Intergovernmental Agreement for Remedial Investigation and Source Control Measures

DEQ No. LQVC-NWR-03-10

Outfall Basin S-2 Sediment Trap Investigation

Technical Memorandum No. OF S2-1
City of Portland Outfall Project
ESCI No. 2425

June 2012

PREPARED BY

ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

CITY OF PORTLAND
ENVIRONMENTAL SERVICES
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TECHNICAL MEMORANDUM No. OFS2-1

Outfall Basin S-2 Sediment Trap Investigation

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FROM: Linda Scheffler, City of Portland, Bureau of Environmental Services (BES)

COPIES: Richard Muza, U.S. Environmental Protection Agency (EPA)
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DATE: June 29, 2012

SUBJECT: **Portland Harbor Source Investigation**

Introduction

This technical memorandum presents the results of the City of Portland (City) source investigation activities conducted in 2011 in Outfall Basin S-2. The investigation results do not indicate the current presence of major upland sources warranting source control.

Outfall S-2 drains a 27-acre area of industrial land on Swan Island. In 2009, a fire at the Daimler Trucks North America (Daimler) facility in the western portion of the basin resulted in contaminant release to the City storm system. The City's release response included cleaning a segment of the City storm line between the site and Outfall S-2. Characterization of material removed from this line after the fire indicated potential current sources of polychlorinated biphenyls (PCBs), semivolatile organic compounds (SVOCs), and metals to Basin S-2. After the line cleanout, the City conducted a source investigation in this branch of Basin S-2. The purpose of this subsequent investigation was to collect inline sediment trap data in the vicinity of identified and suspected sources, including the Daimler facility and Operational Unit 3 (OU3) of the Swan Island Portland Shipyard (Shipyard). The objective of the investigation was to verify that current sources in this portion of Basin S-2 have been controlled. The City conducted the Basin S-2 sediment trap investigation in accordance with the Winter 2010-11 Sampling and Analysis Plan (SAP) submitted to DEQ in December 2010 (BES, 2010a).

This investigation is part of the City's ongoing Remedial Investigation associated with the Portland Harbor City of Portland Outfalls Project being conducted pursuant to the August 13, 2003, Intergovernmental Agreement (IGA) between DEQ and the City. Data collected under this investigation support ongoing DEQ and City efforts to identify, characterize and control discharges to the Basin S-2 municipal storm system.

Background

Basin Physical System and Setting

Outfall S-2, a 36-inch outfall pipe, drains a 27-acre stormwater-only basin. Stormwater runoff from this drainage basin is conveyed by the main stormwater line running along N. Lagoon Avenue to the outfall pipe, which connects to the N. Lagoon line at manhole AAP957 and discharges at the southeast end of the Swan Island Lagoon, at approximately river mile 9.1. The Outfall Basin S-2 stormwater conveyance system and basin boundary are shown on Figure 1.

The Swan Island Lagoon is within an area of the Portland Harbor identified by the U.S. Environmental Protection Agency (EPA) as an area of potential concern (AOPC 17S) based on elevated concentrations of PCBs, metals, tributyltin (TBT), polycyclic aromatic hydrocarbons (PAHs), dibutylphthalate, benzyl alcohol, phenol, and pesticides (EPA, 2010). In addition to Outfall S-2, four other City outfalls and more than 50 non-City outfalls also drain to AOPC 17S.

Summary of Previous Investigations

Previous investigations conducted by the City in Basin S-2 are briefly summarized below.

- *2007 Stormwater Evaluation*: As part of its Portland Harbor stormwater screening effort, the City collected stormwater grab samples from a location in Basin S-2 that represented cumulative discharge from the entire basin. The samples, collected during four storm events between September and December 2007, were analyzed for a broad suite of analytes (e.g., PCBs, metals, PAHs, phthalates) and evaluated statistically to identify stormwater contaminants potentially warranting further source tracing in the basin. Based on this analysis, all analyte concentrations in discharges from Basin S-2 were low and no contaminants were identified for further source tracing in this basin (BES, 2010b).

- *2009 Daimler Release Response – Daimler Investigation*: On November 25, 2009, several trucks caught fire at the Daimler facility located at 5411 N. Lagoon Avenue, resulting in a release of diesel and possibly other contaminants to the onsite stormwater conveyance system connected to Basin S-2. Post-fire environmental response activities by Daimler included collection and offsite disposal of spilled material trapped in absorbent booms in the site parking area, pumping and offsite disposal of diesel from damaged truck tanks, pumping and offsite disposal of diesel from the impacted onsite catch basin, and final cleaning of impacted asphalt and the catch basin (and offsite disposal of cleaning washwater). Due to the orientation of the lateral from the catch basin to the City system, response crews were unable to clean site storm lines. Wastes removed from the site drainage system during release response activities were not characterized.

- *2009 Daimler Release Response – City Investigation:* Based on confirmation of contaminant release to the site storm system and observations of foam and diesel at Outfall S-2, the City contracted with MRP Environmental Services (MRP) to clean the affected portion of the N. Lagoon Avenue stormwater line (see Figure 1) and to deploy an absorbent boom at the outfall. A lateral line connects the portion of the affected Daimler site stormwater system to Basin S-2 between manhole AAM196 and manhole AAP949. Manhole AAP949 was utilized to clean the segment from the approximated lateral connection down to

manhole AAP949; cleaning then extended downstream to manhole AAP957.[1] MRP segregated material removed from the Basin S-2 storm system in a drop box to settle solids for subsequent waste characterization and disposal.

The City collected a composite solids sample from the MRP drop box on November 30, 2009 and analyzed it for PCB Aroclors, SVOCs, metals, total petroleum hydrocarbons (TPH), and total solids (BES, 2010c). Concentrations of total PCBs and metals (chromium, lead, mercury, nickel, silver, and zinc) in the sample were significantly elevated relative to DEQ guidance regarding industrial reference concentrations (DEQ, 2010). Results for this sample are summarized in Table 1. Based on these results, facilities with connections to the N. Lagoon Avenue line upstream of manhole AAP957 (including Daimler and the Shipyard OU3 site) were identified as possible sources of detected contaminants in the western portion of the City's Outfall S-2 conveyance system.

Source Tracing Contaminants

Following further review of the line cleanout analytical results, the City identified PCBs, metals, and polycyclic aromatic hydrocarbons (PAHs), and phthalates for further source tracing in the western portion of Basin S-2. Organotins were included in the investigation because of the current and historical shipyard activities in and around the basin and recent findings during an investigation of organotins in the adjacent Basin S-1 (BES, 2012).

Potential Upland Sources

Facilities listed in DEQ's Environmental Cleanup Site Information (ECSI) database are considered potential upland sources to City stormwater conveyance systems. Operable Unit 3 (OU3) of Shipyard upland facility is the only ECSI site located in the western branch of Basin S-2. The City also considers facilities permitted by DEQ under the National Pollutant Discharge Elimination System (NPDES) industrial stormwater discharge permit program as potential upland sources due to stormwater exposures to industrial operations; no NPDES-permitted facilities discharge to Basin S-2. In addition, the City identified the Daimler facility located at 5411 N. Lagoon Avenue as a potential current source to the system based on the 2009 release and the possibility of legacy contaminants in the onsite conveyance system (see above). These two facilities are briefly described below and shown on Figure 1.

- *Swan Island Portland Ship Yard (ECSI No. 271) – OU3 / Crosby & Overton (#877)*: OU3 is being evaluated by the Port of Portland and DEQ under the Shipyard remedial investigation. The Shipyard began operating in the 1940s; however, OU3 reportedly remained largely undeveloped until approximately the mid- to late 1960s (Ash Creek, 2010). Historical operations on OU3 included storage, maintenance, and parking of equipment and vehicles related to environmental response operations; truck engine research/development and assembly; and periodic storage of containerized wastes (including aboveground tanks of oily bilge water from ships) and stockpiling of petroleum-contaminated soil (Ash Creek, 2010). An additional ECSI file (#877) is associated with the site though DEQ investigation of Crosby & Overton did not occur on this property. OU3 is owned by the Port of Portland and is currently leased to Tetra Tech,

[1] At that time, MRP was not able to ensure that cleaning of the line segment between manhole AAP957 and the outfall would not result in flushing of material to the lagoon, so a decision was made to limit cleaning to the main line on N. Lagoon. The pipe from manhole AAP957 to the outfall was therefore not cleaned.

Inc., for activities related to its conduit construction operations (Ash Creek, 2010). Most of the stormwater runoff from OU3 discharges directly into the Swan Island Lagoon via Port-owned outfalls. Site stormwater also discharges to the Outfall S-2 stormwater conveyance system via a lateral connecting at manhole AAP949 (see Figure 1) and overland runoff to catch basins on N. Lagoon Avenue. Data from the site stormwater evaluation indicate onsite sources of PCBs, SVOCs, and metals (Ash Creek, 2010). At DEQ's request, the Port conducted three additional rounds of stormwater sampling in 2011 for PCBs analysis from the site outfall at which PCBs were previously detected; PCBs were not detected in these samples (Ash Creek, 2011). Stormwater discharges from the site to Basin S-2 have not been characterized (BES, 2010d).

