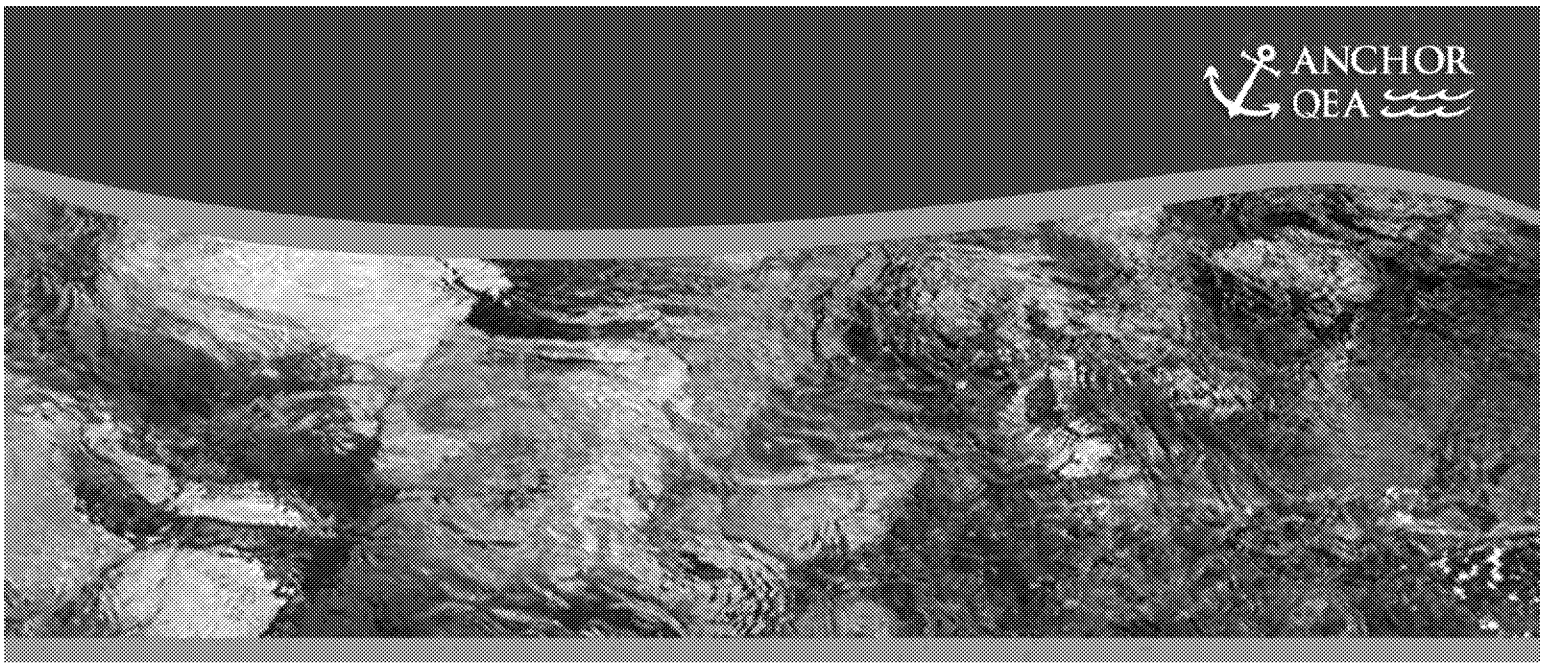

# DATA REPORT
# EAST WATERWAY NEAR-END-OF-PIPE STORM DRAIN SOLIDS STUDY

**Prepared for**

Port of Seattle
2711 Alaskan Way
Seattle, Washington 98121

**Prepared by**

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Seattle, Washington 98101

**December 2015**

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## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| AET | Apparent Effects Threshold |
| ARI | Analytical Resources, Inc. |
| CSL | cleanup screening level |
| EW | East Waterway |
| FS | Feasibility Study |
| ID | identification |
| ISGP | Industrial Stormwater General Permit |
| LiDAR | Light Detection and Ranging |
| MLLW | mean lower low water |
| NOAA | National Oceanic and Atmospheric Administration |
| O&M | operations and maintenance |
| OC-normalized | organic carbon-normalized |
| OU | Operable Unit |
| PAH | polycyclic aromatic hydrocarbon |
| PCB | polychlorinated biphenyl |
| Port | Port of Seattle |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| RI | Remedial Investigation |
| SCO | sediment cleanup objective |
| SMS | Sediment Management Standards |
| SRI | Supplemental Remedial Investigation |
| SVOC | semivolatile organic compound |
| T-18 | Terminal 18 |
| T-25 | Terminal 25 |
| T-30 | Terminal 30 |
| T-102 | Terminal 102 |
| T-104 | Terminal 104 |
| TOC | total organic carbon |
| TPH | total petroleum hydrocarbons |
| TS | total solids |



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# 1 INTRODUCTION

This Data Report presents the storm drain solids characterization results in select Port of Seattle (Port) terminal drainage basins. This study was conducted to assess the current chemical quality of accumulated storm drain solids at 18 locations, and ultimately to support the source evaluation efforts of the Supplemental Remedial Investigation of the East Waterway (EW) Operable Unit (OU) of the Harbor Island Superfund Site. Storm drain solids samples were collected and analyzed in accordance with the Port-approved Quality Assurance Project Plan (QAPP) Addendum (Anchor QEA 2015).

Specific information provided in this Data Report includes the following:

- Summary of sampling activities
- Data quality assessments
- Deviations from the QAPP (Windward 2010) and QAPP Addendum (Anchor QEA 2015)
- Analytical results compared to SCUM II Marine Sediment Apparent Effects Thresholds (AETs) and Sediment Management Standards (SMS) (Ecology 2015)

This storm drain solids characterization effort was conducted by Anchor QEA, LLC, for the Port. The project team also included Analytical Resources, Inc. (ARI) for chemical analysis and Laboratory Data Consultants for data validation.

## 1.1 Site Description

The EW receives both private and municipal-separated stormwater discharges. Port properties make up approximately 350 acres of the total EW stormwater drainage area (820 acres; Windward 2011). Five Port properties with storm drainages to the EW OU include Terminal 18 (T-18), Terminal 25 (T-25), Terminal 30 (T-30), Terminal 102 (T-102), and Terminal 104 (T-104) (Figure 1). Drainage basin boundaries within these terminals were updated by Floyd Snider in November 2015 and used in this Data Report. In some cases, drainage basin boundaries are larger than Port-owned property boundary for T-18. Drainage basin nomenclature is also different between the Port and SSA Marine for T-18. Port nomenclature is used in this report, consistent with Remedial Investigation/Feasibility Study (RI/FS) documents; however, SSA Marine nomenclature is also presented in figures.



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As part of the Port's ongoing source control work for the EW Superfund Site, storm solids were collected over various timeframes, as described in the Supplemental Remedial Investigation (SRI) Report (Windward and Anchor QEA 2014). Following that sampling, several drainage basins have undergone line and/or catch basin cleanouts. Some of this work was conducted by the Port and is documented in the EW SRI Report. Some was conducted recently by SSA Marine in support of their Industrial Stormwater General Permit (ISGP; Figure 1) at T-18.

Select storm drainage basins were identified for sampling either to evaluate the changes in storm line sediments following cleanouts or to collect data not previously collected due to access or lack of sediment. A brief summary of basin use, sampling, and cleanout history, as well as current sampling for this study, are presented in the following subsections.

### 1.1.1 Terminal 18

T-18 is operated as a container terminal by SSA Marine. A majority of this property is covered by SSA Marine's ISGP. Operations include intermodal container storage and loading/unloading, trailer and vehicle parking, container equipment maintenance, and equipment parking and fueling.

A majority of basins were recently cleaned out by SSA Marine in support of their ISGP. In addition, SSA Marine is currently developing treatment plans for B-11, B-16, and B-17. The Port conducted cleanouts at B-7 and B-24. The following drainage basins (Figures 2 and 3) were sampled at T-18: B-7, B-10, B-11, B-12, B-13, B-14, B-16, B-17, B-18, B-19, B-21, and B-22. Basins B-23 and B-24 were not sampled due to lack of accumulated solids in accessible maintenance holes.

### 1.1.2 Terminal 25

Most of T-25 is operated by SSA Marine as a container terminal. The southern part of the property containing Basin B-34 is not operated by SSA Marine and is currently utilized for vehicle parking. The Port conducted cleanouts at basins B-34 and B-32. Drainage basin B-32



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was sampled at T-25 (Figure 4). Basin B-34 was not sampled due to lack of accumulated solids in accessible maintenance holes.

### 1.1.3 Terminal 30

T-30 is operated by SSA Marine as a container terminal similar to T-18, but covered under a separate ISGP. No line cleanouts have been conducted at this terminal based on storm line data or ISGP requirement. The facility is currently in compliance with its ISGP; however, basin B-28 was sampled since there was previously not enough sample to collect (Figure 5).

### 1.1.4 Terminal 102

T-102 contains an office park and Harbor Island Marina at the southern end of Harbor Island. This facility is covered by the Port's Municipal Phase I NPDES permit, and basin B-1 was cleaned out by the Port. Drainage basin B-1 was sampled at T-102 (Figure 6), and all other drainage basins on T-102 drain to other waterways so they were not examined as part of EW cleanup efforts.

### 1.1.5 Terminal 104

T-104 was not sampled as part of this study because it being sampled as part of ongoing Lower Duwamish Waterway Ecology Interagency Agreement with the Port. The entire terminal basins were cleaned out in 2015 as part of this agreement. Sediment traps were installed and sampled following cleanout (EA Engineering 2014). This facility is covered under an ISGP for PCC Logistics.

## 1.2 Report Organization

The remainder of this document includes the following:

- Section 2, Sampling Methods: This section describes the sampling methods used in this program and any field deviations from the QAPP Addendum (Anchor QEA 2015).
- Section 3, Data Quality Assessment: This section describes information on data quality, including sample completeness, quality control (QC) measures, and a summary of data validation findings.



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- Section 4, Analytical Results: This section describes analytical chemistry results and comparisons to applicable screening criteria.
- Section 5, Next Steps: This section describes a summary and rationale for next steps at each terminal.



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# 2 SAMPLING METHODS

Sampling was conducted in accordance with the QAPP (Windward 2010) and QAPP Addendum (Anchor QEA 2015). The QAPP and QAPP Addendum provide the sample design, target sampling locations, procedures for sample collection and processing, data QC, and data reporting requirements. Any deviations from these documents are discussed in this section.

Fifteen storm drain solids samples were collected from T-18, T-25, T-30, and T-102 using a stainless steel scoop attached to a telescoping pole. Samples were processed in the field and delivered to ARI for analysis. Three storm drain basins (B-23, B-24, and B-34) were not sampled due to a lack of sufficient accumulated solids in accessible storm drains. Table 1 provides the sample date and time, sample identification (ID), sampling location coordinates, and solids description. Daily field activity logs are provided in Appendix A.

## 2.1 Sample Collection

Storm drain solids grabs were collected from accessible maintenance holes on June 4, 5, and 8, 2015. Additional inspections were made on June 10 and 11, 2015 at T-25 (basin B-34) due to vehicles blocking access to multiple maintenance holes. Maintenance hole locations nearest to the basin outfalls were targeted for sampling in order to obtain samples corresponding to the greatest drainage area possible from each network. During field sampling, numerous maintenance holes were inaccessible due to overlying containers or jammed lids. If the initial target maintenance hole location was inaccessible or did not contain a sufficient volume of solids, an alternate maintenance hole location that corresponded to the greatest drainage area from the network was chosen. This was generally the next nearest accessible maintenance hole location to the outfall. An overview of sampling locations, inaccessible locations, and locations with limited or no available solids is provided in Figures 2 through 6.

Field staff used a hand-held digital GPS unit and assistance from SSA Marine staff to navigate to maintenance hole locations. Sampling location coordinates were documented on field forms (Appendix A) and are available in Table 1. Depth-to-water and depth-to-bottom



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measurements in maintenance holes were measured using a measuring tape or lead line from the surface and recorded to the nearest tenth of a foot on grab collection logs (Appendix A).

Sampling was conducted during tidal heights less than 4 feet mean lower low water (MLLW) to avoid tidal inundation of the storm drain infrastructure. The predicted tide height based on National Oceanic and Atmospheric Administration (NOAA) predictions for Seattle, Washington, were used to identify acceptable sampling windows.

Field logs from previous sampling efforts (Windward 2011) were referenced to determine sampling windows during periods of no tidal inundation in storm drains. Ground elevations (in MLLW) of maintenance holes were derived from bare earth LiDAR[1] (Light Detection and Ranging) data using the ArcGIS functions. Approximate maintenance hole invert elevations were calculated by subtracting the depth-to-bottom measurement from the ground elevation.

## 2.2 Sample Processing

Sample processing was conducted in accordance with the QAPP Addendum (Anchor QEA 2015). Samples were placed in decontaminated stainless steel bowls and mixed until homogenous in color and texture using a decontaminated stainless steel mixing spoon. The sediment was then spooned into laboratory-supplied jars for analyses. The jars were kept on ice and transferred to ARI at the end of each day. A chain-of-custody form was logged by the processing staff and relinquished to the laboratory staff (Appendix A). Samples collected and submitted to ARI for analysis and archive are listed in Table 2. Grab sample photographs are included in Appendix B. Photographs from basins B-7, B-12, and B-22 were not collected due to limited time at locations with container traffic.

[1] Puget Sound LiDAR Consortium, 2000



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# 3 DATA QUALITY ASSESSMENT

This section provides information on data quality, including field and laboratory QC measures, data validation findings, and completeness.

## 3.1 Field Data Quality

All samples arrived at the laboratory within temperature requirements except for one (of three) coolers that arrived at 6.9° Celsius. Since samples were immediately stored in iced coolers, and brought to the laboratory within a few hours of collection, data quality objectives were not compromised.

One field duplicate was collected and extra volume was provided for a matrix spike and matrix spike duplicate sample, as required in the QAPP (Windward 2010). Field duplicate precision was less than or equal to 50% for all detected compounds and indicates good sample homogeneity. Field duplicates were reported consistent with Appendix D of the EW *Final Supplemental Remedial Investigation Report* (Windward and Anchor QEA 2014).

## 3.2 Analytical Data Quality

Data quality objectives and quality assurance procedures are provided in the QAPP (Windward 2010) and QAPP Addendum (Anchor QEA 2015). The data package was validated under Stage 2B guidelines by Laboratory Data Consultants in Carlsbad, California. The data validation report is provided in Appendix C. All data qualifiers applied to the data during final validation have been incorporated into the database for this project. All data were considered useable as reported or as qualified. Data qualifiers assigned during data validation include the following:

- "J" indicates that the associated numerical value is an estimated concentration
- "U" indicates a reporting limit below which the analyte was not detected
- "UJ" indicates an approximate reporting limit below which the analyte was not detected
- "R" indicates that the data are rejected and unusable for all purposes



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The validation process resulted in some J-qualified data (estimated values) based on a specified protocol or technical advisory, as stated in the data validation reports. Due to method blank contamination, some results were qualified as non-detect at slightly raised detection limits.

Benzyl alcohol was initially rejected in all samples due to zero percent recovery in the laboratory control sample; however, the laboratory re-extracted and reanalyzed all samples with acceptable batch QC sample recoveries. Only the reanalyzed data for this chemical are reported in the final data table. 4-Chloroaniline, 3,3'-dichlorobenzidine, and aniline were rejected in one sample due to zero percent recovery in the associated matrix spike and matrix spike duplicate samples.

Matrix interference required between a 3- and 12-fold dilution in most samples for the semivolatile organic compounds (SVOCs) analysis. This resulted in elevated detection limits (above marine AETs and/or SMS criteria) of hexachlorobenzene, 2,4-dimethylphenol, benzoic acid, benzyl alcohol, and hexachlorobutadiene in one or more samples. These compounds were analyzed using the lowest detection limit methods (dual scan selective ion monitoring method) available at ARI, so no further action could be conducted. Overall, detection limits were deemed acceptable to meet project objectives.

