Stormwater Line Cleaning Report
for
Port of Seattle
Terminals 102, 103, 104, 106, 108, and 115

IAA No. C1400216

Prepared for

The State of Washington, Department of Ecology

Prepared by

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LIST OF ACRONYMS AND ABBREVIATIONS

2LAET	Second Lowest Apparent Effects Threshold
DL	Detection limit
EcoChem	EcoChem, Inc. of Seattle, Washington
Ecology	The State of Washington, Department of Ecology
EMPC	Estimated maximum possible concentration
EPA	U.S. Environmental Protection Agency
HpCDD	1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin
HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
IAA	Inter-Agency Agreement
LAET	Lowest Apparent Effects Threshold
LDW	Lower Duwamish Waterway
mg/kg	Milligram(s) per kilogram
MTCA	Model Toxics Control Act
OCDD	Octachlorodibenzodioxin
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
Port	Port of Seattle
PQL	Practical quantitation limit
QA	Quality assurance
QC	Quality control
RCRA	Resource Conservation and Recovery Act
SCO	Sediment cleanup objective
SIM	Select Ion Monitoring
SVOC	Semivolatile organic compound
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEQ	Toxicity Equivalency Quotient
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound

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1. INTRODUCTION

On 9 April 2014, the Port of Seattle (Port) and the state of Washington Department of Ecology (Ecology) entered into Inter-Agency Agreement (IAA) No. C1400216 (Ecology 2014). In partial fulfillment of the requirements of the IAA, the Port has conducted line cleaning on Port-owned stormwater conveyance systems that discharge to the Lower Duwamish Waterway (LDW) Superfund site within the Duwamish River. This stormwater line cleanout was conducted to remove the legacy sediment load currently in storm drain lines so that more information about the nature of current sources of stormwater solids can be obtained and inputs to the waterways can be reduced. Following line cleaning, sediment traps were installed in manholes/catch basins closest to the point of discharge. Storm sediment samples were then collected and analyzed post-cleanout to determine current chemical concentrations of re-accumulated sediment in the storm lines. This evaluation was completed so that more information about the nature of current sources of stormwater solids could be gained and contaminant inputs to the LDW could subsequently be reduced. This report describes the line cleaning, waste characterization, and post-line cleanout storm sediment sampling that was conducted by the Port at Terminals 102, 103, 104, 106, 108, and 115.

1.1 BACKGROUND

The LDW Superfund site is 441 acres, and consists of 5.5 miles of the Duwamish Waterway as measured from the southern tip of Harbor Island to just south of the Norfolk Combined Sewer Overflow, and flows into Elliott Bay in Seattle, Washington. In December 2000, the LDW Group was issued an Administrative Order on Consent by the U.S. Environmental Protection Agency (EPA) and Ecology to conduct a remedial investigation/feasibility study to address the potential human health and ecological risks from sediment contamination in the LDW. The LDW Superfund site was added to the EPA National Priorities List in September 2001, and to the Washington State Hazardous Sites List in February 2002, due to the risks to human health and ecological risks at levels that warrant action under federal and state law (AECOM 2012).

As a component to the overall cleanup, Ecology implemented a source control strategy for the drainage basin to include investigations and cleanup of facilities, storm drains, and combined sewer overflows within the LDW to address potential ongoing sources of contamination (Ecology 2013c). The near term goal of source control is to prevent recontamination of sediments to levels that exceed the LDW remedial action levels in the Record of Decision (EPA 2014). In order to facilitate this goal, the storm drain line cleaning activities discussed in this report were conducted for Port-owned stormwater conveyance systems located at Terminals 102, 103, 104, 106, 108, and 115.

1.2 PURPOSE AND OBJECTIVES

The purpose of this project was to remove legacy sediment load currently in storm drain lines so that more information about the nature of current sources of stormwater solids can be determined and inputs to the waterways can be reduced. The data collection activities for the study included:

- Remove and dispose of the legacy sediment load currently in storm drain lines
- Install sediment traps and perform post-cleanout sampling
- Perform analysis of post-cleanout samples to determine if contaminants within re-accumulated sediment in the storm lines are at levels that might pose recontamination concerns.

1.3 SCOPE OF WORK

The scope of work included the following tasks at Port-owned stormwater conveyance systems at Terminals 102, 103, 104, 106, 108, and 115:

- Storm drain line cleanout
- Video recording of storm drain line condition post-cleanout
- Collection and analysis of samples from waste generated from the cleanout activities, for disposal characterization
- Post-cleanout stormwater solids sampling
- Report preparation and entering post-cleanout data into the Ecology Environmental Information Management database.

2. STUDY DESIGN AND METHODS

The plan for these activities was developed in consultation with Ecology and approved prior to commencing fieldwork (Port 2014b), and is included in Appendix A. The methods used to conduct the line cleanouts, and deploy, collect, and analyze sediment trap samples for physical characteristics and chemical data are summarized in this section.

2.1 LINE CLEANOUT

2.1.1 Line Cleaning

Line cleaning was completed at Port Terminals 102, 103, 104, 106, 108, and 115 as shown on Figures 1 through 7. Storm lines that were accessible were cleaned, with the exception of Seattle Public Utilities lines on Port property. Line cleaning started in August 2014, and continued through April 2015. Dates of the line cleaning, the number of the manhole/catch basins, and length of lines cleaned per terminal are provided in Table 1. Line cleaning reports are provided in Appendix B.

2.1.2 Cleaning Procedures

Activities associated with the cleaning of stormwater conveyance lines included:

- Zone inspection of the lines prior to and during the cleaning process
- Installation of plugs, as necessary
- Cleaning from the most upgradient portion of the stormwater system and progressing downgradient
    - Branch lines, catch basins, and manholes down to the last structure connected to mainline were cleaned. Wash water and sediments were captured during the cleaning process.
    - The vacuum truck wash water was emptied into tanks and sediment placed into stockpiles, which were sampled for waste characterization prior to disposal.

2.1.3 Video Inspection

Following line cleaning, video inspection was conducted by Ventilation Power Cleaning, Inc. Port personnel reviewed the video inspection and documented the status of the lines. Where video inspection indicated sediment still remained in the line, a second cleaning was performed. Figures 1 through 7 indicate where video inspection of the stormwater lines was completed and where difficulties were encountered. Results of the video survey are included in Appendix B.

2.1.4 Waste Characterization and Disposal

As the line cleaning was performed, wastes generated were segregated by terminal. Wastewater was contained in tanks and sediment/solids were stockpiled and covered with plastic sheeting within a lined decant area. Two wastewater and sediment decant locations were used during the line cleaning (Terminal 115 and Terminal 25).

For all facilities except Terminal 115, waste materials were transported from the terminal being cleaned to the temporary decant facilities. The wastewater was pumped from the truck's tank into a storage tank for each terminal (Appendix F, Photo 4). Solids were dumped into the decant area (Appendix F, Photo 5). Due to the size of Terminal 115, waste materials were separated by drainage system. The wastewater was held at the decant station while the suspended solids were allowed to settle out. Waste materials from line cleaning activities from a given facility were then sampled and waste profiles were generated for disposal purposes.

Copies of the field logbook for these activities are included in Appendix C. Copies of chain-of-custody forms for waste samples are located in Appendix D.

Liquids

Wastewater samples were collected directly from the storage tanks once the line cleaning activities at each terminal were completed, or as the tank was getting close to capacity.

Wastewater samples were collected from the entire vertical depth of the tank using disposable plastic bailers. Samples were analyzed for chemicals listed below. Samples for volatile organic compound (VOC) analysis were collected first, followed by samples for non-volatile analysis.

Solids

Samples from soil stockpiles consisted of one composite sample from three subsample locations within the pile. Samples for VOC analysis were collected first, followed by samples for non-volatile analysis.

Waste characterization samples (soil and water) were submitted for analyses by the following methods:

- Polycyclic aromatic hydrocarbons (PAHs) (EPA Method 8270D)
- Total metals – Resource Conservation and Recovery Act (RCRA) 8 (EPA Method 200.8)
- Toxicity Characteristic Leaching Procedure Metals – RCRA 8 (soil only)
- Polychlorinated biphenyls (PCBs) (EPA Method 8082)
- Gasoline Range Hydrocarbons (NWTPH-G)
- Diesel and Oil Range Hydrocarbons (NWTPH-Dx)
- VOCs (EPA 8260).

Analytical result summary tables for wastewater and waste soil are provided in Appendix G. Laboratory reports are marked as placeholders in this report and will be provided electronically.

Although the samples were collected to characterize the samples for waste disposal purposes, the soil results for metals, VOCs, PAHs, and PCBs were also compared to other standards for information purposes. These comparisons included the Washington State Sediment Management Standards (WAC-173-204) benthic criteria and the lowest apparent effects threshold (LAET), which is functionally equivalent to the Sediment Cleanup Objective (SCO) benthic criteria. Soil results for total petroleum hydrocarbons (TPH) were also compared to the Washington State Model Toxics Control Act Standards (WAC-173-340) (Ecology 2013a). The results were compared to the Method A Soil Cleanup Levels for Industrial Properties. Each table also identifies detections that exceeded the screening level values.

Disposal of Waste Materials

Following receipt of analytical results for the waste samples, the water from line cleaning activities was profiled by the Port and transported and disposed by either Emerald Services or Philip Services Corporation. Waste solids generated during line cleaning were profiled as non-hazardous and were transported by Republic Services and disposed at Roosevelt Municipal Solid Waste Landfill.

Copies of available Bills of Lading for waste disposal are located in Appendix E.

2.2 POST-LINE CLEANING

Post-line cleanout sampling was performed using stationary sediment trap collection bottles mounted within the manholes or catch basins of specified stormwater conveyance lines (Figures 1 through 7). The manhole or catch basin chosen for sampling was typically the closest structure to the outfall. The bottles were installed so that stormwater flowed over them and allowed gravity-driven settling of solids to occur within the bottles. The sediment collection bottles were intended to collect composite samples over multiple months in order to accumulate sufficient sample volume for the desired analyses.

2.2.1 Sediment Trap Installation

Each sediment trap collection bottle was mounted using either a stainless steel bracket system or cinderblock holder. Just prior to placement of the bottle in each manhole/catch basin structure, the lid was removed from each bottle, wrapped in tinfoil, and placed into a plastic bag with the other lids from the specific structure, and the plastic bag was labeled with the structure name. The lids were stored within a laboratory-supplied cooler, secured with custody seals, and kept at an offsite secure office until retrieval of the bottles for sampling. Following bottle installation, the rims of the structures were labeled with the structure identification number.

The installation method used for each structure is described further below. Table 2 provides sediment trap details by structure, such as the number of bottles installed, installation method, installation dates, and if the outfall downgradient of the structure had a tide gate (one-way valve). Photographs of the sediment trap installation are included in Appendix F.

Terminal 102

On 3 and 4 February 2015, storm sediment collection bottles were installed at Terminal 102 (CB5501 and CB5487) (Appendix F, Photos 6 and 7). There were no filters present at the surface grate.

- ***CB5501 and CB5487***—Six stainless steel unistrut® bottle holding brackets were mounted to the walls of the structures at a level approximately even with the invert elevation of the outflow pipe. The base flow level at both structures was determined to be the level of the invert elevation of the outflow pipe. Three narrow-mouth and three wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within the newly installed mounts, and secured using stainless steel hose clamps.

Terminal 103

On 8 December 2014, storm sediment collection bottles were installed at Terminal 103 (CB8118 and CB8126) (Appendix F, Photos 8 and 9). There were no catch basin filters present in the structures at this time.

- ***CB8118***—Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene bottles were placed within two cinderblocks that were tied together. These cinderblocks were stacked upon two rows of cinder blocks high, in order to raise the bottle openings to the stormwater base flow height of the invert elevation of the outlet pipe.

- ***CB8126***—Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene bottles were placed within two cinderblocks tied together. These cinderblocks were placed on 2-inch tall blocks in order to raise the bottle openings to the stormwater base flow height of the invert elevation of the outlet pipe.

Terminal 104

On 3 February 2015, storm sediment collection bottles were installed at Terminal 104 (CB7021, MH7005, and MH6965) (Appendix F, Photos 10 through 13). There was a new catch basin inlet filter in CB7021 at the time of bottle installation. One structure that was planned to be sampled in the work plan (MH10078) was not accessible due to material stored near and on top of it. This deviation was discussed with the Port Project Manager and was omitted from the fieldwork. Therefore, sediment traps were not installed and samples were not collected at this location.

- ***CB7021***—Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene bottles were placed within two cinderblocks that were tied together. These cinderblocks were placed on two additional cinder blocks that were tied together using stainless steel cable, in order to raise the bottle openings to the stormwater base flow height of the invert elevation of the outlet pipe.

- ***MH7005***—Three narrow-mouth and three wide-mouth 1,000-milliliter Nalgene bottles were placed within three cinderblocks and set into the trough of the bottom of the manhole. The lips of the bottles were approximately 2 inches below the level of water observed in the manhole at the time of installation. A stainless steel cable was secured to the furthest cinderblock downstream and to the ladder within the manhole. It was noted that a tidal check-valve was present within the outlet pipe just downstream of this manhole.

- ***MH6965***—Five stainless steel unistrut bottle holding brackets were mounted horizontally to the trough in the bottom of this manhole. Five narrow-mouth 1,000-milliliter Nalgene bottles were secured horizontally to the unistrut brackets using stainless steel hose clamps. NOTE: There is no tide gate valve on this stormwater line, and water within the manhole was initially observed to be 1 inch deep within the trough. During an inspection of this manhole on 15 April 2015, a water line was observed 35 inches up in the manhole. One of the horizontally-mounted bottles had broken free from the trough, was recovered, and mounted vertically on the wall of the manhole below the observed water line.

Terminal 106

On 7 May 2015, storm sediment collection bottles were installed in two manholes at Terminal 106 (MH4684 and MH4715) (Appendix F, Photos 14 through 16).

- ***MH4684***—Six narrow-mouth and three wide-mouth 1,000-milliliter Nalgene bottles were installed using the three existing wall-mounted bottle holders, and stainless steel straps to secure the additional bottles to the sides of the holders. NOTE: At least 2 inches of sediment was observed inside each of the existing bottle holders prior to bottle installation.

- ***MH4715***—Four narrow-mouth and five wide-mouth 1,000-milliliter Nalgene bottles were installed using the three existing wall-mounted bottle holders, and stainless steel straps to secure the additional bottles to the sides of the holders.

Terminal 108

On 7 May 2015, storm sediment collection bottles were installed in two manholes at Terminal 108 (MH7640 and MH7646) (Appendix F, Photos 17 and 18).

- ***MH7640***—Four narrow-mouth and five wide-mouth 1,000-milliliter Nalgene bottles were installed using the three existing wall-mounted bottle holders, and stainless steel straps to secure the additional bottles to the sides of the holders. NOTE: A slight sheen was observed on the water surface within the manhole, and at least 8 inches of sediment was observed inside each of the existing bottle holders. Sediment was also observed within the bottom of the inlet pipes, and between 0.5 and 2 inches deep on the floor of the manhole.

- ***MH7646***—Nine narrow-mouth 1,000-milliliter Nalgene bottles were installed using the three existing horizontally-mounted bottle holders, and stainless steel straps to secure the additional bottles to the sides of the holders. A water line was observed to be approximately 5 inches up from the base of the manhole at the time of bottle installation. Minimal sediment was observed near the outlet pipe of this manhole.

Terminal 115

On 17 and 18 November 2014, storm sediment collection bottles were installed at six manhole/catch basin structures at Terminal 115 (MH422, MH540, CB608, CB632, MH682, and MH637) (Appendix F, Photos 19 through 27). The bottle holding device used within each of these structures is described in more detail below.

- ***CB632***—Four stainless steel unistrut bottle holders were mounted to the walls of this structure at a level approximately 3 inches above the invert elevation of the outflow pipe. The base flow level at this structure was determined to be the level of the invert elevation of the outflow pipe. Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within the four newly installed mounts, and secured using stainless steel hose clamps. Note that existing mounts within the structure were deemed to be mounted too high and, therefore, were not used. Also note that this structure, and the stormwater conveyance lines associated with it, had not been jetted/cleaned prior to the bottle installation. During the installation process, a moderate amount of sediment was observed in the bottom of the structure and within the lines coming into the structure.

- ***CB608***—Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within two cinderblocks that were tied together, and placed on top of a third cinderblock, in order to raise the opening of the bottles just above the base flow water height (determined to be the level of the invert elevation of the outflow pipe). The cinderblock bottle holders were then lowered into the catch basin with a stainless steel cable, which was secured to the catch basin grate.

- ***MH422***—Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within two cinderblocks that were tied together, and placed within the trough of the bottom of the manhole. A stainless steel cable was also tied to the cinder block holder and attached to the ladder within the manhole as a secondary holding device and a method of lowering the cinder blocks into the manhole. The base flow level of water at this structure varies as this conveyance line is connected to a water treatment system, which backs the stormwater up the line until the treatment system is operated manually. Therefore, at times, the sediment traps are fully submerged; and, once the treatment system has been operated, the sediment traps are not submerged.

- ***MH540*—**Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within a free-standing stainless steel bottle holding device, used in prior years at Terminal 115. The device was placed within the trough of the bottom of the manhole. A cable attached to the bottle holder was secured to the ladder within the manhole as a secondary holding device and to be used in lowering the holder into the manhole. The base flow level of water at this structure varies as this conveyance line is connected to a water treatment system, which backs the stormwater up the line until the treatment system is operated manually. Therefore, at times, the sediment traps are fully submerged; and, once the treatment system has been operated, the sediment traps are not submerged.

- ***MH682*—**Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within the existing four bottle holders within this structure. The base flow height of water could not be determined at the time of bottle installation.

- ***MH637*—**Four stainless steel unistrut bottle holders were mounted to the walls of this structure at a level approximately 1 inch above the invert elevation of the outflow pipe. The base flow level at this structure was determined to be the level of the invert elevation of the outflow pipe. Two narrow-mouth and two wide-mouth 1,000-milliliter Nalgene plastic bottles were placed within the four newly installed mounts, and secured using stainless steel hose clamps.

2.2.2 Post-Cleanout Sample Collection

Post-cleanout sampling for storm sediment was performed after line cleaning activities. Samples were collected from approximately 4 to 7 months after sediment trap placement. Locations of manholes where samples were collected are identified on Figures 1 through 7. Details on sediment trap retrieval dates, duration of deployment, volume of sediment collected from each structure, and rainfall amounts are presented in Table 3. Photographs of the collected samples are shown in Appendix F (Photos 28 through 43).

If the structure was tidally affected and entry into the structure was needed, the work was scheduled during medium to low tide, and a pump was used to remove water from the structure. Confined space procedures were used during any entry of a structure. Confined space forms are included in Appendix C. Personnel then used the following procedures for sample collection. Sample bottles were capped, removed from the holders and structures, wiped clean on the exterior, visually assessed for sample volume, and then labeled. If sediment was available, a grab sample of storm sediment was then collected from each structure. Grab samples from within the base of the manholes or catch basins were collected using disposable plastic scoops and were placed into laboratory supplied 9-ounce jars. Samples were secured in a chilled cooler until delivery to the laboratory.