- *Daimler Trucks North America*: This truck assembly and testing facility is the site of a documented release to the Basin S-2 conveyance system that occurred during a fire and related emergency response activities on November 25, 2009. An unknown quantity of diesel and possibly other contaminants drained into one onsite catch basin. This catch basin was confirmed to connect to the City stormwater line in N. Lagoon Avenue just upstream of manhole AAP949, and oily material was observed discharging from Outfall S-2 immediately following the incident (BES, 2009). A Daimler contractor cleaned out the affected catch basin but was unable to clean the site storm line connected to Basin S-2. To assist with the spill response, a City contractor cleaned the N. Lagoon storm line downstream of the site lateral connection (as discussed above). Subsequently the City required Daimler to collect post-cleanout stormwater samples from this lateral (BES, 2011). Daimler collected stormwater samples from this lateral on March 9 and April 13, 2011 and submitted the samples for laboratory analysis of selected metals, PCBs, PAHs, and phthalates (Daimler, 2011a; 2011b). PCBs were not detected in the stormwater samples. PAHs and phthalates were detected at low concentrations. The only detections in the samples that exceeded Joint Source Control Strategy (JSCS; DEQ/EPA, 2005) screening level values (SLVs) in one or both of these samples were certain metals (arsenic, cadmium, copper, lead and zinc) and bis(2-ethylhexyl) phthalate (BEHP). Concentrations of these analytes were low relative to harborwide industrial concentrations compiled by DEQ (DEQ, 2010).[2]

2011 Sediment Trap Investigation

Field Activities

The sediment trap deployment and sampling activities were completed in accordance with the SAP (BES, 2010a). A Screened Inline Flow-Through (SIFT©)[3] sediment trap was installed in the outgoing 30-inch line in manhole AAP953 on December 22, 2010 (see Figure 1). The sediment trap was inspected periodically to assess the volume of trapped solids, note general conditions, and remove any debris that might be obstructing the opening of the trap chamber. Accumulated solids were removed as needed during the field inspections and archived. The final round of solids removal and archiving was conducted on April 18, 2011. During the following inspection,

[2] Daimler collected a third stormwater sample from the site on April 26, 2011, for analysis only of copper, lead, zinc, and other parameters that are monitored under National Pollutant Discharge Elimination System industrial stormwater permits. Copper, lead, and zinc concentrations in this sample also exceeded JSCS SLVs but were low relative to the DEQ-compiled harborwide upland concentrations.

[3] 2009 City of Portland. These traps are proprietary and patent pending. They were designed by the City for use in smaller pipe diameters and low-flow depth conditions.

on May 23, 2011, the sediment trap was found to be inundated with river water as a result of the unusually high stage of the Willamette River; therefore, any solids present in the trap at that time may not have been representative solely of contributions from sources within the western portion of Basin S-2. Because the objective of the investigation was to evaluate the potential presence of contaminant sources upgradient of the trap, only the solids that had been archived to date (i.e., the solids collected through April 18) were included in the sample submitted for laboratory analysis.

The archived sediment trap contents were thoroughly homogenized before submitting the final composite sample for laboratory analyses. Selected photographs of the sediment trap in the installed location, sample collection, and sample processing are provided in Attachment A. Field notes recorded during sediment trap installation, monitoring, removal, and processing activities are provided in Attachment B.

Summary of Results

The Basin S-2 sediment trap sample was analyzed for PCB Aroclors, metals, PAHs, phthalates, total organic carbon, and total solids. In addition, the sample was analyzed for organotin compounds, which are contaminants that have been identified at the Shipyard (OU1) and detected in stormwater solids from adjacent Basin S-1 (BES, 2012). The laboratory analytical reports and a data review memorandum are provided in Attachment C.

Table 1 summarizes the laboratory analytical results for the sediment trap sample. The JSCS SLVs are provided in Table 1 for reference. PCBs were not detected in the sample. Metals and certain PAHs, phthalates and organotins were detected. With the exception of BEHP, di-n-butyl-phthalate, and TBT, all detected contaminants were either below or within an order-of-magnitude of recommended JSCS SLVs.

Data Evaluation

The solids sample collected from manhole AAP953 represents current discharges from the OU3 and Daimler facilities, as well as from other upstream connections to the N. Lagoon Avenue line. The City reviewed the sediment trap results to determine whether results indicate potential major sources of PCBs, metals, SVOCs, or organotins to the N. Lagoon Avenue line upstream of manhole AAP953.

Analytical results for the sediment trap sample do not indicate current PCB sources. Data do indicate a current source of organotins. Detected concentrations of metals and SVOCs are generally considered low based on the following factors:

- Concentrations of most metals (cadmium, copper, lead and zinc), as well as total PAHs and BEHP are low relative to the reference concentration ranges for Portland Harbor industrial sites (DEQ, 2010).
- Cadmium in the sample is moderately elevated relative to DEQ's reference concentration ranges, but is within an order-of-magnitude of the JSCS SLV.
- The di-n-butylphthalate concentration is above the recommended SLV but within an order-of-magnitude of the Toxicity SLV (DEQ's stormwater guidance does not include reference concentration ranges for this contaminant).

The City also reviewed stormwater sampling results for the Daimler and OU3 facilities that discharge to this branch upstream of the sediment trap monitoring location. Metals, PAHs, and phthalates were detected in stormwater samples collected at the Daimler and OU3 facilities (Daimler, 2011b; Ash Creek, 2010). TBT was not analyzed in Daimler stormwater; it was not detected in OU3 stormwater and was not analyzed in OU3 storm system sediment. As noted earlier, TBT is a contaminant associated with the Shipyard OU1. During a recent investigation of the adjacent Basin S-1, the City detected TBT in trapped sediment from the OU1 lateral connection and in catch basins along N. Lagoon Avenue (BES, 2012). Offsite migration of TBT is likely occurring from the Shipyard (e.g., via vehicle dragout and air deposition) to Basin S-2.

Conclusions

Analysis of the solids removed from the western portion of Basin S-2 in 2009, following a release during a fire at the Daimler facility, indicated sources of PCBs, SVOCs, and metals to this line segment. The two facilities identified as possible current sources to this line were the Shipyard OU3 facility (where elevated PCBs, SVOCs, and metals concentrations were detected in solids from the onsite system; Ash Creek, 2010) and the Daimler facility where diesel and possibly other contaminants were released to the system during the November 2009 fire. To verify that major ongoing sources of these contaminants are not present in the western portion of Basin S-2, the City deployed a sediment trap in 2010 downstream of the Daimler and OU3 sites.

Results for the sediment trap investigation indicate that contaminant concentrations in current solids discharges to this line are low and do not suggest that major sources of PCBs, SVOCs, and metals are present in the western basin. TBT was detected in the sediment trap sample at a concentration more than an order-of-magnitude higher than the DEQ screening level. TBT has been detected at elevated concentrations in storm sediment at the nearby Shipyard OU1, suggesting that offsite migration from the Shipyard OU1 to Basin S-2 may be occurring.

Stormwater source control evaluations are underway under DEQ Cleanup Program oversight at the Shipyard OU1 and OU3 sites. The City Industrial Stormwater Program continues to provide technical assistance to the Daimler site on minimizing industrial exposures to stormwater. Future identification and control of onsite source areas at these sites will likely further reduce contaminant discharges to Basin S-2. Based on these findings, the City concludes that no further source tracing efforts in Basin S-2 are needed.

