of the City's drainage systems. Catch basins in the drainage system are inspected each year and cleaned when the depth of sediment accumulation in the sump is within 18 inches of the lowest pipe entering or exiting the structure, or if the sump is more than 60 percent full, whichever is less. SPU has also implemented a preventative maintenance program in the wastewater collection system to routinely inspect and clean or repair the system. Inspection schedules are based on an evaluation of critical system components to ensure effective operation of the system.

### References


City of Seattle. 2009a. Directors' rules for Seattle Municipal Code, Chapters 22.800-22.808, Stormwater Code: volume 1, Source Control Technical Requirements Manual, Directors' Rule 2009-003 (SPU), 15-2009 (DPD). Department of Planning and Development, Seattle Public Utilities, City of Seattle, Washington.

City of Seattle. 2009b. Directors' rules for Seattle Municipal Code, Chapters 22.800-22.808, Stormwater Code: volume 2, Construction Stormwater Control Technical Requirements Manual, Directors' Rule 2009-004 (SPU), 16-2009 (DPD). Department of Planning and Development, Seattle Public Utilities, City of Seattle, Washington.

City of Seattle. 2009c. Directors' rules for Seattle Municipal Code, Chapters 22.800-22.808, Stormwater Code: volume 3, Stormwater Flow Control and Water Quality Treatment Technical Requirements Manual, Directors' Rule 2009-005 (SPU), 17-2009 (DPD). Department of Planning and Development, Seattle Public Utilities, City of Seattle, Washington.

City of Seattle.2009d. Directors' rules for Seattle Municipal Code, Chapters 22.800-22.808, Stormwater Code: volume 4, Stormwater Code Enforcement Manual, Directors' Rule 2009-007 (SPU), 18-2009 (DPD). Department of Planning and Development, Seattle Public Utilities, City of Seattle, Washington.

Ecology. 2006. Fact sheet for National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge general permit for discharges from large and medium municipal separate storm sewer drains. Water Quality Program, State of Washington Department of Ecology, Olympia, WA.

SPU. 2020. 2020 NPDES Phase I Municipal Stormwater Permit, Stormwater Management Program. March 2020 [online]. Seattle Public Utilities, Seattle, WA. Available from: http://www.seattle.gov/Documents/Departments/SPU/Documents/Plans/Seattle_2020_Stormwater_Plan.pdf.