## 3.3 Data Completeness

Data completeness includes collection of required samples in the field and laboratory analysis for target chemicals as outlined in the project QAPP (Windward 2010) and QAPP Addendum (Anchor QEA 2015). Due to insufficient solids in all sampling basins, 15 of 18 target samples were collected and submitted for physical and chemical testing. Additional sampling in the three basins with insufficient solids may be conducted in the future.

Laboratory data completeness was measured by percentage of results reported by the analytical laboratory. Data completeness levels were set at 95% for all parameters, according to data quality objectives specified in the QAPP (Windward 2010). Usable results for all requested parameters were obtained with the exception of three rejected SVOC compounds, and laboratory completeness was measured at 99%.



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# 4 ANALYTICAL RESULTS

This section summarizes analytical results for SVOCs, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) Aroclors, dioxin/furans, mercury, total organic carbon (TOC), total solids (TS), and grain size, including any exceedances of marine sediment AET screening criteria (Ecology 2015). To support ISGP requirements, four additional samples collected from T-18 were analyzed for total petroleum hydrocarbons (TPH) and additional metals by method 6020A (antimony, beryllium, nickel, selenium, and thallium).

## 4.1 Physical Analysis Results

Fifteen samples were analyzed for physical sediment parameters, including TOC, TS, and grain size. Results of these analyses are shown in Table 3. TOC ranged from 1.12% to 13% with only five samples that fall within the EW 0.5% to 4% organic carbon-normalization range (Windward and Anchor QEA 2014). TS results were indicative of a mix of fine- and coarse-grained material, and ranged from 25.19% to 80.86%. Grain size analysis indicated that sediment samples were primarily composed of poorly graded sand, silty sand, and sandy silt. Due to the presence of organic matter, anthropogenic debris, and/or biota (shell fragments) the percentage of gravel reported for grain size analysis may be biased high for the following basins: B-1, B-7, B-19, B-21, B-22, B-28, and B-32. In general, the southern basins are more silty with higher TOC, and the northern locations are more sandy. Physical descriptions of storm drain solids collected in the field are available in Table 1 and on field collection forms in Appendix A.

## 4.2 Chemical Analysis Results

Fifteen samples were analyzed for SVOCs, PAHs, PCBs, and metals. Three samples were analyzed for dioxin/furans (based on past historical data). In addition, four samples were analyzed for TPH, and five samples were analyzed for additional metals per request from SSA Marine to help supplement data needs for their ISGP. Dry weight results were compared to SCUM II Marine Sediment AETs (Ecology 2015). Organic carbon-normalized (OC-normalized) results were calculated for nonionizable chemicals when the TOC was in range and screened against the benthic sediment cleanup objective (SCO) SMS criteria. As no specific storm solids quality standards exist, these comparisons are for screening purposes only.



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Complete results of these analyses including screening level exceedances are shown in Tables 3a (dry weight AETs[2]) and 3b (OC-normalized SMS). A summary of chemicals exceeding sediment screening levels is summarized in Section 4.3.

## 4.3 Screening Level Exceedances

Exceedances of the marine sediment AET SCO or cleanup screening level (CSL) of one or more compounds occurred in all sampled basins except B-16.

The information in Chart 1 is a summary of chemicals that exceed AET SCO or CSL screening levels at one or more location(s) in each terminal.

**Chart 1**
**Summary of Marine AET Screening Criteria Exceedances**

| Chemical | Number of Samples with Screening Criteria Exceedances | | | |
|---|---|---|---|---|
| | T-18 (12 samples collected) | T-25 (1 sample collected) | T-30 (1 sample collected) | T-102 (1 sample collected) |
| **Metals** | | | | |
| Arsenic | 1 | 0 | 0 | 0 |
| Cadmium | 1 | 0 | 0 | 0 |
| Copper | 1 | 0 | 0 | 0 |
| Lead | 1 | 0 | 0 | 0 |
| Mercury | 1 | 0 | 0 | 0 |
| Zinc | 10 | 1 | 0 | 1 |
| **Semivolatile Organic Compounds** | | | | |
| 2-methylphenol | 1 | 0 | 0 | 0 |
| 4-methylphenol | 1 | 0 | 0 | 0 |
| Benzoic acid | 1 | 0 | 0 | 0 |
| Benzyl alcohol | 2 | 0 | 0 | 0 |
| Bis(2-ethylhexy)phthalate | 8[a] | 0[b] | 0 | 1 |

[2] Dry weight AETs were previously referred to as LAET and 2LAET. For this document, they are referred to as AET SCO and AET CSL to be consistent with SCUM II guidance (Ecology 2015). Screening criteria are the same except for diethyl-phthalate and di-octyl-phthalate, which had no 2LAET criteria but now have AET CSL criteria.



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| Chemical | Number of Samples with Screening Criteria Exceedances | | | |
|---|---|---|---|---|
| | T-18 (12 samples collected) | T-25 (1 sample collected) | T-30 (1 sample collected) | T-102 (1 sample collected) |
| Butylbenzyl phthalate | 11[a] | 0 | 1 | 1 |
| Diethyl phthalate | 1 | 0 | 0 | 0 |
| Hexachlorobutadiene | 1[b] | 0 | 0 | 0 |
| N-nitrosodiphenylamine | 9 | 0 | 1 | 1 |
| Phenol | 1 | 0 | 0 | 0 |
| **Polycyclic Aromatic Hydrocarbons** | | | | |
| Anthracene | 1 | 0 | 0 | 0 |
| Chrysene | 1 | 0 | 0 | 0 |
| Flouranthene | 1 | 0 | 0 | 0 |
| Pyrene | 1 | 0 | 0 | 0 |
| Total LPAH | 1 | 0 | 0 | 0 |
| Total HPAH | 1 | 0 | 0 | 0 |
| PCB Aroclors | 5 | 0 | 0 | 0 |

Notes:
a. Three of these samples have organic carbon-normalized results that exceed Marine Sediment Management Standards criteria.
b. This sample has an organic carbon-normalized result that exceeds Marine Sediment Management Standards criteria.
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl

Exceedances of the SMS Marine SCO or CSL of one or more compounds occurred in four of the five sediment samples that fall within the 0.5% to 4% OC-normalization range (B-16, B-18, B-19, B-22, and B-32).

## 4.4 Comparisons to Historical Data

Table 4 summarizes detected chemical exceedances in this study compared to historical data from 2010 (Windward 2011) within the same basin. Twenty-two basins were sampled in 2010 from T-18, T-25, T-30, T-102, and T-104. Comparisons in Table 4 are made only for basins where sampling was conducted in this round of sampling. The relative percent difference between any two exceedance values were calculated and the change in concentration was qualified as an increase, decrease, or no change. Among specific



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compounds within the same basin, the comparison indicated 34 increased concentrations, 39 decreased concentrations, and 15 concentrations with no change.



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# 5 NEXT STEPS

The analytical results (Tables 3a and 3b), observed trends (Table 4), planned treatment installations, and other site-specific use information will be used to determine the need for additional source control efforts or investigations. This section provides a summary and rationale for next steps at each terminal. In general, the Port source control strategy for storm solids has comprised the following:

- Near-end-of-pipe sampling for all Port outfalls (2010)
- Review of current site activities in impacted basins
- Prioritized line cleanouts for locations greater than AET CSL or greater than 25 parts per trillion - toxic equivalency for dioxin/furans except for the following:
  - Common industrial runoff chemicals (i.e., phthalates, n-nitrosodiphenylamine, copper, and zinc)
  - Transient compounds potentially related to biogenic material (i.e., benzyl alcohol and benzoic acid)
- Re-sampling of cleaned lines when sediment has accumulated to evaluate impacts
- Identification of next steps in conjunction with other planned actions

## 5.1 Terminal 18

Twelve basins were sampled at T-18. Trends in chemical concentrations are variable across the terminal. One or more industrial stormwater runoff chemicals (zinc, copper, n-nitrosodiphenylamine, and phthalates) at concentrations above AETs were present in several basins. Elevated concentrations of various PAHs, SVOCs, PCBs, dioxins/furan, and/or metals were also present in some basins (Chart 1).

In addition to the solids sampling in this report, SSA Marine received an Administrative Order in August 2015 that requires installation of site-wide stormwater treatment systems to comply with their ISGP conditions. They conducted video line inspections of three basins where Phase 1 treatment systems will be installed (Figure 1). These basins include B-11, B-16, and B-17. The video inspection report is included as Attachment 1. Recommendations based on sediment sampling and inspections are summarized below:



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- Exceedance of AETs are limited to common industrial runoff contaminants. Basin B-7 had both increased and decreased concentrations of industrial runoff contaminants. Stormwater at T-18 is monitored under the ISGP program. Results from this monitoring will be used to determine what corrective actions may be required in the future.
- Basin B-10 had decreased concentrations of most industrial runoff contaminants but increased concentrations of PAHs, PCBs, cadmium, and mercury. This basin will have an in-line treatment system installed in the near future (Attachment 1). Additional investigations (i.e., video inspections) should be conducted in this basin to determine if additional sediment removal, line repairs, or other corrective actions are warranted.
- Basin B-11 had elevated concentrations of industrial runoff contaminants. Elevated concentrations of PCBs were still present but greatly reduced since the 2010 sampling event (1,000 µg/kg compared to 13,662 µg/kg), indicating that the Port and SSA Marine line cleaning and catch basin cleanouts successfully reduced concentrations of legacy contamination. Dioxin/furans were also reduced from 82.4 to 35.2 ng/kg. This basin will have an in-line treatment system installed in the near future. A recent video survey revealed sediment accumulation upstream of the outfall and a cracked pipe with infiltrating groundwater near the outfall. Additional pipe repairs are recommended in this basin (Attachment 1).
- Basin B-12 had both increased and decreased concentrations of industrial runoff contaminants. Other chemicals, including lead, several SVOCs, and PCBs, increased in concentration since the 2010 sampling. Additional investigations (i.e., video inspections) should be conducted in this basin to determine if line repairs or other corrective actions are warranted.
- Basin B-13 had both increased and decreased concentrations of industrial runoff contaminants. Stormwater at T-18 is monitored under the ISGP program. Results from this monitoring will be used to determine what corrective actions may be required in the future.
- Basin B-14 had a similar concentration of only one industrial runoff contaminant (butylbenzyl phthalate), but increased concentrations of arsenic, benzyl alcohol, and PCBs. Additional investigations (i.e., video inspections) should be conducted in this basin to determine if line repairs or other corrective actions are warranted.



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- Basin B-16 had decreased concentrations of all chemicals and no exceedances. This basin will have an in-line treatment system installed in the near future. A recent video survey revealed cracks with infiltrating groundwater in the pipe conveying stormwater to the treatment system. Pipe repair is recommended during installation of the treatment system (Attachment 1).
- Basin B-17 had both increased and decreased concentrations of industrial runoff contaminants. This basin will have an in-line treatment system installed in the near future. A recent video survey showed that the pipes in this basin are in good condition (Attachment 1).
- Basin B-18 had both increased and decreased concentrations of industrial runoff contaminants. Benzyl alcohol and hexachlorobutadiene are also slightly above AETs in this basin. Stormwater at T-18 is monitored under the ISGP program. Results from this monitoring will be used to determine what corrective actions may be required in the future.
- Basin B-19 had both increased and decreased concentrations of industrial runoff contaminants. Stormwater at T-18 is monitored under the ISGP program. Results from this monitoring will be used to determine what corrective actions may be required in the future.
- Basin B-21 had both increased and decreased concentrations of industrial runoff contaminants. PCBs increased in concentration since the 2010 sampling. Additional investigations (i.e., video inspections) should be conducted in this basin to determine if line repairs or other corrective actions are warranted.
- Basin B-22 had both increased and decreased concentrations of industrial runoff contaminants. Stormwater at T-18 is monitored under the ISGP program. Results from this monitoring will be used to determine what corrective actions may be required in the future.

## 5.2 Terminal 25

At T-25, basin B-32 showed decreases in all chemical concentrations since 2010, and only zinc was still above the AET. This basin will continue to be monitored under the ISGP to determine what corrective actions, if any, may be required in the future. Basin B-34 did not



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have sufficient solids accumulation and could not be sampled. The Port is scoping the installation of a sediment trap at this location.

## 5.3 Terminal 30

Only one basin was sampled as part of this work to evaluate a basin not previously sampled. Only butylbenzylphthalate and n-nitrosodiphenylamine exceeded AET criteria. No additional source control action is recommended at this terminal beyond routine operations and maintenance (O&M) under the ISGP requirements. Data from the 2010 near-end-of-pipe sampling from all remaining basins at T-30 either only contained exceedances of common industrial runoff chemicals, or were not above the AET CSL.

## 5.4 Terminal 102

At T-102, basin B-1 data indicated that most compounds decreased since line cleanout. Chemical concentrations for PAHs and PCBs have decreased below AETs, indicating that the 2013 line cleanout was effective at removing elevated concentrations of solids. Dioxin/furan concentrations also decreased. Only common industrial runoff compounds (zinc and n-nitrosodiphenylamine) concentrations had increases. Based on these data and current site use, no additional source control action is recommended at this terminal beyond routine O&M under the Port municipal permit.



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ED_006289_00002902-00022

# TABLES

## Table 1
## Near-End-Of-Pipe Storm Drain Solids Sample Locations and Descriptions

| Terminal | Drainage Basin ID | SSA Basin ID | Sample ID | Sample Date/Time | Northing[a] | Easting[a] | Sample Field Description[e] | Solids Sampled in Initial Study[b] |
|---|---|---|---|---|---|---|---|---|
| T-18 | B-7 | T18-22 | EW15-B7-MH03 | 6/4/2015 15:15 | 212974.48 | 1266654.96 | SILTY SAND (SM), olive gray, 60% fine sand, 40% fines. Occasional organic matter (wood). Slight petroleum-like odor. Trace sheen. | Yes |
| | B-10 | T18-20 | EW15-B10-MH01 | 6/4/2015 14:48 | 214087.90 | 1266949.27 | SILT (ML), dark gray to black, 90% fines, 10% fine sand. Trace organic matter (wood). | Yes |
| | B-11 | T18-19 | EW15-B11-MH03 | 6/5/2015 14:50 | 213696.52 | 1266369.52 | SANDY SILT (ML), dark gray to black, 60% fines, 40% fine sand. Trace anthropogenic debris. | No[c] |
| | B-12 | T18-18 | EW15-B12-MH01 | 6/5/2015 13:16 | 214444.39 | 1266891.45 | SILTY SAND (SM), olive gray with brown streaks, 60% fine sand, 40% fines. | Yes |
| | B-13 | T18-17 | EW15-B13-MH05 | 6/5/2015 15:10 | 214729.61 | 1266741.59 | SILTY SAND (SM), brownish gray, 75% fine sand, 25% fines. | Yes |
| | B-14 | T18-16 | EW15-B14-MH01 | 6/4/2015 14:00 | 215035.20 | 1266937.55 | SILT (ML), reddish brown, 90% fines, 10% fine sand. Trace sheen. | Yes |
| | B-16 | T18-15 | EW15-B16-MH01 | 6/4/2015 12:20 | 215341.61 | 1266744.13 | POORLY GRADED SAND (SP), dark gray, 95% fine sand, 5% fines. | Yes |
| | B-17 | T18-14 | EW15-B17-MH01 | 6/4/2015 13:30 | 215637.66 | 1266899.42 | SILT with SAND (ML), brownish gray, 80% fines, 20% fine sand. | Yes |
| | B-18 | T18-13 | EW15-B18-MH01 | 6/4/2015 11:50 | 215982.60 | 1266984.70 | POORLY GRADED SAND with SILT (SP-SM), sand grains are brown, gray, and black, 85% medium to coarse sand, 10% fines, and 5% fine gravel. Trace sheen. Slight petroleum-like odor. | Yes |
| | B-19 | T18-11 | EW15-B19-MH01 | 6/4/2015 11:15 | 216689.93 | 1267010.18 | POORLY GRADED SAND (SP), dark brownish gray, 95% medium sand, 5% fines. Contains pockets of silt. Contains biota (shell and barnacle fragments). | Yes |
| | B-21 | T18-10 | EW15-B21-MH02 | 6/4/2015 12:30 | 216675.05 | 1266733.50 | SILTY SAND (SM), brownish gray, 75% fine to medium sand, 25% fines. Contains biota (amphipod) and anthropogenic debris (plastic). | Yes |
| | B-22 | T18-9 | EW15-B22-MH01 | 6/4/2015 10:45 | 217187.70 | 1266987.50 | POORLY GRADED SAND WITH SILT (SP-SM), dark gray to black, 90% fine sand, 10% fines. Contains biota (amphipod, barnacle). | Yes |
| | B-23 | T18-8 | Not Sampled[d] | | | | | No[d] |
| | B-24 | T18-7 | Not Sampled[d] | | | | | Yes |
| T-25 | B-32 | -- | EW15-B32-MH01 | 6/5/2015 11:30 | 214082.58 | 1267960.91 | POORLY GRADED SAND (SP), sand grains are multi-colored, 90% medium to coarse sand, 5% fine gravel, 5% fines. Contains biota (mussel, shells, amphipod). | Yes |
| | B-34 | -- | Not Sampled[d] | | | | | Yes |
| T-30 | B-28 | -- | EW15-B28-MH05 | 6/5/2015 10:45 | 216339.98 | 1268360.04 | SILTY SAND (ML), dark gray to black, 60% fines, 30% fine sand, 10% fine to coarse gravel. Contains anthropogenic debris (nylon bristle, angular fragments). Slight petroleum-like odor. | No[d] |
| T-102 | B-1 | -- | EW15-B1-MH01 | 6/8/2015 12:45 | 211392.64 | 1266845.54 | ORGANIC SILT (OL), black, 95% fines, 5% fine sand. Substantial organic matter (leaf, tree needles, sticks, wood). Occasional anthropogenic debris (asphalt fragments). Moderate hydrogen sulfide-like odor. | Yes |