References

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Table

Figure

Attachments

Table 1
Basin S-2 Stormwater Solids Results

Analyte	Units	MRP Drop Box- From Storm Line on N Lagoon Avenue Composite Cleanout Solids Sample FO096244 11/30/2009	Manhole AAP953 Downstream in 30" Line Sediment Trap Sample W11E206 4/18/2011	JSCS[1] Screening Level Value Toxicity	 Bioaccumulation
Total Organic Carbon (ASTM D4129-82M)					
TOC	mg/Kg	NA	92,000	--	--
Total Solids (EPA 160.3M)					
TS	%	52.9	41.9	--	--
Metals (EPA 6020)					
Arsenic	mg/Kg	**17.6**	3.67	33	7
Barium	mg/Kg	476	NA	--	--
Cadmium	mg/Kg	**25.2**	**1.97**	4.98	1
Chromium	mg/Kg	241	254	111	--
Copper	mg/Kg	529	186	149	--
Lead	mg/Kg	**1,380**	**105**	128	17
Mercury	mg/Kg	**0.903**	0.0662	1.06	0.07
Nickel	mg/Kg	142	39.7	48.6	--
Selenium	mg/Kg	1 U	NA	--	2,000
Silver	mg/Kg	87	2.31	5	--
Zinc	mg/Kg	4,600	802	459	--
Polychlorinated Biphenyls (PCBs) (EPA 8082)					
Aroclor 1016	µg/Kg	100 U	23.9 U	530	--
Aroclor 1221	µg/Kg	200 U	47.7 U	--	--
Aroclor 1232	µg/Kg	100 U	23.9 U	--	--
Aroclor 1242	µg/Kg	100 U	23.9 U	--	--
Aroclor 1248	µg/Kg	100 U	23.9 U	1,500	--
Aroclor 1254	µg/Kg	622	23.9 U	300	--
Aroclor 1260	µg/Kg	1,030	23.9 U	200	--
Aroclor 1262	µg/Kg	100 U	23.9 U	--	--
Aroclor 1268	µg/Kg	100 U	23.9 U	--	--
Total PCBs[2]	µg/Kg	**1,652**	ND	676	0.39
Organotins					
Dibutyltin	µg/Kg	NA	170	--	--
Monobutyltin	µg/Kg	NA	110	--	--
Tetra-n-butyltin	µg/Kg	NA	7.3 U	--	--
Tributyltin	µg/Kg	NA	**52**	--	2.3
Tripentyltin	µg/Kg	NA	340	--	--
Polycyclic Aromatic Hydrocarbons (PAHs) (EPA 8270-SIM)					
1-Methylnaphthalene	µg/Kg	NA	200 U	--	--
2-Methylnaphthalene	µg/Kg	NA	200 U	200	--
Acenaphthene	µg/Kg	493 U	100 U	300	--
Acenaphthylene	µg/Kg	719	100 U	200	--
Anthracene	µg/Kg	592	140	845	--
Benzo(a)anthracene	µg/Kg	406	260	1,050	--
Benzo(a)pyrene	µg/Kg	511	320	1,450	--
Benzo(b)fluoranthene	µg/Kg	501	520	--	--
Benzo(g,h,i)perylene	µg/Kg	524	360	300	--
Benzo(k)fluoranthene	µg/Kg	445	180	13,000	--
Chrysene	µg/Kg	622	440	1,290	--
Dibenzo(a,h)anthracene	µg/Kg	123 U	74	1,300	--
Fluoranthene	µg/Kg	1,320	790	2,230	37,000
Fluorene	µg/Kg	877	100 U	536	--
Indeno(1,2,3-cd)pyrene	µg/Kg	358	180	100	--
Naphthalene	µg/Kg	1,100	200 U	561	--
Phenanthrene	µg/Kg	2,470	450	1,170	--
Pyrene	µg/Kg	1,340	980	1,520	1,900
Total PAHs[2]	µg/Kg	11,785	4,700	--	--
Phthalates (EPA 8270-SIM)					
Bis(2-ethylhexyl) phthalate (BEHP)	µg/Kg	**8,510**	**22,000**	800	330
Butyl Benzyl Phthalate	µg/Kg	2,750	1,200	--	--
Diethyl phthalate	µg/Kg	493 U	500 U	600	--
Dimethyl phthalate	µg/Kg	1,190	1,000	--	--
Di-n-butyl phthalate	µg/Kg	493 U	**640**	100	60
Di-n-octyl phthalate	µg/Kg	740 U	1,100	--	--

Table 1
Basin S-2 Stormwater Solids Results

Analyte	Units	MRP Drop Box- From Storm Line on N Lagoon Avenue Composite Cleanout Solids Sample FO096244 11/30/2009	Manhole AAP953 Downstream in 30" Line Sediment Trap Sample W11E206 4/18/2011	JSCS[1] Screening Level Value Toxicity	 Bioaccumulation
Semi-Volatile Organic Compounds (EPA 8270-LV)					
1,2,4-Trichlorobenzene	µg/Kg	990 U	NA	9,200	--
1,2-Dichlorobenzene	µg/Kg	990 U	NA	1,700	--
1,3-Dichlorobenzene	µg/Kg	990 U	NA	300	--
1,4-Dichlorobenzene	µg/Kg	990 U	NA	300	--
2,4,5-Trichlorophenol	µg/Kg	990 U	NA	--	--
2,4,6-Trichlorophenol	µg/Kg	990 U	NA	--	--
2,4-Dichlorophenol	µg/Kg	990 U	NA	--	--
2,4-Dimethylphenol	µg/Kg	5,000 U	NA	--	--
2,4-Dinitrophenol	µg/Kg	20,000 U	NA	--	--
2,4-Dinitrotoluene	µg/Kg	990 U	NA	--	--
2,6-Dinitrotoluene	µg/Kg	990 U	NA	--	--
2-Chloronaphthalene	µg/Kg	3,400	NA	--	--
2-Chlorophenol	µg/Kg	990 U	NA	--	--
2-Methylnaphthalene	µg/Kg	6,800	NA	--	--
2-Methylphenol	µg/Kg	990 U	NA	--	--
2-Nitroaniline	µg/Kg	2,000 U	NA	--	--
2-Nitrophenol	µg/Kg	990 U	NA	--	--
3,3'-Dichlorobenzidine	µg/Kg	9,900 U	NA	--	--
3-Nitroaniline	µg/Kg	2,000 U	NA	--	--
4,6-Dinitro-2-methylphenol	µg/Kg	9,900 U	NA	--	--
4-Bromophenylphenyl ether	µg/Kg	990 U	NA	--	--
4-Chloro-3-methylphenol	µg/Kg	990 U	NA	--	--
4-Chloroaniline	µg/Kg	990 U	NA	--	--
4-Chlorophenylphenyl ether	µg/Kg	990 U	NA	--	--
4-Methylphenol	µg/Kg	990 U	NA	--	--
4-Nitroaniline	µg/Kg	2,000 U	NA	--	--
4-Nitrophenol	µg/Kg	9,900 U	NA	--	--
Acenaphthene	µg/Kg	990 U	NA	--	--
Acenaphthylene	µg/Kg	990 U	NA	--	--
Anthracene	µg/Kg	990 U	NA	--	--
Benzo(a)anthracene	µg/Kg	990 U	NA	--	--
Benzo(a)pyrene	µg/Kg	990 U	NA	--	--
Benzo(b)fluoranthene	µg/Kg	990 U	NA	--	--
Benzo(g,h,i)perylene	µg/Kg	990 U	NA	--	--
Benzo(k)fluoranthene	µg/Kg	990 U	NA	--	--
Benzoic acid	µg/Kg	20,000 U	NA	--	--
Benzyl alcohol	µg/Kg	2,000 U	NA	--	--
Bis(2-chloroethoxy) methane	µg/Kg	990 U	NA	--	--
Bis(2-chloroethyl) ether	µg/Kg	990 U	NA	--	--
Bis(2-chloroisopropyl) ether	µg/Kg	990 U	NA	--	--
Bis(2-ethylhexyl) phthalate	µg/Kg	9,900 U	NA	--	--
Butyl benzyl phthalate	µg/Kg	1,700	NA	--	--
Chrysene	µg/Kg	990 U	NA	--	--
Dibenzo(a,h)anthracene	µg/Kg	990 U	NA	--	--
Dibenzofuran	µg/Kg	990 U	NA	--	--
Diethyl phthalate	µg/Kg	990 U	NA	--	--
Dimethyl phthalate	µg/Kg	1,200	NA	--	--
Di-n-butyl phthalate	µg/Kg	2,000 U	NA	--	--
Di-n-octyl phthalate	µg/Kg	990 U	NA	--	--
Fluoranthene	µg/Kg	990 U	NA	--	--
Fluorene	µg/Kg	990 U	NA	--	--
Hexachlorobenzene	µg/Kg	990 U	NA	100	19
Hexachlorobutadiene	µg/Kg	990 U	NA	600	--
Hexachlorocyclopentadiene	µg/Kg	5,000 U	NA	400	--
Hexachloroethane	µg/Kg	990 U	NA	--	--
Indeno(1,2,3-cd)pyrene	µg/Kg	990 U	NA	--	--

Table 1
Basin S-2 Stormwater Solids Results

Analyte	Units	**MRP Drop Box- From Storm Line on N Lagoon Avenue** Composite Cleanout Solids Sample FO096244 11/30/2009	**Manhole AAP953 Downstream in 30" Line** Sediment Trap Sample W11E206 4/18/2011	**JSCS[(1)] Screening Level Value** Toxicity	Bioaccumulation
Isophorone	µg/Kg	990 U	NA	--	--
Naphthalene	µg/Kg	1,400	NA	--	--
Nitrobenzene	µg/Kg	990 U	NA	--	--
N-Nitrosodi-n-propylamine	µg/Kg	990 U	NA	--	--
N-Nitrosodiphenylamine	µg/Kg	1,100	NA	--	--
Pentachlorophenol	µg/Kg	9,900 U	NA	--	--
Phenanthrene	µg/Kg	2,100	NA	--	--
Phenol	µg/Kg	3,000 U	NA	--	--
Pyrene	µg/Kg	1,500	NA	--	--
Total Petroleum Hydrocarbons (TPH) (NWTPH-Dx)					
Diesel-Range Hydrocarbons (C12-C24)	mg/Kg	7,420	NA	--	--
Oil-Range Hydrocarbons (>C24)	mg/Kg	7,810	NA	--	--
Total Petroleum Hydrocarbons (TPH) (NWTPH-HCID)					
Diesel	mg/Kg	>50	NA	--	--
Gasoline	mg/Kg	20 U	NA	--	--
Lube Oil	mg/Kg	>100	NA	--	--

Notes:

J = The result is an estimated concentration that is less than the MRL, but greater than or equal to the MDL.