A total of 17 unique sample locations were associated with the terminals.

- Two sampling locations at Terminal 102
- Two sampling locations at Terminal 103
- Three sampling locations at Terminal 104
- Two sampling locations at Terminal 106
- Two sampling locations at Terminal 108
- Six sampling locations at Terminal 115.

If the volume of stormwater solids within the traps was not sufficient for the laboratory to perform the requested analyses, then the grab sample collected from the same manhole was homogenized with the stormwater sediment sample until the volume was sufficient to perform the analytical testingper agreement between Ecology and the Port.

Terminal 102

On 22 September 2015, post-cleanout storm sediment samples were collected at Terminal 102 (CB5487 and CB5501). Both catch basins had tide gates. Six storm sediment sample bottles were collected from each structure. Two grab samples of sediment were also collected from the floor of the structure to supplement the sample volume. The wall-mounted bottle holders were left in place within the catch basins. Sediment was noted across the bottom of both catch basins and was highly organic consisting of mostly leaves and pine needles.

Terminal 103

On 13 April 2015, the post-cleanout storm sediment samples were collected at Terminal 103 (CB8118 and CB8126). Both catch basins had filter socks that were temporarily removed in order to retrieve the sediment trap collection bottles. Grab samples of sediment were collected from each structure, adjacent to the bottles, to supplement sample volume. All equipment was removed from the catch basins after sample collection, and filters were set back into place under the catch basin grates.

Terminal 104

On 22 September 2015, the post-cleanout storm sediment samples were collected at Terminal 104 (MH7005, MH6965, and CB7021). Four storm sediment sample bottles and two grab samples were collected from CB7021. Six storm sediment sample bottles and one grab sample were collected from MH7005. Five sediment sample bottles and two grab samples were collected from MH6965.

Cinderblock holders were removed from CB7021 and MH7005. The four floor and one wall-mounted bottle holders were left in MH6965.

Terminal 106

On 23 September 2015, the post-cleanout storm sediment samples were collected at Terminal 106 (MH4684 and MH4715). Nine storm sediment bottles were collected from each of the manhole structures. The three existing wall-mounted bottle holders were left within each of the structures sampled. No grab samples were collected from structures at this terminal.

Terminal 108

On 23 September 2015, the post-cleanout storm sediment samples were collected at Terminal 108 (MH7640 and MH7646). Nine storm sediment bottles were collected from each of the manhole structures. The three existing wall-mounted bottle holders were left within MH7640 and the three horizontal mounted bottle holders were left within MH7646. No grab samples were collected from structures at this terminal.

Approximately 0.25 to 1.5 inches of sediment was observed in the bottom of MH7640 and in the inlet/outlet pipes.

Terminal 115

On 14 April 2015, the post-cleanout storm sediment samples were collected at Terminal 115 (MH422, MH540, CB608, CB632, MH682, and MH637). Four storm sediment bottles and a grab sediment sample were collected from each of the six structures. Other pertinent observations during sampling were:

- Water within MH540 and associated lines had to be pumped by Clearwater through their treatment system before personnel could enter the manhole to collect samples.

- At CB608, a sheen was observed on the surface of the water in the catch basin. A filter basket with metals and turbidity reducing media was present at the structure surface, and multiple round booms were tied off within the structure and the outfall pipe.

Cinderblock holders were removed from all structures where they were used, with the exception of CB608 where they could not be recovered. Wall-mounted bottle holders were left within the structures and the stainless steel straps were removed.

2.2.3 Chemical Analysis

Post-cleanout samples (stormwater solids) were submitted for the following analyses:

- Total solids (Standards Method 2540G)

- Grain size (ASTM International D422)

- PAHs/semivolatile organic compounds (SVOCs) (EPA Method 8270D/Select Ion Monitoring)

- Metals: arsenic, cadmium, chromium, copper, lead, silver, zinc, and mercury (EPA Method 6010/7000/200.8)

- PCBs (EPA Method 8082A)

- Dioxins/furans (EPA Method 1613) – one per each terminal.

Total organic carbon was not measured and analytical results were not organic carbon normalized.

If sufficient solids were not available to perform analysis for all chemicals of concern, priority for chemical analysis was as follows:

- Metals
- PCBs
- PAHs/SVOCs
- Dioxins/furans.

Analytical testing of samples was performed by Onsite Environmental Inc., in Redmond, Washington. Total solids and grain size analysis was performed by AmTest Inc., in Kirkland Washington. Dioxin/furan analysis was performed by Vista Analytical Laboratory, in El Dorado Hills, California.

2.3 QUALITY ASSURANCE/QUALITY CONTROL

Only laboratory quality assurance (QA)/quality control (QC) samples were used to evaluate the data precision, accuracy, representativeness, and comparability of the analytical results, because there was not sufficient sample volumes present to collect and analyze field duplicate samples. QA samples are discussed in the following sections. No trip blanks were submitted with post-cleanout samples as no volatile analyses were performed on the samples. Additionally, no equipment rinse blank samples were collected as disposable sample collection equipment was used throughout the project.

2.3.1 Field Duplicates

No field duplicate samples were collected due to the limited volume of storm sediment available within the collection bottles.

2.3.2 Laboratory

Laboratory calibration and QA/QC sample requirements were performed as defined in the test methods. One method blank and one control sample were analyzed for metals and organics in each analytical batch.

Prior to performing the SVOC analysis, a strong anion exchange cleanup was performed on all samples. The sample matrix is believed to be the cause of several laboratory matrix spike/matrix spike duplicate recoveries falling outside of laboratory control limits.

Similarly, the sample matrix was believed to cause low surrogate recoveries during analysis for PCBs. However, the spike blank and spike blank duplicate and other surrogate recoveries were within laboratory control limits. Due to the effect of the sample matrix on the analytical instruments, the Aroclor 1260 continuing calibration verification standards were low.

During total metals analysis, the laboratory duplicate relative percent difference for chromium was outside of laboratory control limits due to sample inhomogeneity. Samples were re-run with similar results.

2.3.3 Data Validation

All post-cleanout analytical data were independently validated by EcoChem, Inc. of Seattle, Washington (EcoChem). Data validation was performed following EPA National Functional Guideline for data review (EPA 1994, 2008, 2010, 2011). Level 4 validation was performed on dioxin/furan analysis, and Level 2B for other chemical analyses. This assessment of analytical data was performed to measure the parameters of precision, accuracy, and completeness. EcoChem's validation reports are included in Appendix I.

The validation of sample delivery groups 1504-146, 1504-147, and 1504-148, for samples collected from Terminal 103 and Terminal 115, indicate that:

- Laboratories followed the specified analytical methods
- Accuracy was acceptable
- Precision was acceptable (except for during the dioxin and furan analysis where it could not be evaluated)
- No data were rejected
- All data, as qualified, are acceptable for use.

The validation of sample delivery group 1509-242 for samples collected from Terminals 102, 104, 106, and 108, indicate that:

- Laboratories followed the specified analytical methods
- Accuracy was acceptable
- Precision was acceptable (except for during the dioxin and furan analysis where it could not be evaluated)
- No data were rejected
- All data, as qualified, are acceptable for use.

Completeness measures the amount of usable data obtained versus the total possible planned data. Completeness for the validation of these four sample delivery groups was 100 percent.

Representativeness cannot be evaluated as no duplicate samples were included in these sample groups.

Qualifiers assigned by EcoChem included in Appendix C of the data validation reports have been added to the analytical data summary tables in this report.

2.4 PROJECT DEVIATIONS

Work was performed in accordance with the Work Plan, with the following exceptions.

Materials stored on top of MH10078 at Terminal 104 prevented access and sediment trap deployment or sampling at this location.

More than four sediment trap bottles were installed in each structure, where possible, in an attempt to collect a greater volume of sample material in a shorter period of time.

Field duplicate samples were not collected due to the limited volume of sample material available.

For sample locations where sufficient sediment volume was not collected for all analyses, a grab sample was collected and composited w/ sediment collected to achieve adequate sample volume.

2.4.1 Sediment Trap Mounting Devices

Stainless steel bottle holding devices were not used within structures that were too narrow to allow personnel entry and installation of the wall mounted brackets, or which had a trough bottom and minimal base flow water depths. At these locations concrete cinder blocks were used to hold the sediment trap bottles in place. The type of bottle holding device used in each structure is listed on Table 2.

2.4.2 Notable Field Items

The water level within MH422 and MH540 at Terminal 115 is determined by the pulsed operation of a treatment system downgradient of these structures, and not by tidal influences.

Moderate amounts of sediment were observed within the following structures during initial placement of sediment traps: MH632 at Terminal 115, MH4684 at Terminal 106, and MH7640 at Terminal 108. Note that MH632 was not proposed to be cleaned under this project.

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3. POST-CLEANOUT ANALYTICAL RESULTS

Tables 4 through 9 provide summaries of physical and analytical testing for PCB, PAH, and SVOC analyses of post-line cleaning sample results. Sample results are compared to the LAET and the second lowest apparent effects threshold (2LAET) criteria for protection of benthic organisms, where available.

Table 10 contains the analytical results for dioxins and furans. If the sample result was non-detect, either the detection limit (DL) or the estimated maximum possible concentration (EMPC) was listed with a U qualifier. These DL and EMPC values were then used to calculate Toxicity Equivalency Quotient (TEQ) values. Dioxin and furan results were converted using Toxic Equivalency Factors in order to obtain the TEQ (Ecology 2013b).

3.1 TERMINAL 102

Total solids in the two samples collected from this terminal ranged from 28 to 37 percent. Grain size analysis was not performed due to limited sample volumes. Table 4 presents PCB, PAH, and SVOC analysis results for Terminal 102.

Cadmium was detected at a concentration of 6.4 milligrams per kilogram (mg/kg) in sample CB5501, above the LAET screening level (5.1 mg/kg). Zinc was detected at a concentration of 4,900 mg/kg in the sample from CB5501, and 3,600 mg/kg in the sample from CB5487, above the LAET and 2LAET screening levels (410 and 960 mg/kg, respectively). The detection level for mercury was above the LAET and/or 2LAET screening level (0.41 and 0.59 mg/kg, respectively).

PCBs were not detected above laboratory reporting level (0.089 and 0.054 mg/kg) in the samples collected from Terminal 102.

Select Ion Monitoring (SIM) analysis was performed on PAH and SVOC analyses to lower the detection level; however there were still compounds for which the detection level was not sufficient to meet screening level criteria. Four SVOC compounds were detected at or above the laboratory's practical quantitation limit (PQL) in the samples from CB5501 and CB5487. Of these detections, five compounds exceeded the LAET and/or 2LAET screening criteria.

- Phenol was detected in the sample from CB5501 (0.61 mg/kg) and CB5487 (0.79 mg/kg) above the LAET of 0.42 mg/kg

- (3+4)-Methylphenol (m,p-Cresol) was detected in the sample from CB5501 (4.1 mg/kg) and CB5487 (2.1 mg/kg) above the LAET and 2LAET of 0.063 mg/kg

- Butylbenzylphthalate was detected in the sample from CB5487 (0.58 mg/kg) above the LAET of 0.063 mg/kg

- Bis(2-Ethylhexyl)phthalate was detected in the sample from CB5501 (7.5 mg/kg) and CB5487 (6.5 mg/kg) above the LAET of 1.3 mg/kg and 2LAET of 3.1 mg/kg

- Di-n-octylphthalate was detected in the sample from CB5501 (300 mg/kg) above the LAET and 2LAET of 6.2 mg/kg.

PAH compounds detected above the screening criteria were:

- Benzo(g,h,i)perylene (0.71 mg/kg) was detected in sample CB5501 above the LAET of 0.67 mg/kg.

Dioxin/furan analysis was performed on the sample from CB5487 at this terminal. All dioxin/furan compounds were detected at concentrations above the laboratory's PQL. The dioxin/furan concentration detected in the sample from CB5487 was 48.67 nanograms TEQ per kilogram (ng/kg). The remediation action level for the LDW, per the Record of Decision for the LDW Superfund Site (EPA 2014) ranges from 25 to 28 ng/kg. Table 10 contains the analytical results for dioxins and furans.

3.2 TERMINAL 103

Total solids in the two samples collected from this terminal ranged from 50.4 to 58.6 percent. Grain size analysis indicates that the sample material collected from CB8126 was predominantly silt, and the sample material from CB8118 was predominantly sand. Table 5 presents PCB, PAH, and SVOC analysis results for Terminal 103.

Zinc was detected at a concentration of 1,600 mg/kg in the sample from CB8126, and 1,800 mg/kg in the sample from CB8118, above both the LAET and 2LAET screening levels (410 and 960 mg/kg, respectively).

Aroclor 1260 was detected in the sample from CB8126 (0.051 mg/kg) and CB8118 (0.069 mg/kg). For non-detections, the laboratory reporting limits for PCBs ranged from 0.044 to 0.05 mg/kg. The total PCB calculation did not exceed LAET and 2LAET screening levels.

The majority of SVOC compounds were not detected at or above the laboratory's PQL (3 detections out of 60 compounds). Higher PQLs were observed due to matric interference within the samples (i.e., the mass of material that remains in the sample extract prior to analysis, and the small quantity of sample extract that is injected into the gas chromatography/mass spectrometer).

The following exceedances of screening criteria were observed:

- Bis(2-ethylhexyl)phthalate was detected in both samples from this terminal (37 mg/kg in sample CB8126 and 69 mg/kg in sample CB8118), above the LAET and 2LAET screening criteria of 1.3 and 3.1 mg/kg, respectively.

PAH compounds were detected above the laboratory PQL in all but one instance. The following exceedances of screening criteria were observed:

- Fluoranthene (2.4 mg/kg) and chrysene (1.4 mg/kg) were detected in the sample from CB8126, above the LAET and 2LAET.

Dioxin/furan analysis was performed on the sample from CB8118 at this terminal. All dioxin/furan compounds were detected at concentrations above the laboratory's PQL. The dioxin/furan concentration detected in the sample from CB8118 was 52.91 nanograms TEQ per kilogram, exceeding the remedial action level for the LDW. Table 10 contains the analytical results for dioxins and furans.

3.3 TERMINAL 104

Total solids in the three samples collected from this terminal ranged from 30 to 54 percent. Grain size analysis was not performed due to limited sample volumes. Table 6 presents PCB, PAH, and SVOC analysis results for Terminal 104.

Lead was detected in the sample from CB7021 (480 mg/kg), above the LAET screening level (450 mg/kg). Zinc was detected in the sample from MH7005 (2,100 mg/kg) and CB7021 (4,900 mg/kg), above the LAET and 2LAET screening levels (410 and 960 mg/kg, respectively). Zinc was also detected in the sample from MH6965 (860 mg/kg), above the LAET screening level (410 mg/kg). The detection level for mercury was above the LAET and/or 2LAET screening level (0.41 and 0.59 mg/kg, respectively).

PCBs Aroclor 1254 and 1260 were detected in samples MH7005 (0.051 and 0.071 J mg/kg, respectively) and CB7021 (0.10 J and 0.043 mg/kg, respectively). The total PCB calculation for the sample from CB7021 (0.143 mg/kg) exceeded the LAET screening level of 0.13 mg/kg. For non-detections, the laboratory reporting limits for PCBs ranged from 0.037 to 0.067 mg/kg.

SVOC analysis was performed on the samples from MH7005 and CB7021. The use of SIM analysis for PAHs and SVOCs on these samples was able to lower the detection level; however there were still compounds for which the detection level was not sufficient to meet screening level criteria. Six SVOC compounds were detected at or above the laboratory's PQL in the samples from MH7005 and CB7021. The following exceedances of screening criteria were observed:

- Phenol was detected in the sample from MH7005 (0.96 mg/kg) and CB7021 (0.87 mg/kg) above the LAET of 0.42 mg/kg

- (3+4)-Methylphenol (m,p-Cresol) was detected in the sample from MH7005 (8.3 mg/kg) and CB7021 (8.5 mg/kg) above the LAET and 2LAET of 0.063 mg/kg

- Butylbenzylphthalate was detected in the sample from MH7005 (0.25 mg/kg) and CB7021 (0.56 mg/kg) above the LAET of 0.063 mg/kg

- Bis(2-Ethylhexyl)phthalate was detected in the sample from MH7005 (9.9 mg/kg) and CB7021 (7.4 mg/kg) above the LAET of 1.3 mg/kg and 2LAET of 3.1 mg/kg.

PAH analysis was performed on the samples from MH7005 and CB7021. All PAH compounds were detected above the laboratory's PQL. PAH compounds detected which exceed screening criteria were (Table 6):

- Fluorene was detected in the sample from MH7005 (0.54 mg/kg), equal to the LAET

- Phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, and benzo(g,h,i)perylene were detected in the samples from MH7005 and CB7021 above the LAET and 2LAET

- Benzo(a)pyrene, indeno(1,2,3-cd)pyrene, dibenzo(g,h,i)perylene, benzo(b)fluorathene was detected in the sample from CB7021 above the LAET and 2LAET screening levels.

Dioxin/furan analysis was performed on the sample from MH7005 at this terminal. The only compound not detected above the laboratory's PQL was 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD). Concentrations reported for 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (HpCDD) and Octachlorodibenzodioxin (OCDD) were estimated. The dioxin/furan concentration detected in the sample from MH7005 was 320.83 nanograms TEQ per kilogram, exceeding the remedial action level for the LDW. Table 10 contains the analytical results for dioxins and furans.

3.4 TERMINAL 106

Total solids in the two samples collected from this terminal ranged from 53 to 62 percent. Grain size analysis was not performed due to limited sample volumes. Table 7 presents PCB, PAH, and SVOC analysis results for Terminal 106.

Copper was detected in the sample from MH4715 (440 mg/kg) above the LAET and 2LAET screening level of 390 mg/kg. Zinc was detected at estimated concentrations in the sample from MH4684 and MH4715 (3,200 J and 3,100 J mg/kg, respectively), above the LAET and 2LAET screening levels (410 and 960 mg/kg, respectively). Mercury was detected in the sample from MH4715 (0.57 mg/kg) above the LAET of 0.41 mg/kg.

PCBs Aroclor 1254 and 1260 were detected in the sample from MH4715 (0.11 and 0.12 mg/kg, respectively). For non-detections, the laboratory reporting limits for PCBs ranged from 0.032 to

0.75 mg/kg. The total PCB calculation for the sample from MH4715 (0.23 mg/kg) exceeded the LAET screening level of 0.13 mg/kg.

Due to the limited sample volume from MH4684, only the sample from MH4715 was analyzed for SVOCs and PAHs. The use of SIM analysis for PAHs and SVOCs was able to lower the detection level; however there were still compounds for which the detection level was not sufficient to meet the screening level criteria. Only one compound, Bis(2-Ethylhexyl)phthalate, was detected at or above the laboratory's PQL, with a concentration of 32 mg/kg, above the LAET and 2LAET screening levels, 1.3 and 3.1 mg/kg, respectively.

All but three PAH compounds were detected above the laboratory's PQL; however none of the detections exceeded screening levels.

Dioxin/furan analysis was performed on the sample from MH4715 at this terminal. The only compound not detected above the laboratory's PQL was TCDD. The dioxin/furan concentration detected in the sample from MH4715 was 41.27 nanograms TEQ per kilogram, exceeding the remedial action level for the LDW. Table 10 contains the analytical results for dioxins and furans.