Notes:
a. Coordinates are in North American Datum of 1983, Washington State Plane North, U.S. Feet.
b. Windward (2011).
c. Basin B-11 was sampled by the Port as part of an ongoing sediment trap monitoring program in conjunction with Seattle Public Utilities.
d. Not sampled because of a lack of accumulated solids in accessible maintenance holes.
e. Field descriptions were based on field observations and not updated to reflect actual grain size analysis results. See Tables 3a and 3b for laboratory results.
T-18 = Terminal 18
T-25 = Terminal 25
T-30 = Terminal 30
T-102 = Terminal 102



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## Table 2
## Near-End-Of-Pipe Storm Drain Solids Sample Inventory

| Terminal | Sample ID | Samples Delivered to ARI | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Grain Size | TS/ TOC | Metals[a] | SVOCs | Dioxins/ Furans | TPH | Field Duplicate |
| T-18 | EW15-B7-MH03 | X | X | X[d] | X | -- | X | -- |
| | EW15-B10-MH01 | X | X | X | X | -- | -- | -- |
| | EW15-B11-MH03 | X | X | X[d] | X | X | X | -- |
| | EW15-B12-MH01 | X | X | X[d] | X | -- | X | -- |
| | EW15-B13-MH05 | X | X | X | X | -- | -- | -- |
| | EW15-B14-MH01 | X | X | X | X | -- | -- | -- |
| | EW15-B16-MH01 | X | X | X | X | X | -- | -- |
| | EW15-B17-MH01 | X | X | X | X | -- | -- | -- |
| | EW15-B18-MH01 | X | X | X | X | -- | -- | X[b] |
| | EW15-B19-MH01 | X | X | X | X | -- | -- | -- |
| | EW15-B21-MH02 | X | X | X | X | -- | -- | -- |
| | EW15-B22-MH01 | X | X | X[d] | X | -- | --[e] | -- |
| T-25 | EW15-B32-MH01 | X | X | X | X | -- | -- | -- |
| T-30 | EW15-B28-MH05 | X | X | X[d] | X | -- | X | X[c] |
| T-102 | EW15-B1-MH01 | X | X | X | X | X | -- | -- |

Notes:
a. Metals include mercury.
b. Field duplicate collected for SVOCs, PCBs, metals, mercury, TOC, and TS.
c. Field duplicate collected for grain size.
d. Additional metals run by Method SW6020A for antimony, beryllium, nickel, selenium, and thallium.
e. TPH analysis may be conducted on remaining frozen sample if there is sufficient volume.
ARI = Analytical Resources, Inc.
PCB = polychlorinated biphenyl
SVOC = semivolatile organic compound
T-18 = Terminal 18
T-25 = Terminal 25
T-30 = Terminal 30
T-102 = Terminal 102
TOC = total organic carbon
TPH = total petroleum hydrocarbons
TS = total solids

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 | T18 - B-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 | T18-13 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 | EW15-B18-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 | 1266984.70 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 | 215982.60 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | | | |
| **Conventional Parameters (percent)** | | | | | | | | | | | | | |
| Total organic carbon | Plumb 1981 | | | 7.7 | 11.1 | 13 | 10.4 | 10.8 | 6.97 | 5.68 | 1.12 | 10.1 | 2.1 |
| Total solids | SM2540G | | | 27.7 | 62.34 | 55.88 | 59.19 | 56.44 | 78.14 | 25.19 | 73.87 | 69.46 | 79.75 |
| **Grain Size (percent)** | | | | | | | | | | | | | |
| Gravel | PSEP | | | 23.5 | 42.3 | 1.9 | 2.6 | 3.1 | 4.8 | 0.6 | 1.1 | 25.2 | 31.7 |
| Total Sands | PSEP | | | 64.3 | 40.2 | 44.8 | 64.8 | 48.9 | 57.6 | 49.8 | 95 | 51.2 | 62.2 |
| Sand, very coarse | PSEP | | | 16.8 | 9.4 | 2.3 | 3.6 | 2.3 | 11.9 | 0.6 | 0.7 | 5.2 | 38.3 |
| Sand, coarse | PSEP | | | 16.5 | 10.2 | 5.4 | 9.8 | 5 | 8.7 | 2.6 | 12.8 | 5.5 | 17.3 |
| Sand, medium | PSEP | | | 14.8 | 12.2 | 14.5 | 18.8 | 13.5 | 10.4 | 33.3 | 54.9 | 10.1 | 4.6 |
| Sand, fine | PSEP | | | 10.6 | 6.1 | 13.8 | 19.3 | 15.8 | 12.9 | 8.3 | 23.8 | 16.3 | 1.3 |
| Sand, very fine | PSEP | | | 5.6 | 2.3 | 8.8 | 13.3 | 12.3 | 13.7 | 5 | 2.8 | 14.1 | 0.7 |
| Total Silt | PSEP | | | 10.4 | 14 | 41.4 | 27.4 | 36.3 | 31.1 | 40.7 | 3.8 U | 19.2 | 4.7 |
| Silt, coarse | PSEP | | | 1.4 | 3.3 | 8.9 | 8.7 | 8 | 10.8 | 5.2 | 3.8 U | 7.3 | 1.3 |
| Silt, medium | PSEP | | | 6.5 | 5.1 | 12.8 | 9.3 | 10.1 | 8.3 | 30.1 | 3.8 U | 4.3 | 1.4 |
| Silt, fine | PSEP | | | 1.7 | 3.6 | 12.6 | 5.5 | 10.1 | 6.4 | 3.5 | 3.8 U | 4.1 | 1.2 |
| Silt, very fine | PSEP | | | 0.8 | 2 | 7.1 | 3.9 | 8.1 | 5.6 | 1.9 | 3.8 U | 3.5 | 0.8 |
| Total Clay | PSEP | | | 1.7 | 3.5 | 11.9 | 5.2 | 11.7 | 6.4 | 8.9 | 3.8 U | 4.3 | 1.4 |
| Clay, coarse | PSEP | | | 0.4 | 1.2 | 4.3 | 1.8 | 4.4 | 3.5 | 0.8 | 3.8 U | 2.9 | 0.4 |
| Clay, medium | PSEP | | | 0.2 | 0.8 | 3.3 | 1.1 | 3.2 | 1.8 | 0.1 | 3.8 U | 0.4 | 0.2 |
| Clay, fine | PSEP | | | 1.1 | 1.5 | 4.3 | 2.3 | 4.1 | 1.1 | 8 | 3.8 U | 1 | 0.8 |
| Total Fines | PSEP | | | 12.1 | 17.5 | 53.3 | 32.6 | 48 | 37.5 | 49.6 | 3.8 U | 23.5 | 6.1 |
| **Metals (mg/kg)** | | | | | | | | | | | | | |
| Antimony | SW6020A | | | -- | 0.118 J | -- | 0.233 J | 0.5 J | -- | -- | -- | -- | -- |
| Arsenic | SW6010C | 57 | 93 | 15.7 J | 16 | 24 | 30 | 40 | 20 | 80 | 12 | 15.3 J | 14.8 J |
| Beryllium | SW6020A | | | -- | 0.223 J | -- | 0.247 J | 0.315 J | -- | -- | -- | -- | -- |
| Cadmium | SW6010C | 5.1 | 6.7 | 1.1 | 1.1 | 5.3 | 1.6 | 3.1 | 0.9 | 2 U | 0.3 U | 1 | 0.6 U |
| Chromium | SW6010C | 260 | 270 | 47 | 43.5 J | 71.5 J | 96 J | 113 J | 96 J | 38 J | 16.7 J | 79 J | 37 J |
| Copper | SW6010C | 390 | 390 | 130 | 100 J | 188 J | 691 J | 352 J | 173 J | 99 J | 27 J | 140 J | 97.6 J |
| Lead | SW6010C | 450 | 530 | 114 | 55 | 322 | 217 | 678 | 64 | 60 | 36 | 99 | 32 |
| Mercury | SW7471A | 0.41 | 0.59 | 0.14 | 0.08 | 0.56 | 0.16 | 0.36 | 0.22 | 0.16 | 0.0252 J | 0.09 | 0.03 |
| Nickel | SW6020A | | | -- | 28.8 | -- | 49.3 | 51.1 | -- | -- | -- | -- | -- |
| Selenium | SW6020A | | | -- | 0.41 J | -- | 0.49 J | 0.63 J | -- | -- | -- | -- | -- |
| Silver | SW6010C | 6.1 | 6.1 | 1 U | 0.4 U | 0.5 U | 0.2 J | 0.6 J | 0.9 U | 3 U | 0.4 U | 1 U | 0.9 U |
| Thallium | SW6020A | | | -- | 0.105 J | -- | 0.116 J | 0.158 J | -- | -- | -- | -- | -- |
| Zinc | SW6010C | 410 | 960 | 847 J | 625 | 1200 | 2030 | 1670 | 2050 | 309 | 85 | 2090 | 571 |
| **Semivolatile Organics (µg/kg)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | SW8270DSIM | 31 | 51 | 25 U | 29 U | 29 U | 28 U | 15 U[1] | 30 U | 14 U | 2.6 J | 28 U | 7.5 U[1] |
| 1,2-Dichlorobenzene | SW8270DSIM | 35 | 50 | 25 U | 29 U | 29 U | 28 U | 13 U[1] | 30 U | 14 U | 3 J | 28 U | 25 U |
| 1,3-Dichlorobenzene | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 1,4-Dichlorobenzene | SW8270DSIM | 110 | 110 | 57 | 29 U | 29 U | 100 | 49 U | 30 U | 14 U | 3.2 J | 28 U | 25 U |
| 2,2'-Oxybis (1-chloropropane) | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 2,4,5-Trichlorophenol | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2,4,6-Trichlorophenol | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2,4-Dichlorophenol | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2,4-Dimethylphenol[1] | SW8270DSIM | 29 | 29 | *51 U* | *59 U* | *59 U* | *58 U* | *99 U* | *60 U* | *30 U* | 9.7 UJ | *57 U* | *51 U* |

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 | T18 - B-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 | T18-13 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 | EW15-B18-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 | 1266984.70 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 | 215982.60 |
| Analyte | Method | SCO | CSL | | | | | | | | | | |
| 2,4-Dinitrophenol | SW8270D | | | 1000 U | 1200 U | 1200 U | 2300 U | 2000 U | 1200 U | 580 U | 190 U | 1100 U | 990 U |
| 2,4-Dinitrotoluene | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2,6-Dinitrotoluene | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2-Chloronaphthalene | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 2-Chlorophenol | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 2-Methylphenol (o-Cresol) | SW8270DSIM | 63 | 63 | 25 U | 29 U | 29 U | 28 U | **73** | 30 U | **7.8 J** | 4.8 UJ | 28 U | 25 U |
| 2-Nitroaniline | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 2-Nitrophenol | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 3,3'-Dichlorobenzidine | SW8270D | | | 500 UJ | 570 UJ | 580 UJ | 1100 UJ | 970 UJ | 590 UJ | 290 UJ | -- R | 560 UJ | 500 UJ |
| 3-Nitroaniline | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 UJ | 560 U | 500 U |
| 4-Bromophenyl-phenyl ether | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 4-Chloro-3-methylphenol | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 4-Chloroaniline | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | -- R | 560 U | 500 U |
| 4-Chlorophenyl phenyl ether | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 4-Methylphenol (p-Cresol) | SW8270D | 670 | 670 | **95 J** | 120 U | 120 U | 230 U | **680** | 120 U | 58 U | 19 UJ | 110 U | 99 U |
| 4-Nitroaniline | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| 4-Nitrophenol | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| Aniline | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | -- R | 560 U | 500 U |
| Benzoic acid[1] | SW8270D | 650 | 650 | 290 U | 340 U | 340 U | *670 U* | **1400 J** | 350 U | **350 J** | **75 J** | 330 U | 290 U |
| Benzyl alcohol[1] | SW8270DSIM | 57 | 73 | *410 U* | *80 U* | *150 U* | *96 U* | *68 U* | *71 U* | **80** | 12 U | 35 U | **98** |
| bis(2-Chloroethoxy)methane | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| bis(2-Chloroethyl)ether | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| bis(2-Ethylhexyl)phthalate | SW8270D | 1300 | 3100 | **6300** | **3700** | **11000** | **13000** | **6200** | **1400** | **640** | **120** | **1300** | **1000** |
| Butylbenzyl phthalate | SW8270DSIM | 63 | 900 | **270** | **960** | **640** | **760** | **160** | **680** | **73** | 4.8 U | **440** | **140** |
| Diethyl phthalate | SW8270D | 200 | 1200 | 100 U | 120 U | **1300** | 200 U[1] | 200 U | 120 U | 58 U | **47** | 110 U | 99 U |
| Dimethyl phthalate | SW8270DSIM | 71 | 160 | **19 J** | 29 U | **16 J** | **44** | 49 U | 30 U | 14 U | **2.9 J** | **27 J** | **21 J** |
| Di-n-butyl phthalate | SW8270D | 1400 | 1400 | **180** | 120 U | **93 J** | **150 J** | **97 J** | 120 U | **73** | 19 U | **56 J** | 99 U |
| Dinitro-o-cresol (4,6-Dinitro-2-methylphenol) | SW8270D | | | 1000 U | 1200 U | 1200 U | 2300 U | 2000 U | 1200 U | 580 U | 190 U | 1100 U | 990 U |
| Di-n-octyl phthalate | SW8270D | 6200 | 6200 | 100 U | 120 U | 120 U | 230 U | **490** | 120 U | 58 U | 19 U | 110 U | 99 U |
| Hexachlorobenzene[1] | SW8270DSIM | 22 | 70 | 11 U | 12 U | 12 U | 12 U | 21 U | 13 U | 6.1 U | **3.6 J** | 12 U | **14 J** |
| Hexachlorocyclopentadiene | SW8270D | | | 500 U | 570 U | 580 U | 1100 U | 970 U | 590 U | 290 U | 95 U | 560 U | 500 U |
| Hexachloroethane | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| Hexachlorobutadiene (Hexachloro-1,3-butadiene)[1] | SW8270DSIM | 11 | 120 | 7.1 U | 8.1 U | 8.3 U | 8.0 U | *14 U* | 8.4 U | 4.1 U | **2.8 J** | 7.9 U | **14 J** |
| Isophorone | SW8270D | | | 100 U | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| Nitrobenzene | SW8270D | | | 100 UJ | 120 UJ | 120 UJ | 230 UJ | 200 UJ | 120 UJ | 58 UJ | 19 UJ | 110 UJ | 99 UJ |
| n-Nitrosodimethylamine | SW8270DSIM | | | 120 U | 140 U | 140 U | 140 U | 240 U | 150 U | 73 U | 24 U | 140 U | 120 U |
| n-Nitrosodi-n-propylamine | SW8270DSIM | | | 100 U | 120 U | 120 U | 110 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| n-Nitrosodiphenylamine | SW8270DSIM | 28 | 40 | **180** | **67** | **160** | **190** | 22 U[1] | **53** | **21** | 4.8 U | **75** | **38** |
| Pentachlorophenol | SW8270DSIM | 360 | 690 | **60 J** | 120 U | **100 J** | 110 U | 200 U | 120 U | 58 U | **18 J** | 110 U | 99 U |
| Phenol | SW8270D | 420 | 1200 | **90 J** | **63 J** | **130** | **100 J** | **640** | 120 U | **52 J** | **35** | **56 J** | 99 U |
| **Polycyclic Aromatic Hydrocarbons (µg/kg)** | | | | | | | | | | | | | |
| 1-Methylnaphthalene | SW8270D | | | **110** | 120 U | **50 J** | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| 2-Methylnaphthalene | SW8270D | 670 | 670 | **250** | 120 U | **230** | **91 J** | 200 U | 120 U | **26 J** | 19 U | 110 U | 99 U |
| Acenaphthene | SW8270D | 500 | 500 | **65 J** | 120 U | 120 U | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| Acenaphthylene | SW8270D | 1300 | 1300 | **95 J** | 120 U | **150** | 230 U | 200 U | 120 U | **38 J** | **7.6 J** | 110 U | 99 U |