U = The analyte was not detected above the reported sample quantification limit.

ND = not detected.

-- No JSCS screening level available.

µg/Kg = micrograms per kilogram.

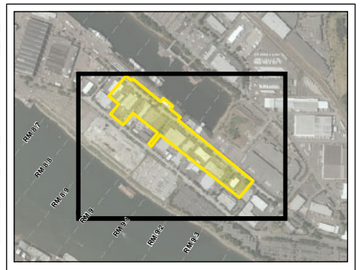
mg/Kg = milligrams per kilogram.

(1) JSCS - Portland Harbor Joint Source Control Strategy (DEQ/EPA Final December 2005, Amended July 2007).

(2) Total PCBs and PAHs are calculated by assigning "0" to undetected constituents.

= concentration exceeds JSCS Toxicity Screening Level Value.

bold = concentration exceeds JSCS Bioaccumulation Screening Level Value.



LEGEND

- Sample Location
- Sediment Trap Sample
- Outfall Basin S-2
- Line Cleaned in November 2009
- City Outfall
- Non-City Outfall
- Storm Line
- Manhole (MH)
- Catch Basin (CB)
- DEQ ECSI Site
- Tax Lot
- River Mile Tenths

N

0 125 250
Feet

FIGURE 1
Outfall Basin S-2
Drainage Basin Overview and Sample Location

Disclaimer:
Information contained on this map is accurate according to available records, however the City of Portland makes no warranty, expressed or implied, as to the completeness or accuracy of the information published.

Prepared By:
GSI, June 28, 2012
005_SCR\OF_Basin_S2

Source:
City of Portland BES,
Aerial Photo 2010

ENVIRONMENTAL SERVICES
CITY OF PORTLAND
1120 SW Fifth Avenue, Room 1000
Portland Oregon, 97204-1912

Attachment A
Field Photographs

Photo 1 (December 22, 2010). Setup for sediment trap installation at manhole AAP953. View is to the northwest along N. Lagoon Avenue.

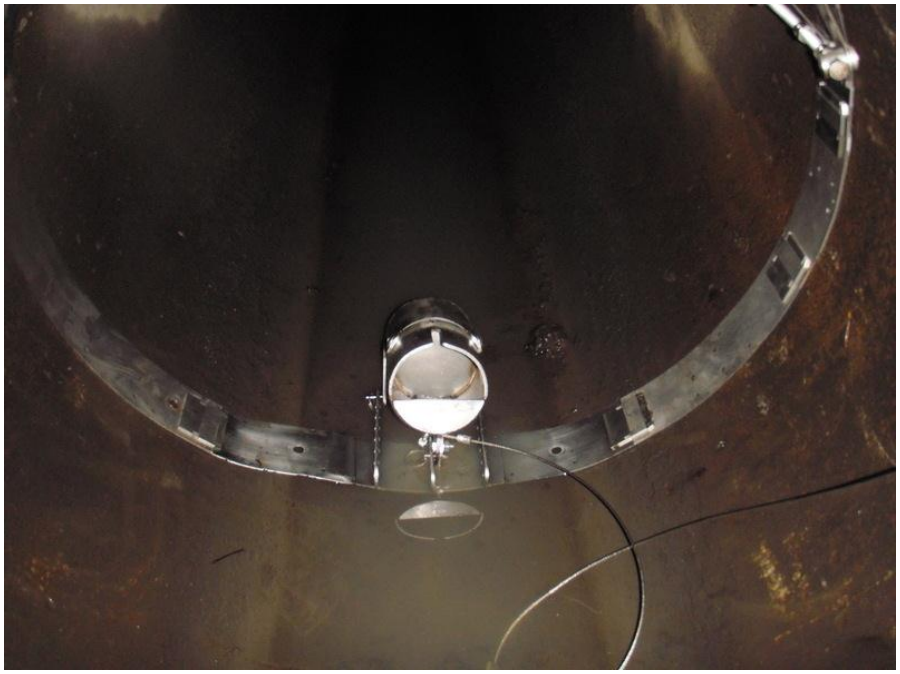


Photo 2 (December 22, 2010). Screened Inline Flow-Through (SIFT)© [1] sediment trap installed in the 30-inch diameter outgoing line at manhole AAP953. SIFT trap is positioned 3 feet downstream of manhole.

[1] 2009 City of Portland. These traps are proprietary and patent pending. These traps were designed by the City for use in smaller pipe diameters and low-flow depth conditions.

Photo 3 (January 26, 2011). Sediment trap with accumulated solids and organic matter during first monthly field check.

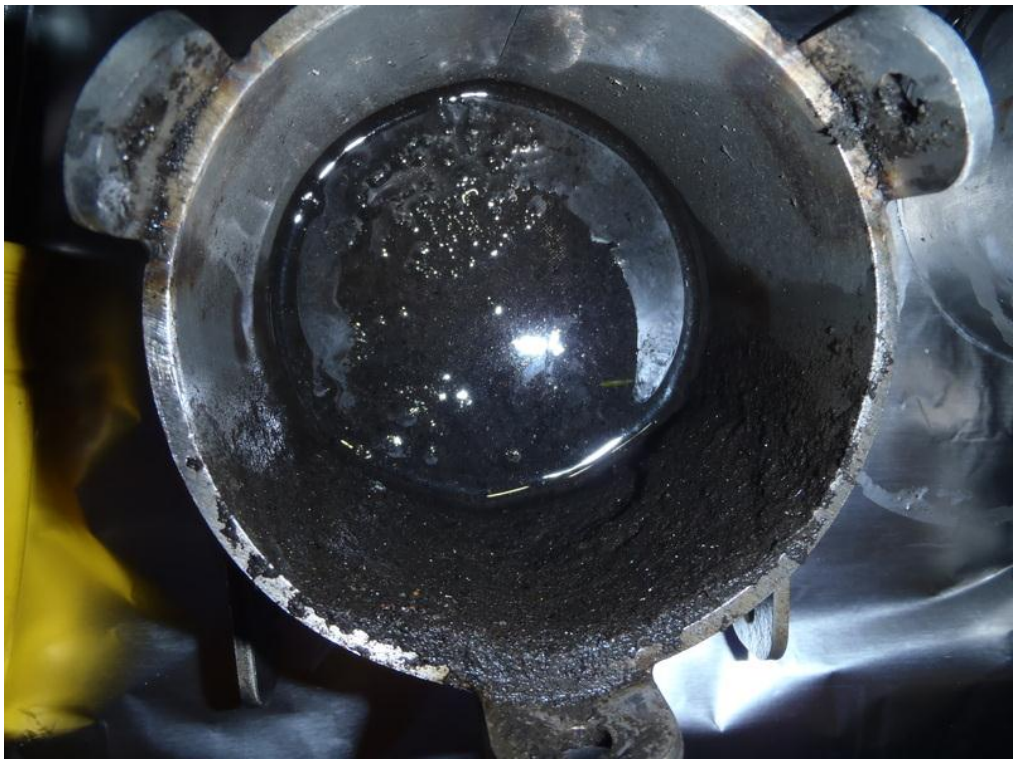


Photo 4 (March 7, 2011). Stormwater solids in secondary chamber at time of second monthly field check.

Attachment B
Field Notes

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Water Pollution Control Laboratory
6543 N. Burlington Ave.
Portland, Oregon 97203-4552
Sample Custodian: (503) 823-5696
General Lab: (503) 823-5681

City of Portland Chain-of-Custody

Bureau of Environmental Services

Date: 5/26/11

Work Order #: W11E206

Collected By: JJM, PTB

Client Name: Director's Office

Project Name: **Portland Harbor**

Matrix: Sediment

Requested Analyses

Basin S-2 Sediment Traps

* WPCL - Care should be taken during TS analysis to retain sample volume for other analyses.

[1]Includes 1 & 2 Methylnaphthalene

Lab Number	Location ID	Install Date	Install Time	Removal Date	Removal Time	Sample Type	TS	TOC	Total Metals (As, Cd, Cr, Cu Pb, Hg, Ni, Ag, Zn)	PCB Aroclors (low-level)	PAH + Phthalates [1]	Organotins	# of Containers	Remarks
01	S2_ST1	12/22/2010	1040	4/18/2011	1235	C	●	●	●	●	●	●	1	ST-S2-AAP953-~~MMMY~~ 8211 107.7 g Total Wet Weight

Relinquished By:	Received By:	Relinquished By:	Received By:
Signature:	Signature:	Signature:	Signature:
Date: 5/26/11	Date: 5/26/11	Date:	Date:
Printed Name: Peter Bryant	Printed Name:	Printed Name:	Printed Name:
Time: 0920	Time: 0920	Time:	Time:

City of Portland
Environmental Services

DAILY FIELD REPORT

Page 1 of 1

Project PORTLAND HARBOR
Project No.
Location BASIN 52
Date 12/22/10
Subject SIFT Installation
By MJS, PTB

1015 Arrive on-site AAP953 to install SIFT for FY10-11 storm season.

1030 Entrant observes ~~PTB~~ CB from W inlet is 8" concrete as is CB from E. Main line inlet & outlet are 30" concrete. 1¼" of flowing water in main line at 0.25 fps. No sediment in line observed.