3.5 TERMINAL 108

Total solids in the two samples collected from this terminal ranged from 64 to 68 percent. Grain size analysis of the sample from MH7640 indicated that the sample material was predominantly silt. Grain size was not performed on the sample from MH7646. Table 8 presents PCB, PAH, and SVOC analysis results for Terminal 108.

Cadmium was detected at a concentration of 5.6 mg/kg in sample MH7646, above the LAET screening levels (5.1 mg/kg). Zinc was detected at a concentration of 1,100 mg/kg in the sample from MH7640, above the LAET and 2LAET screening levels (410 and 960 mg/kg, respectively). Zinc was also detected in the sample from MH7646 at 630 mg/kg, above the LAET.

PCBs Aroclor 1254 and 1260 were detected in the sample from MH7640 (0.038 and 0.032 mg/kg, respectively). For non-detections, the laboratory reporting limits for PCBs ranged from 0.030 to 0.031 mg/kg. The PCB Aroclor 1254 was detected in the sample from MH7646 at 0.031 mg/kg. The total PCB calculations did not exceed LAET and 2LAET screening levels.

The use of SIM analysis for PAHs and SVOCs was able to lower the detection level; however there were still compounds for which the detection level was not sufficient to meet the screening level criteria. Due to the limited sample volume from MH7646, only the sample from MH7640 at this terminal was analyzed for SVOCs and PAHs. The following exceedances of screening criteria were observed:

- Phenol was detected in the sample from MH7640 (0.43 mg/kg) above the LAET of 0.42 mg/kg

- (3+4)-Methylphenol (m,p-Cresol) was detected in the sample from MH7640 (0.71 mg/kg) above the LAET and 2LAET of 0.063 mg/kg,

- Butylbenzylphthalate was detected in the sample from MH7640 (0.37 mg/kg) above the LAET of 0.063 mg/kg

- Bis(2-Ethylhexyl)phthalate was detected in the sample from MH7640 (10 mg/kg) above the LAET of 1.3 mg/kg and 2LAET of 3.1 mg/kg.

All PAH compounds were detected above the laboratory's PQL in the sample from MH7640; however none of the detections exceeded screening levels.

Dioxin/furan analysis was performed on the sample from MH7640 at this terminal. The following compounds were not detected above the laboratory's PQL: TCDD, HxCDD, 2,3,4,7,8-pentachlorodibenzofuran, and HxCDF. Eight additional compounds were detected at estimated concentrations. The dioxin/furan concentration detected in the sample from MH7640 was 7.42 nanograms TEQ per kilogram. Table 10 contains the analytical results for dioxins and furans.

3.6 TERMINAL 115

Total solids in the six samples collected from this terminal ranged from 53.8 to 69.3 percent. Grain size analysis indicates that the sample material collected from CB608, CB632, and MH540 was predominantly silt, sample material from MH682 was predominantly clay, and sample material from MH422 and CB637 was predominantly sand. Table 9 presents PCB, PAH, and SVOC analysis results for Terminal 115.

The following metals were detected at concentrations above the LAET and/or 2LAET screening criteria:

- Zinc exceeded the 2LAET screening criteria in all six samples

- Mercury concentrations exceeded the LAET in four out of six samples, and the 2LAET in one

- Chromium concentrations exceeded 2LAET at one sample location (MH682)

- Copper exceeded the 2LAET screening criteria at one sample location (CB637).

Total PCBs were detected at concentrations above the LAET in two out of six sample results (CB632 and MH422). For non-detections, the laboratory reporting limits for PCBs ranged from 0.045 to 0.11 mg/kg.

The majority of SVOCs were not detected at or above the laboratory's PQL (12 detections out of 60 compounds for six samples). The higher PQLs were due to matric interference within the samples (i.e., the mass of material that remains in the sample extract prior to analysis, and the small quantity of sample extract that is injected into the gas chromatography/mass spectrometer).

The following exceedances of screening criteria were observed:

- Phenol was detected above the 2LAET in the sample from CB637.
- Bis(2-ethylhexyl)phthalate was detected above the 2LAET in all six samples, with the highest result of 37 mg/kg from CB637.
- Butylbenzylphthalate was detected in two samples (CB608 and MH422) at concentrations above the 2LAET, and one sample (CB632) above the LAET.

Other detections of SVOCs occurred for (3+4)-methylphenol (m,p-cresol) and bis-2-ethyhexyladipate; however, no LAET criteria are available for these compounds.

The majority of PAH compounds were detected, but did not exceed screening criteria. Those compounds that exceeded screening criteria are listed below.

- Anthracene was detected in the sample from MH682 above the LAET and 2LAET.
- Fluoranthene was detected in three out of six samples (CB608, MH682, and MH540) above the LAET and 2LAET.
- Pyrene and chrysene were detected in the sample from MH540 at concentrations above the LAET.

Dioxin/furan analysis was only performed on the sample from MH540 at this terminal. Concentrations reported for HpCDD, OCDD, and HxCDF were estimated. The dioxin/furan concentration detected in the sample from MH540 was 91.31 nanograms TEQ per kilogram, exceeding the remedial action level for the LDW. Table 10 contains the analytical results for dioxins and furans.

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4. CONCLUSIONS

Post-stormwater line cleaning samples were collected from 17 structures across six Port of Seattle terminals. Samples were analyzed for the chemicals of concern as listed in the Supplemental Remedial Investigation, and stated in the Line Cleaning Work Plan (Port 2014). The analytical results of these post-stormwater line cleaning samples were compared to historic/prior sample analytical results where they were available and applicable. No comparable sample locations were available for Terminal 102. Historic versus current sample results for metals, PCBs and PAHs at Terminals 104, 106 and 108 are included in Table 11. Historic versus current results for SVOC and PAHs for Terminal 115 are provided in Table 12. The only comparable sample locations where dioxins and furans were analyzed are for Terminal 115. Historic versus current dioxin and furan results are provided in Table 13. A comparison of results follows. A summary of detections exceeding the 2LAET screening levels, by terminal, is provided in Table 14.

4.1 COMPARISON OF HISTORICAL VERSUS CURRENT RESULTS

4.1.1 Terminal 103

Storm sediments were sampled at three locations (CB1, CB2, and CB3) at Terminal 103 (Figure 2) in 1996 (SAIC 2012). CB1 appears to tie into the drainage system upstream of the current sample location CB8118 and discharges through Outfall 8132. CB2 is upstream while CB3 is located downstream of the recent 2015 sample location CB8126, all of which tie into the drainage system upstream of Outfall 8133. Based on that proximity, results from the sample collected from CB1 are compared to the results from the sample collected from CB8118, and the results from CB2 and CB3 are compared to the results from the sample collected from CB8126.

The samples collected in 1996 were only analyzed for TPH and metals. TPH concentrations were not measured during the 2015 study. In 1996, metals (arsenic, cadmium, chromium, lead, and mercury) were detected in all three storm sediment samples at concentrations below the LAET screening values. In the sample collected in 2015, zinc was detected at concentrations exceeding the LAET in both samples.

4.1.2 Terminal 104

A storm sediment sample was collected from MH7005 at Terminal 104 in both 2010 and during this study in 2015. A comparison of historical and current sample results follows:

Six out of eight metals results are lower in the 2015 sample than were detected during 2010. Zinc was the only metal detected above screening levels during 2015, compared to three metals (cadmium, zinc, and mercury) in 2010 that were detected above screening levels.

Detections of PCBs were similar during 2010 and 2015; however the 2010 Total PCBs calculated exceeded the LAET.

The number of PAH compounds detected at concentrations exceeding LAET or 2LAET screening levels in 2015 was greater than in 2010. In general, the concentrations detected in 2015 are two orders of magnitude higher than those detected during 2010.

4.1.3 Terminal 106

In 2013, prior storm sediment samples were collected from two locations at Terminal 106. The prior sample labeled MH004 was collected from MH4684, and the prior sample labeled MH001 was collected from MH4715.

In general, metals concentrations from 2015 were slightly higher than those detected in 2013, however, the results in 2015 were flagged by the lab as estimated. Only copper and zinc data was available for 2013.

Detected concentrations of PCBs appear equal during both sampling years with both the 2013 and 2015 total calculated PCBs exceeding LAET and 2LAET screening criteria from the MH4715 location.

Detected concentrations of PAHs appear approximately equal during both sampling years, with no individual compounds exceeding screening levels.

4.1.4 Terminal 108

In 2013, prior storm sediment samples were collected from two locations at Terminal 108. The prior sample, labeled MH003, was collected from MH7640, and the sample labeled MH002 was collected from MH7646. Ecology also collected a sample from MH7640 in April 2013.

Results from the 2015 event indicated that zinc concentrations detected in the sample collected from MH7640 were higher than measured in 2013, but were lower than both samples collected from MH7646.

Detected concentrations of PCBs were slightly lower during the 2015 sampling. However, this may be due to lower laboratory detection or reporting levels. Total calculated PCBs did not exceed screening criteria in 2015 but did exceed in the sample collected by the Port 2013, but not in the sample collected by Ecology.

Detected concentrations of PAHs from samples collected from MH7640 appear approximately equal during both sampling years, with no individual compounds exceeding screening levels.

4.1.5 Terminal 115

Storm sediments were sampled from five locations at Terminal 115 in 2010/2011 (TEC Inc. 2011). Two of these locations were also sampled in 2015 (CB608 and CB632), while a third was collected one structure upstream from MH534 at MH540. CB608, CB632, and MH540 discharge to outfalls 2123, 2124, and 2220, respectively. During the 2010/2011 sampling events, grab samples were collected during both the wet and dry seasons (and analyzed separately), and the “in-line” (sediment trap) samples were also collected during both seasons, and composited prior to analysis.

The comparison of historic versus current analytical results for SVOCs and PAHs is provided in Table 12. Comparison of 2015 SVOC and PAH sample results to 2010/2011 sample results show that 2015 concentrations are less than 2011 in-line samples, and are approximately equivalent to the 2010 grab sample concentrations. Overall, current sample results have fewer compounds exceeding LAET screening values than prior results.

Dioxins and furans were analyzed at one location (MH540) at Terminal 115 in 2015. A comparison of historic versus current dioxin furan results for MH540 and 2011 “In-Line 2220A-Composite” samples show that 2015 concentrations are slightly elevated compared to 2011 concentrations, but significantly lower than 2010 “Grab 2220A” sample. The TEQ for the sample collected in 2015 was 91, compared to 1,252 for the 2010 grab sample, and 42 for the 2011 in-line sample. Table 13 provides a comparison of these results. A summary of contaminants detected above 2LAET screening values, by terminal, is provided in Table 14.

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Figures

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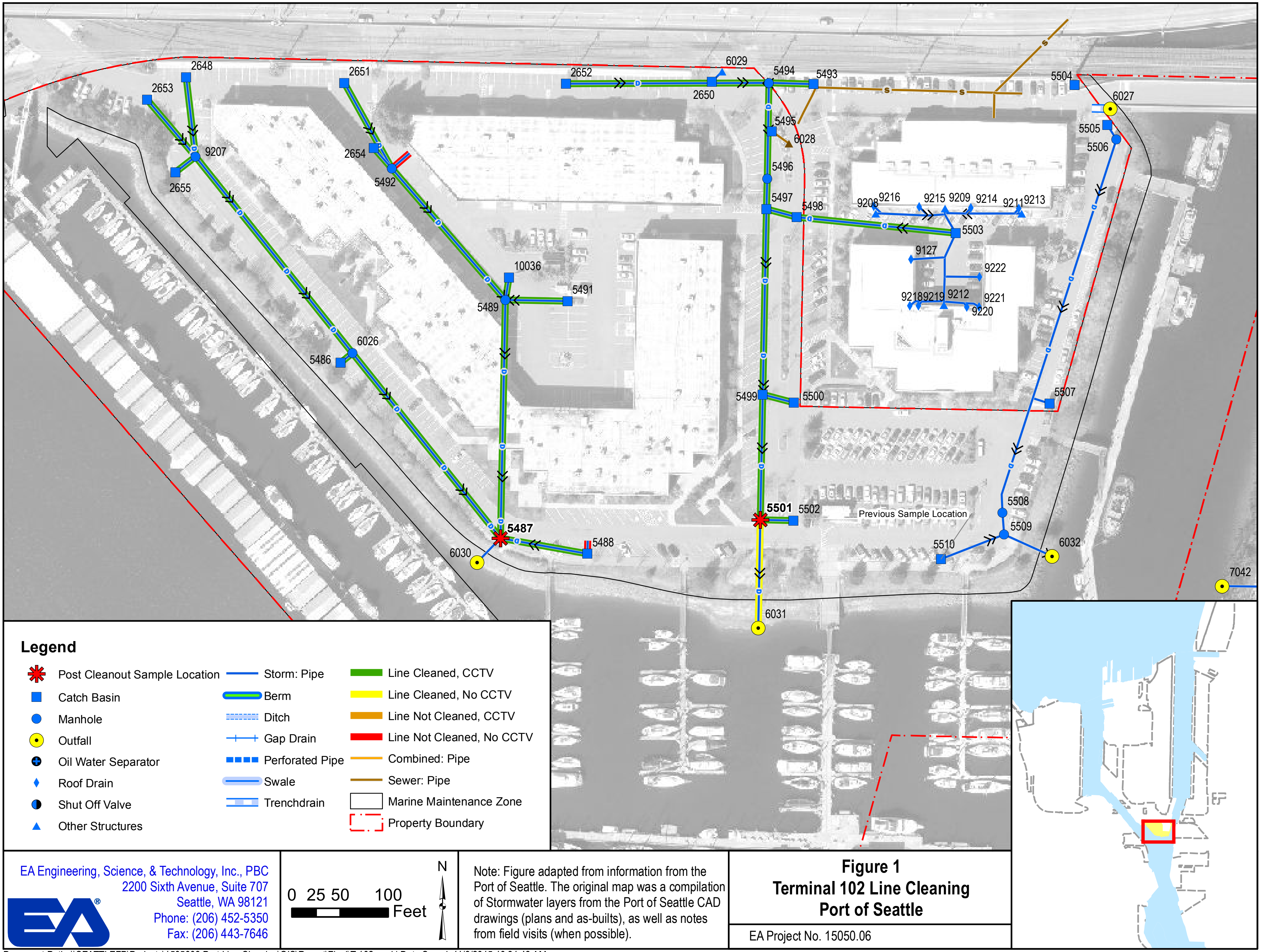

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Figure 1
Terminal 102 Line Cleaning
Port of Seattle

EA Project No. 15050.06

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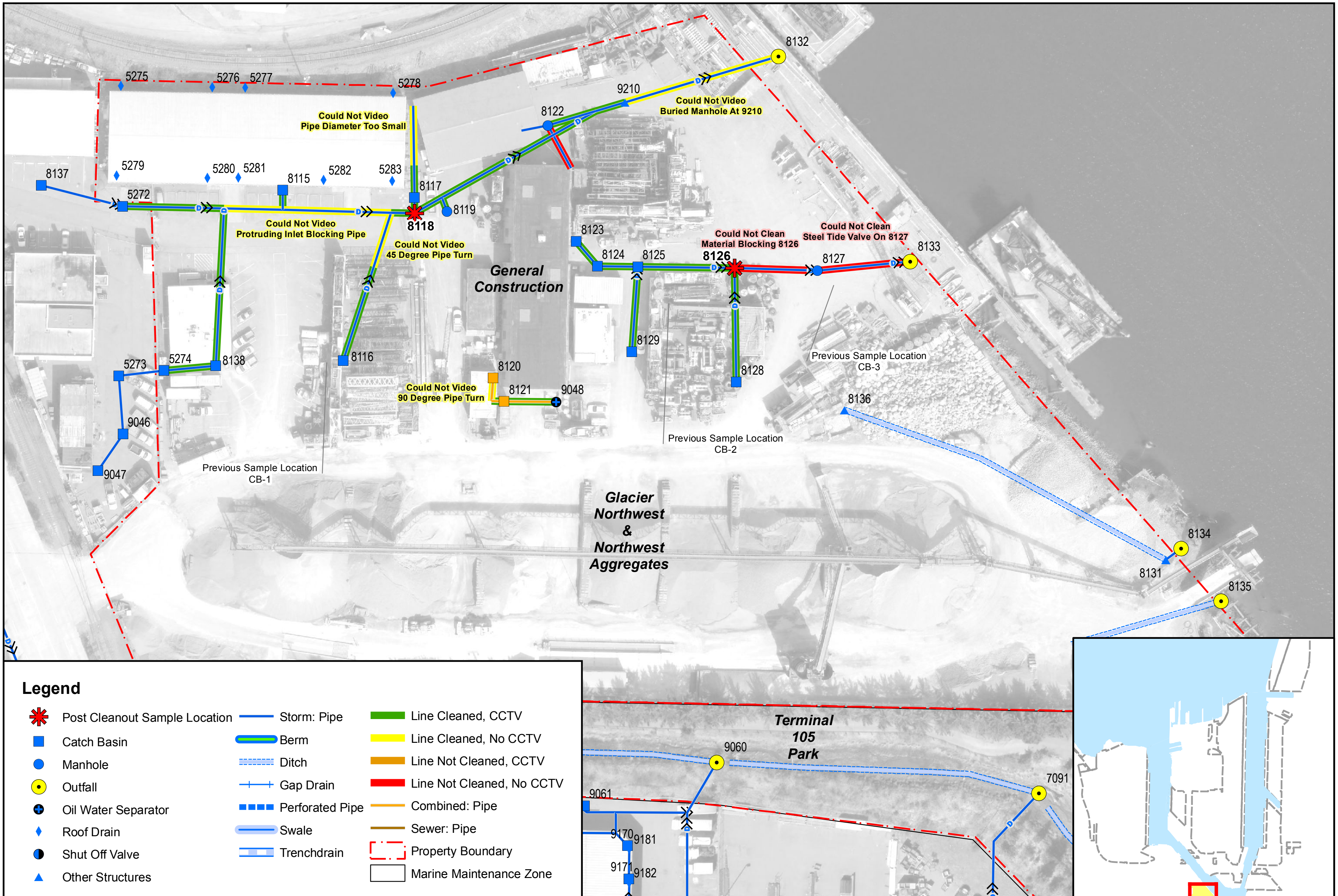

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Figure 2
Terminal 103 Line Cleaning
Port of Seattle