ED_006289_00002902-00027

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 | T18 - B-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 | T18-13 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 | EW15-B18-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 | 1266984.70 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 | 215982.60 |
| Analyte | Method | SCO | CSL | | | | | | | | | | |
| Anthracene | SW8270D | 960 | 960 | **280** | **69 J** | 4400 | **150 J** | 200 U | 120 U | **73** | **10 J** | **45 J** | 99 U |
| Benzo(a)anthracene | SW8270D | 1300 | 1600 | **380** | **140** | **900** | **410** | **140 J** | **110 J** | **96** | **23** | **120** | **65 J** |
| Benzo(a)pyrene | SW8270D | 1600 | 1600 | **460** | **220** | **760** | **380** | **170 J** | **150** | **160** | **24** | **170** | **80 J** |
| Benzo(g,h,i)perylene | SW8270D | 670 | 720 | **380** | **170** | **310** | **570** | **230** | **270** | **120** | **42** | **180** | **94 J** |
| Carbazole | SW8270D | | | **110 J** | 120 UJ | **1800 J** | 230 UJ | 200 UJ | 120 UJ | **32 J** | 19 UJ | 110 UJ | 99 UJ |
| Chrysene | SW8270D | 1400 | 2800 | **760** | 420 U | 1900 | 990 U | 350 U | 290 U | 230 U | 42 U | 300 U | 150 U |
| Dibenzo(a,h)anthracene | SW8270DSIM | 230 | 230 | **110** | **49** | **86** | **140** | **54** | **50** | **29** | **13** | **47** | **21 J** |
| Dibenzofuran | SW8270D | 540 | 540 | **75 J** | 120 U | **230** | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| Fluoranthene | SW8270D | 1700 | 2500 | **980** | **440** | 4300 | **940** | 490 U | 170 U | **220** | 51 U | 240 U | 200 U |
| Fluorene | SW8270D | 540 | 540 | 100 U | 120 U | **400** | 230 U | 200 U | 120 U | 58 U | 19 U | 110 U | 99 U |
| Indeno(1,2,3-c,d)pyrene | SW8270D | 600 | 690 | **260** | **110 J** | **270** | **300** | **130 J** | **130** | **110** | **27** | **120** | 99 U |
| Naphthalene | SW8270D | 2100 | 2100 | **280** | **57 J** | **180** | **150 J** | **88 J** | **47 J** | **52 J** | **20** | **67 J** | **30 J** |
| Phenanthrene | SW8270D | 1500 | 1500 | **640** | **160** | **1500** | **410** | **460** | **110 J** | **120** | **28** | **160** | **55 J** |
| Pyrene | SW8270D | 2600 | 3300 | **1500** | **640** | 4700 | **1100** | 430 U | 260 U | **240** | 50 U | 280 U | 300 U |
| Total Benzofluoranthenes (b,j,k) (U = 0) | | 3200 | 3600 | **1100** | 560 U | **2400** | 1000 U | 390 U | 300 U | **440** | 64 U | 440 U | 200 U |
| Total LPAH (SMS) (U = 0) | | 5200 | 5200 | **1360 J** | **286 J** | 6630 | **710 J** | **548 J** | **157 J** | **283 J** | **65.6 J** | **272 J** | **85 J** |
| Total HPAH (SMS) (U = 0) | | 12000 | 17000 | **5930** | **1769 J** | 15626 | **3840** | **724 J** | **710 J** | **1415** | **129** | **637** | **260 J** |
| **Dioxin Furans (ng/kg)** | | | | | | | | | | | | | |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | E1613B | | | **6.29** | -- | -- | **1.23** | -- | -- | -- | **0.259 J** | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | E1613B | | | **31.7** | -- | -- | **7.2** | -- | -- | -- | **0.626 J** | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | **31.4** | -- | -- | **8.91** | -- | -- | -- | 0.658 U | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | **66.6** | -- | -- | **22.7** | -- | -- | -- | **1.67** | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | **68.8** | -- | -- | **16.7** | -- | -- | -- | **1.39 J** | -- | -- |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD) | E1613B | | | **1140** | -- | -- | **456** | -- | -- | -- | **28.4** | -- | -- |
| 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | E1613B | | | **8490 J** | -- | -- | **4340 J** | -- | -- | -- | **212** | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | E1613B | | | **4.26** | -- | -- | **8.45** | -- | -- | -- | **0.915 J** | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | E1613B | | | **4.32** | -- | -- | **8.38** | -- | -- | -- | **0.694 J** | -- | -- |
| 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | E1613B | | | **5.72** | -- | -- | **13** | -- | -- | -- | **0.824 J** | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | **9.67 J** | -- | -- | **26.2** | -- | -- | -- | **0.983 J** | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | **11.3** | -- | -- | **19** | -- | -- | -- | **0.889 J** | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | E1613B | | | **3.67 J** | -- | -- | **8.35** | -- | -- | -- | 0.447 U | -- | -- |
| 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | **15.1** | -- | -- | **29.9** | -- | -- | -- | **1.23** | -- | -- |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) | E1613B | | | **131** | -- | -- | **245** | -- | -- | -- | **7.83** | -- | -- |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF) | E1613B | | | **6.45** | -- | -- | **19.1** | -- | -- | -- | **0.696 J** | -- | -- |
| 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | E1613B | | | **185** | -- | -- | **551** | -- | -- | -- | **15.6** | -- | -- |
| Total Tetrachlorodibenzo-p-dioxin (TCDD) | E1613B | | | **87.1 J** | -- | -- | **56.7 J** | -- | -- | -- | **6.28 J** | -- | -- |
| Total Pentachlorodibenzo-p-dioxin (PeCDD) | E1613B | | | **208** | -- | -- | **82.4 J** | -- | -- | -- | **7.39 J** | -- | -- |
| Total Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | **729 J** | -- | -- | **245** | -- | -- | -- | **16.1 J** | -- | -- |
| Total Heptachlorodibenzo-p-dioxin (HpCDD) | E1613B | | | **2360** | -- | -- | **977** | -- | -- | -- | **58.4 J** | -- | -- |
| Total Tetrachlorodibenzofuran (TCDF) | E1613B | | | **116 J** | -- | -- | **170 J** | -- | -- | -- | **19.1 J** | -- | -- |
| Total Pentachlorodibenzofuran (PeCDF) | E1613B | | | **162 J** | -- | -- | **218 J** | -- | -- | -- | **20.1 J** | -- | -- |
| Total Hexachlorodibenzofuran (HxCDF) | E1613B | | | **260 J** | -- | -- | **316** | -- | -- | -- | **17.2 J** | -- | -- |
| Total Heptachlorodibenzofuran (HpCDF) | E1613B | | | **298 J** | -- | -- | **501** | -- | -- | -- | **20.2 J** | -- | -- |
| Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2) | | | | **76.2926 J** | -- | -- | **35.2707 J** | -- | -- | -- | **2.35351 J** | -- | -- |
| Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0) | | | | **76.2926 J** | -- | -- | **35.2707 J** | -- | -- | -- | **2.29826 J** | -- | -- |



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## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 | T18 - B-18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 | T18-13 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 | EW15-B18-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 | 1266984.70 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 | 215982.60 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | | | |
| **PCB Aroclors (µg/kg)** | | | | | | | | | | | | | |
| Aroclor 1016 | SW8082A | | | 19 U | 19 U | 18 U | 19 U | 18 U | 18 U | 19 U | 18 U | 17 U | 19 U |
| Aroclor 1221 | SW8082A | | | 19 U | 19 U | 18 U | 19 U | 18 U | 18 U | 19 U | 18 U | 17 U | 19 U |
| Aroclor 1232 | SW8082A | | | 19 U | 19 U | 18 U | 19 U | 18 U | 18 U | 19 U | 18 U | 17 U | 19 U |
| Aroclor 1242 | SW8082A | | | 19 UJ | 19 UJ | 18 U | 19 UJ | 18 UJ | 18 UJ | 19 U | 18 UJ | 17 U | 19 U |
| Aroclor 1248 | SW8082A | | | 29 U | 19 U | 110 U | **140** | 730 U | 18 U | 19 U | 18 U | 17 U | 19 U |
| Aroclor 1254 | SW8082A | | | **66** | **65** | **650** | **380** | **1300** | **22** | **74 J** | **23** | 17 U | 19 U |
| Aroclor 1260 | SW8082A | | | 19 U | **24** | **260** | **480** | **390** | 18 U | **110** | **24** | 17 U | 19 U |
| Total PCB Aroclors (SMS Marine 2013) (U = 0) | | 130 | 1000 | **66 J** | **89 J** | **910** | **1000 J** | **1690 J** | **22 J** | **184 J** | **47 J** | 17 U | 19 U |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | | | | | | |
| Diesel range hydrocarbons | NWTPHD | | | -- | **490** | -- | **830** | **1100** | -- | -- | -- | -- | -- |
| Motor oil range hydrocarbons | NWTPHD | | | -- | **2800** | -- | **3200** | **4900** | -- | -- | -- | -- | -- |

Notes:
1. Method detection limit is reported.
2. Chemistry field duplicate is shown independently and averaged with the parent sample (consistent with East Waterway Data Summation Rules).

Detected concentration is greater than AET Marine SCO SCUM II screening level
Detected concentration is greater than AET Marine CSL SCUM II screening level
*Italic* = Non-detected concentration is above one or more identified screening levels
**Bold** = Detected result
µg/kg = microgram per kilogram
AET = Apparent Effects Threshold
CSL = cleanup screening level
J = Estimated value
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
PCB = polychlorinated biphenyl
R = Rejected
SCO = sediment cleanup objective
SMS = Sediment Management Standards
U = Compound analyzed, but not detected above detection limit
UJ = Compound analyzed, but not detected above estimated detection limit

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T30 - B-28 | T25 - B-32 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- | -- |
| Sample ID | | | | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B28-MH105 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | FD | N/FD[2] | N | N | N | N | FD | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1268272.59 | 1267960.91 |
| Y | | Marine | Marine | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 216357.31 | 214082.58 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | |
| **Conventional Parameters (percent)** | | | | | | | | | | | |
| Total organic carbon | Plumb 1981 | | | 2.56 | 2.33 | 2.64 | 6.11 | 2.92 | 4.63 | -- | 1.74 |
| Total solids | SM2540G | | | 79.18 | 79.47 | 75.61 | 76.21 | 78.21 | 64.34 | -- | 80.86 |
| **Grain Size (percent)** | | | | | | | | | | | |
| Gravel | PSEP | | | -- | 31.7 | 17.2 | 18.2 | 23.2 | 60 | 44.7 | 37 |
| Total Sands | PSEP | | | -- | 62.2 | 73.8 | 72.3 | 64.3 | 31.2 | 43.7 | 58.8 |
| Sand, very coarse | PSEP | | | -- | 38.3 | 23.5 | 15.1 | 4.4 | 6.8 | 10.1 | 37.3 |
| Sand, coarse | PSEP | | | -- | 17.3 | 24.3 | 12.6 | 9.4 | 7.1 | 10.9 | 16.6 |
| Sand, medium | PSEP | | | -- | 4.6 | 16.5 | 18.3 | 29.1 | 8.9 | 12.3 | 3.7 |
| Sand, fine | PSEP | | | -- | 1.3 | 6.3 | 18.8 | 17.5 | 5.6 | 6.9 | 0.7 |
| Sand, very fine | PSEP | | | -- | 0.7 | 3.2 | 7.5 | 3.9 | 2.8 | 3.5 | 0.5 |
| Total Silt | PSEP | | | -- | 4.7 | 6.9 | 7.3 | 8.9 | 7.1 | 9.6 | 3.2 |
| Silt, coarse | PSEP | | | -- | 1.3 | 1.9 | 2.3 | 0.7 | 1.4 | 1.2 | 1.4 |
| Silt, medium | PSEP | | | -- | 1.4 | 2 | 1.8 | 3.4 | 3.2 | 5.3 | 0.8 |
| Silt, fine | PSEP | | | -- | 1.2 | 1.7 | 1.8 | 2.7 | 1.7 | 2.3 | 0.6 |
| Silt, very fine | PSEP | | | -- | 0.8 | 1.3 | 1.4 | 2.1 | 0.8 | 0.8 | 0.4 |
| Total Clay | PSEP | | | -- | 1.4 | 2.1 | 2 | 3.5 | 1.5 | 1.9 | 1 |
| Clay, coarse | PSEP | | | -- | 0.4 | 0.7 | 0.7 | 1.1 | 0.4 | 0.5 | 0.2 |
| Clay, medium | PSEP | | | -- | 0.2 | 0.3 | 0.3 | 0.6 | 0.1 U | 0.1 | 0.1 U |
| Clay, fine | PSEP | | | -- | 0.8 | 1.1 | 1 | 1.8 | 1.1 | 1.3 | 0.8 |
| Total Fines | PSEP | | | -- | 6.1 | 9 | 9.3 | 12.4 | 8.6 | 11.5 | 4.2 |
| **Metals (mg/kg)** | | | | | | | | | | | |
| Antimony | SW6020A | | | -- | -- | -- | -- | 0.089 J | 0.111 J | -- | -- |
| Arsenic | SW6010C | 57 | 93 | 14 | 14 J | 20 | 14 | 15.1 J | 17 | -- | 12.7 J |
| Beryllium | SW6020A | | | -- | -- | -- | -- | 0.179 J | 0.3 | -- | -- |
| Cadmium | SW6010C | 5.1 | 6.7 | 0.3 | 0.3 | 0.6 U | 0.8 | 0.6 U | 0.22 J | -- | 0.7 |
| Chromium | SW6010C | 260 | 270 | 32.2 J | 35 J | 123 J | 116 J | 104 J | 61 J | -- | 67 J |
| Copper | SW6010C | 390 | 390 | 58.6 J | 78.1 J | 91.8 J | 85.6 J | 80.6 J | 58.7 J | -- | 50.2 J |
| Lead | SW6010C | 450 | 530 | 40 | 36 | 67 | 143 | 68 | 24 | -- | 46 |
| Mercury | SW7471A | 0.41 | 0.59 | 0.03 | 0.03 | 0.03 | 0.12 | 0.07 | 0.04 | -- | 0.0218 J |
| Nickel | SW6020A | | | -- | -- | -- | -- | 28.1 | 36.1 | -- | -- |
| Selenium | SW6020A | | | -- | -- | -- | -- | 0.28 J | 0.25 J | -- | -- |
| Silver | SW6010C | 6.1 | 6.1 | 0.4 U | 0.4 U | 0.9 U | 0.4 U | 0.9 U | 0.5 U | -- | 0.9 U |
| Thallium | SW6020A | | | -- | -- | -- | -- | 0.051 J | 0.056 J | -- | -- |
| Zinc | SW6010C | 410 | 960 | 626 | 599 | 930 | 599 | 597 | 321 | -- | 675 |
| **Semivolatile Organics (µg/kg)** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | SW8270DSIM | 31 | 51 | 8.9 U[1] | 7.5 U[1] | 8.6 U[1] | 28 U | 15 U | 29 U | -- | 14 U |
| 1,2-Dichlorobenzene | SW8270DSIM | 35 | 50 | 29 U | 25 U | 29 U | 28 U | 15 U | 29 U | -- | 14 U |
| 1,3-Dichlorobenzene | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 1,4-Dichlorobenzene | SW8270DSIM | 110 | 110 | 29 U | 25 U | 29 U | 28 U | 15 U | 29 U | -- | 14 U |
| 2,2'-Oxybis (1-chloropropane) | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 2,4,5-Trichlorophenol | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2,4,6-Trichlorophenol | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2,4-Dichlorophenol | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2,4-Dimethylphenol[1] | SW8270DSIM | 29 | 29 | *60 U* | *51 U* | *58 U* | *58 U* | *30 U* | *60 U* | -- | *29 U* |