1040 SIFT installed in downstream line 3' from center of node at 15° angle and 4 3/4" to top of weir on SIFT.

Attachments

City of Portland
Environmental Services

DAILY FIELD REPORT

Page 1 of

Project Portland Harbor Sift Checks
Location Basin 52
Subject Daily Field notes

Project No.
Date 1-26-11
By AJA PTB

1015 Arrive at 52-ST21 PTB 2/26/11 for first regular monthly check. Weather has been fairly dry for previous week and a half. Last big rainstorm was Jan 15-16, 2011

Reinstalled as originally installed 15° angle. No solids collected or archived.

Attachments

City of Portland
Environmental Services

DAILY FIELD REPORT

Project PORTLAND HARBOR
Project No.
Location BASIN 52
Date 3-7-11
Subject SIFT CHECKS
By WKR / PTB

1109 ARR @ 5160 N. LAGOON FOR SECOND FIELD CHECK OF SEASON FOLLOWING SIGNIFICANT WINTER STORM ACTIVITY (LAST CHECK WAS 1-26-11

INLET CATCH BASIN HAVE AMPLE SAMPLEABLE SEDIMENT

PTB IS "STOKED"

~~ARR 1210 @ T8-ST6 @ NW LAKE & 35TH AVE, LOTS OF GRAVEL ON HILLD.~~

RE-INSTALL SIFT, NO SED COLLECTION

Attachments

City of Portland
Environmental Services

DAILY FIELD REPORT

Project PORTLAND HARBOR
Location BASIN SL
Subject SFT CHECKS

Project No.
Date 4/18/11
By JJM, PTB

PTB 5/26/11

1158 Arrive on-site SL-ST21 Set up TC. This is the first check where seds will be collected due to conversation with customer re: accumulations. Argument made that by collecting seds we will know that each time whatever we find will be representative of that period whereas if we leave them in for the whole time we don't know if seds from beginning of deployment are being washed out.
Upon arrival at MH there is a trickle of flow into the N CB apparently from landscaping activity.
1235 Collected seds into Archive Jar.
1245 Departed site.

Attachments

City of Portland
Environmental Services

DAILY FIELD REPORT

Page 1 of 1

Project Portland Harbor Sed traps. Project No.

Location BASIN 52 Date 5/23/11

Subject Monthly check By PTB, CJK

PTB 5/26/11

1121 arrived on site at 5160 N. Lagoon Ave. S2-ST21

1128 Willamette River is backed up filling pipe up to manhole chamber floor (27"). flow appears to be stagnant. Will attempt to remove trap.

1133 Entry made in attempt to remove trap.

1141 Water too deep to remove trap. flow seems to be moving in a positive and then negative flow pattern.
27" deep water on arrival
29" deep water on departure.
flow rate @ ~ 0.1 fps

Attachments

City of Portland
Environmental Services

DAILY FIELD REPORT

Page 1 of 1

Project PORTLAND HARBOR
Project No.
Location WPCL
Date 5/26/11
Subject BASIN S2 Sample Processing
By PTB

0830 Due to river inundation at AAP953 customer made decision to submit previously collected seds from site S2_ST1 as the seds currently in the SIFT can no longer definitively be attributed to upstream sources. Sediments present in archive jar were homogenized using a decanned stainless steel spatula (decanned according to SOP 7.0/a). Loss of seds during processing totalled 3.8g. This leaves 107.7g for submittal. The time on the COC no longer needs to be differentiated as the lab's LIMS can accomodate composite start and end times.

0920 Submitted S2_ST1 jar for analysis.

Attachments

CITY OF PORTLAND
ENVIRONMENTAL SERVICES
Field Operations
6543 N. Burlington Ave
Portland, OR 97203-5452

INLINE SEDIMENT TRAP FIELD DATA SHEET

Project Name: Portland Harbor	Date: 12/22/10	Personnel: MJS, PTB	Point Code: S2_ST1 PTB 5/26/11
Site Address: 5160 N LAGOON AVE		Basin: S-2	Hansen ID: AAP953

SECTION 1 – INSTALLATION INFORMATION

Traffic control and/or site access concerns: MH is located in far right lane of 3 lane one way street, adjacent to driveway for Freightliner Windtunnel. TC signs required: UWA, RLCA & Transition Left. Taper can be started just after SE driveway to Freightliner windtunnel. Ensure space is left for adjacent driveway.

Flowing water: (Y) or N | Standing water: Y or (N)

If flowing: Depth of flow = 1/4 in. Rate of flow = 1/4 fps

Does river appear to back up to this location: Y or (N)

Are sediments present inline? Y or (N) | If Yes, Avg Depth of seds = _____ in Sed Depth Range = _____ in to _____ in

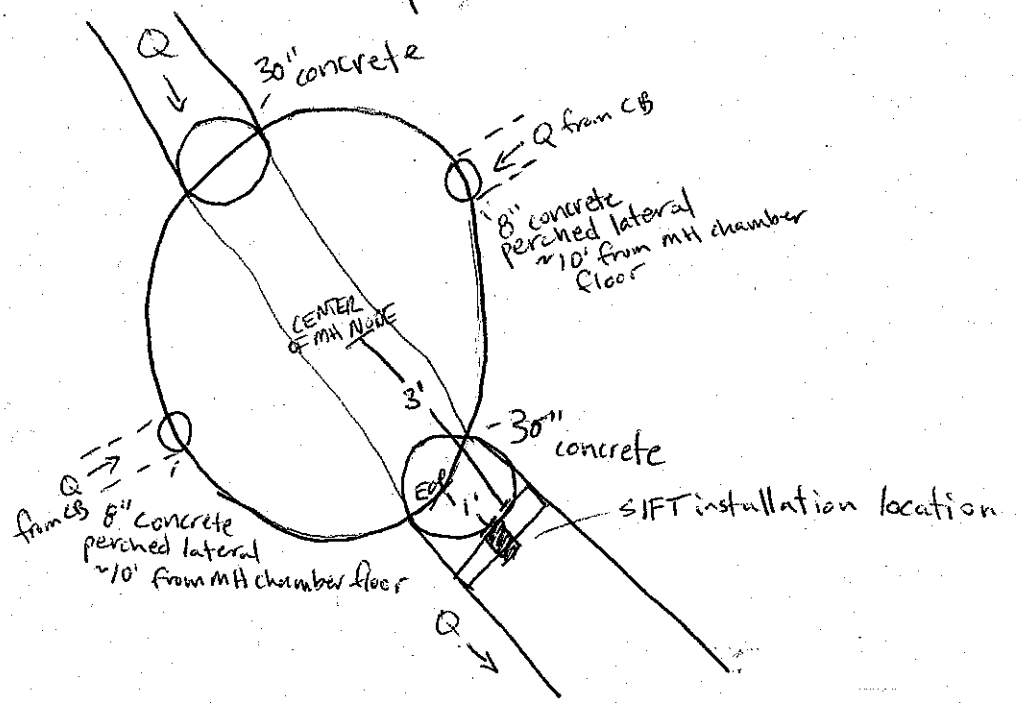
Estimated dimensions of sediment deposit: _____ in. by _____ in. OR ☐ As far as can be seen

Sed Trap Installed in: 30 in. Pipe On Upstream or (Downstream) side of MH (circle one) 3 ft from center of MH node

SED TRAP SITE DIAGRAM

Sketch map of the lateral(s) and layout of manhole, showing approx sed. trap location, manhole elevation and inline sediment if present. Orient drawing using the top of the page as north):

SIFT installed at 15° with 4¾ in. to top of weir



Pt. Code: 52 SIFT (PTB 5/24/11)

SECTION 2 – MONTHLY FIELD CHECK INFORMATION

Hansen ID: AAP953

Archived ID:

Date: 1-26-11
By: PTB, AJA
Average sed. depth per chamber: Primary = Trace in Secondary = 0.1 in
Sediments removed? Yes or (No) If Yes, from Primary / Secondary
Final Removal? Yes or (No)
Face occluded? Yes or (No)

Holding Sticker

Sediment Trap Status Observations: Standing water in line 1.25". Some seds deposited in front of SIFT, gravel 1/4" deep. SIFT Does show signs of high water about halfway up chamber. Re-installed sift same as before check. No solids collected.

Housing:

Primary Chamber: Trace accumulation in primary.

Secondary Chamber: Trace accumulation across face of screen. Invert has some accum. ranging a trace to 1/4" depth, @ 2.5" wide, appears to be fines,

Photos Taken? (Y)N
1 Photo in situ.
Describe: 1 Photo primary chamber, 1 of Secondary

Date: 3-7-11
By: WER/PTB
Average sed. depth per chamber: Primary = 1/8" in Secondary = 1/4" in
Sediments removed? Yes or (No) If Yes, from Primary / Secondary
Final Removal? Yes or (No)
Face occluded? (Yes) or No A LEAK PARTIALLY

Holding Sticker

Sediment Trap Status Observations: 1.5" STANDING WATER IN LINE. SOME GRAVEL, LEAVES AT BASE.