EA Project No. 15050.06

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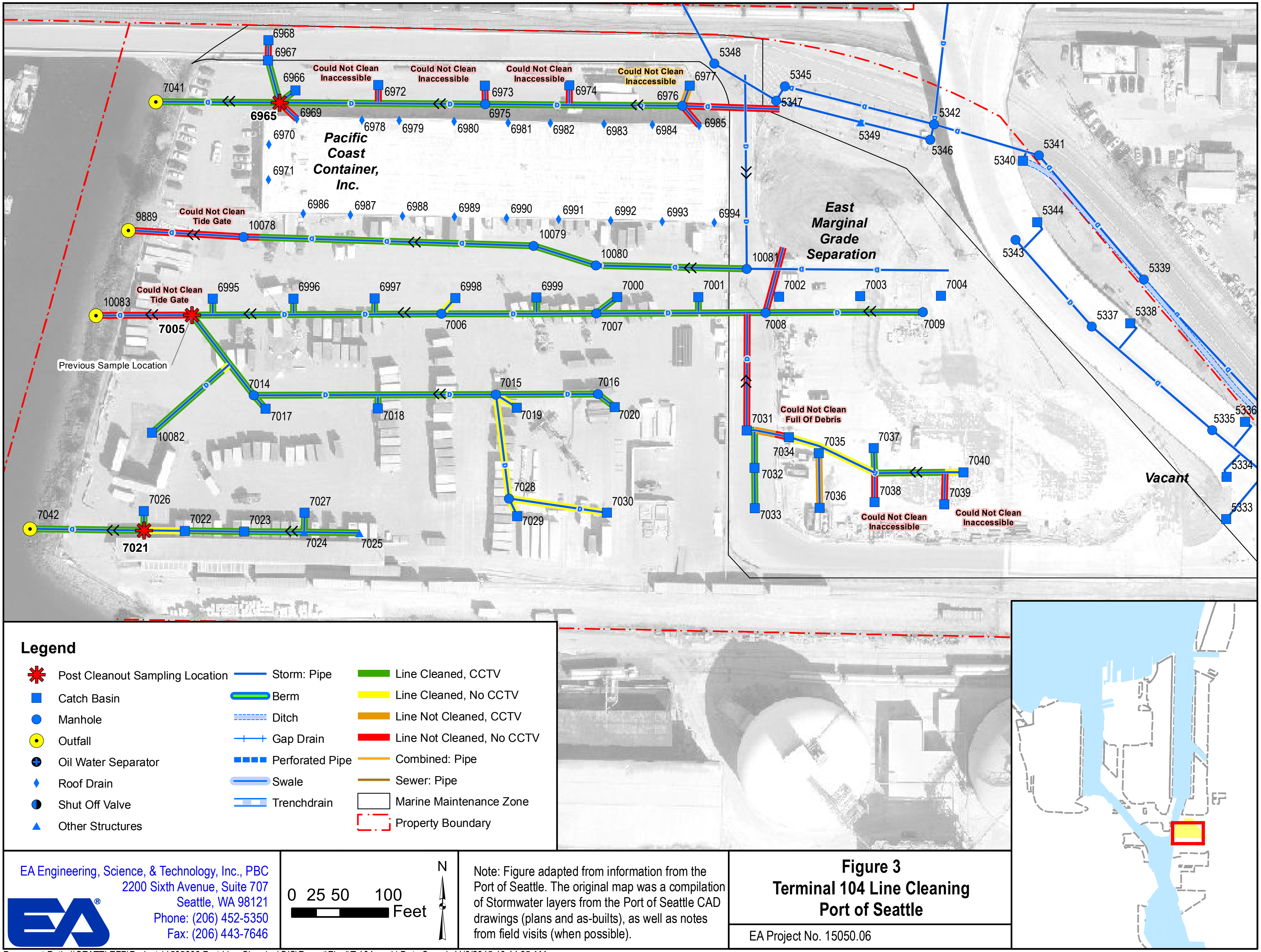

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Figure 3
Terminal 104 Line Cleaning
Port of Seattle

EA Project No. 15050.06

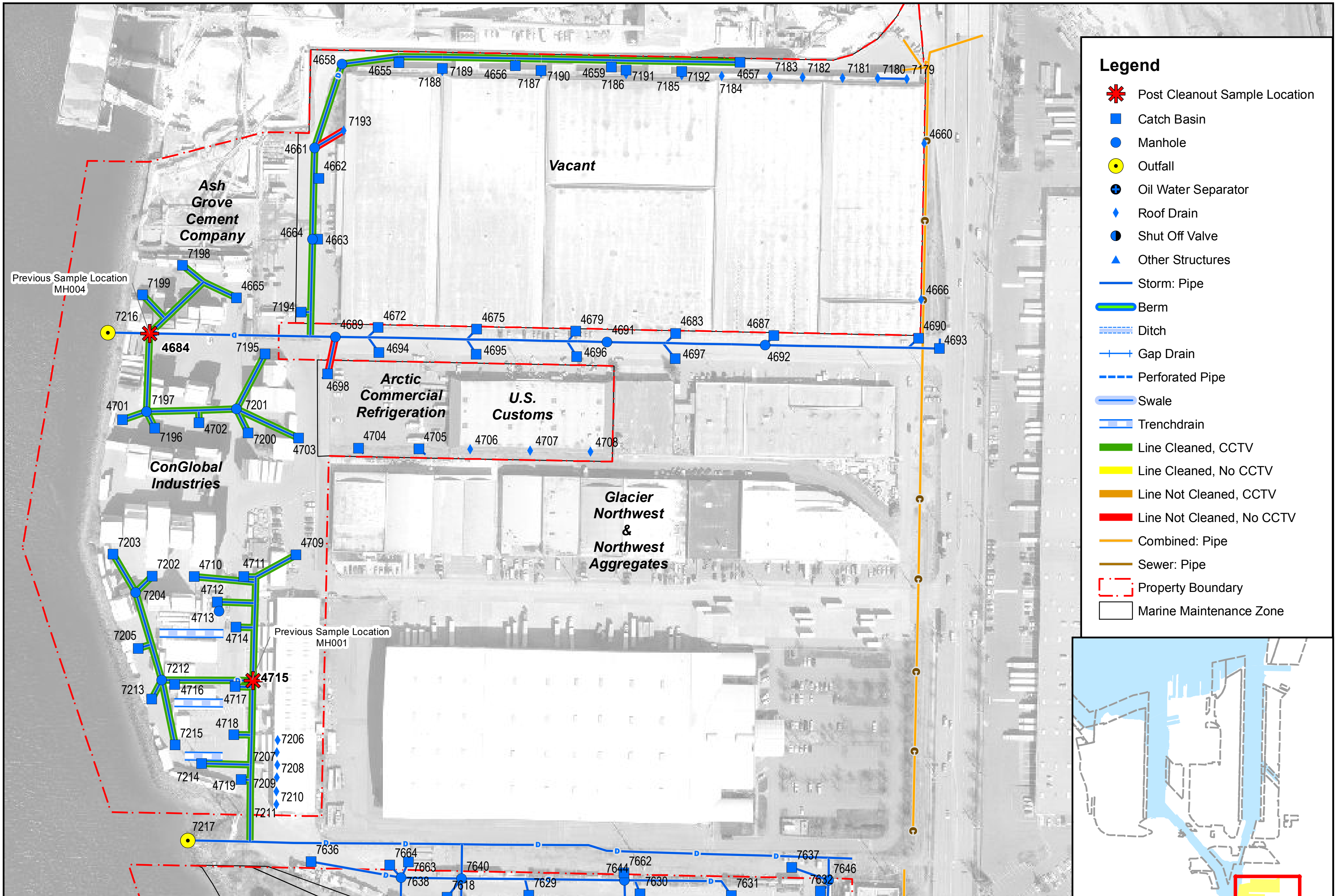

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Figure 4
Terminal 106 Line Cleaning
Port of Seattle

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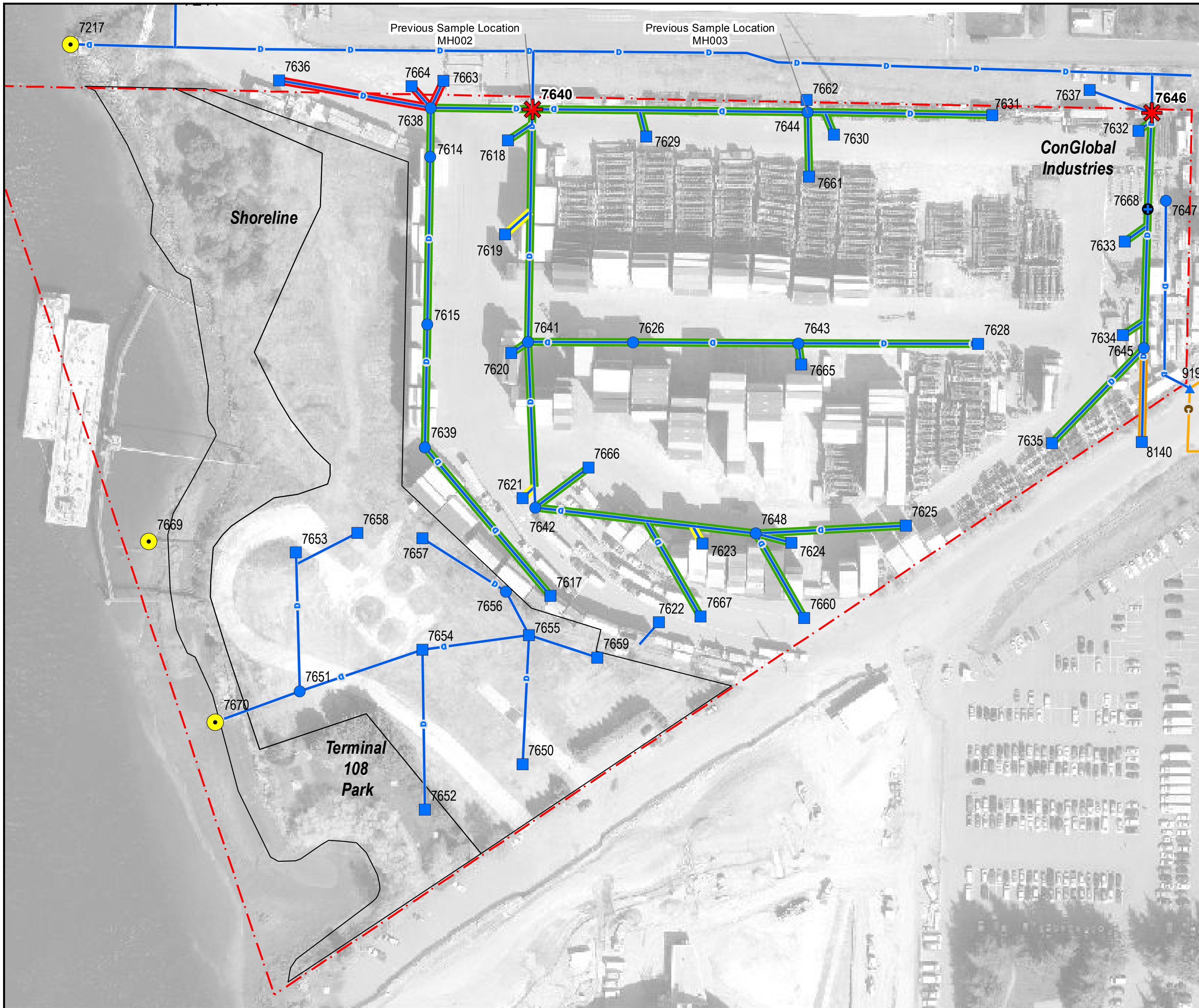

Legend

- Post Cleanout Sample Location
- Catch Basin
- Manhole
- Outfall
- Oil Water Separator
- Roof Drain
- Shut Off Valve
- Other Structures
- Storm: Pipe
- Berm
- Ditch
- Gap Drain
- Perforated Pipe
- Swale
- Trenchdrain
- Line Cleaned, CCTV
- Line Cleaned, No CCTV
- Line Not Cleaned, CCTV
- Line Not Cleaned, No CCTV
- Combined: Pipe
- Sewer: Pipe
- Property Boundary
- Marine Maintenance Zone

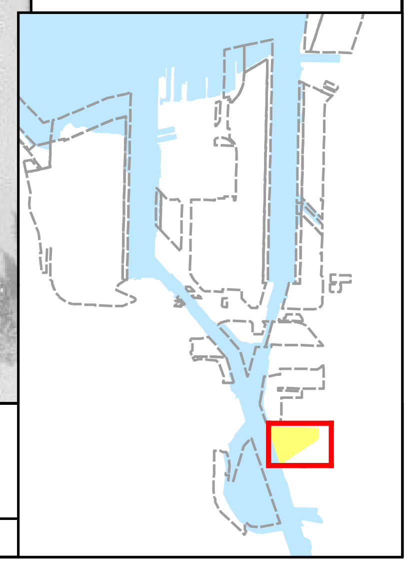

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Figure 5
Terminal 108 Line Cleaning
Port of Seattle

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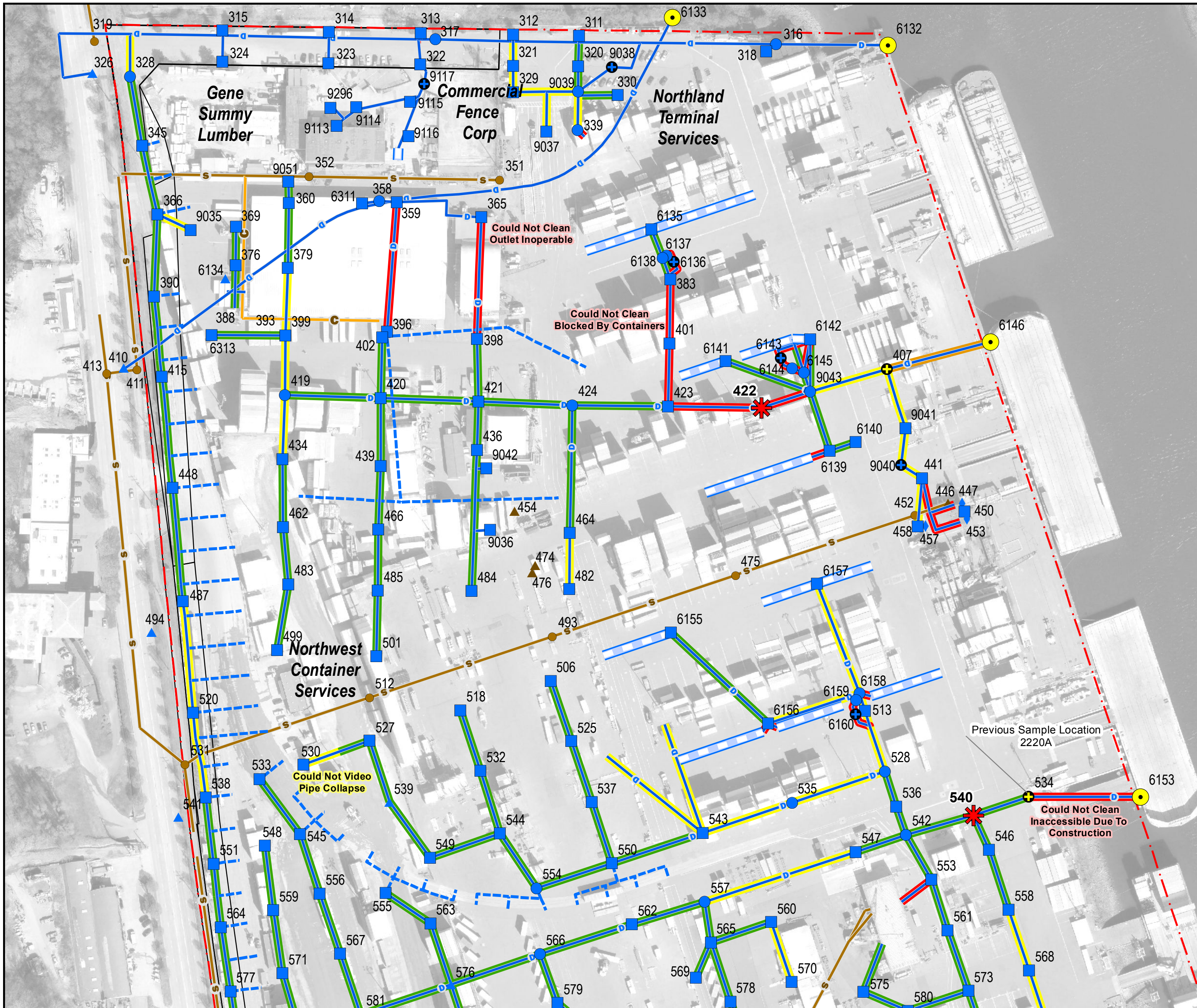

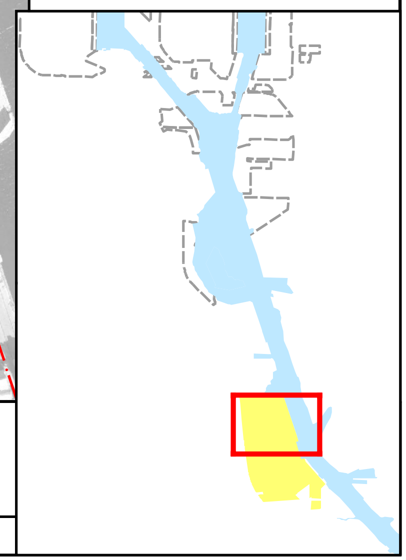

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Figure 6
Terminal 115 North Line Cleaning
Port of Seattle

EA Project No. 15050.06

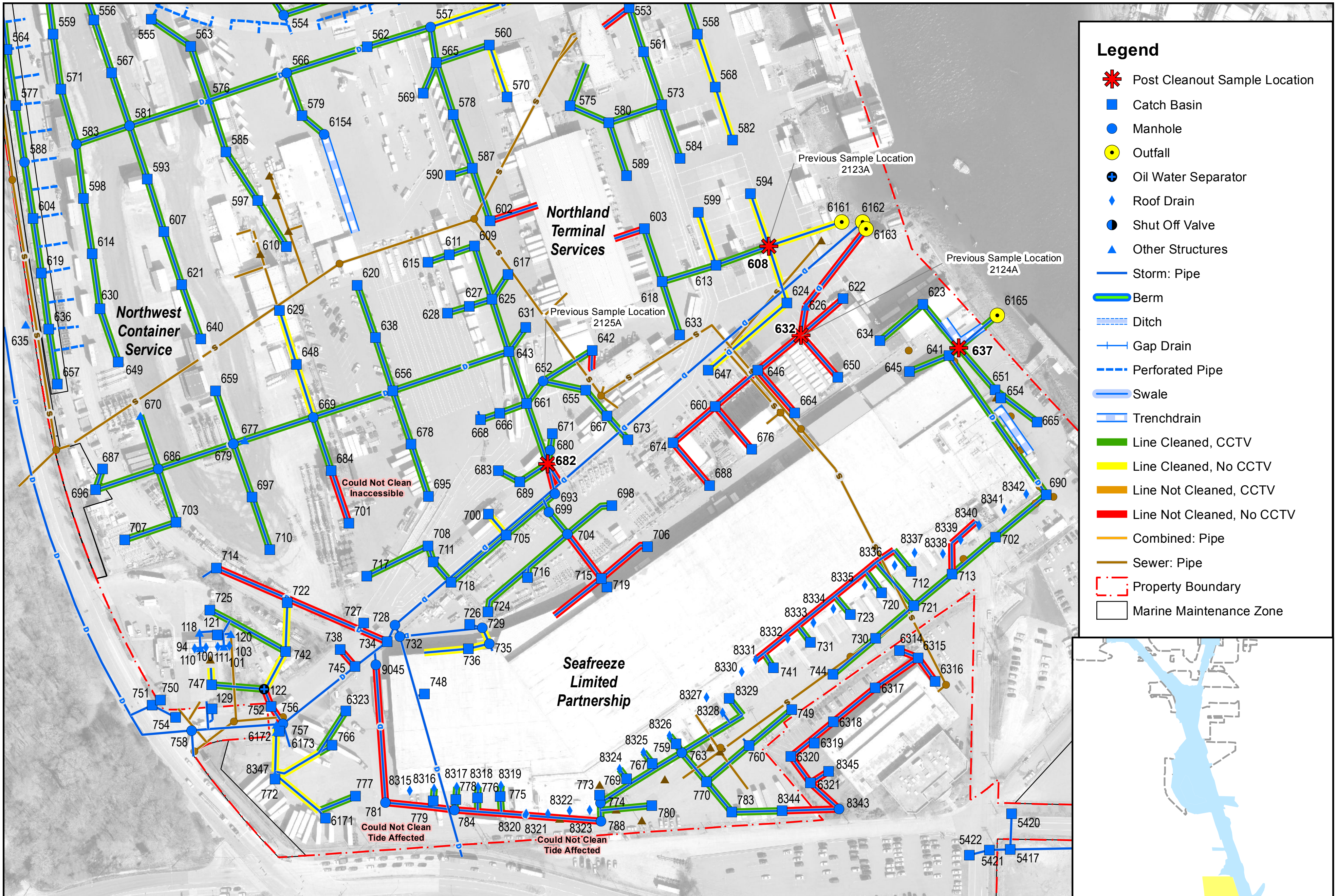

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Figure 7
Terminal 115 South Line Cleaning
Port of Seattle

EA Project No. 15050.06

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Tables

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Table 1 Line Cleaning Dates and Structures by Terminal

Terminal	Dates of Cleaning	Number of Structures Cleaned	Feet of Line Cleaned	Sediment Removed (tons)
Terminal 102	1/22/2015 – 1/24/2015	27	2,649	Not Available
Terminal 103	11/10/2014 – 11/24/2014	17	1,337	2.09
Terminal 104	12/10/2014 – 12/30/2014	42	3,600	4.53
Terminal 106	12/1/2014, 1/7/2015 – 1/8/2015, 4/14/2015	41	7,526	3.56
Terminal 108	3/20/2015 – 3/26/2015	35	3,743	
Terminal 115	7/1/2014 – 11/10/2014	249	27,000	37.24
Source: Email from Kym Anderson of Port of Seattle to Jil Frain at EA Engineering, dated 5/29/15.				