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T30 - B-28 | T25 - B-32 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- | -- |
| Sample ID | | | | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B28-MH105 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | FD | N/FD[2] | N | N | N | N | FD | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1268272.59 | 1267960.91 |
| Y | | Marine | Marine | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 216357.31 | 214082.58 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | |
| 2,4-Dinitrophenol | SW8270D | | | 1200 U | 990 U | 1100 U | 1100 U | 580 U | 1200 U | -- | 560 U |
| 2,4-Dinitrotoluene | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2,6-Dinitrotoluene | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2-Chloronaphthalene | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 2-Chlorophenol | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 2-Methylphenol (o-Cresol) | SW8270DSIM | 63 | 63 | 29 U | 25 U | 29 U | 28 U | 15 U | 29 U | -- | 14 U |
| 2-Nitroaniline | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 2-Nitrophenol | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 3,3'-Dichlorobenzidine | SW8270D | | | 590 UJ | 500 UJ | 570 UJ | 570 UJ | 290 UJ | 590 UJ | -- | 280 UJ |
| 3-Nitroaniline | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 4-Bromophenyl-phenyl ether | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 4-Chloro-3-methylphenol | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 4-Chloroaniline | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 4-Chlorophenyl phenyl ether | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 4-Methylphenol (p-Cresol) | SW8270D | 670 | 670 | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 4-Nitroaniline | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| 4-Nitrophenol | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| Aniline | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| Benzoic acid[1] | SW8270D | 650 | 650 | 350 U | 290 U | 340 U | 340 U | 170 U | 350 U | -- | **250 J** |
| Benzyl alcohol[1] | SW8270DSIM | 57 | 73 | 35 U | 98 | *70 U* | 35 U | 34 U | 36 U | -- | 36 U |
| bis(2-Chloroethoxy)methane | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| bis(2-Chloroethyl)ether | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| bis(2-Ethylhexyl)phthalate | SW8270D | 1300 | 3100 | **1300** | **1150** | **2500** | **2200** | **2400** | **1300** | -- | **980** |
| Butylbenzyl phthalate | SW8270DSIM | 63 | 900 | **180** | **160** | **560** | **600** | **240** | **97** | -- | **48** |
| Diethyl phthalate | SW8270D | 200 | 1200 | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| Dimethyl phthalate | SW8270DSIM | 71 | 160 | **22 J** | **22 J** | **19 J** | **14 J** | **12 J** | 29 U | -- | 14 U |
| Di-n-butyl phthalate | SW8270D | 1400 | 1400 | 120 U | 99 U | 110 U | **74 J** | **35 J** | 120 U | -- | 56 U |
| Dinitro-o-cresol (4,6-Dinitro-2-methylphenol) | SW8270D | | | 1200 U | 990 U | 1100 U | 1100 U | 580 U | 1200 U | -- | 560 U |
| Di-n-octyl phthalate | SW8270D | 6200 | 6200 | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| Hexachlorobenzene[1] | SW8270DSIM | 22 | 70 | 12 U | **14 J** | 12 U | 12 U | 6.2 U | 12 U | -- | 5.9 U |
| Hexachlorocyclopentadiene | SW8270D | | | 590 U | 500 U | 570 U | 570 U | 290 U | 590 U | -- | 280 U |
| Hexachloroethane | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| Hexachlorobutadiene (Hexachloro-1,3-butadiene)[1] | SW8270DSIM | 11 | 120 | 8.3 U | **14 J** | 8.1 U | 8.1 U | 4.1 U | 8.4 U | -- | 4.0 U |
| Isophorone | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| Nitrobenzene | SW8270D | | | 120 UJ | 99 UJ | 110 UJ | 110 UJ | 58 UJ | 120 UJ | -- | 56 UJ |
| n-Nitrosodimethylamine | SW8270DSIM | | | 150 U | 120 U | 140 U | 140 U | 73 U | 150 U | -- | 70 U |
| n-Nitrosodi-n-propylamine | SW8270DSIM | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| n-Nitrosodiphenylamine | SW8270DSIM | 28 | 40 | **39** | **39** | **34** | **35** | **38** | **54** | -- | **7.6 J** |
| Pentachlorophenol | SW8270DSIM | 360 | 690 | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | **32 J** |
| Phenol | SW8270D | 420 | 1200 | 120 U | 99 U | 110 U | 110 U | **52 J** | **53 J** | -- | **56** |
| **Polycyclic Aromatic Hydrocarbons (µg/kg)** | | | | | | | | | | | |
| 1-Methylnaphthalene | SW8270D | | | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| 2-Methylnaphthalene | SW8270D | 670 | 670 | 120 U | 99 U | 110 U | 110 U | **20 J** | 120 U | -- | 56 U |
| Acenaphthene | SW8270D | 500 | 500 | 120 U | 99 U | 110 U | 110 U | 58 U | 120 U | -- | 56 U |
| Acenaphthylene | SW8270D | 1300 | 1300 | 120 U | 99 U | 110 U | 110 U | **29 J** | 120 U | -- | 56 U |

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T30 - B-28 | T25 - B-32 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- | -- |
| Sample ID | | | | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B28-MH105 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | FD | N/FD[2] | N | N | N | N | FD | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1268272.59 | 1267960.91 |
| Y | | Marine | Marine | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 216357.31 | 214082.58 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | |
| Anthracene | SW8270D | 960 | 960 | 120 U | 99 U | 110 U | 110 U | **160** | 120 U | -- | 56 U |
| Benzo(a)anthracene | SW8270D | 1300 | 1600 | **76 J** | **71 J** | **80 J** | **40 J** | **88** | **100 J** | -- | 56 U |
| Benzo(a)pyrene | SW8270D | 1600 | 1600 | **76 J** | **78 J** | **91 J** | 110 U | **85** | **120** | -- | **25 J** |
| Benzo(g,h,i)perylene | SW8270D | 670 | 720 | 120 U | **94 J** | **110** | 110 U | **96** | **210** | -- | **51 J** |
| Carbazole | SW8270D | | | 120 UJ | 99 UJ | 110 UJ | 110 UJ | **26 J** | 120 UJ | -- | 56 UJ |
| Chrysene | SW8270D | 1400 | 2800 | 160 U | 150 U | 230 U | 110 U | **270** | 300 U | -- | 79 U |
| Dibenzo(a,h)anthracene | SW8270DSIM | 230 | 230 | **17 J** | **17 J** | **28 J** | **15 J** | **18** | **60** | -- | **7.6 J** |
| Dibenzofuran | SW8270D | 540 | 540 | 120 U | 99 U | 110 U | 110 U | **20 J** | 120 U | -- | 56 U |
| Fluoranthene | SW8270D | 1700 | 2500 | 230 U | 200 U | 210 U | 110 U | **610** | 210 U | -- | 59 U |
| Fluorene | SW8270D | 540 | 540 | 120 U | 99 U | 110 U | 110 U | **29 J** | 120 U | -- | 56 U |
| Indeno(1,2,3-c,d)pyrene | SW8270D | 600 | 690 | 120 U | 99 U | **51 J** | 110 U | **44 J** | **120** | -- | 56 U |
| Naphthalene | SW8270D | 2100 | 2100 | 120 U | **30 J** | 110 U | 110 U | **32 J** | **41 J** | -- | 56 U |
| Phenanthrene | SW8270D | 1500 | 1500 | **70 J** | **63 J** | **100 J** | **51 J** | **190** | **110 J** | -- | **34 J** |
| Pyrene | SW8270D | 2600 | 3300 | 350 U | 300 U | 250 U | 110 U | **500** | 290 U | -- | 62 U |
| Total Benzofluoranthenes (b,j,k) (U = 0) | | 3200 | 3600 | 240 U | 200 U | 230 U | 230 U | 230 U | 310 U | -- | 110 U |
| Total LPAH (SMS) (U = 0) | | 5200 | 5200 | **70 J** | **78 J** | **100 J** | **51 J** | **440 J** | **151 J** | -- | **34 J** |
| Total HPAH (SMS) (U = 0) | | 12000 | 17000 | **169 J** | **215 J** | **360 J** | **55 J** | **1711 J** | **610 J** | -- | **83.6 J** |
| **Dioxin Furans (ng/kg)** | | | | | | | | | | | |
| 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,3,7,8-Tetrachlorodibenzofuran (TCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,7,8-Pentachlorodibenzofuran (PeCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,3,4,7,8-Pentachlorodibenzofuran (PeCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Tetrachlorodibenzo-p-dioxin (TCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Pentachlorodibenzo-p-dioxin (PeCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Hexachlorodibenzo-p-dioxin (HxCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Heptachlorodibenzo-p-dioxin (HpCDD) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Tetrachlorodibenzofuran (TCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Pentachlorodibenzofuran (PeCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Hexachlorodibenzofuran (HxCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Heptachlorodibenzofuran (HpCDF) | E1613B | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2) | | | | -- | -- | -- | -- | -- | -- | -- | -- |
| Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0) | | | | -- | -- | -- | -- | -- | -- | -- | -- |

## Table 3a
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results

| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T30 - B-28 | T25 - B-32 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- | -- |
| Sample ID | | | | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B28-MH105 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | FD | N/FD[2] | N | N | N | N | FD | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | AET | AET | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1268272.59 | 1267960.91 |
| Y | | Marine | Marine | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 216357.31 | 214082.58 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | |
| **PCB Aroclors (µg/kg)** | | | | | | | | | | | |
| Aroclor 1016 | SW8082A | | | 20 U | 19 U | 17 U | 18 U | 20 U | 19 U | -- | 17 U |
| Aroclor 1221 | SW8082A | | | 20 U | 19 U | 17 U | 18 U | 20 U | 19 U | -- | 17 U |
| Aroclor 1232 | SW8082A | | | 20 U | 19 U | 26 U | 18 U | 20 U | 19 U | -- | 17 U |
| Aroclor 1242 | SW8082A | | | 20 U | 19 U | 17 U | 18 U | 20 U | 19 UJ | -- | 17 UJ |
| Aroclor 1248 | SW8082A | | | 20 U | 19 U | 17 U | 18 U | 20 U | 19 U | -- | 17 U |
| Aroclor 1254 | SW8082A | | | **20** | **20** | 17 U | 180 U | 29 U | 19 U | -- | **34** |
| Aroclor 1260 | SW8082A | | | **13 J** | **13 J** | 17 U | **500** | **67 J** | 19 U | -- | **41** |
| Total PCB Aroclors (SMS Marine 2013) (U = 0) | | 130 | 1000 | **33 J** | **33 J** | 26 U | **500** | **67 J** | 19 UJ | -- | **75 J** |
| **Total Petroleum Hydrocarbons (mg/kg)** | | | | | | | | | | | |
| Diesel range hydrocarbons | NWTPHD | | | -- | -- | -- | -- | -- | **150** | -- | -- |
| Motor oil range hydrocarbons | NWTPHD | | | -- | -- | -- | -- | -- | **620** | -- | -- |

Notes:
1. Method detection limit is reported.
2. Chemistry field duplicate is shown independently and averaged with the parent sample (consistent with East Waterway Data Summation Rules).

Detected concentration is greater than AET Marine SCO SCUM II screening level
Detected concentration is greater than AET Marine CSL SCUM II screening level
*Italic* = Non-detected concentration is above one or more identified screening levels
**Bold** = Detected result
µg/kg = microgram per kilogram
AET = Apparent Effects Threshold
CSL = cleanup screening level
J = Estimated value
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
PCB = polychlorinated biphenyl
R = Rejected
SCO = sediment cleanup objective
SMS = Sediment Management Standards
U = Compound analyzed, but not detected above detection limit
UJ = Compound analyzed, but not detected above estimated detection limit



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## Table 3b
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results – Organic Carbon-normalized