Housing: 1/4" OF SED @ BASE OF SIFT, SAND & GRAVEL

Primary Chamber: ~ 1/8" ACCUMULATION, RANGED TO SIFT

Secondary Chamber: ~ 1/4" ALONG INVERT, 3" WIDE, FACE HAS TRACE ACCUM, W/ 1/8" STANDING WATER W/ SLIGHT SHEEN

Photos Taken? (Y)N SIFT IN SITU, EACH CHAMBER

Describe:

Date: 4/18/11
By: JJM PTB
Average sed. depth per chamber: Primary = 0.25 in Secondary = 0.4 in
Sediments removed? (Yes) or No If Yes, from (Primary) / (Secondary)
Final Removal? Yes or (No)
Face occluded? Yes or (No)

Holding Sticker

Sediment Trap Status Observations: 1.5" of standing water. Gravel & leaves around base. Gravelly seds in 6"x4"x1" area us of SIFT (& ds too.)

Housing:

Primary Chamber: 2" wide band of 0.25" accumulation against weir and screen with narrowing of the accumulation band in the middle. Seds were gravelly

Secondary Chamber: Screen: top 2/3 has trace accumulations of fines with bottom 1/3 sloping into invert that has ~ 0.4" of accumulations of fines.

Photos Taken? (Y)N SIFT IN-SITU, PRIMARY CHAMBER & SECONDARY CHAMBER

Describe:

PTB 5/26/11

Pt. Code: S2-S12	SECTION 2 – MONTHLY FIELD CHECK INFORMATION		Hansen ID: AAP953
Date: 5/23/11	Estimated sed. depth per chamber: Primary = _____ in Secondary =_____ in	Sediments removed? Yes or (No) If Yes, from Primary / Secondary	Date: 5/23/11
By: PTB CJK	Final Removal? Yes or (No)	Face occluded? Yes or (No)	
Sediment Trap Status Observations: River backed up. Water 27-29" deep, Too deep for manual inspection. Water stagnant, not flowing upon arrival and while on site oscillated positive and negative @ approx 0.1 fps. Housing: Primary Chamber: Secondary Chamber:			Holding Sticker
Photos Taken? (Y)N Describe: photo confirms face not occluded.			
Date:	Estimated sed. depth per chamber: Primary = _____ in Secondary =_____ in	Sediments removed? Yes or No If Yes, from Primary / Secondary	Date:
By:	Final Removal? Yes or No	Face occluded? Yes or No	
Sediment Trap Status Observations: Housing: Primary Chamber: Secondary Chamber:			Holding Sticker
Photos Taken? Y/N Describe:			

SECTION 3 – COMPOSITE SAMPLE

Sample ID: WIIE206-01 affix FO number sticker	Duplicate sample collected at this site? Y(N)	DUPLICATE ID: —
Duplicate Sample ID on COC: — affix FO number sticker	Any deviations from standard operating procedures? Y(N) Describe:	

Comments: Sample submitted early due to river back up. Previously collected seds through 4/19/11 check were submitted.

Portland Harbor SIFT Sediment Trap
Sediment Accumulation Tracking Sheet

PTB 5/26/11

Basin 52 **Site** AAP953/S2-ST21

DATE	TOTAL WEIGHT SEDS + JAR + LID (g)		TARE WEIGHT OF JAR + LID (g)		TOTAL COLLECTED WEIGHT (g)		WEIGHT OF PREVIOUSLY COLLECTED SEDS (g)		DEPLOYMENT'S SED ACCUMULATION (g)
4/18/11	329.8	-	218.3	=	111.5		NA	=	111.5
		-		=		-		=	
		-		=		-		=	
		-		=		-		=	
		-		=		-		=	

Homogenization Procedure: (In a Single Jar) OR In a Bowl from Multiple Jars (then parceled out into new clean jars)

Total Weight Seds + Jar + Lid after homogenization	Tare Weight of Jar + Lid	Sed Weight After Homogenization (At Submittal)
= 326.0 g	- 218.3 g	= 107.7 g

~~COC Time (time composite jar is capped):~~ NA

Number of Sample Jars Collected (size & fullness): 1 8oz. jar 1/3 full

Visual Description of Final Composite Sample: Very dark brown with 80% fine sands 20% fines (silts & clays) organic odor

Sample ID: W11E206-01

Duplicate Collected? Y / (N)

Dup ID:

~~Total Solids (%) per Lab Analysis =~~ SUFFICIENT VOLUME AVAILABLE FOR REQUESTED ANALYSES ~~Total Weight Available for Analysis =~~

Comments: COC Time no longer necessary to be differentiated as the lab's LIMS can accomodate composite start and end times

Attachment C
Laboratory Results and QA/QC Review
(on CD only)

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GSI Water Solutions, Inc.
55 SW Yamhill Street, Suite 400 Portland, OR 97204
P: 503.239.8799 F: 503.239.8940
info@gsiwatersolutions.com www.gsiwatersolutions.com

Laboratory Data QA/QC Review
Sediment Trap Sampling
Outfall Basin S-2

To: File

From: Andrew Davidson, GSI Water Solutions, Inc.

Date: February 15, 2012

This memorandum presents a quality assurance/quality control (QA/QC) review of the laboratory data generated from a sampling event conducted by the City of Portland (City) in Basin S-2. A sediment trap was deployed between December 22, 2010 and April 18, 2011. The sediment trap was monitored over time, and accumulated solids were archived. Archived samples were homogenized, and a final sediment trap sample (W11E206-01) representing accumulated solids from the entire deployment period was submitted for analyses.

The laboratory analyses for this solids samples was completed by the City's Bureau of Environmental Services (BES) Water Pollution Control Laboratory (WPCL) and a subcontracted laboratory. The following laboratories conducted the analyses listed below:

- BES WPCL
    - Total Solids (TS) – SM 2540G
    - Total Metals – EPA 6020
    - Polynuclear Aromatic Hydrocarbons (PAHs) & Phthalates – EPA 8270M-SIM
    - Polychlorinated Biphenyls (PCBs) Aroclors – EPA 8082
- Test America (TA)
    - Total Organic Carbon (TOC) – EPA 9060 MOD
    - Organotin Compounds – PSEP GC/MS

The WPCL summary report and the subcontracted laboratory reports for all analyses associated with this sampling event are attached.

The following QA/QC review of the analytical data is based on the available documentation provided by WPCL and the subcontracted laboratories. The QA/QC review of the analytical data

consisted of reviewing the following elements for each laboratory report, if applicable and/or available:

- Chain-of-custody for completeness and continuous custody
- Analysis conducted within holding times
- Chemicals of interest detected in method blanks
- Surrogate recoveries within accuracy control limits
- Internal standard recoveries within accuracy control limits
- Matrix spike and matrix spike duplicate (MS/MSD) sample results within control limits
- Laboratory control and duplicate laboratory control (LC/DLC) sample recoveries within control limits
- Relative percent differences (RPDs) for laboratory duplicate samples within laboratory control limits

The results from the QA/QC review of the available information in the laboratory reports are presented below.

Chain-of-Custody

The chain-of-custody forms showed continuous custody of the samples. The chain-of-custody procedures appear to have been adequate indicating that sample integrity was maintained throughout the sample collection and delivery process.

Analysis Holding Times

WPCL reports that holding times were exceeded for the analyses of PAHs & phthalates and for mercury due to the delayed request for analysis. Additionally, TA reports that holding times were exceeded for the analyses of TOC and organotins. However, because the samples were properly preserved, the results are acceptable for the purposes of this investigation.

Method Blanks

Method blanks were processed during WPCL's analyses of total metals, PAHs & phthalates, and PCB Aroclors, and during the subcontracted laboratory analyses of TOC and organotins. No analytes were detected in any of the method blank samples.

Surrogate Recoveries

Surrogate chemicals were analyzed during WPCL's analyses of PAHs & phthalates and PCB Aroclors, as well as in the subcontracted laboratory analysis of organotins. Surrogate recoveries for the MS/MSD samples processed during the analysis of PCB Aroclors were slightly below detection limits, but were within laboratory control limits for the field sample and associated LC sample. All other surrogate recoveries were within acceptance limits.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

MS samples were processed during the analyses of total metals, PCB Aroclors, TOC, and organotins. MSD samples were also processed during the analyses of PCB Aroclors and organotins. MS/MSD sample recoveries were within laboratory acceptance limits with one exception; tetra-n-butyltin was collected in the organotin MS sample at a concentration greater than the laboratory control limit. However, the associated MSD, LC, and DLC sample recoveries for tetra-n-butyltin were well within acceptance limits, and the data is not qualified further. Relative percent differences (RPDs) between MS/MSD samples processed during the PCB Aroclor and organotin analysis were also within acceptance criteria.

Laboratory Control/Laboratory Control Duplicate Sample (LC/LCD)

LC samples were processed during the laboratory analyses of total metals, PAHs & phthalates, PCB Aroclors, TOC, and organotins. All LC sample recoveries were within laboratory control limits with three exceptions; butyl benzyl phthalate, di-n-butyl phthalate, and bis(2-ethylhexyl) phthalate were collected just above laboratory control limits in LC sample processed during the analysis of PAHs & phthalates. WPCL reports that the high analyte recoveries in the LC sample were due to the low spike concentrations. Accordingly, WPCL comments that associated analyte recoveries in the field sample may be high estimates. A DLC sample was collected during the organotin analysis. All DLC sample recoveries and associated LC/DLC RPDs were within acceptance criteria.