Table 2 Sediment Trap Details

Terminal	Structure Identification	Structure Type	Number of Sediment Traps	Installation Method	Sediment Trap Installation Date	Tide Gate on Outfall
102	CB5501	Catch Basin	6	Wall mount	2/3/2015	Yes
	CB5487	Catch Basin	6	Wall mount	2/4/2015	Yes
103	CB8118	Catch Basin	4	Cinderblock Bottom of catch basin	12/8/2014	No
	CB8126	Catch Basin	4	Cinderblock Bottom of catch basin	12/8/2014	Yes
104	MH7005	Manhole	6	Cinderblock Bottom of trough	2/3/2015	Yes/just downstream of MH7005
	CB7021	Catch Basin	4	Cinderblock Bottom of catch basin	2/3/2015	No/outfall is above high tide
	MH6965	Manhole	5	Wall mount	2/3/2015	No/tidally influenced
106	MH4715	Manhole	9	Wall mount	5/7/2015	No/tidally influenced
	MH4684	Manhole	9	Wall mount	5/7/2015	No/tidally influenced
108	MH7646	Manhole	9	Stainless steel holders horizontally mounted on bottom of manhole	5/7/2015	No/tidally influenced
	MH7640	Manhole	9	Wall mount	5/7/2015	No/check valve just downgradient of MH7640
115	MH422	Manhole	4	Cinderblock Bottom of trough	11/18/2014	Yes/also has treatment system
	MH540	Manhole	4	Stainless steel tripod Bottom of trough	11/17/2014	Yes/also has treatment system
	CB608	Catch Basin	4	Cinderblock Bottom of catch basin	11/17/2014	Yes
	CB632	Manhole	4	Wall mount	11/18/2014	Yes
	MH682	Manhole	4	Wall mount	11/17/2014	Unknown
	CB637	Manhole	4	Wall mount	11/18/2014	Unknown

Table 3 Sample Retrieval Volumes

Terminal	Structure Identification	Sediment Trap Retrieval Date	Sample Volume from Trap (Grams)	Sample Volume from Grab (Grams)	Total Trap and Grab Combined Sample volume (Grams)	Duration of Deployment (Days)	Sediment Trap Collection Rate (Grams/Day/Bottle)	Rainfall During Deployment Period (Inches)
102	CB5501	9/22/2015	127	407	534	231	0.09	9.61
	CB5487		247	597	844	230	0.18	
103	CB8118	4/13/2015	50	180	230	126	0.10	16.17
	CB8126		220	19	239		0.44	
104	MH7005	9/22/2015	267	270	537	231	0.19	9.61
	CB7021		102	450	552		0.11	
	MH6965		24	488	512		0.02	
106	MH4715	9/23/2015	183	Not collected	183	139	0.15	0.68
	MH4684		47	Not collected	47		0.04	
108	MH7646	9/23/2015	71	Not collected	71	139	0.06	0.68
	MH7640		417	Not collected	417		0.33	
115	MH422	4/14/2015	140	370	510	147	0.24	19.62
	MH540		260	180	340	148	0.44	
	CB608		108	200	308	148	0.18	
	CB632		100	280	380	147	0.17	
	MH682		139	100	239	148	0.23	
	CB637		290	240	530	147	0.49	

Notes:
[1] AccuWeather, Inc. 2015. AccuWeather.com for Seattle, WA. http://www.accuweather.com/en/us/seattle-wa/98104/november-weather/41335_pc. Accessed on 02 November 2015.

Table 4 Post-Cleanout Storm Sediment Sample Results
Terminal 102

Location / Sample Name / Lab Report Number / Date				T102 / T102-CB5501-SS / 1509-242 / 9/22/2015		T102 / T102-CB5487-SS / 1509-242 / 9/22/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
Total Solids	%	NA	NA	28		37	
Gravel	%	NA	NA	--		--	
Sand	%	NA	NA	--		--	
Silt	%	NA	NA	--		--	
Clay	%	NA	NA	--		--	
Metals (EPA 6010C/7471B)							
Arsenic	mg/kg	57	93	20		18	
Cadmium	mg/kg	5.1	6.7	**6.4**		1.9	
Chromium	mg/kg	260	270	160		150	
Copper	mg/kg	390	390	360		330	
Lead	mg/kg	450	530	240		160	
Silver	mg/kg	6.1	6.1	3.6	U	2.7	U
Zinc	mg/kg	410	960	**4900**	J	**3600**	J
Mercury	mg/kg	0.41	0.59	*0.89*	U	*0.68*	U
Polychlorinated Biphenyls (EPA 8082A)							
Aroclor 1016	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1221	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1232	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1242	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1248	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1254	mg/kg	NA	NA	0.089	U	0.054	U
Aroclor 1260	mg/kg	NA	NA	0.089	U	0.054	U
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.089		0.054	
Semivolatile Organic Compounds (EPA 8270D/SIM)							
n-Nitrosodimethylamine	mg/kg	NA	NA	0.71	U	0.54	U
Pyridine	mg/kg	NA	NA	0.71	U	0.54	U
Phenol	mg/kg	0.42	1.2	**0.61**		**0.79**	
Aniline	mg/kg	NA	NA	0.71	U	0.54	U
bis(2-Chloroethyl)ether	mg/kg	NA	NA	0.71	U	0.54	U
2-Chlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
1,3-Dichlorobenzene	mg/kg	NA	NA	0.71	U	0.54	U
1,4-Dichlorobenzene	mg/kg	0.11	0.11	*0.18*	U	*0.27*	U
Benzyl alcohol	mg/kg	0.057	0.073	*0.71*	U	*0.54*	U
1,2-Dichlorobenzene	mg/kg	0.035	0.050	*0.18*	U	*0.27*	U
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	*0.18*	U	*0.27*	U
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	0.71	U	0.54	U
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	**4.1**		**2.1**	
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	0.71	U	0.54	U
Hexachloroethane	mg/kg	NA	NA	0.71	U	0.54	U
Nitrobenzene	mg/kg	NA	NA	0.71	U	0.54	U
Isophorone	mg/kg	NA	NA	0.71	U	0.54	U
2-Nitrophenol	mg/kg	NA	NA	0.71	U	0.54	U
2,4-Dimethylphenol	mg/kg	0.029	0.029	*0.18*	U	*0.27*	U
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	0.71	U	0.54	U
2,4-Dichlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	*0.18*	U	*0.27*	U
4-Chloroaniline	mg/kg	NA	NA	0.71	U	0.54	U
Hexachlorobutadiene	mg/kg	0.011	0.12	*0.18*	U	*0.27*	U
4-Chloro-3-methylphenol	mg/kg	NA	NA	0.71	U	0.54	U
Hexachlorocyclopentadiene	mg/kg	NA	NA	0.71	U	0.54	U
2,4,6-Trichlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
2,3-Dichloroaniline	mg/kg	NA	NA	0.71	U	0.54	U
2,4,5-Trichlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
2-Chloronaphthalene	mg/kg	NA	NA	0.71	U	0.54	U
2-Nitroaniline	mg/kg	NA	NA	0.71	U	0.54	U
1,4-Dinitrobenzene	mg/kg	NA	NA	0.71	U	0.54	U
Dimethylphthalate	mg/kg	0.071	0.16	*0.18*	U	*0.27*	U
1,3-Dinitrobenzene	mg/kg	NA	NA	0.71	U	0.54	U
2,6-Dinitrotoluene	mg/kg	NA	NA	0.71	U	0.54	U
1,2-Dinitrobenzene	mg/kg	NA	NA	0.71	U	0.54	U
3-Nitroaniline	mg/kg	NA	NA	0.71	U	0.54	U
2,4-Dinitrophenol	mg/kg	NA	NA	0.71	U	0.54	U
4-Nitrophenol	mg/kg	NA	NA	0.71	U	0.54	U
2,4-Dinitrotoluene	mg/kg	NA	NA	0.71	U	0.54	U
Dibenzofuran	mg/kg	0.54	0.54	0.18	U	0.27	U
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	0.71	U	0.54	U
Diethylphthalate	mg/kg	0.2	0.2	0.18	U	*0.54*	U

Table 4 Post-Cleanout Storm Sediment Sample Results
Terminal 102

			Location Sample Name Lab Report Number Date	T102 T102-CB5501-SS 1509-242 9/22/2015		T102 T102-CB5487-SS 1509-242 9/22/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
4-Chlorophenyl-phenylether	mg/kg	NA	NA	0.71	U	0.27	U
4-Nitroaniline	mg/kg	NA	NA	0.71	U	0.54	U
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	0.71	U	0.54	U
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	*0.18*	U	*0.27*	U
1,2-Diphenylhydrazine	mg/kg	NA	NA	0.71	U	0.54	U
4-Bromophenyl-phenylether	mg/kg	NA	NA	0.71	U	0.54	U
Hexachlorobenzene	mg/kg	0.022	0.07	*0.18*	U	*0.27*	U
Pentachlorophenol	mg/kg	0.36	0.69	*0.71*	U	*0.54*	U
Carbazole	mg/kg	NA	NA	0.71	U	0.54	U
Di-n-butylphthalate	mg/kg	1.4	5.1	1	U	*1.4*	U
Benzidine	mg/kg	NA	NA	0.71	U	0.54	U
Butylbenzylphthalate	mg/kg	0.063	0.9	*0.18*	U	**0.58**	
bis-2-Ethylhexyladipate	mg/kg	NA	NA	0.71	U	0.54	U
3,3'-Dichlorobenzidine	mg/kg	NA	NA	0.71	U	0.54	U
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	**7.5**		**6.5**	
Di-n-octylphthalate	mg/kg	6.2	6.2	**300**		0.54	U
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)							
Naphthalene	mg/kg	2.1	2.1	0.071	U	0.054	U
2-Methylnaphthalene	mg/kg	0.67	0.67	0.071	U	0.054	U
1-Methylnaphthalene	mg/kg	NA	NA	0.071	U	0.054	U
Acenaphthylene	mg/kg	1.3	1.3	0.071	U	0.054	U
Acenaphthene	mg/kg	0.50	0.50	0.071	U	0.054	U
Fluorene	mg/kg	0.54	0.54	0.12		0.054	U
Phenanthrene	mg/kg	1.5	1.5	0.68		0.36	
Anthracene	mg/kg	0.96	0.96	0.1		0.054	U
Fluoranthene	mg/kg	1.7	2.5	1.1		0.64	
Pyrene	mg/kg	2.6	3.3	1		0.46	
Benzo[a]anthracene	mg/kg	1.3	1.6	0.4		0.23	
Chrysene	mg/kg	1.4	2.8	0.97		0.55	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	0.75		0.41	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	0.2		0.14	
Benzo[a]pyrene	mg/kg	1.6	1.6	0.52		0.22	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	0.44		0.22	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	0.11		0.054	U
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	**0.71**		0.28	
LPAH Sum	mg/kg	5.2	5.2	1.11		0.63	
HPAH Sum	mg/kg	12	17	6.2		3.2	

NOTES:
Bold and Shaded = Detected at or above standard
Italics = Non detect value that is above the screening standard
1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.
2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.
-- = Not analzyed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 5 Post-Cleanout Storm Sediment Sample Results
Terminal 103

Location Sample Name Lab Report Number Date				T103 T103-CB8126-SS 1504-148 4/13/2015		T103 T103-CB8118-SS 1504-148 4/13/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
Total Solids	%	NA	NA	50.4		58.6	
Gravel	%	NA	NA	1.2		7.7	
Sand	%	NA	NA	20.7		45.1	
Silt	%	NA	NA	42		22.4	
Clay	%	NA	NA	35.9		24.7	
Metals (EPA 6010C/7471B)							
Arsenic	mg/kg	57	93	26		14	
Cadmium	mg/kg	5.1	6.7	1.7		2	
Chromium	mg/kg	260	270	110	J	130	J
Copper	mg/kg	390	390	380		300	
Lead	mg/kg	450	530	150		170	
Silver	mg/kg	6.1	6.1	2	U	1.8	U
Zinc	mg/kg	410	960	**1600**		**1800**	
Mercury	mg/kg	0.41	0.59	0.12		0.14	
Polychlorinated Biphenyls (EPA 8082A)							
Aroclor 1016	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1221	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1232	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1242	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1248	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1254	mg/kg	NA	NA	0.05	U	0.044	U
Aroclor 1260	mg/kg	NA	NA	0.051		0.069	
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.051		0.069	
Semivolatile Organic Compounds (EPA 8270D/SIM)							
n-Nitrosodimethylamine	mg/kg	NA	NA	1	U	0.88	U
Pyridine	mg/kg	NA	NA	10	U	8.8	U
Phenol	mg/kg	0.42	1.2	*1*	U	*0.88*	U
Aniline	mg/kg	NA	NA	5	U	4.4	U
bis(2-Chloroethyl)ether	mg/kg	NA	NA	1	U	0.88	U
2-Chlorophenol	mg/kg	NA	NA	1	U	0.88	U
1,3-Dichlorobenzene	mg/kg	NA	NA	1	U	0.88	U
1,4-Dichlorobenzene	mg/kg	0.11	0.11	*1*	U	*0.88*	U
Benzyl alcohol	mg/kg	0.057	0.073	*5*	U	*4.4*	U
1,2-Dichlorobenzene	mg/kg	0.035	0.050	*1*	U	*0.88*	U
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	*1*	U	*0.88*	U
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	1	U	0.88	U
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	*1*	U	*0.88*	U
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	1	U	0.88	U
Hexachloroethane	mg/kg	NA	NA	1	U	0.88	U
Nitrobenzene	mg/kg	NA	NA	1	U	0.88	U
Isophorone	mg/kg	NA	NA	1	U	0.88	U
2-Nitrophenol	mg/kg	NA	NA	1	U	0.88	U
2,4-Dimethylphenol	mg/kg	0.029	0.029	*1*	U	*0.88*	U
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	1	U	0.88	U
2,4-Dichlorophenol	mg/kg	NA	NA	1	U	0.88	U
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	*1*	U	*0.88*	U
4-Chloroaniline	mg/kg	NA	NA	5	U	4.4	U
Hexachlorobutadiene	mg/kg	0.011	0.12	*1*	U	*0.88*	U
4-Chloro-3-methylphenol	mg/kg	NA	NA	1	U	0.88	U
Hexachlorocyclopentadiene	mg/kg	NA	NA	1	U	0.88	U
2,4,6-Trichlorophenol	mg/kg	NA	NA	1	U	0.88	U
2,3-Dichloroaniline	mg/kg	NA	NA	1	U	0.88	U
2,4,5-Trichlorophenol	mg/kg	NA	NA	1	U	0.88	U
2-Chloronaphthalene	mg/kg	NA	NA	1	U	0.88	U
2-Nitroaniline	mg/kg	NA	NA	1	U	0.88	U
1,4-Dinitrobenzene	mg/kg	NA	NA	1	U	0.88	U
Dimethylphthalate	mg/kg	0.071	0.16	*1*	U	*0.88*	U
1,3-Dinitrobenzene	mg/kg	NA	NA	1	U	0.88	U
2,6-Dinitrotoluene	mg/kg	NA	NA	1	U	0.88	U
1,2-Dinitrobenzene	mg/kg	NA	NA	1	U	0.88	U
3-Nitroaniline	mg/kg	NA	NA	1	U	0.88	U
2,4-Dinitrophenol	mg/kg	NA	NA	5	U	4.4	U
4-Nitrophenol	mg/kg	NA	NA	1	U	0.88	U
2,4-Dinitrotoluene	mg/kg	NA	NA	1	U	0.88	U
Dibenzofuran	mg/kg	0.54	0.54	*1*	U	*0.88*	U
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	1	U	0.88	U
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	1	U	0.88	U
Diethylphthalate	mg/kg	0.2	0.2	*5*	U	*4.4*	U