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | SMS | SMS | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | | |
| **Conventional Parameters (percent)** | | | | | | | | | | | | |
| Total organic carbon | Plumb 1981 | | | **7.7** | **11.1** | **13** | **10.4** | **10.8** | **6.97** | **5.68** | **1.12** | **10.1** |
| Total solids | SM2540G | | | **27.7** | **62.34** | **55.88** | **59.19** | **56.44** | **78.14** | **25.19** | **73.87** | **69.46** |
| **Semivolatile Organics (mg/kg-OC)** | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | SW8270DSIM | 0.81 | 1.8 | 0.325 U | 0.261 U | 0.223 U | 0.269 U | 0.454 U | 0.43 U | 0.246 U | **0.2321 J** | 0.277 U |
| 1,2-Dichlorobenzene | SW8270DSIM | 2.3 | 2.3 | 0.325 U | 0.261 U | 0.223 U | 0.269 U | 0.454 U | 0.43 U | 0.246 U | **0.2679 J** | 0.277 U |
| 1,4-Dichlorobenzene | SW8270DSIM | 3.1 | 9 | **0.74** | 0.261 U | 0.223 U | **0.962** | 0.454 U | 0.43 U | 0.246 U | **0.2857 J** | 0.277 U |
| bis(2-Ethylhexyl)phthalate | SW8270D | 47 | 78 | **81.818** | **33.333** | **84.615** | **125** | **57.407** | **20.086** | **11.268** | **10.714** | **12.871** |
| Butylbenzyl phthalate | SW8270DSIM | 4.9 | 64 | **3.506** | **8.649** | **4.923** | **7.308** | **1.481** | **9.756** | **1.285** | 0.4286 U | **4.356** |
| Diethyl phthalate | SW8270D | 61 | 110 | 1.299 U | 1.081 U | **10** | 2.212 U | 1.852 U | 1.722 U | 1.021 U | **4.196** | 1.089 U |
| Dimethyl phthalate | SW8270DSIM | 53 | 53 | **0.247 J** | 0.261 U | **0.123 J** | **0.423** | 0.454 U | 0.43 U | 0.246 U | **0.2589 J** | **0.267 J** |
| Di-n-butyl phthalate | SW8270D | 220 | 1700 | **2.338** | 1.081 U | **0.715 J** | **1.442 J** | **0.898 J** | 1.722 U | **1.285** | 1.696 U | **0.554 J** |
| Di-n-octyl phthalate | SW8270D | 58 | 4500 | 1.299 U | 1.081 U | 0.923 U | 2.212 U | **4.537** | 1.722 U | 1.021 U | 1.696 U | 1.089 U |
| Hexachlorobenzene[1] | SW8270DSIM | 0.38 | 2.3 | 0.143 U | 0.108 U | 0.092 U | 0.115 U | 0.194 U | 0.187 U | 0.107 U | **0.3214 J** | 0.119 U |
| Hexachlorobutadiene (Hexachloro-1,3-butadiene) | SW8270DSIM | 3.9 | 6.2 | 0.325 U | 0.261 U | 0.223 U | 0.269 U | 0.454 U | 0.43 U | 0.246 U | **0.25 J** | 0.277 U |
| n-Nitrosodiphenylamine | SW8270DSIM | 11 | 11 | **2.338** | **0.604** | **1.231** | **1.827** | 0.454 U | **0.76** | **0.37** | 0.4286 U | **0.743** |
| **Polycyclic Aromatic Hydrocarbons (mg/kg-OC)** | | | | | | | | | | | | |
| 2-Methylnaphthalene | SW8270D | 38 | 64 | **3.247** | 1.081 U | **1.769** | **0.875 J** | 1.852 U | 1.722 U | **0.458 J** | 1.696 U | 1.089 U |
| Acenaphthene | SW8270D | 16 | 57 | **0.844 J** | 1.081 U | 0.923 U | 2.212 U | 1.852 U | 1.722 U | 1.021 U | 1.696 U | 1.089 U |
| Acenaphthylene | SW8270D | 66 | 66 | **1.234 J** | 1.081 U | **1.154** | 2.212 U | 1.852 U | 1.722 U | **0.669 J** | **0.6786 J** | 1.089 U |
| Anthracene | SW8270D | 220 | 1200 | **3.636** | **0.622 J** | **33.846** | **1.442 J** | 1.852 U | 1.722 U | **1.285** | **0.893 J** | **0.446 J** |
| Benzo(a)anthracene | SW8270D | 110 | 270 | **4.935** | **1.261** | **6.923** | **3.942** | **1.296 J** | **1.578 J** | **1.69** | **2.054** | **1.188** |
| Benzo(a)pyrene | SW8270D | 99 | 210 | **5.974** | **1.982** | **5.846** | **3.654** | **1.574 J** | **2.152** | **2.817** | **2.143** | **1.683** |
| Benzo(g,h,i)perylene | SW8270D | 31 | 78 | **4.935** | **1.532** | **2.385** | **5.481** | **2.13** | **3.874** | **2.113** | **3.75** | **1.782** |
| Chrysene | SW8270D | 110 | 460 | **9.87** | 3.784 U | **14.615** | 9.519 U | 3.241 U | 4.161 U | 4.049 U | 3.75 U | 2.97 U |
| Dibenzo(a,h)anthracene | SW8270DSIM | 12 | 33 | **1.429** | **0.441** | **0.662** | **1.346** | **0.5** | **0.717** | **0.511** | **1.161** | **0.465** |
| Dibenzofuran | SW8270D | 15 | 58 | **0.974 J** | 1.081 U | **1.769** | 2.212 U | 1.852 U | 1.722 U | 1.021 U | 1.696 U | 1.089 U |
| Fluoranthene | SW8270D | 160 | 1200 | **12.727** | **3.964** | **33.077** | **9.038** | 4.537 U | 2.439 U | **3.873** | 4.554 U | 2.376 U |
| Fluorene | SW8270D | 23 | 79 | 1.299 U | 1.081 U | **3.077** | 2.212 U | 1.852 U | 1.722 U | 1.021 U | 1.696 U | 1.089 U |
| Indeno(1,2,3-c,d)pyrene | SW8270D | 34 | 88 | **3.377** | **0.991 J** | **2.077** | **2.885** | **1.204 J** | **1.865** | **1.937** | **2.411** | **1.188** |
| Naphthalene | SW8270D | 99 | 170 | **3.636** | **0.514 J** | **1.385** | **1.442 J** | **0.815 J** | **0.674 J** | **0.915 J** | **1.786** | **0.663 J** |
| Phenanthrene | SW8270D | 100 | 480 | **8.312** | **1.441** | **11.538** | **3.942** | **4.259** | **1.578 J** | **2.113** | **2.5** | **1.584** |
| Pyrene | SW8270D | 1000 | 1400 | **19.481** | **5.766** | **36.154** | **10.577** | 3.981 U | 3.73 U | **4.225** | 4.464 U | 2.772 U |
| Total Benzofluoranthenes (b,j,k) (U = 0) | | 230 | 450 | **14.286** | 5.045 U | **18.462** | 9.615 U | 3.611 U | 4.304 U | **7.746** | 5.714 U | 4.356 U |
| Total LPAH (SMS) (U = 0) | | 370 | 780 | **17.662 J** | **2.577 J** | **51** | **6.827 J** | **5.074 J** | **2.253 J** | **4.982 J** | **5.8571 J** | **2.693 J** |
| Total HPAH (SMS) (U = 0) | | 960 | 5300 | **77.013** | **15.937 J** | **120.2** | **36.923** | **6.704 J** | **10.187 J** | **24.912** | **11.518** | **6.307** |

## Table 3b
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results – Organic Carbon-normalized

| Location ID | | | | T102 - B-1 | T18 - B-7 | T18 - B-10 | T18 - B-11 | T18 - B-12 | T18 - B-13 | T18 - B-14 | T18 - B-16 | T18 - B-17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SSA Basin ID | | | | -- | T18-22 | T18-20 | T18-19 | T18-18 | T18-17 | T18-16 | T18-15 | T18-14 |
| Sample ID | | | | EW15-B1-MH01 | EW15-B7-MH03 | EW15-B10-MH01 | EW15-B11-MH03 | EW15-B12-MH01 | EW15-B13-MH05 | EW15-B14-MH01 | EW15-B16-MH01 | EW15-B17-MH01 |
| Sample Date | | | | 6/8/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 | 6/5/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 |
| Sample Type | | | | N | N | N | N | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | SMS | SMS | 1266845.54 | 1266654.96 | 1266949.27 | 1266369.52 | 1266891.45 | 1266741.59 | 1266937.55 | 1266744.13 | 1266899.42 |
| Y | | Marine | Marine | 211392.64 | 212974.48 | 214087.90 | 213696.52 | 214444.39 | 214729.61 | 215035.20 | 215341.61 | 215637.66 |
| **Analyte** | **Method** | **SCO** | **CSL** | | | | | | | | | |
| **PCB Aroclors (mg/kg-OC)** | | | | | | | | | | | | |
| Total PCB Aroclors (SMS Marine 2013) (U = 0) | | 12 | 65 | **0.857 J** | **0.802 J** | **7** | **9.615 J** | **15.648 J** | **0.316 J** | **3.239 J** | **4.196 J** | 0.168 U |

Notes:
1. Method detection limit is reported.
2. Field duplicates are shown independently and averaged with the parent sample (consist with East Waterway Data Summation Rules).

Detected concentration is greater than SMS Marine SCO SCUM II screening level
Detected concentration is greater than SMS Marine CSL SCUM II screening level
*Italic* = Non-detected concentration is above one or more identified screening levels
**Bold = Detected result**
µg/kg = microgram per kilogram
CSL = cleanup screening level
J = Estimated value
mg/kg = milligram per kilogram
OC = organic carbon-normalized
PCB = polychlorinated biphenyl
R = Rejected
SCO = sediment cleanup objective
SMS = Sediment Management Standards
U = Compound analyzed, but not detected above detection limit
UJ = Compound analyzed, but not detected above estimated detection limit

## Table 3b
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results – Organic Carbon-normalized

| Analyte | Method | SMS Marine SCO | SMS Marine CSL | T18 - B-18 | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T25 - B-32 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T25 - B-32 |
| SSA Basin ID | | | | T18-13 | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- |
| Sample ID | | | | EW15-B18-MH01 | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | N | FD | N/FD[2] | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | | | 1266984.70 | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1267960.91 |
| Y | | | | 215982.60 | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 214082.58 |
| **Conventional Parameters (percent)** | | | | | | | | | | | |
| Total organic carbon | Plumb 1981 | | | **2.1** | **2.56** | **2.33** | **2.64** | **6.11** | **2.92** | **4.63** | **1.74** |
| Total solids | SM2540G | | | **79.75** | **79.18** | **79.47** | **75.61** | **76.21** | **78.21** | **64.34** | **80.86** |
| **Semivolatile Organics (mg/kg-OC)** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | SW8270DSIM | 0.81 | 1.8 | 0.357 U[1] | 0.348 U[1] | 0.348 U[1] | 0.326 U[1] | 0.458 U | 0.514 U | 0.626 U | 0.805 U |
| 1,2-Dichlorobenzene | SW8270DSIM | 2.3 | 2.3 | 1.19 U | 1.133 U | 1.133 U | 1.098 U | 0.458 U | 0.514 U | 0.626 U | 0.805 U |
| 1,4-Dichlorobenzene | SW8270DSIM | 3.1 | 9 | 1.19 U | 1.133 U | 1.133 U | 1.098 U | 0.458 U | 0.514 U | 0.626 U | 0.805 U |
| bis(2-Ethylhexyl)phthalate | SW8270D | 47 | 78 | **47.619** | **50.781** | **49.200** | **94.697** | **36.007** | **82.192** | **28.078** | **56.322** |
| Butylbenzyl phthalate | SW8270DSIM | 4.9 | 64 | **6.667** | **7.031** | **6.849** | **21.212** | **9.82** | **8.219** | **2.095** | **2.759** |
| Diethyl phthalate | SW8270D | 61 | 110 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | 1.986 U | 2.592 U | 3.218 U |
| Dimethyl phthalate | SW8270DSIM | 53 | 53 | **1 J** | **0.859 J** | **1 J** | **0.72 J** | **0.229 J** | **0.411 J** | 0.626 U | 0.805 U |
| Di-n-butyl phthalate | SW8270D | 220 | 1700 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | **1.211 J** | **1.199 J** | 2.592 U | 3.218 U |
| Di-n-octyl phthalate | SW8270D | 58 | 4500 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | 1.986 U | 2.592 U | 3.218 U |
| Hexachlorobenzene[1] | SW8270DSIM | 0.38 | 2.3 | **0.667 J** | *0.469 U* | **0.667 J** | *0.455 U* | 0.196 U | 0.212 U | 0.259 U | 0.339 U |
| Hexachlorobutadiene (Hexachloro-1,3-butadiene) | SW8270DSIM | 3.9 | 6.2 | **0.667 J** | 1.133 U | 0.667 J | 1.098 U | 0.458 U | 0.514 U | 0.626 U | 0.805 U |
| n-Nitrosodiphenylamine | SW8270DSIM | 11 | 11 | **1.81** | **1.523** | **1.67** | **1.288** | **0.573** | **1.301** | **1.166** | **0.4368 J** |
| **Polycyclic Aromatic Hydrocarbons (mg/kg-OC)** | | | | | | | | | | | |
| 2-Methylnaphthalene | SW8270D | 38 | 64 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | **0.685 J** | 2.592 U | 3.218 U |
| Acenaphthene | SW8270D | 16 | 57 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | 1.986 U | 2.592 U | 3.218 U |
| Acenaphthylene | SW8270D | 66 | 66 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | **0.993 J** | 2.592 U | 3.218 U |
| Anthracene | SW8270D | 220 | 1200 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | **5.479** | 2.592 U | 3.218 U |
| Benzo(a)anthracene | SW8270D | 110 | 270 | **3.095 J** | **2.969 J** | **3.032 J** | **3.03 J** | **0.655 J** | **3.014** | **2.16 J** | 3.218 U |
| Benzo(a)pyrene | SW8270D | 99 | 210 | **3.81 J** | **2.969 J** | **3.39 J** | **3.447 J** | 1.8 U | **2.911** | **2.592** | **1.437 J** |
| Benzo(g,h,i)perylene | SW8270D | 31 | 78 | **4.476 J** | 4.688 U | **4.476 J** | **4.167** | 1.8 U | **3.288** | **4.536** | **2.931 J** |
| Chrysene | SW8270D | 110 | 460 | 7.143 U | 6.25 U | 6.25 U | 8.712 U | 1.8 U | **9.247** | 6.479 U | 4.54 U |
| Dibenzo(a,h)anthracene | SW8270DSIM | 12 | 33 | **1 J** | **0.664 J** | **1 J** | **1.061 J** | **0.245 J** | **0.616** | **1.296** | **0.4368 J** |
| Dibenzofuran | SW8270D | 15 | 58 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | **0.685 J** | 2.592 U | 3.218 U |
| Fluoranthene | SW8270D | 160 | 1200 | 9.524 U | 8.984 U | 8.984 U | 7.955 U | 1.8 U | **20.89** | 4.536 U | 3.391 U |
| Fluorene | SW8270D | 23 | 79 | 4.714 U | 4.688 U | 4.688 U | 4.167 U | 1.8 U | **0.993 J** | 2.592 U | 3.218 U |
| Indeno(1,2,3-c,d)pyrene | SW8270D | 34 | 88 | 4.714 U | 4.688 U | 4.688 U | **1.932 J** | 1.8 U | **1.507 J** | **2.592** | 3.218 U |
| Naphthalene | SW8270D | 99 | 170 | **1.429 J** | 4.688 U | **1.429 J** | 4.167 U | 1.8 U | **1.096 J** | **0.886 J** | 3.218 U |
| Phenanthrene | SW8270D | 100 | 480 | **2.619 J** | **2.734 J** | **2.677 J** | **3.788 J** | **0.835 J** | **6.507** | **2.376 J** | **1.954 J** |
| Pyrene | SW8270D | 1000 | 1400 | 14.286 U | 13.672 U | 13.672 U | 9.47 U | 1.8 U | **17.123** | 6.263 U | 3.563 U |
| Total Benzofluoranthenes (b,j,k) (U = 0) | | 230 | 450 | 9.524 U | 9.375 U | 9.375 U | 8.712 U | 3.764 U | 7.877 U | 6.695 U | 6.322 U |
| Total LPAH (SMS) (U = 0) | | 370 | 780 | **4.048 J** | **2.734 J** | **3.391 J** | **3.788 J** | **0.835 J** | **15.068 J** | **3.261 J** | **1.954 J** |
| Total HPAH (SMS) (U = 0) | | 960 | 5300 | **12.381 J** | **6.602 J** | **9.492 J** | **13.636 J** | **0.9 J** | **58.596 J** | **13.175 J** | **4.8046 J** |

## Table 3b
## Near-End-Of-Pipe Storm Drain Solids Summary Analytical Results – Organic Carbon-normalized

| Analyte | Method | SMS Marine SCO | SMS Marine CSL | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Location ID | | | | T18 - B-18 | T18 - B-18 | T18 - B-18 | T18 - B-19 | T18 - B-21 | T18 - B-22 | T30 - B-28 | T25 - B-32 |
| SSA Basin ID | | | | T18-13 | T18-13 | T18-13 | T18-11 | T18-10 | T18-9 | -- | -- |
| Sample ID | | | | EW15-B18-MH01 | EW15-B18-MH101 | EW15-B18-MH01/-MH101 | EW15-B19-MH01 | EW15-B21-MH02 | EW15-B22-MH01 | EW15-B28-MH05 | EW15-B32-MH01 |
| Sample Date | | | | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/4/2015 | 6/5/2015 | 6/5/2015 |
| Sample Type | | | | N | FD | N/FD[2] | N | N | N | N | N |
| Matrix | | | | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids | Storm Solids |
| X | | | | 1266984.70 | 1266984.70 | 1266984.70 | 1267010.18 | 1266733.50 | 1266987.50 | 1268272.59 | 1267960.91 |
| Y | | | | 215982.60 | 215982.60 | 215982.60 | 216689.93 | 216615.05 | 217187.70 | 216357.31 | 214082.58 |
| **PCB Aroclors (mg/kg-OC)** | | | | | | | | | | | |
| Total PCB Aroclors (SMS Marine 2013) (U = 0) | | 12 | 65 | 0.905 U | **1.289 J** | **1.289 J** | 0.985 U | **8.183** | **2.295 J** | 0.41 UJ | **4.31 J** |

Notes:
1. Method detection limit is reported.
2. Field duplicates are shown independently and averaged with the parent sample (consist with East Waterway Data Summation Rules).