Laboratory Duplicate Samples

Laboratory duplicate samples were processed during the analyses of total metals, PAHs & phthalates, and TOC. RPDs for all laboratory duplicate samples were within laboratory control limits.

Other

WPCL reports that the sample processed during the analysis of PAHs and phthalates required dilution due to non-target matrix interferences, resulting in raised reporting limits. Additionally, WPCL reports that reporting limits were raised in the PCB Aroclor analysis due to the low percent solids.

City of Portland
Water Pollution Control Laboratory
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

July 20, 2011

Linda Scheffler
Director's Office

Work Order	Project	Received
W11E206	**Portland Harbor**	05/26/11 09:20

Enclosed are the results of analysis for the above work order. If you have questions concerning this report, please contact your project coordinator Peter Abrams at 503-823-5533.

Renee Chauvin
Laboratory Coordinator QA/QC

City of Portland
Water Pollution Control Laboratory
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

LABORATORY ANALYSIS REPORT

Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler
Received:	5/26/11 9:20	WQDB #:	Janus329
Submitted By:	Field Operations		

Sample	Laboratory ID	Matrix	Type	Sample Collection Date Start	End	Qualifier
S2_ST1	W11E206-01	Sediment	Composite	04/18/11 12:35	04/18/11 12:35	

Analyte	Result	Units	MRL	Dilution	Batch	Prepared	Analyzed	Method	Qualifier
S2_ST1 : W11E206-01									
General Chemistry									
Total solids	**41.9**	% W/W	0.01		B11F017	06/01/11	06/02/11	SM 2540G	
Total Metals									
Total Metals by ICPMS									
Arsenic	**3.67**	mg/kg dry	0.500	20	B11F012	06/01/11	06/03/11	EPA 6020	
Cadmium	**1.97**	mg/kg dry	0.100	20	B11F012	06/01/11	06/03/11	EPA 6020	
Chromium	**254**	mg/kg dry	0.500	80	B11F012	06/01/11	06/03/11	EPA 6020	
Copper	**186**	mg/kg dry	0.200	80	B11F012	06/01/11	06/03/11	EPA 6020	
Lead	**105**	mg/kg dry	0.100	20	B11F012	06/01/11	06/03/11	EPA 6020	
Mercury	**0.0662**	mg/kg dry	0.0100	20	B11F012	06/01/11	06/03/11	EPA 6020	H5
Nickel	**39.7**	mg/kg dry	0.200	20	B11F012	06/01/11	06/03/11	EPA 6020	
Silver	**2.31**	mg/kg dry	0.100	20	B11F012	06/01/11	06/03/11	EPA 6020	
Zinc	**802**	mg/kg dry	0.500	80	B11F012	06/01/11	06/03/11	EPA 6020	

Reported: 07/20/11 10:12

The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.

Renee Chauvin, Laboratory Coordinator QA/QC

City of Portland
Water Pollution Control Laboratory
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Analyte	Result	Units	MRL	Dilution	Batch	Prepared	Analyzed	Method	Qualifier
Semivolatile Organics - SIM									
Polynuclear Aromatics & Phthalates by GCMS-SIM									D1, H5
Acenaphthene	ND	ug/kg dry	100	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Acenaphthylene	ND	ug/kg dry	100	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Anthracene	**140**	ug/kg dry	100	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Benzo(a)anthracene	**260**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Benzo(a)pyrene	**320**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Benzo(b)fluoranthene	**520**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Benzo(g,h,i)perylene	**360**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Benzo(k)fluoranthene	**180**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Chrysene	**440**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Dibenzo(a,h)anthracene	**74**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Fluoranthene	**790**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Fluorene	ND	ug/kg dry	100	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Indeno(1,2,3-cd)pyrene	**180**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
1-Methylnaphthalene	ND	ug/kg dry	200	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
2-Methylnaphthalene	ND	ug/kg dry	200	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Naphthalene	ND	ug/kg dry	200	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Phenanthrene	**450**	ug/kg dry	100	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Pyrene	**980**	ug/kg dry	50	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Butyl benzyl phthalate	**1200**	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	L2
Di-n-butyl phthalate	**640**	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	L2
Diethyl phthalate	ND	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Dimethyl phthalate	**1000**	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Di-n-octyl phthalate	**1100**	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	
Bis(2-ethylhexyl) phthalate	**22000**	ug/kg dry	500	50	B11E492	05/31/11	06/03/11	EPA 8270-SIM	L2
Surrogate	***Result***		***Expected***	***%Rec***	***Limits(%)***				
2-Methylnaphthalene-d10	*510*		*411*	*125%*	*50-150*	*B11E492*	*05/31/11*	*06/03/11*	*EPA 8270-SIM*
Fluoranthene-d10	*480*		*411*	*116%*	*50-150*	*B11E492*	*05/31/11*	*06/03/11*	*EPA 8270-SIM*
Polychlorinated Biphenyls (PCBs)									
PCB Aroclors by GC-ECD									Z0b
Aroclor 1016/1242	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1221	ND	ug/kg dry	47.7	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1232	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1248	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1254	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1260	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1262	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Aroclor 1268	ND	ug/kg dry	23.9	1	B11E499	05/31/11	06/01/11	EPA 8082	
Surrogate	***Result***		***Expected***	***%Rec***	***Limits(%)***				
Tetrachloro-m-xylene	*16.3*		*23.1*	*70%*	*62.5-132*	*B11E499*	*05/31/11*	*06/01/11*	*EPA 8082*
Decachlorobiphenyl	*14.9*		*23.1*	*64%*	*43.5-150*	*B11E499*	*05/31/11*	*06/01/11*	*EPA 8082*

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Renee Chauvin, Laboratory Coordinator QA/QC

City of Portland
Water Pollution Control Laboratory
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Quality Control Report

Total Metals - QC

Analyte	Result	Units	MRL	Spike Level	Source Result	%Rec *(Limits)*	RPD *(Limit)*	Prepared: Analyzed	Qualifier
Total Metals by ICPMS - Batch B11F012									
Blank (B11F012-BLK1)									
Arsenic	ND	mg/kg wet	0.500					06/01/11 :06/03/11	
Cadmium	ND	mg/kg wet	0.100					06/01/11 :06/03/11	
Chromium	ND	mg/kg wet	0.500					06/01/11 :06/03/11	
Copper	ND	mg/kg wet	0.200					06/01/11 :06/03/11	
Lead	ND	mg/kg wet	0.100					06/01/11 :06/03/11	
Mercury	ND	mg/kg wet	0.0100					06/01/11 :06/03/11	
Nickel	ND	mg/kg wet	0.200					06/01/11 :06/03/11	
Silver	ND	mg/kg wet	0.100					06/01/11 :06/03/11	
Zinc	ND	mg/kg wet	0.500					06/01/11 :06/03/11	
Standard Reference Material (B11F012-SRM1)									
Arsenic	**194**	mg/kg wet	0.500	225		86 *(75-125)*		06/01/11 :06/03/11	
Cadmium	**68.9**	mg/kg wet	0.100	69.1		100 *(75-125)*		06/01/11 :06/03/11	
Chromium	**141**	mg/kg wet	0.500	124		114 *(75-125)*		06/01/11 :06/03/11	
Copper	**71.1**	mg/kg wet	0.200	78.8		90 *(75-125)*		06/01/11 :06/03/11	
Lead	**228**	mg/kg wet	0.100	223		102 *(75-125)*		06/01/11 :06/03/11	
Mercury	**5.123**	mg/kg wet	0.0100	5.15		99 *(75-125)*		06/01/11 :06/03/11	
Nickel	**185**	mg/kg wet	0.200	172		108 *(75-125)*		06/01/11 :06/03/11	
Silver	**36.3**	mg/kg wet	0.100	35.2		103 *(75-125)*		06/01/11 :06/03/11	
Zinc	**375**	mg/kg wet	0.500	349		108 *(75-125)*		06/01/11 :06/03/11	
Duplicate (B11F012-DUP1)			**Source: W11E211-08**						
Arsenic	**2.54**	mg/kg dry	0.500		2.63		4 *(20)*	06/01/11 :06/03/11	
Cadmium	**0.472**	mg/kg dry	0.100		0.503		6 *(20)*	06/01/11 :06/03/11	
Chromium	**34.6**	mg/kg dry	0.500		34.7		0.6 *(20)*	06/01/11 :06/03/11	
Copper	**45.0**	mg/kg dry	0.200		45.3		0.6 *(20)*	06/01/11 :06/03/11	
Lead	**22.3**	mg/kg dry	0.100		26.4		17 *(20)*	06/01/11 :06/03/11	
Mercury	**0.02106**	mg/kg dry	0.0100		0.02397		13 *(20)*	06/01/11 :06/03/11	
Nickel	**36.4**	mg/kg dry	0.200		35.0		4 *(20)*	06/01/11 :06/03/11	
Silver	ND	mg/kg dry	0.100		ND		*(20)*	06/01/11 :06/03/11	
Zinc	**214**	mg/kg dry	0.500		232		8 *(20)*	06/01/11 :06/03/11	
Matrix Spike (B11F012-MS1)			**Source: W11E211-08**						
Arsenic	**17.2**	mg/kg dry	0.500	15.7	2.63	93 *(75-125)*		06/01/11 :06/03/11	
Cadmium	**15.7**	mg/kg dry	0.100	15.7	0.503	97 *(75-125)*		06/01/11 :06/03/11	
Chromium	**84.1**	mg/kg dry	0.500	47.1	34.7	105 *(75-125)*		06/01/11 :06/03/11	
Copper	**127**	mg/kg dry	0.200	78.5	45.3	104 *(75-125)*		06/01/11 :06/03/11	
Lead	**110**	mg/kg dry	0.100	78.5	26.4	107 *(75-125)*		06/01/11 :06/03/11	
Mercury	**0.8213**	mg/kg dry	0.0100	0.785	0.02397	102 *(75-125)*		06/01/11 :06/03/11	
Nickel	**116**	mg/kg dry	0.200	78.5	35.0	103 *(75-125)*		06/01/11 :06/03/11	
Silver	**15.3**	mg/kg dry	0.100	15.7	ND	98 *(75-125)*		06/01/11 :06/03/11	