Table 5 Post-Cleanout Storm Sediment Sample Results
Terminal 103

Location				**T103**		**T103**	
Sample Name				**T103-CB8126-SS**		**T103-CB8118-SS**	
Lab Report Number				**1504-148**		**1504-148**	
Date				**4/13/2015**		**4/13/2015**	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
4-Chlorophenyl-phenylether	mg/kg	NA	NA	1	U	0.88	U
4-Nitroaniline	mg/kg	NA	NA	1	U	0.88	U
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	5	U	4.4	U
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	*1*	U	*0.88*	U
1,2-Diphenylhydrazine	mg/kg	NA	NA	1	U	0.88	U
4-Bromophenyl-phenylether	mg/kg	NA	NA	1	U	0.88	U
Hexachlorobenzene	mg/kg	0.022	0.07	*1*	U	*0.88*	U
Pentachlorophenol	mg/kg	0.36	0.69	*5*	U	*4.4*	U
Carbazole	mg/kg	NA	NA	1	U	0.88	U
Di-n-butylphthalate	mg/kg	1.4	5.1	1	U	0.88	U
Benzidine	mg/kg	NA	NA	10	UJ	8.8	UJ
Butylbenzylphthalate	mg/kg	0.063	0.9	*1*	U	*0.88*	U
bis-2-Ethylhexyladipate	mg/kg	NA	NA	1	U	1.2	
3,3'-Dichlorobenzidine	mg/kg	NA	NA	5	U	4.4	U
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	**37**		**69**	
Di-n-octylphthalate	mg/kg	6.2	6.2	1	U	0.88	U
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)							
Naphthalene	mg/kg	2.1	2.1	0.086		0.065	
2-Methylnaphthalene	mg/kg	0.67	0.67	0.43		0.049	
1-Methylnaphthalene	mg/kg	NA	NA	0.34		0.035	U
Acenaphthylene	mg/kg	1.3	1.3	0.092		0.039	
Acenaphthene	mg/kg	0.50	0.50	0.2		0.087	
Fluorene	mg/kg	0.54	0.54	0.39		0.15	
Phenanthrene	mg/kg	1.5	1.5	1.3		0.63	
Anthracene	mg/kg	0.96	0.96	0.29		0.24	
Fluoranthene	mg/kg	1.7	2.5	**2.4**		1	
Pyrene	mg/kg	2.6	3.3	2		1.2	
Benzo[a]anthracene	mg/kg	1.3	1.6	0.57		0.39	
Chrysene	mg/kg	1.4	2.8	**1.4**		0.82	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	1.4		0.82	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	0.17		0.17	
Benzo[a]pyrene	mg/kg	1.6	1.6	0.54		0.47	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	0.36		0.08	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	0.1		0.12	
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	0.53		0.55	
LPAH Sum	mg/kg	5.2	5.2	2.358		1.211	
HPAH Sum	mg/kg	12	17	9.47		5.62	

NOTES:
Bold and Shaded = Detected at or above standard
Italics = Non detect value that is above the screening standard

1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.
2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.
-- = Not analzyed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 6 Post-Cleanout Storm Sediment Sample Results
Terminal 104

Location Sample Name Lab Report Number Date				T104 T104-MH7005-SS 1509-242 9/22/2015		T104 T104-MH6965-SS 1509-242 9/22/2015		T104 T104-CB7021-SS 1509-242 9/22/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Total Solids	%	NA	NA	54		30		49	
Gravel	%	NA	NA	--		--		--	
Sand	%	NA	NA	--		--		--	
Silt	%	NA	NA	--		--		--	
Clay	%	NA	NA	--		--		--	
Metals (EPA 6010C/7471B)									
Arsenic	mg/kg	57	93	14		18		20	
Cadmium	mg/kg	5.1	6.7	1.3		1.7	U	1.4	
Chromium	mg/kg	260	270	120		60		77	
Copper	mg/kg	390	390	200		140		200	
Lead	mg/kg	450	530	160		120		**480**	
Silver	mg/kg	6.1	6.1	1.9	U	3.3	U	2	U
Zinc	mg/kg	410	960	**2100**	J	**860**	J	**1900**	J
Mercury	mg/kg	0.41	0.59	*0.46*	U	*0.83*	U	*0.51*	U
Polychlorinated Biphenyls (EPA 8082A)									
Aroclor 1016	mg/kg	NA	NA	0.037	U	0.067	U	0.041	U
Aroclor 1221	mg/kg	NA	NA	0.037	U	0.067	U	0.041	U
Aroclor 1232	mg/kg	NA	NA	0.037	U	0.067	U	0.041	U
Aroclor 1242	mg/kg	NA	NA	0.037	U	0.067	U	0.041	U
Aroclor 1248	mg/kg	NA	NA	0.037	U	0.067	U	0.041	U
Aroclor 1254	mg/kg	NA	NA	0.051		0.067	U	0.1	J
Aroclor 1260	mg/kg	NA	NA	0.071	J	0.067	U	0.043	
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.122		0.067		**0.143**	
Semivolatile Organic Compounds (EPA 8270D/SIM)									
n-Nitrosodimethylamine	mg/kg	NA	NA	0.37	U	--		0.41	U
Pyridine	mg/kg	NA	NA	0.37	U	--		0.41	U
Phenol	mg/kg	0.42	1.2	**0.96**		--		**0.87**	
Aniline	mg/kg	NA	NA	0.37	U	--		0.41	U
bis(2-Chloroethyl)ether	mg/kg	NA	NA	0.37	U	--		0.41	U
2-Chlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
1,3-Dichlorobenzene	mg/kg	NA	NA	0.37	U	--		0.41	U
1,4-Dichlorobenzene	mg/kg	0.11	0.11	0.093	U	--		0.1	U
Benzyl alcohol	mg/kg	0.057	0.073	*0.37*	U	--		*0.41*	U
1,2-Dichlorobenzene	mg/kg	0.035	0.050	*0.093*	U	--		*0.1*	U
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	*0.093*	U	--		*0.1*	U
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	0.37	U	--		0.41	U
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	**8.3**		--		**8.5**	
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	0.37	U	--		0.41	U
Hexachloroethane	mg/kg	NA	NA	0.37	U	--		0.41	U
Nitrobenzene	mg/kg	NA	NA	0.37	U	--		0.41	U
Isophorone	mg/kg	NA	NA	0.37	U	--		0.41	U
2-Nitrophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4-Dimethylphenol	mg/kg	0.029	0.029	*0.093*	U	--		*0.1*	U
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4-Dichlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	*0.093*	U	--		*0.1*	U
4-Chloroaniline	mg/kg	NA	NA	0.37	U	--		0.41	U
Hexachlorobutadiene	mg/kg	0.011	0.12	*0.093*	U	--		*0.1*	U
4-Chloro-3-methylphenol	mg/kg	NA	NA	0.37	U	--		0.41	U
Hexachlorocyclopentadiene	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4,6-Trichlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
2,3-Dichloroaniline	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4,5-Trichlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
2-Chloronaphthalene	mg/kg	NA	NA	0.37	U	--		0.41	U
2-Nitroaniline	mg/kg	NA	NA	0.37	U	--		0.41	U
1,4-Dinitrobenzene	mg/kg	NA	NA	0.37	U	--		0.41	U
Dimethylphthalate	mg/kg	0.071	0.16	*0.093*	U	--		*0.1*	U
1,3-Dinitrobenzene	mg/kg	NA	NA	0.37	U	--		0.41	U
2,6-Dinitrotoluene	mg/kg	NA	NA	0.37	U	--		0.41	U
1,2-Dinitrobenzene	mg/kg	NA	NA	0.37	U	--		0.41	U
3-Nitroaniline	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4-Dinitrophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
4-Nitrophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
2,4-Dinitrotoluene	mg/kg	NA	NA	0.37	U	--		0.41	U
Dibenzofuran	mg/kg	0.54	0.54	0.24		--		0.26	
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	0.37	U	--		0.41	U
Diethylphthalate	mg/kg	0.2	0.2	0.093	U	--		0.1	U
4-Chlorophenyl-phenylether	mg/kg	NA	NA	0.37	U	--		0.41	U
4-Nitroaniline	mg/kg	NA	NA	0.37	U	--		0.41	U

Table 6 Post-Cleanout Storm Sediment Sample Results
Terminal 104

Location / Sample Name / Lab Report Number / Date				T104 / T104-MH7005-SS / 1509-242 / 9/22/2015		T104 / T104-MH6965-SS / 1509-242 / 9/22/2015		T104 / T104-CB7021-SS / 1509-242 / 9/22/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	0.37	U	--		0.41	U
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	*0.096*	U	--		*0.17*	U
1,2-Diphenylhydrazine	mg/kg	NA	NA	0.37	U	--		0.41	U
4-Bromophenyl-phenylether	mg/kg	NA	NA	0.37	U	--		0.41	U
Hexachlorobenzene	mg/kg	0.022	0.07	*0.093*	U	--		*0.1*	U
Pentachlorophenol	mg/kg	0.36	0.69	*0.37*	U	--		*0.41*	U
Carbazole	mg/kg	NA	NA	0.53		--		0.71	
Di-n-butylphthalate	mg/kg	1.4	5.1	0.93	U	--		1	U
Benzidine	mg/kg	NA	NA	0.37	U	--		0.41	U
Butylbenzylphthalate	mg/kg	0.063	0.9	**0.25**		--		**0.56**	
bis-2-Ethylhexyladipate	mg/kg	NA	NA	0.37	U	--		0.41	U
3,3'-Dichlorobenzidine	mg/kg	NA	NA	0.37	U	--		0.41	U
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	**9.9**		--		**7.4**	
Di-n-octylphthalate	mg/kg	6.2	6.2	0.37	U	--		0.41	U
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)									
Naphthalene	mg/kg	2.1	2.1	0.084		--		0.22	
2-Methylnaphthalene	mg/kg	0.67	0.67	0.098		--		0.3	
1-Methylnaphthalene	mg/kg	NA	NA	0.078		--		0.24	
Acenaphthylene	mg/kg	1.3	1.3	0.23		--		0.45	
Acenaphthene	mg/kg	0.50	0.50	0.21		--		0.13	
Fluorene	mg/kg	0.54	0.54	**0.54**		--		0.48	
Phenanthrene	mg/kg	1.5	1.5	**8.1**		--		**3.3**	
Anthracene	mg/kg	0.96	0.96	**1.5**		--		**2.2**	
Fluoranthene	mg/kg	1.7	2.5	**14**		--		**11**	
Pyrene	mg/kg	2.6	3.3	**10**		--		**9.4**	
Benzo[a]anthracene	mg/kg	1.3	1.6	**3.2**	J	--		**4.1**	J
Chrysene	mg/kg	1.4	2.8	**4.7**		--		**6.6**	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	2.6		--		**4.8**	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	0.96		--		1.5	
Benzo[a]pyrene	mg/kg	1.6	1.6	1.2		--		**1.7**	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	0.54		--		**1**	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	0.22		--		**0.43**	
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	**0.82**		--		**1.3**	
LPAH Sum	mg/kg	5.2	5.2	**10.664**				**6.78**	
HPAH Sum	mg/kg	12	17	**38.24**				**41.83**	

NOTES:
Bold and Shaded = Detected at or above standard
Italics = Non detect value that is above the screening standard
1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.

2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.

-- = Not analzyed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 7 Post-Cleanout Storm Sediment Sample Results
Terminal 106

Location Sample Name Lab Report Number Date				T106 T106-MH4684-SS 1509-242 9/23/2015		T106 T106-MH4715-SS 1509-242 9/23/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
Total Solids	%	NA	NA	53		62	
Gravel	%	NA	NA	--		--	
Sand	%	NA	NA	--		--	
Silt	%	NA	NA	--		--	
Clay	%	NA	NA	--		--	
Metals (EPA 6010C/7471B)							
Arsenic	mg/kg	57	93	9.6		13	
Cadmium	mg/kg	5.1	6.7	1.1		2	
Chromium	mg/kg	260	270	100		180	
Copper	mg/kg	390	390	170		**440**	
Lead	mg/kg	450	530	120		250	
Silver	mg/kg	6.1	6.1	1.9	U	2.4	
Zinc	mg/kg	410	960	**3200**	J	**3100**	J
Mercury	mg/kg	0.41	0.59	*0.47*	U	**0.57**	
Polychlorinated Biphenyls (EPA 8082A)							
Aroclor 1016	mg/kg	NA	NA	0.075	U	0.032	U
Aroclor 1221	mg/kg	NA	NA	0.075	U	0.032	U
Aroclor 1232	mg/kg	NA	NA	0.075	U	0.032	U
Aroclor 1242	mg/kg	NA	NA	0.075	U	0.032	U
Aroclor 1248	mg/kg	NA	NA	0.075	U	0.032	U
Aroclor 1254	mg/kg	NA	NA	0.075	U	0.11	
Aroclor 1260	mg/kg	NA	NA	0.075	U	0.12	
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.075		**0.23**	
Semivolatile Organic Compounds (EPA 8270D/SIM)							
n-Nitrosodimethylamine	mg/kg	NA	NA	--		0.65	U
Pyridine	mg/kg	NA	NA	--		0.65	U
Phenol	mg/kg	0.42	1.2	--		0.32	U
Aniline	mg/kg	NA	NA	--		0.65	U
bis(2-Chloroethyl)ether	mg/kg	NA	NA	--		0.65	U
2-Chlorophenol	mg/kg	NA	NA	--		0.65	U
1,3-Dichlorobenzene	mg/kg	NA	NA	--		0.65	U
1,4-Dichlorobenzene	mg/kg	0.11	0.11	--		*0.32*	U
Benzyl alcohol	mg/kg	0.057	0.073	--		*0.65*	U
1,2-Dichlorobenzene	mg/kg	0.035	0.050	--		*0.32*	U
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	--		*0.32*	U
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	--		0.65	U
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	--		*0.32*	U
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	--		0.65	U
Hexachloroethane	mg/kg	NA	NA	--		0.65	U
Nitrobenzene	mg/kg	NA	NA	--		0.65	U
Isophorone	mg/kg	NA	NA	--		0.65	U
2-Nitrophenol	mg/kg	NA	NA	--		0.65	U
2,4-Dimethylphenol	mg/kg	0.029	0.029	--		*0.32*	U
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	--		0.65	U
2,4-Dichlorophenol	mg/kg	NA	NA	--		0.65	U
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	--		*0.32*	U
4-Chloroaniline	mg/kg	NA	NA	--		0.65	U
Hexachlorobutadiene	mg/kg	0.011	0.12	--		*0.32*	U
4-Chloro-3-methylphenol	mg/kg	NA	NA	--		0.65	U
Hexachlorocyclopentadiene	mg/kg	NA	NA	--		0.65	U
2,4,6-Trichlorophenol	mg/kg	NA	NA	--		0.65	U
2,3-Dichloroaniline	mg/kg	NA	NA	--		0.65	U
2,4,5-Trichlorophenol	mg/kg	NA	NA	--		0.65	U
2-Chloronaphthalene	mg/kg	NA	NA	--		0.65	U
2-Nitroaniline	mg/kg	NA	NA	--		0.65	U
1,4-Dinitrobenzene	mg/kg	NA	NA	--		0.65	U
Dimethylphthalate	mg/kg	0.071	0.16	--		*0.32*	U
1,3-Dinitrobenzene	mg/kg	NA	NA	--		0.65	U
2,6-Dinitrotoluene	mg/kg	NA	NA	--		0.65	U
1,2-Dinitrobenzene	mg/kg	NA	NA	--		0.65	U
3-Nitroaniline	mg/kg	NA	NA	--		0.65	U
2,4-Dinitrophenol	mg/kg	NA	NA	--		0.65	U
4-Nitrophenol	mg/kg	NA	NA	--		0.65	U
2,4-Dinitrotoluene	mg/kg	NA	NA	--		0.65	U
Dibenzofuran	mg/kg	0.54	0.54	--		0.32	U
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	--		0.65	U
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	--		0.65	U
Diethylphthalate	mg/kg	0.2	0.2	--		*0.32*	U

Table 7 Post-Cleanout Storm Sediment Sample Results
Terminal 106

Location / Sample Name / Lab Report Number / Date				T106 / T106-MH4684-SS / 1509-242 / 9/23/2015		T106 / T106-MH4715-SS / 1509-242 / 9/23/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
4-Chlorophenyl-phenylether	mg/kg	NA	NA	--		0.65	U
4-Nitroaniline	mg/kg	NA	NA	--		0.65	U
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	--		0.65	U
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	--		*0.32*	U
1,2-Diphenylhydrazine	mg/kg	NA	NA	--		0.65	U
4-Bromophenyl-phenylether	mg/kg	NA	NA	--		0.65	U
Hexachlorobenzene	mg/kg	0.022	0.07	--		*0.32*	U
Pentachlorophenol	mg/kg	0.36	0.69	--		*0.65*	U
Carbazole	mg/kg	NA	NA	--		0.65	U
Di-n-butylphthalate	mg/kg	1.4	5.1	--		*1.6*	U
Benzidine	mg/kg	NA	NA	--		0.65	U
Butylbenzylphthalate	mg/kg	0.063	0.9	--		*0.32*	U
bis-2-Ethylhexyladipate	mg/kg	NA	NA	--		0.65	U
3,3'-Dichlorobenzidine	mg/kg	NA	NA	--		0.65	U
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	--		**32**	
Di-n-octylphthalate	mg/kg	6.2	6.2	--		0.65	U
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)							
Naphthalene	mg/kg	2.1	2.1	--		0.097	
2-Methylnaphthalene	mg/kg	0.67	0.67	--		0.092	
1-Methylnaphthalene	mg/kg	NA	NA	--		0.075	
Acenaphthylene	mg/kg	1.3	1.3	--		0.065	U
Acenaphthene	mg/kg	0.50	0.50	--		0.065	U
Fluorene	mg/kg	0.54	0.54	--		0.085	
Phenanthrene	mg/kg	1.5	1.5	--		0.28	
Anthracene	mg/kg	0.96	0.96	--		0.067	
Fluoranthene	mg/kg	1.7	2.5	--		0.3	
Pyrene	mg/kg	2.6	3.3	--		0.77	
Benzo[a]anthracene	mg/kg	1.3	1.6	--		0.13	
Chrysene	mg/kg	1.4	2.8	--		0.32	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	--		0.28	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	--		0.078	
Benzo[a]pyrene	mg/kg	1.6	1.6	--		0.18	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	--		0.25	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	--		0.065	U
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	--		0.66	
LPAH Sum	mg/kg	5.2	5.2	--		0.659	
HPAH Sum	mg/kg	12	17	--		3.033	

NOTES:

Bold and Shaded = Detected at or above standard

Italics = Non detect value that is above the screening standard

1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.

2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.

-- = Not analzyed.