Detected concentration is greater than SMS Marine SCO SCUM II screening level
Detected concentration is greater than SMS Marine CSL SCUM II screening level
*Italic* = Non-detected concentration is above one or more identified screening levels
**Bold = Detected result**
µg/kg = microgram per kilogram
CSL = cleanup screening level
J = Estimated value
mg/kg = milligram per kilogram
OC = organic carbon-normalized
PCB = polychlorinated biphenyl
R = Rejected
SCO = sediment cleanup objective
SMS = Sediment Management Standards
U = Compound analyzed, but not detected above detection limit
UJ = Compound analyzed, but not detected above estimated detection limit

## Table 4
## Summary of Apparent Effects Threshold Exceedances

| Drainage Basin ID | SSA Basin ID | Chemical (units) | 2010 AET Exceedances[a,b,e,f] | 2015 AET Exceedances[a,e,f] | Relative Percent Difference (%) | Change in Concentration[d] |
|---|---|---|---|---|---|---|
| **Terminal 102** | | | | | | |
| **B-1** | -- | zinc (mg/kg) | **480** | **847** | 55.3 | Increase |
| | | anthracene (µg/kg) | **1000** | **280** | 112.5 | Decrease |
| | | fluoranthene (µg/kg) | **3900** | **980** | 119.7 | Decrease |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **11000** | **6300** | 54.3 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **250** | **270** | 7.7 | No change |
| | | n-Nitrosodiphenylamine (µg/kg) | *6.1* | **180** | 186.9 | Increase |
| | | Total PCB Aroclors (µg/kg) | **260** | **66** | 119.0 | Decrease |
| | | D/F (ng/kg) | **148** | **76.29** | 63.9 | Decrease |
| **Terminal 18** | | | | | | |
| **B-7** | **T18-22** | zinc (mg/kg) | **296** | **625** | 71.4 | Increase |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **980** | **3700** | 116.2 | Increase |
| | | butylbenzyl phthalate (µg/kg) | **820** | **960** | 15.7 | No change |
| | | dimethyl phthalate (µg/kg) | **96** | *29* | 107.2 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **12** | **67** | 139.2 | Increase |
| **B-10** | **T18-20** | cadmium (mg/kg) | **1.2** | **5.3** | 126.2 | Increase |
| | | mercury (mg/kg) | **0.07** | **0.56** | 155.6 | Increase |
| | | zinc (mg/kg) | **1180** | **1200** | 1.7 | No change |
| | | anthracene (µg/kg) | **72** | **4400** | 193.6 | Increase |
| | | chrysene (µg/kg) | **690** | **1900** | 93.4 | Increase |
| | | fluoranthene (µg/kg) | **700** | **4300** | 144.0 | Increase |
| | | pyrene (µg/kg) | **360** | **4700** | 171.5 | Increase |
| | | total LPAH (µg/kg) | **330** | **6630** | 181.0 | Increase |
| | | total HPAH (µg/kg) | **3300** | **15626** | 130.3 | Increase |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **11000** | **11000** | 0.0 | No change |
| | | benzyl alcohol (µg/kg) | **420** | *150* | 94.7 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **2500** | **640** | 118.5 | Decrease |
| | | diethyl phthalate (µg/kg) | *18* | **1300** | 194.5 | Increase |
| | | dimethyl phthalate (µg/kg) | **150** | *16* | 161.4 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **30** | **160** | 136.8 | Increase |
| | | Total PCB Aroclors (µg/kg) | **450** | **910** | 67.6 | Increase |
| **B-11[c]** | **T18-19** | copper (mg/kg) | **911** | **691** | 27.5 | No change |
| | | zinc (mg/kg) | NS | **2030** | -- | -- |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | NS | **13000** | -- | -- |
| | | butylbenzyl phthalate (µg/kg) | NS | **760** | -- | -- |
| | | n-Nitrosodiphenylamine (µg/kg) | NS | **190** | -- | -- |
| | | Total PCB Aroclors (µg/kg) | **13662** | **1000** | 172.7 | Decrease |
| | | D/F (ng/kg) | **82.4** | **35.2** | 80.3 | Decrease |
| **B-12** | **T18-18** | copper (mg/kg) | **688** | **352** | 64.6 | Decrease |
| | | lead (mg/kg) | **132** | **678** | 134.8 | Increase |
| | | zinc (mg/kg) | **964** | **1670** | 53.6 | Increase |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **7100** | **6200** | 13.5 | No change |
| | | benzoic acid (µg/kg) | *1000* | **1400** | 33.3 | No change |
| | | butylbenzyl phthalate (µg/kg) | **1100** | **160** | 149.2 | No change |
| | | 2-Methylphenol (µg/kg) | *100* | **73** | 31.2 | No change |
| | | 4-Methylphenol (µg/kg) | *100* | **680** | 148.7 | Increase |
| | | phenol (µg/kg) | *100* | **640** | 145.9 | Increase |
| | | Total PCB Aroclors (µg/kg) | **430** | **1690** | 118.9 | Increase |
| **B-13** | **T18-17** | zinc (mg/kg) | **200** | **2050** | 164.4 | Increase |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **19000** | **1400** | 172.5 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **420** | **680** | 47.3 | No change |
| | | n-Nitrosodiphenylamine (µg/kg) | *6.1* | **53** | 158.7 | Increase |
| **B-14** | **T18-16** | arsenic (mg/kg) | **8** | **80** | 163.6 | Increase |
| | | benzyl alcohol (µg/kg) | *30* | **80** | 90.9 | Increase |
| | | butylbenzyl phthalate (µg/kg) | **83** | **73** | 12.8 | No change |
| | | Total PCB Aroclors (µg/kg) | *33* | **184** | 139.2 | Increase |
| **B-16** | **T18-15** | lead (mg/kg) | **463** | **36** | 171.1 | Decrease |
| | | zinc (mg/kg) | **1520** | **85** | 178.8 | Decrease |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **2000** | **120** | 177.4 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **510** | *4.8* | 196.3 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **39** | *4.8* | 156.2 | Decrease |
| | | Total PCB Aroclors (µg/kg) | **2800** | **47** | 193.4 | Decrease |
| | | D/F (ng/kg) | **44.5** | **2.35** | 179.9 | Decrease |
| **B-17** | **T18-14** | zinc (mg/kg) | **1300** | **2090** | 46.6 | Increase |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **5200** | **1300** | 120.0 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **2700** | **440** | 143.9 | Decrease |
| | | dimethyl phthalate (µg/kg) | **400** | **27** | 174.7 | Decrease |
| | | 4-Methylphenol (µg/kg) | **1200** | *110* | 166.4 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **29** | **75** | 88.5 | Increase |



ED_006289_00002902-00038

## Table 4
## Summary of Apparent Effects Threshold Exceedances

| Drainage Basin ID | SSA Basin ID | Chemical (units) | 2010 AET Exceedances[a,b,e,f] | 2015 AET Exceedances[a,e,f] | Relative Percent Difference (%) | Change in Concentration[d] |
|---|---|---|---|---|---|---|
| **Terminal 18** | | | | | | |
| **B-18** | **T18-13** | zinc (mg/kg) | **782** | **571** | 31.2 | Decrease |
| | | benzyl alcohol (µg/kg) | **60** | **98** | 48.1 | No change |
| | | butylbenzyl phthalate (µg/kg) | **420** | **140** | 100.0 | Decrease |
| | | hexachlorobutadiene (µg/kg) | *6.1* | **14** | 78.6 | Increase |
| | | n-Nitrosodiphenylamine (µg/kg) | **13** | **38** | 98.0 | Increase |
| **B-19** | **T18-11** | zinc (mg/kg) | **715** | **930** | 26.1 | No change |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **1400** | **2500** | 56.4 | Increase |
| | | benzyl alcohol (µg/kg) | **160** | *70* | 78.3 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **940** | **560** | 50.7 | Decrease |
| | | dimethyl phthalate (µg/kg) | **120** | **19** | 145.3 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | *7.3* | **34** | 129.3 | Increase |
| **B-21** | **T18-10** | zinc (mg/kg) | **1930** | **599** | 105.3 | Decrease |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **6700** | **2200** | 101.1 | Decrease |
| | | benzyl alcohol (µg/kg) | **270** | *35* | 154.1 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **2900** | **600** | 131.4 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **41** | **35** | 15.8 | No change |
| | | Total PCB Aroclors (µg/kg) | **170** | **500** | 98.5 | Increase |
| **B-22** | **T18-9** | zinc (mg/kg) | **566** | **597** | 5.3 | No change |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **1600** | **2400** | 40.0 | No change |
| | | benzyl alcohol (µg/kg) | **240** | *34* | 150.4 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **23000** | **240** | 195.9 | Decrease |
| | | n-Nitrosodiphenylamine (µg/kg) | **20** | **38** | 62.1 | Increase |
| **Terminal 30** | | | | | | |
| **B-28** | -- | butylbenzyl phthalate (µg/kg) | NS | **97** | -- | -- |
| | | n-Nitrosodiphenylamine (µg/kg) | NS | **54** | -- | -- |
| **Terminal 25** | | | | | | |
| **B-32** | -- | zinc (mg/kg) | **1330** | **675** | 65.3 | Decrease |
| | | bis(2-Ethylhexyl)phthalate (µg/kg) | **5200** | **980** | 136.6 | Decrease |
| | | benzyl alcohol (µg/kg) | **490** | *36* | 172.6 | Decrease |
| | | butylbenzyl phthalate (µg/kg) | **610** | **48** | 170.8 | Decrease |

Notes:
a. Exceedances of AET Marine SCO and CSL criteria (Ecology 2015).
b. 2010 data provided by Windward Environmental, LLC.
c. 2010 results for copper and total PCB Aroclors are the average of several maintenance holes collected in the basin. The dioxin/furan result was from a concurrent sediment trap study.
d. Relative percent differences were compared to QAPP (Windward 2010) precision criteria of 50% for organics and 30% for metals.
e. Non-detect concentrations are reported in *italics*
f. J-qualifiers have been removed. See Tables 3a and 3b for final data with qualifiers.
Detected concentration is greater than AET Marine SCO SCUM II screening level
Detected concentration is greater than AET Marine CSL SCUM II screening level
**Bold** = Detected result
µg/kg = microgram per kilogram
AET = Apparent Effects Threshold
D/F = dioxin/furan
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligram per kilogram
ng/kg = nanogram per kilogram
NS = not sampled due to lack of accumulated solids in accessible maintenance holes
PCB = polychlorinated biphenyl



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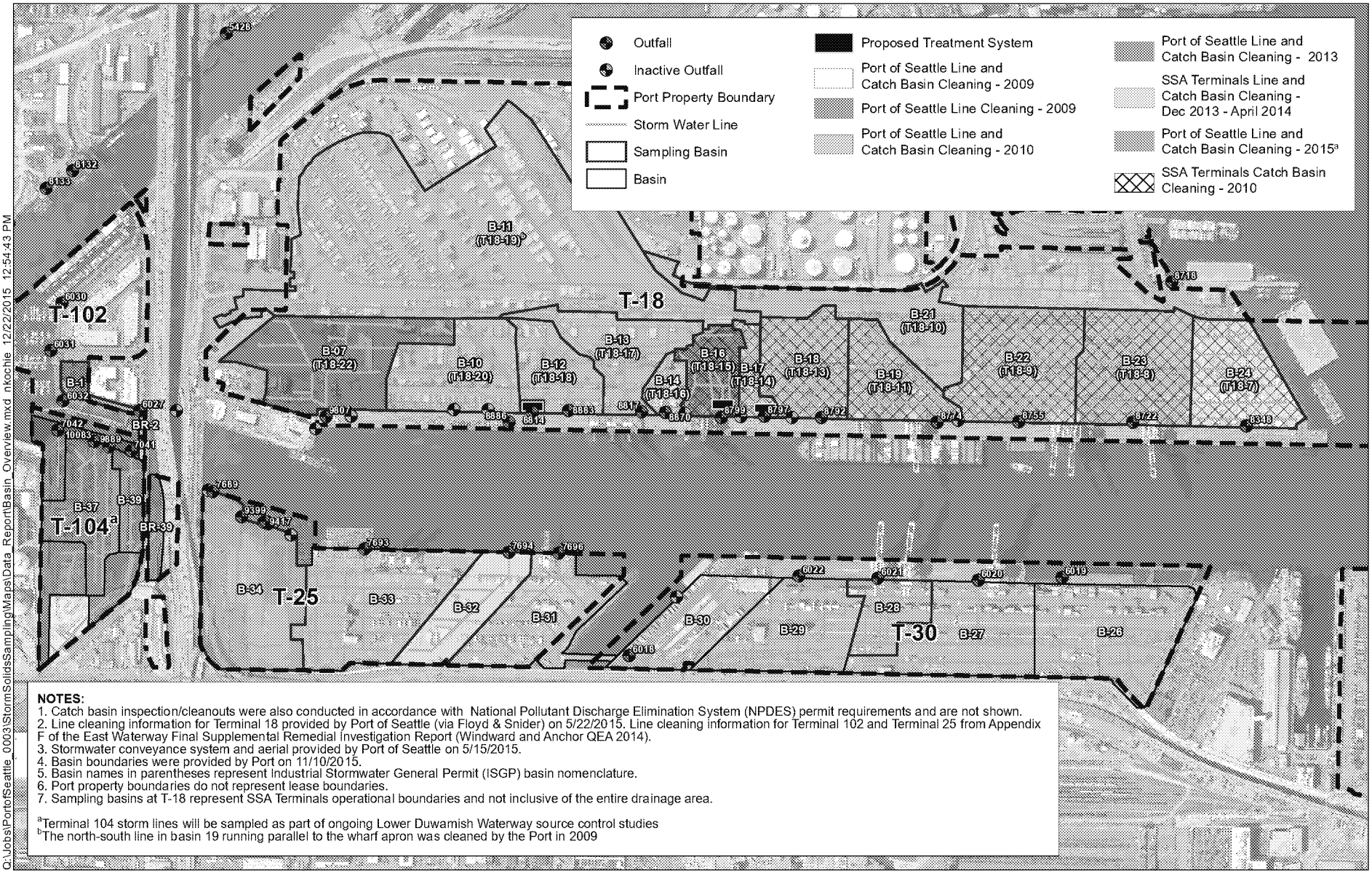
# FIGURES

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**NOTES:**
1. Catch basin inspection/cleanouts were also conducted in accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements and are not shown.
2. Line cleaning information for Terminal 18 provided by Port of Seattle (via Floyd & Snider) on 5/22/2015. Line cleaning information for Terminal 102 and Terminal 25 from Appendix F of the East Waterway Final Supplemental Remedial Investigation Report (Windward and Anchor QEA 2014).
3. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
4. Basin boundaries were provided by Port on 11/10/2015.
5. Basin names in parentheses represent Industrial Stormwater General Permit (ISGP) basin nomenclature.
6. Port property boundaries do not represent lease boundaries.
7. Sampling basins at T-18 represent SSA Terminals operational boundaries and not inclusive of the entire drainage area.