MTCA = Model Toxics Control Act

LAET = Lowest Apparent Effects Threshold

2LAET = Secondary LAET

EPA = U.S. Environmental Protection Agency

mg/kg = Milligram(s) per kilogram

NA = No screening criteria available

Q = Qualifier

SIM = Select ion monitoring

Data Qualifiers:

U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 8 Post-Cleanout Storm Sediment Sample Results
Terminal 108

Location Sample Name Lab Report Number Date				T108 T108-MH7640-SS 1509-242 9/23/2015		T108 T108-MH7646-SS 1509-242 9/23/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**
Total Solids	%	NA	NA	64		68	
Gravel	%	NA	NA	9.00		--	
Sand	%	NA	NA	26.9		--	
Silt	%	NA	NA	52.8		--	
Clay	%	NA	NA	11.2		--	
Metals (EPA 6010C/7471B)							
Arsenic	mg/kg	57	93	7.8	U	7.4	U
Cadmium	mg/kg	5.1	6.7	1.3		**5.6**	
Chromium	mg/kg	260	270	59		38	
Copper	mg/kg	390	390	93		66	
Lead	mg/kg	450	530	52		40	
Silver	mg/kg	6.1	6.1	1.6	U	1.5	U
Zinc	mg/kg	410	960	**1100**	J	**630**	J
Mercury	mg/kg	0.41	0.59	0.39	U	0.37	U
Polychlorinated Biphenyls (EPA 8082A)							
Aroclor 1016	mg/kg	NA	NA	0.031	U	0.030	U
Aroclor 1221	mg/kg	NA	NA	0.031	U	0.030	U
Aroclor 1232	mg/kg	NA	NA	0.031	U	0.030	U
Aroclor 1242	mg/kg	NA	NA	0.031	U	0.030	U
Aroclor 1248	mg/kg	NA	NA	0.031	U	0.030	U
Aroclor 1254	mg/kg	NA	NA	0.038	J	0.031	
Aroclor 1260	mg/kg	NA	NA	0.032		0.030	U
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.070		0.031	
Semivolatile Organic Compounds (EPA 8270D/SIM)							
n-Nitrosodimethylamine	mg/kg	NA	NA	0.16	U	--	
Pyridine	mg/kg	NA	NA	0.16	U	--	
Phenol	mg/kg	0.42	1.2	**0.43**		--	
Aniline	mg/kg	NA	NA	0.16	U	--	
bis(2-Chloroethyl)ether	mg/kg	NA	NA	0.16	U	--	
2-Chlorophenol	mg/kg	NA	NA	0.16	U	--	
1,3-Dichlorobenzene	mg/kg	NA	NA	0.16	U	--	
1,4-Dichlorobenzene	mg/kg	0.11	0.11	0.078	U	--	
Benzyl alcohol	mg/kg	0.057	0.073	*0.16*	U	--	
1,2-Dichlorobenzene	mg/kg	0.035	0.050	*0.078*	U	--	
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	*0.078*	U	--	
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	0.16	U	--	
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	**0.71**		--	
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	0.16	U	--	
Hexachloroethane	mg/kg	NA	NA	0.16	U	--	
Nitrobenzene	mg/kg	NA	NA	0.16	U	--	
Isophorone	mg/kg	NA	NA	0.16	U	--	
2-Nitrophenol	mg/kg	NA	NA	0.16	U	--	
2,4-Dimethylphenol	mg/kg	0.029	0.029	*0.078*	U	--	
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	0.16	U	--	
2,4-Dichlorophenol	mg/kg	NA	NA	0.16	U	--	
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	*0.078*	U	--	
4-Chloroaniline	mg/kg	NA	NA	0.16	U	--	
Hexachlorobutadiene	mg/kg	0.011	0.12	*0.078*	U	--	
4-Chloro-3-methylphenol	mg/kg	NA	NA	0.16	U	--	
Hexachlorocyclopentadiene	mg/kg	NA	NA	0.16	U	--	
2,4,6-Trichlorophenol	mg/kg	NA	NA	0.16	U	--	
2,3-Dichloroaniline	mg/kg	NA	NA	0.16	U	--	
2,4,5-Trichlorophenol	mg/kg	NA	NA	0.16	U	--	
2-Chloronaphthalene	mg/kg	NA	NA	0.16	U	--	
2-Nitroaniline	mg/kg	NA	NA	0.16	U	--	
1,4-Dinitrobenzene	mg/kg	NA	NA	0.16	U	--	
Dimethylphthalate	mg/kg	0.071	0.16	*0.078*	U	--	
1,3-Dinitrobenzene	mg/kg	NA	NA	0.16	U	--	
2,6-Dinitrotoluene	mg/kg	NA	NA	0.16	U	--	
1,2-Dinitrobenzene	mg/kg	NA	NA	0.16	U	--	
3-Nitroaniline	mg/kg	NA	NA	0.16	U	--	
2,4-Dinitrophenol	mg/kg	NA	NA	0.16	U	--	
4-Nitrophenol	mg/kg	NA	NA	0.16	U	--	
2,4-Dinitrotoluene	mg/kg	NA	NA	0.16	U	--	
Dibenzofuran	mg/kg	0.54	0.54	0.078	U	--	
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	0.16	U	--	
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	0.16	U	--	
Diethylphthalate	mg/kg	0.2	0.2	0.078	U	--	

Table 8 Post-Cleanout Storm Sediment Sample Results
Terminal 108

Analyte (Analytical Method)	Units	LAET[1] mg/kg	2LAET[1] mg/kg	Result	Q	Result	Q
Location				T108		T108	
Sample Name				T108-MH7640-SS		T108-MH7646-SS	
Lab Report Number				1509-242		1509-242	
Date				9/23/2015		9/23/2015	
4-Chlorophenyl-phenylether	mg/kg	NA	NA	0.16	U	--	
4-Nitroaniline	mg/kg	NA	NA	0.16	U	--	
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	0.16	U	--	
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	*0.078*	U	--	
1,2-Diphenylhydrazine	mg/kg	NA	NA	0.16	U	--	
4-Bromophenyl-phenylether	mg/kg	NA	NA	0.16	U	--	
Hexachlorobenzene	mg/kg	0.022	0.07	*0.078*	U	--	
Pentachlorophenol	mg/kg	0.36	0.69	0.16	U	--	
Carbazole	mg/kg	NA	NA	0.16	U	--	
Di-n-butylphthalate	mg/kg	1.4	5.1	0.4	U	--	
Benzidine	mg/kg	NA	NA	0.16	U	--	
Butylbenzylphthalate	mg/kg	0.063	0.9	**0.37**		--	
bis-2-Ethylhexyladipate	mg/kg	NA	NA	0.16	U	--	
3,3'-Dichlorobenzidine	mg/kg	NA	NA	0.16	U	--	
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	**10**		--	
Di-n-octylphthalate	mg/kg	6.2	6.2	0.16	U	--	
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)							
Naphthalene	mg/kg	2.1	2.1	0.027		--	
2-Methylnaphthalene	mg/kg	0.67	0.67	0.036		--	
1-Methylnaphthalene	mg/kg	NA	NA	0.025		--	
Acenaphthylene	mg/kg	1.3	1.3	0.027		--	
Acenaphthene	mg/kg	0.50	0.50	0.075		--	
Fluorene	mg/kg	0.54	0.54	0.052		--	
Phenanthrene	mg/kg	1.5	1.5	0.21		--	
Anthracene	mg/kg	0.96	0.96	0.037		--	
Fluoranthene	mg/kg	1.7	2.5	0.29		--	
Pyrene	mg/kg	2.6	3.3	0.36		--	
Benzo[a]anthracene	mg/kg	1.3	1.6	0.11		--	
Chrysene	mg/kg	1.4	2.8	0.33		--	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	0.17		--	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	0.049		--	
Benzo[a]pyrene	mg/kg	1.6	1.6	0.087		--	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	0.1		--	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	0.036		--	
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	0.23		--	
LPAH Sum	mg/kg	5.2	5.2	0.428		--	
HPAH Sum	mg/kg	12	17	1.762		--	

NOTES:
Bold and Shaded = Detected at or above standard
Italics = Non detect value that is above the screening standard

1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.

2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.

-- = Not analzyed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 9 Post-Cleanout Storm Sediment Sample Results
Terminal 115

Location / Sample Name / Lab Report Number / Date				T115 T115-CB608-SS 1504-147 4/14/2015		T115 T115-MH682-SS 1504-147 4/14/2015		T115 T115-CB632-SS 1504-146 4/14/2015		T115 T115-MH422-SS 1504-146 4/14/2015		T115 T115-MH540-SS 1504-146 4/14/2015		T115 T115-CB637-SS 1504-146 4/14/2015	
Analyte (Analytical Method)	Units	LAET[1] mg/kg	2LAET[1] mg/kg	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Solids	%	NA	NA	53.8		53.8		59.0		69.3		56.1		24.3	
Gravel	%	NA	NA	1.40		3.80		3.40		4.40		2.00		7.40	
Sand	%	NA	NA	27.7		20.3		24.0		49.0		23.9		45.5	
Silt	%	NA	NA	52.3		36.2		54.0		31.6		44.4		17.7	
Clay	%	NA	NA	18.7		39.6		18.4		15.2		29.8		29.3	
Metals (EPA 6010C/7471B)															
Arsenic	mg/kg	57	93	13		14		16		18		18		22	U
Cadmium	mg/kg	5.1	6.7	2		2.1		3.4		2.3		4		2.2	U
Chromium	mg/kg	260	270	92	J	**520**	J	87	J	77	J	80	J	170	J
Copper	mg/kg	390	390	150		130		190		160		160		**440**	
Lead	mg/kg	450	530	180		130		250		180		280		150	
Silver	mg/kg	6.1	6.1	1.9	U	1.9	U	1.7	U	1.5	U	1.8	U	4.4	U
Zinc	mg/kg	410	960	**2900**		**1400**		**3200**		**2300**		**3000**		**2000**	
Mercury	mg/kg	0.41	0.59	**0.63**		0.22		**0.53**		**0.49**		0.33		**0.41**	
Polychlorinated Biphenyls (EPA 8082A)															
Aroclor 1016	mg/kg	NA	NA	0.048	U	0.048	U	0.043	U	0.038	U	0.045	U	0.11	U
Aroclor 1221	mg/kg	NA	NA	0.048	U	0.048	U	0.043	U	0.038	U	0.045	U	0.11	U
Aroclor 1232	mg/kg	NA	NA	0.048	U	0.048	U	0.043	U	0.038	U	0.045	U	0.11	U
Aroclor 1242	mg/kg	NA	NA	0.048	U	0.048	U	0.14	NJ	0.098	J	0.045	U	0.11	U
Aroclor 1248	mg/kg	NA	NA	0.048	U	0.048	U	0.043	U	0.038	U	0.045	U	0.11	U
Aroclor 1254	mg/kg	NA	NA	0.048	U	0.048	U	0.043	U	0.038	U	0.045	U	0.11	U
Aroclor 1260	mg/kg	NA	NA	0.048	U	0.048	U	0.13		0.046		0.048		0.11	U
Total PCBs (calculated)[2]	mg/kg	0.13	1	0.048		0.048		**0.27**		**0.144**		0.048		0.11	
Semivolatile Organic Compounds (EPA 8270D/SIM)															
n-Nitrosodimethylamine	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Pyridine	mg/kg	NA	NA	9.5	U	9.6	U	8.6	U	7.6	U	9.1	U	22	U
Phenol	mg/kg	0.42	1.2	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	**9.9**	J
Aniline	mg/kg	NA	NA	4.8	U	4.8	U	4.3	U	3.8	U	4.5	U	11	U
bis(2-Chloroethyl)ether	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2-Chlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	UJ
1,3-Dichlorobenzene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
1,4-Dichlorobenzene	mg/kg	0.11	0.11	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	UJ
Benzyl alcohol	mg/kg	0.057	0.073	*4.8*	U	*4.8*	U	*4.3*	U	*3.8*	U	*4.5*	U	*11*	U
1,2-Dichlorobenzene	mg/kg	0.035	0.050	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
2-Methylphenol (o-Cresol)	mg/kg	0.063	0.063	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
bis(2-Chloroisopropyl)ether	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
(3+4)-Methylphenol (m,p-Cresol)	mg/kg	0.063	0.063	**4.8**		*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	**35**	
n-Nitroso-di-n-propylamine	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Hexachloroethane	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Nitrobenzene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Isophorone	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2-Nitrophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,4-Dimethylphenol	mg/kg	0.029	0.029	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
bis(2-Chloroethoxy)methane	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,4-Dichlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
1,2,4-Trichlorobenzene	mg/kg	0.031	0.051	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
4-Chloroaniline	mg/kg	NA	NA	4.8	U	4.8	U	4.3	U	3.8	U	4.5	U	11	U
Hexachlorobutadiene	mg/kg	0.011	0.12	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
4-Chloro-3-methylphenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	UJ
Hexachlorocyclopentadiene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,4,6-Trichlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,3-Dichloroaniline	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,4,5-Trichlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2-Chloronaphthalene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2-Nitroaniline	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
1,4-Dinitrobenzene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Dimethylphthalate	mg/kg	0.071	0.16	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
1,3-Dinitrobenzene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,6-Dinitrotoluene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
1,2-Dinitrobenzene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
3-Nitroaniline	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,4-Dinitrophenol	mg/kg	NA	NA	4.8	U	4.8	U	4.3	U	3.8	U	4.5	U	11	U
4-Nitrophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	UJ
2,4-Dinitrotoluene	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	UJ
Dibenzofuran	mg/kg	0.54	0.54	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
2,3,5,6-Tetrachlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
2,3,4,6-Tetrachlorophenol	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Diethylphthalate	mg/kg	0.2	0.2	*4.8*	U	*4.8*	U	*4.3*	U	*3.8*	U	*4.5*	U	*11*	U
4-Chlorophenyl-phenylether	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
4-Nitroaniline	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
4,6-Dinitro-2-methylphenol	mg/kg	NA	NA	4.8	U	4.8	U	4.3	U	3.8	U	4.5	U	11	U
n-Nitrosodiphenylamine	mg/kg	0.028	0.04	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
1,2-Diphenylhydrazine	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
4-Bromophenyl-phenylether	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Hexachlorobenzene	mg/kg	0.022	0.07	*0.95*	U	*0.96*	U	*0.86*	U	*0.76*	U	*0.91*	U	*2.2*	U
Pentachlorophenol	mg/kg	0.36	0.69	*4.8*	U	*4.8*	U	*4.3*	U	*3.8*	U	*4.5*	U	*11*	UJ
Carbazole	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Di-n-butylphthalate	mg/kg	1.4	5.1	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	*2.2*	U
Benzidine	mg/kg	NA	NA	9.5	UJ	9.6	UJ	8.6	UJ	7.6	UJ	9.1	UJ	22	UJ
Butylbenzylphthalate	mg/kg	0.063	0.9	**1.5**		*0.96*	U	**0.88**		**1**		*0.91*	U	*2.2*	U
bis-2-Ethylhexyladipate	mg/kg	NA	NA	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
3,3'-Dichlorobenzidine	mg/kg	NA	NA	4.8	U	4.8	U	4.3	U	3.8	U	4.5	U	11	U
bis(2-Ethylhexyl)phthalate	mg/kg	1.3	3.1	**21**		**14**		**10**		**17**		**11**		**37**	
Di-n-octylphthalate	mg/kg	6.2	6.2	0.95	U	0.96	U	0.86	U	0.76	U	0.91	U	2.2	U
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)															
Naphthalene	mg/kg	2.1	2.1	0.073		0.051		0.052		0.038		0.041		0.089	U
2-Methylnaphthalene	mg/kg	0.67	0.67	0.05		0.038	U	0.034	U	0.031		0.036	U	0.089	U
1-Methylnaphthalene	mg/kg	NA	NA	0.038	U	0.038	U	0.034	U	0.03	U	0.036	U	0.089	U
Acenaphthylene	mg/kg	1.3	1.3	0.11		0.093		0.049		0.046		0.097		0.089	U
Acenaphthene	mg/kg	0.50	0.50	0.038	U	0.087		0.034	U	0.05		0.071		0.089	U
Fluorene	mg/kg	0.54	0.54	0.11		0.24		0.055		0.09		0.13		0.089	U
Phenanthrene	mg/kg	1.5	1.5	0.95		1.3		0.22		0.45		1		0.51	
Anthracene	mg/kg	0.96	0.96	0.37		**0.99**		0.16		0.2		0.57		0.14	
Fluoranthene	mg/kg	1.7	2.5	**2**		**1.8**		0.42		1.2		**2.9**		0.71	
Pyrene	mg/kg	2.6	3.3	2		1.9		0.69		1.1		**2.8**		0.61	J
Benzo[a]anthracene	mg/kg	1.3	1.6	0.43		0.51		0.17		0.33		0.68		0.2	
Chrysene	mg/kg	1.4	2.8	1.3		1.2		0.52		0.71		**1.4**		0.76	
Benzo[b]fluoranthene	mg/kg	3.2	3.6	0.69		0.97		0.35		0.44		1.1		0.5	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	0.24		0.34		0.089		0.15		0.36		0.12	
Benzo[a]pyrene	mg/kg	1.6	1.6	0.39		0.5		0.2		0.49		0.49		0.24	
Indeno[1,2,3-cd]pyrene	mg/kg	0.6	0.69	0.22		0.37		0.14		0.13		0.32		0.22	
Dibenz[a,h]anthracene	mg/kg	0.23	0.23	0.11		0.17		0.073		0.055		0.14		0.093	

Table 9 Post-Cleanout Storm Sediment Sample Results
Terminal 115

Location / Sample Name / Lab Report Number / Date				T115 T115-CB608-SS 1504-147 4/14/2015		T115 T115-MH682-SS 1504-147 4/14/2015		T115 T115-CB632-SS 1504-146 4/14/2015		T115 T115-MH422-SS 1504-146 4/14/2015		T115 T115-MH540-SS 1504-146 4/14/2015		T115 T115-CB637-SS 1504-146 4/14/2015	
Analyte (Analytical Method)	**Units**	**LAET[1] mg/kg**	**2LAET[1] mg/kg**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Benzo[g,h,i]perylene	mg/kg	0.67	0.72	0.53		0.65		0.32		0.3		0.58		0.57	
LPAH Sum	mg/kg	5.2	5.2	1.651		2.761		0.57		0.57		0.57		0.57	
HPAH Sum	mg/kg	12	17	7.91		8.41		2.972		4.905		10.77		4.023	

NOTES:
Bold and Shaded = Detected at or above standard
Italics = Non detect value that is above the screening standard
1 Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.
2 Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.
-- = Not analzyed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.

Table 10 Post-Cleanout Dioxin/Furan Analytical Results
All Terminals

Location Sample Name Date			T102 T102-CB5487-SS 9/22/2015			T103 T103-CB8118-SS 4/13/2015			T104 T104-MH7005-SS 9/22/2015			T106 T106-MH4715-SS 9/23/2015			T108 T108-MH7640-SS 9/23/2015			T115 T115-MH540-SS 4/14/2015		
Analyte (Analytical Method)	**Units**	**TEF[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**
Dioxin Compounds (EPA 1613B)																				
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1	3.53		3.53	1.4		1.40	1.64	U	1.64	1.16	U	1.16	0.841	U	0.841	0.986		0.99
1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1	13.7		13.7	11.1		11.10	9.17		9.17	10.1		10.10	1.82	J	1.82	8.87		8.87
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	17.5		1.75	23.9		2.39	22.0		2.20	17.9		1.79	2.02	U	0.20	20.8		2.08
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	36.2		3.62	51.9		5.19	460		46.00	49.6		4.96	6.58	J	0.66	97.0		9.70
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	34		3.4	42.4		4.24	44.7		4.47	34.2		3.42	4.79	J	0.48	48.2		4.82
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	0.01	643		6.43	1,390		13.90	13,900	J	139.00	873		8.73	129		1.29	3,460	J	34.60
Octachlorodibenzodioxin (OCDD)	ng/kg	0.0003	4,430		1.329	16,800	J	5.04	185,000	J	55.50	6,960		2.09	1,110		0.33	52,000	J	15.60
2,3,7,8-tetrachlorodibenzofuran (TCDF)	ng/kg	0.1	6.92		0.692	2.85		0.29	12.4		1.24	7.96		0.80	1.69		0.17	1.91		0.19
1,2,3,7,8-pentachlorodibenzofuran (PeCDF)	ng/kg	0.03	8.89		0.2667	3.52		0.11	19.2		0.58	4.86	J	0.15	1.03	J	0.03	2.55		0.08
2,3,4,7,8-pentachlorodibenzofuran (PeCDF)	ng/kg	0.3	14.5		4.35	6.41		1.92	29.3		8.79	7.18	J	2.15	1.22	U	0.37	2.89		0.87
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	22.7		2.27	21		2.10	134		13.40	12.2		1.22	2.61	J	0.26	18.5		1.85
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	21.3		2.13	11.8		1.18	30.3		3.03	10.5		1.05	2.24	J	0.22	13.8		1.38
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	24.7		2.47	15.5		1.55	54.0		5.40	13.5		1.35	3.17	J	0.32	22		2.20
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	6.09	J	0.609	2.05	J	0.21	74.5		7.45	3.05	J	0.31	0.472	U	0.05	1.46	J	0.15
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.01	192		1.92	207		2.07	1,880		18.80	175		1.75	33.6		0.34	638		6.38
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.01	10.7		0.107	12.5		0.13	174		1.74	12.7		0.13	2.03	J	0.02	49.9		0.50
Octachlorodibenzofuran (OCDF)	ng/kg	0.0003	213		0.0639	351		0.11	8,090		2.43	410		0.12	80.4		0.02	3,550		1.07
Results	ng/kg				48.64			52.91			320.83			41.27			7.42			91.31

NOTES:

[1] Washington State Department of Ecology Toxics Cleanup Program. 2013a. Model Toxics Control Act (MTCA) Regulation and Statute. Table 708-1 Toxicity Equivalency Factors for Chlorinated dibenzo-p-dioxins and Chlorinated Dibenzofurans Congeners. Publication No. 94-06.