[a]Terminal 104 storm lines will be sampled as part of ongoing Lower Duwamish Waterway source control studies
[b]The north-south line in basin 19 running parallel to the wharf apron was cleaned by the Port in 2009

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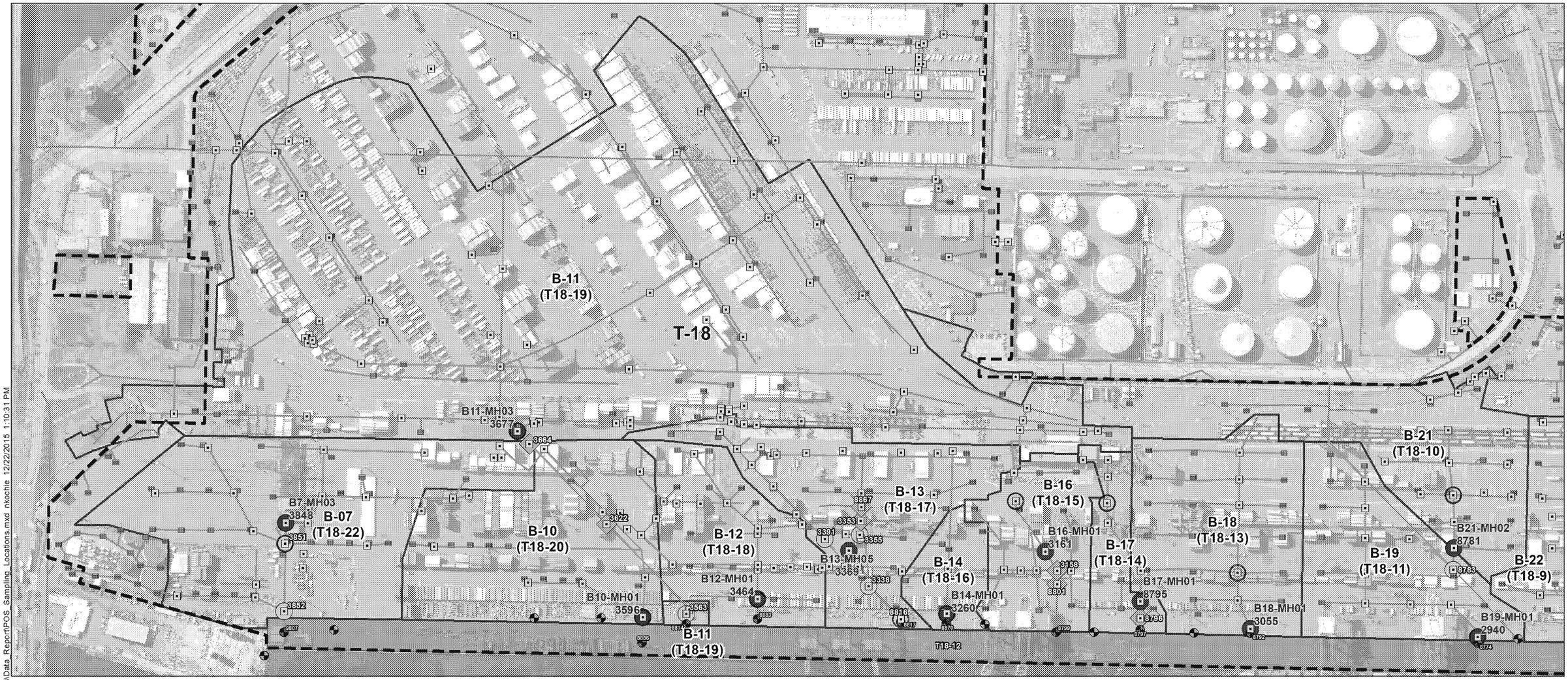
Feet
0 500 1,000

**Figure 1**
Basin Overview
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study




Sample Location
No Available Solids
Inaccessible - behind locked fence
Inaccessible - jammed lid
Inaccessible - under containers
Inaccessible - under vehicle
Inaccessible - outside T-18 perimeter fence
Archive Location
Sampled 2010 (Windward 2011)
Maintenance Hole
Catch Basin
Outfall
Inactive Outfall
Storm Water Line
Sampling Basin
Basin
Port Property Boundary
Port of Seattle Apron

**NOTES:**
1. Maintenance holes labeled by Port identification number.
2. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
3. Basin boundaries were provided by Port on 11/10/2015.
4. Basin names in parentheses represent SSA Terminals Industrial Stormwater General Permit (ISGP) basin nomenclature.
5. Port property boundaries do not represent lease boundaries.
6. Sampling basins at T-18 represent SSA Terminals operational boundaries and not inclusive of the entire drainage area.

Feet
0 150 300 450 600

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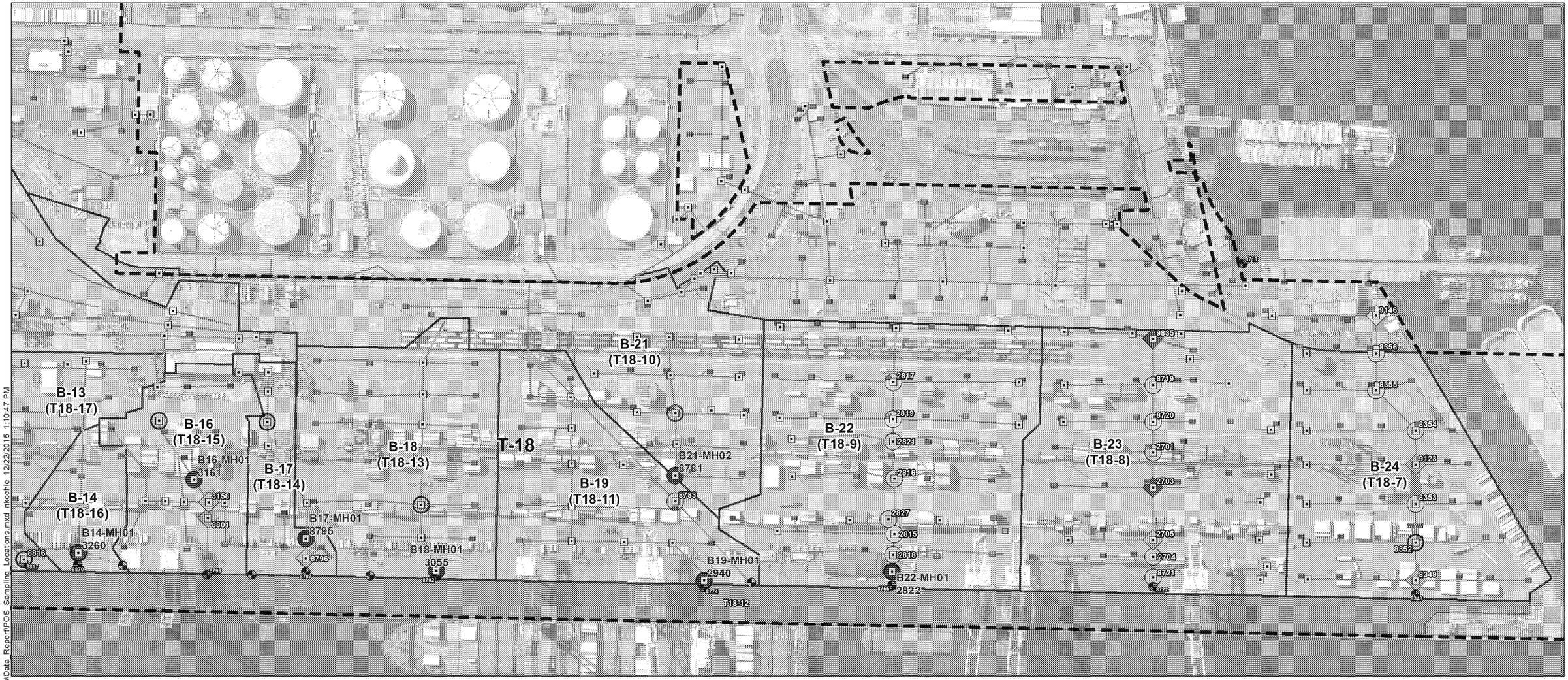
**Figure 2**
Sampling Locations - T-18 South
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study




Sample Location
No Available Solids
Inaccessible - behind locked fence
Inaccessible - jammed lid
Inaccessible - under containers
Inaccessible - under vehicle
Inaccessible - outside T-18 perimeter fence
Archive Location
Sampled 2010 (Windward 2011)
Maintenance Hole
Catch Basin
Outfall
Inactive Outfall
Storm Water Line
Sampling Basin
Basin
Port Property Boundary
Port of Seattle Apron

**NOTES:**
1. Maintenance holes labeled by Port identification number.
2. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
3. Basin boundaries were provided by Port on 11/10/2015.
4. Basin names in parentheses represent SSA Terminals Industrial Stormwater General Permit (ISGP) basin nomenclature.
5. Port property boundaries do not represent lease boundaries.
6. Sampling basins at T-18 represent SSA Terminals operational boundaries and not inclusive of the entire drainage area.

Feet
0 130 260 390 520

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**Figure 3**
Sampling Locations - T-18 North
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study

Sample Location
No Available Solids
Inaccessible - behind locked fence
Inaccessible - jammed lid
Inaccessible - under containers
Inaccessible - under vehicle
Inaccessible - outside T-18 perimeter fence
Archive Location
Sampled 2010 (Windward 2011)
Maintenance Hole
Catch Basin
Outfall
Inactive Outfall
Storm Water Line
Sampling Basin
Basin
Port Property Boundary
Port of Seattle Apron

**NOTES:**
1. Maintenance holes labeled by Port identification number.
2. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
3. Basin boundaries were provided by Port on 11/10/2015.
4. Basin names in parentheses represent Industrial Stormwater General Permit (ISGP) basin nomenclature.
5. Port property boundaries do not represent lease boundaries.

Feet
0 100 200 300 400

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ANCHOR QEA

**Figure 4**
Sampling Locations - T-25
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study

Sample Location
No Available Solids
Inaccessible - behind locked fence
Inaccessible - jammed lid
Inaccessible - under containers
Inaccessible - under vehicle
Inaccessible - outside T-18 perimeter fence
Archive Location
Sampled 2010 (Windward 2011)
Maintenance Hole
Catch Basin
Outfall
Inactive Outfall
Storm Water Line
Sampling Basin
Basin
Port Property Boundary
Port of Seattle Apron

**NOTES:**
1. Maintenance holes labeled by Port identification number.
2. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
3. Basin boundaries were provided by Port on 11/10/2015.
4. Basin names in parentheses represent Industrial Stormwater General Permit (ISGP) basin nomenclature.
5. Port property boundaries do not represent lease boundaries.

Feet
0 125 250 375 500

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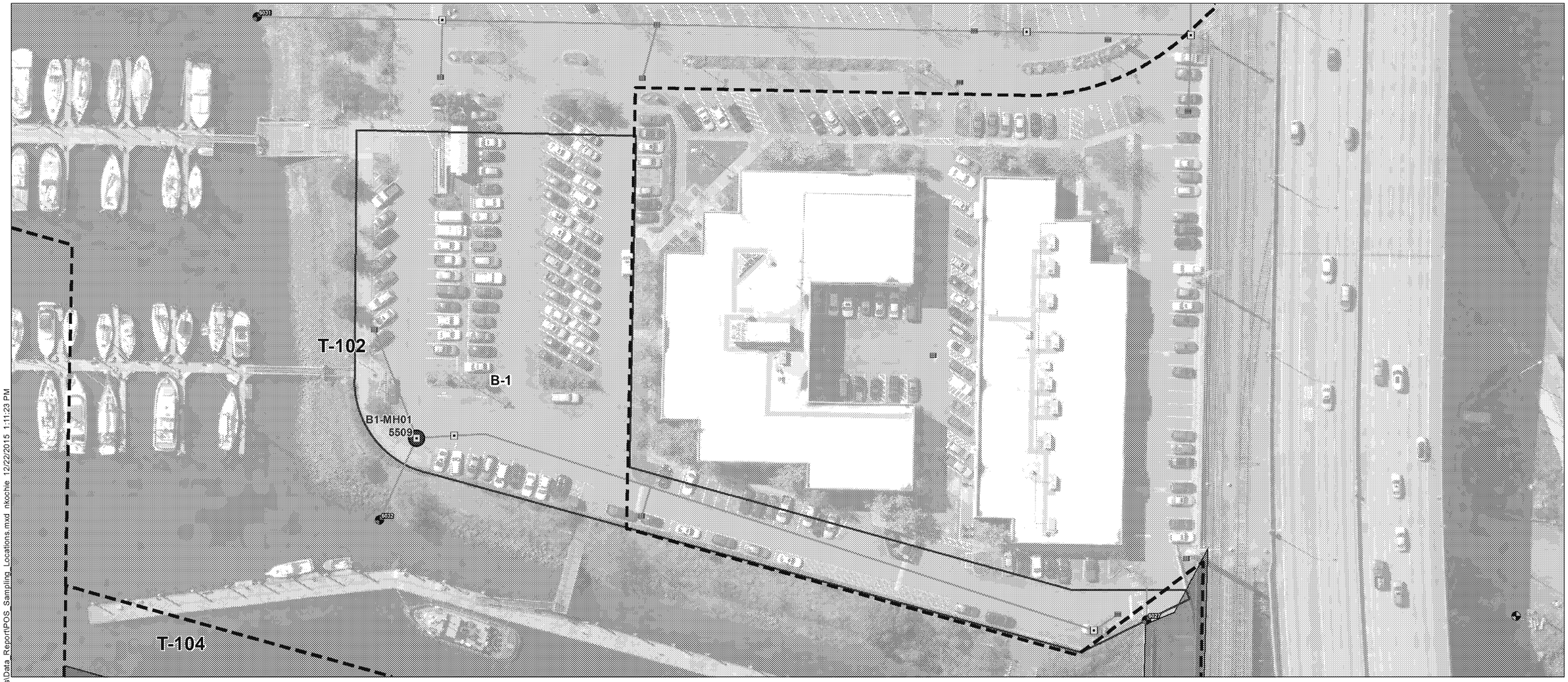
**Figure 5**
Sampling Locations - T-30
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study




Sample Location
No Available Solids
Inaccessible - behind locked fence
Inaccessible - jammed lid
Inaccessible - under containers
Inaccessible - under vehicle
Inaccessible - outside T-18 perimeter fence
Archive Location
Sampled 2010 (Windward 2011)
Maintenance Hole
Catch Basin
Outfall
Inactive Outfall
Storm Water Line
Sampling Basin
Basin
Port Property Boundary
Port of Seattle Apron

**NOTES:**
1. Maintenance holes labeled by Port identification number.
2. Stormwater conveyance system and aerial provided by Port of Seattle on 5/15/2015.
3. Basin boundaries were provided by Port on 11/10/2015.
4. Basin names in parentheses represent Industrial Stormwater General Permit (ISGP) basin nomenclature.
5. Port property boundaries do not represent lease boundaries.

Feet
0 30 60 90 120

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ANCHOR QEA

**Figure 6**
Sampling Locations - T-102
Data Report
East Waterway Near-End-Of-Pipe Storm Drain Solids Study

# APPENDIX A
# FIELD LOGS

# APPENDIX B
# SEDIMENT GRAB PHOTOGRAPHS

# APPENDIX C
# DATA VALIDATION REPORTS

# APPENDIX D
# LABORATORY REPORTS

# ATTACHMENT 1
# TERMINAL 18 STORMWATER CONVEYANCE LINE VIDEO INSPECTION SUMMARY