EPA = U.S. Environmental Protection Agency

ng/kg = Nanogram per kilogram (equivalent to parts per trillion or pico gram per gram)

Q = Qualifier.

TEF = Toxic Equivalency Factor

TEQ = Toxicity Equivalency Quotient

Where compounds were non-detect, the laboratory's detection level or estimated maximum possible concentration was listed and used in the calculation of the TEQ.

Table 11 Historic Versus Current Metals, PCBs and PAHs
Terminals 104, 106 and 108

Location / Sample Name / Lab Report Number / Date					T104 EW10-B37-MH01 4/20/2010		T104 T104-MH7005-SS 1509-242 9/22/2015		T106 T106-MH004-120313 12/03/2013		T106 T106-MH4684-SS 1509-242 9/23/2015		T106 T106-MH001-112613 11/26/2013		T106 T106-MH4715-SS 1509-242 9/23/2015		T108 T108-MH003-112613 11/26/2013		T108 T108-MH7640-SS 1509-242 9/23/2015		T108 T108-MH002-112613 11/26/2013		T108 T108-MH7646-SS 1509-242 9/23/2015	
Analyte (Analytical Method)	**Units**	**MTCA[1] mg/kg**	**LAET[2] mg/kg**	**2LAET[2] mg/kg**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Metals (EPA 6010C/7471B)																								
Arsenic	mg/kg	20	57	93	*30*	U	14		--		9.6		--		13		--		7.8	U	--		7.4	U
Cadmium	mg/kg	2	5.1	6.7	**3**		1.3		--		1.1		--		**2**		--		1.3		--		**5.6**	
Chromium	mg/kg	2000	260	270	227		120		--		100		--		180		--		59		--		38	
Copper	mg/kg	NA	390	390	227		200		237		170		366		**440**		113		93		226		66	
Lead	mg/kg	1000	450	530	430		160		--		120		--		250		--		52		--		40	
Silver	mg/kg	NA	6.1	6.1	2	U	1.9	U	--		1.9	U	--		2.4		--		1.6	U	--		1.5	U
Zinc	mg/kg	NA	410	960	**1100**		**2100**		**2480**		**3200**	J	**2180**		**3100**	J	**829**		**1100**	J	**1770**		**630**	J
Mercury	mg/kg	2	0.41	0.59	**0.45**		*0.46*	U	--		*0.47*	U	--		**0.57**		--		0.39	U	--		0.37	U
Polychlorinated Biphenyls (EPA 8082A)																								
Aroclor 1016	mg/kg	NA	NA	NA	0.033	U	0.037	U	0.02	U	0.075	U	0.019	U	0.032	U	0.019	U	0.031	U	0.051	U	0.03	U
Aroclor 1221	mg/kg	NA	NA	NA	0.033	U	0.037	U	0.02	U	0.075	U	0.019	U	0.032	U	0.019	U	0.031	U	0.051	U	0.03	U
Aroclor 1232	mg/kg	NA	NA	NA	0.033	U	0.037	U	0.02	U	0.075	U	0.019	U	0.032	U	0.019	U	0.031	U	0.051	U	0.03	U
Aroclor 1242	mg/kg	NA	NA	NA	0.033	U	0.037	U	0.02	U	0.075	U	0.019	U	0.032	U	0.019	U	0.031	U	0.051	U	0.03	U
Aroclor 1248	mg/kg	NA	NA	NA	0.087	U	0.037	U	0.029	U	0.075	U	0.048	U	0.032	U	0.029	U	0.031	U	0.051	U	0.03	U
Aroclor 1254	mg/kg	NA	NA	NA	0.092		0.051		0.033	U	0.075	U	0.14		0.11		0.07		0.038	J	0.068		0.031	
Aroclor 1260	mg/kg	NA	NA	NA	0.088		0.071		0.03		0.075	U	0.081		0.12		0.068		0.032		0.071		0.03	U
Total PCBs (calculated)[3]	mg/kg	10	0.13	1	**0.18**		0.122		0.03		0.075		**0.221**		**0.23**		**0.138**		0.07		**0.139**		0.031	
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)																								
Naphthalene	mg/kg	5	2.1	2.1	0.64		0.084		0.26	U	--		0.12		0.097		0.14	U	0.027		--		--	
2-Methylnaphthalene	mg/kg	NA	0.67	0.67	**1.6**		0.098		--		--		--		0.092		--		0.036		--		--	
1-Methylnaphthalene	mg/kg	NA	NA	NA	2.1		0.078		--		--		--		0.075		--		0.025		--		--	
Acenaphthylene	mg/kg	NA	1.3	1.3	0.13	U	0.23		0.26	U	--		0.086	U	0.065	U	0.14	U	0.027		--		--	
Acenaphthene	mg/kg	NA	0.50	0.50	0.13	U	0.21		0.26	U	--		0.086	U	0.065	U	0.14	U	0.075		--		--	
Fluorene	mg/kg	NA	0.54	0.54	**1**		**0.54**		0.26	U	--		0.086	U	0.085		0.14	U	0.052		--		--	
Phenanthrene	mg/kg	NA	1.5	1.5	**2.8**		**8.1**		0.31		--		0.23		0.28		0.18		0.21		--		--	
Anthracene	mg/kg	NA	0.96	0.96	0.13	U	**1.5**		0.26	U	--		0.086	U	0.067		0.14	U	0.037		--		--	
Fluoranthene	mg/kg	NA	1.7	2.5	**3.2**		**14**		0.48		--		0.36		0.3		0.25		0.29		--		--	
Pyrene	mg/kg	NA	2.6	3.3	2.2		**10**		0.76		--		0.65		0.77		0.39		0.36		--		--	
Benzo[a]anthracene	mg/kg	NA	1.3	1.6	**1.4**		**3.2**		0.26	U	--		0.13	U	0.13		0.14	U	0.11		--		--	
Chrysene	mg/kg	NA	1.4	2.8	0.81		**4.7**		0.5		--		0.44		0.32		0.39		0.33		--		--	
Benzo[b]fluoranthene	mg/kg	NA	3.2	3.6	1.1		2.6		--		--		--		0.28		--		0.17		--		--	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	NA	--		0.96		--		--		--		0.078		--		0.049		--		--	
Benzo[a]pyrene	mg/kg	2	1.6	1.6	0.93		1.2		0.26	U	--		0.21		0.18		0.17		0.087		--		--	
Indeno[1,2,3-cd]pyrene	mg/kg	NA	0.6	0.69	0.48		0.54		0.26	U	--		0.13		0.25		0.15		0.1		--		--	
Dibenz[a,h]anthracene	mg/kg	NA	0.23	0.23	0.16		0.22		*0.26*	U	--		0.086	U	0.065	U	0.14	U	0.036		--		--	
Benzo[g,h,i]perylene	mg/kg	NA	0.67	0.72	**0.68**		**0.82**		0.65	J	--		0.49	J	0.66		0.4	J	0.23		--		--	
LPAH Sum	mg/kg	NA	5.2	5.2	4.83		**10.664**		1.61		--		0.694		0.659		0.88		0.428		--		--	
HPAH Sum	mg/kg	NA	12	17	10.96		**38.24**		3.43		--		2.496		3.033		2.03		1.762		--		--	

NOTES:

Bold and Shaded = Detected at or above standard

Italics = Non detect value that is above the screening standard

[1] Washington State Department of Ecology Toxics Cleanuup Program. 2013. Model Toxics Control Act (MTCA) Regulation and Statue. Table 745-1: Cleanup Regulation Method A Soil Cleanup Levels for Industrial Properties. Publication No. 94-06

[2] Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February

[3] Calculated polychlorinated biphenyl and polycyclic aromatic hydrocarbon summed using detected values only. If all results are not detected, the highest reporting limit is used for the total calculated value.

-- = Not analyzed.
MTCA = Model Toxics Control Act
LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram

NA = No screening criteria available
Q = Qualifier
SIM = Select ion monitoring
Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.
J = Estimated concentration

Table 12 Historic Versus Current SVOC and PAH Results
Terminal 115

Sample Name / Year					Grab 2220A-041610G[3] (2010)		2220A COMBINED[3] (2011)		MH540 (2015)		Grab 2123A-041610G[3] (2010)		2123A COMBINED[3] (2011)		CB608 (2015)		Grab 2124A-041610[3] (2010)		2124A COMBINED[3] (2011)		CB632 (2015)	
Analyte (Analytical Method)	**Units**	**MTCA[1] mg/kg**	**LAET[2] mg/kg**	**2LAET[2] mg/kg**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**		**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**	**Result**	**Q**
Semivolatile Organic Compounds (EPA 8270D)																						
Butylbenzylphthalate	mg/kg	NA	0.063	0.9	**1.2**	J	**1.3**		*0.91*	U	**1.0**	J	**1.4**		**1.5**		**1.6**	J	**1.2**		**0.88**	
bis(2-Ethylhexyl)phthalate	mg/kg	NA	1.3	1.9	**1.7**	J	**13**		**11**		**3.3**		**21**		**21**		**13**		**17**		**10**	
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)																						
Naphthalene	mg/kg	5	2.1	2.1	0.2	J	0.86	U	0.041		0.099	U	0.1	J	0.073		0.099	U	0.47	U	0.052	
2-Methylnaphthalene	mg/kg	NA	0.64	0.67	0.2	U	0.240	J	0.036	U	0.099	U	0.370	U	0.050		0.05	J	0.470	U	0.034	U
1-Methylnaphthalene	mg/kg	NA	NA	NA	NA		NA		0.036	U	NA		NA		0.038	U	NA		NA		0.034	U
Acenaphthylene	mg/kg	NA	0.13	0.13	**0.31**		**0.17**	J	0.097		0.041	J	**0.17**	J	0.11		0.044	J	*0.47*	U	0.049	
Acenaphthene	mg/kg	NA	0.54	0.54	0.2	U	**0.63**	J	0.071		0.11		0.095	J	0.038	U	0.11		0.47	U	0.034	U
Fluorene	mg/kg	NA	0.54	0.54	0.068	J	**1.2**		0.13		0.17		0.2	J	0.11		0.3		0.12	J	0.055	
Phenanthrene	mg/kg	NA	1.5	1.5	0.42		**7.50**		1.0		0.96		**2.20**		0.95		**2.3**		1.10		0.22	
Anthracene	mg/kg	NA	0.96	0.96	0.56		**2.2**		0.57		0.33		0.69		0.37		0.53		0.29	J	0.16	
Fluoranthene	mg/kg	NA	1.7	2.5	0.87		**17.0**		**2.9**		**2.2**		**5.5**		**2.0**		**3.0**		**2.7**		0.42	
Pyrene	mg/kg	NA	2.6	3.3	0.77		**12.0**		**2.8**		1.6		**3.4**		2.0		2.3		2.4		0.69	
Benzo[a]anthracene	mg/kg	NA	1.3	1.6	0.33		**3.5**		0.68		0.71		**1.4**		0.43		1.0		0.63		0.17	
Chrysene	mg/kg	NA	1.4	2.8	0.43		**3.70**		**1.4**		0.21		**3.40**		1.30		0.34		0.97		0.52	
Benzo[b]fluoranthene	mg/kg	NA	3.2	3.6	0.81		**3.60**		1.1		0.47		2.5		0.69		0.78		1.00		0.35	
Benzo(j,k)fluoranthene	mg/kg	NA	NA	NA	NA		NA		0.36		NA		NA		0.24		NA		NA		0.089	
Benzo[a]pyrene	mg/kg	2	1.6	1.6	0.61	J	**1.8**		0.49		0.3	J	1.00		0.39		0.51	J	0.51		0.2	
Indeno[1,2,3-cd]pyrene	mg/kg	NA	0.6	0.69	**1.6**	J	**1.5**		0.32		0.26	J	**0.89**		0.22		0.45	J	0.47	U	0.14	
Dibenz[a,h]anthracene	mg/kg	NA	0.23	0.23	**0.3**	J	*0.86*	U	0.14		0.09	J	*0.37*	U	0.11		0.13	J	*0.47*	U	0.073	
Benzo[g,h,i]perylene	mg/kg	NA	0.67	0.72	**2.6**		**2.3**		0.58		0.34		**1.4**		0.53		0.49		**0.92**		0.32	
LPAH Sum	mg/kg	NA	5.2	13	NA		NA		1.909		NA		NA		1.613		NA		NA		0.57	
HPAH Sum	mg/kg	NA	12	17	NA		NA		10.77		NA		NA		7.91		NA		NA		2.972	

NOTES:

Bold and Shaded = Detected at or above standard

Italics = Non detect value that is above the screening standard

[1] Washington State Department of Ecology Toxics Cleanuup

[2] Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.

[3] Results from Recontamination Study for T115 Field Report Technical Memorandum. October 26, 2011. TEC Inc. Results listed are not total organic carbon normailized.

LAET = Lowest Apparent Effects Threshold
2LAET = Secondary LAET
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = Not available
Q = Qualifier
SIM = Select ion monitoring

Data Qualifiers:
U = The analyte was analyzed for, but not detected. The associated numerical value is at or below the limit of detection.
J = The result is estimated

Table 13 Historic Versus Current Dioxin Furan Concentrations
Terminal 115

Location / Sample Name / Date			T115 Grab ST2220A-041410 (2010)[2]			T115 In-Line 2220A-Composite (2011)[2]			T115 T115-MH540-SS (2015)		
Analyte (Analytical Method)	**Units**	**TEF[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**	**Result**	**Q**	**TEQ[1]**
Dioxin Compounds (EPA 1613B)											
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	ng/kg	1	10.2		10.2	1.62	U	0	0.986		0.986
1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD)	ng/kg	1	189		189	5.09	J	5.09	8.87		8.87
1,2,3,4,7,8-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	593	J	59.3	12.7		1.27	20.8		2.08
1,2,3,6,7,8-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	1550	J	155	39.7		3.97	97		9.7
1,2,3,7,8,9-hexachlorodibenzo-p-dioxin (HxCDD)	ng/kg	0.1	1080	J	108	25.2		2.52	48.2		4.82
1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (HpCDD)	ng/kg	0.01	46400		464	1430	J	14.3	3460	J	34.6
Octachlorodibenzodioxin (OCDD)	ng/kg	0.0003	448000		134.4	12500	J	3.75	52000	J	15.6
2,3,7,8-tetrachlorodibenzofuran (TCDF)	ng/kg	0.1	20.3		2.03	1.62	U	0	1.91		0.191
1,2,3,7,8-pentachlorodibenzofuran (PeCDF)	ng/kg	0.03	33.2	J	0.996	1.71	J	0.0513	2.55		0.0765
2,3,4,7,8-pentachlorodibenzofuran (PeCDF)	ng/kg	0.3	29.3		8.79	2.14	J	0.642	2.89		0.867
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	250	J	25	4.04	U	0	18.5		1.85
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	149	J	14.9	9.86	J	0.986	13.8		1.38
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	111	J	11.1	6.58		0.658	22		2.2
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	ng/kg	0.1	3.73	UJ	0	4.04	U	0	1.46	J	0.146
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.01	5680		56.8	663	J	6.63	638		6.38
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	ng/kg	0.01	440	J	4.4	43.5		0.435	49.9		0.499
Octachlorodibenzofuran (OCDF)	ng/kg	0.0003	27700		8.31	4540	J	1.362	3550		1.065
Summed Results	ng/kg				1,252.23			41.66			91.31

NOTES:

[1] Washington State Department of Ecology Toxics Cleanup Program. 2013a. Model Toxics Control Act (MTCA)

[2] Results from Recontamination Study for T115 Field Report Technical Memorandum. October 26, 2011. TEC Inc.

Non-detect concentrations estimated at a value "0".

EPA = U.S. Environmental Protection Agency

Sample location 2220A was collected from MH534 at Terminal 115

ng/kg = Nanogram per kilogram (equivalent to parts per trillion or pico gram per gram)

Q = Qualifier

TEF = Toxic Equivalency Factor

TEQ = Toxicity Equivalency Quotient

Table 14 Terminals Exceeding 2LAET Criteria

Analyte (Analytical Method)	2LAET[1] mg/kg	Terminal 102	Terminal 103	Terminal 104	Terminal 106	Terminal 108	Terminal 115
Metals (EPA 6010C/7471B)							
Chromium	270						X
Copper	390				X		X
Zinc	960	X	X	X	X	X	X
Mercury	0.59						X
Semivolatile Organic Compounds (EPA 8270D/SIM)							
Phenol	1.2						X
(3+4)-Methylphenol (m,p-Cresol)	0.063	X		X		X	X
n-Nitrosodiphenylamine	0.04			X			
Butylbenzylphthalate	0.9						X
bis(2-Ethylhexyl)phthalate	3.1	X	X	X	X	X	X
Di-n-octylphthalate	6.2	X					
Polycyclic Aromatic Hydrocarbons (EPA 8270D/SIM)							
Fluorene	0.54			X			
Phenanthrene	1.5			X			
Anthracene	0.96			X			X
Fluoranthene	2.5			X			X
Pyrene	3.3			X			
Benzo[a]anthracene	1.6			X			
Chrysene	2.8			X			
Benzo[a]pyrene	1.6			X			
Indeno[1,2,3-cd]pyrene	0.69			X			
Dibenz[a,h]anthracene	0.23			X			
Benzo[g,h,i]perylene	0.72			X			
LPAH Sum	5.2			X			
HPAH Sum	17			X			

NOTES:
[1] Washington State Department of Ecology. 2013b. Sediment Management Standards Chapter 173-204 WAC. Publication No. 13-09-055. February.

2LAET = Secondary Lowest Apparent Effects Threshold
EPA = U.S. Environmental Protection Agency
mg/kg = Milligram(s) per kilogram
NA = No screeening criteria available
X = Indicates a sample from that terminal exceeded the 2LAET screening level