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City of Portland
Water Pollution Control Laboratory
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Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Total Metals - QC

Analyte	Result	Units	MRL	Spike Level	Source Result	%Rec *(Limits)*	RPD *(Limit)*	Prepared: Analyzed	Qualifier
Total Metals by ICPMS - Batch B11F012									
Matrix Spike (B11F012-MS1)			**Source: W11E211-08**						
Zinc	**327**	mg/kg dry	0.500	78.5	232	121 *(75-125)*		06/01/11 :06/03/11	

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Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Semivolatile Organics - SIM - QC

Analyte	Result	Units	MRL	Spike Level	Source Result	%Rec *(Limits)*	RPD *(Limit)*	Prepared: Analyzed	Qualifier
Polynuclear Aromatics & Phthalates by GCMS-SIM - Batch B11E492									
Blank (B11E492-BLK1)									
Acenaphthene	ND	ug/kg wet	20					05/31/11 :06/03/11	
Acenaphthylene	ND	ug/kg wet	20					05/31/11 :06/03/11	
Anthracene	ND	ug/kg wet	20					05/31/11 :06/03/11	
Benzo(a)anthracene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Benzo(a)pyrene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Benzo(b)fluoranthene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Benzo(g,h,i)perylene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Benzo(k)fluoranthene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Chrysene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Dibenzo(a,h)anthracene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Fluoranthene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Fluorene	ND	ug/kg wet	20					05/31/11 :06/03/11	
Indeno(1,2,3-cd)pyrene	ND	ug/kg wet	10					05/31/11 :06/03/11	
1-Methylnaphthalene	ND	ug/kg wet	40					05/31/11 :06/03/11	
2-Methylnaphthalene	ND	ug/kg wet	40					05/31/11 :06/03/11	
Naphthalene	ND	ug/kg wet	40					05/31/11 :06/03/11	
Phenanthrene	ND	ug/kg wet	20					05/31/11 :06/03/11	
Pyrene	ND	ug/kg wet	10					05/31/11 :06/03/11	
Butyl benzyl phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Di-n-butyl phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Diethyl phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Dimethyl phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Di-n-octyl phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Bis(2-ethylhexyl) phthalate	ND	ug/kg wet	100					05/31/11 :06/03/11	
Surrogate									
2-Methylnaphthalene-d10	*120*		ug/kg wet	*100*		117		05/31/11 :06/03/11	
Fluoranthene-d10	*110*		ug/kg wet	*100*		114		05/31/11 :06/03/11	
LCS (B11E492-BS1)									
Acenaphthene	**20.4**	ug/kg wet	20	20.0		102 *(50-150)*		05/31/11 :06/03/11	
Acenaphthylene	**22.0**	ug/kg wet	20	20.0		110 *(50-150)*		05/31/11 :06/03/11	
Anthracene	**21.6**	ug/kg wet	20	20.0		108 *(50-150)*		05/31/11 :06/03/11	
Benzo(a)anthracene	**21.2**	ug/kg wet	10	20.0		106 *(50-150)*		05/31/11 :06/03/11	
Benzo(a)pyrene	**20.8**	ug/kg wet	10	20.0		104 *(50-150)*		05/31/11 :06/03/11	
Benzo(b)fluoranthene	**21.2**	ug/kg wet	10	20.0		106 *(50-150)*		05/31/11 :06/03/11	
Benzo(g,h,i)perylene	**14.0**	ug/kg wet	10	20.0		70 *(50-150)*		05/31/11 :06/03/11	
Benzo(k)fluoranthene	**20.4**	ug/kg wet	10	20.0		102 *(50-150)*		05/31/11 :06/03/11	
Chrysene	**20.8**	ug/kg wet	10	20.0		104 *(50-150)*		05/31/11 :06/03/11	
Dibenzo(a,h)anthracene	**18.0**	ug/kg wet	10	20.0		90 *(50-150)*		05/31/11 :06/03/11	
Fluoranthene	**21.2**	ug/kg wet	10	20.0		106 *(50-150)*		05/31/11 :06/03/11	
Fluorene	**20.0**	ug/kg wet	20	20.0		100 *(50-150)*		05/31/11 :06/03/11	

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Renee Chauvin, Laboratory Coordinator QA/QC

City of Portland
Water Pollution Control Laboratory
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Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Semivolatile Organics - SIM - QC

Analyte	Result	Units	MRL	Spike Level	Source Result	%Rec *(Limits)*	RPD *(Limit)*	Prepared: Analyzed	Qualifier
Polynuclear Aromatics & Phthalates by GCMS-SIM - Batch B11E492									
LCS (B11E492-BS1)									
Indeno(1,2,3-cd)pyrene	**16.8**	ug/kg wet	10	20.0		84 *(50-150)*		05/31/11 :06/03/11	
Naphthalene	**18.0**	ug/kg wet	10	20.0		90 *(50-150)*		05/31/11 :06/03/11	
Phenanthrene	**21.6**	ug/kg wet	20	20.0		108 *(50-150)*		05/31/11 :06/03/11	
Pyrene	**22.0**	ug/kg wet	10	20.0		110 *(50-150)*		05/31/11 :06/03/11	
Butyl benzyl phthalate	**132**	ug/kg wet	50	80.0		164 *(50-150)*		05/31/11 :06/03/11	Z0
Di-n-butyl phthalate	**125**	ug/kg wet	50	80.0		156 *(50-150)*		05/31/11 :06/03/11	Z0
Diethyl phthalate	**85.2**	ug/kg wet	50	80.0		106 *(50-150)*		05/31/11 :06/03/11	
Dimethyl phthalate	**74.0**	ug/kg wet	50	80.0		92 *(50-150)*		05/31/11 :06/03/11	
Di-n-octyl phthalate	**96.4**	ug/kg wet	50	80.0		120 *(50-150)*		05/31/11 :06/03/11	
Bis(2-ethylhexyl) phthalate	**123**	ug/kg wet	50	80.0		154 *(50-150)*		05/31/11 :06/03/11	Z0
Surrogate									
2-Methylnaphthalene-d10	*120*		ug/kg wet	*100*		120 *(50-150)*		05/31/11 :06/03/11	
Fluoranthene-d10	*120*		ug/kg wet	*100*		118 *(50-150)*		05/31/11 :06/03/11	
Duplicate (B11E492-DUP1)			**Source: W11E211-05**						**D1**
Acenaphthene	ND	ug/kg dry	100		ND		*(50)*	05/31/11 :06/03/11	
Acenaphthylene	ND	ug/kg dry	100		ND		*(50)*	05/31/11 :06/03/11	
Anthracene	ND	ug/kg dry	100		ND		*(50)*	05/31/11 :06/03/11	
Benzo(a)anthracene	ND	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Benzo(a)pyrene	**58.6**	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Benzo(b)fluoranthene	**104**	ug/kg dry	50		83.0		23 *(50)*	05/31/11 :06/03/11	
Benzo(g,h,i)perylene	**166**	ug/kg dry	50		153		8 *(50)*	05/31/11 :06/03/11	
Benzo(k)fluoranthene	ND	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Chrysene	**68.8**	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Dibenzo(a,h)anthracene	ND	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Fluoranthene	**135**	ug/kg dry	50		83.0		48 *(50)*	05/31/11 :06/03/11	
Fluorene	ND	ug/kg dry	100		ND		*(50)*	05/31/11 :06/03/11	
Indeno(1,2,3-cd)pyrene	**53.5**	ug/kg dry	50		ND		*(50)*	05/31/11 :06/03/11	
Naphthalene	ND	ug/kg dry	200		ND		*(50)*	05/31/11 :06/03/11	
Phenanthrene	ND	ug/kg dry	100		ND		*(50)*	05/31/11 :06/03/11	
Pyrene	**173**	ug/kg dry	50		141		21 *(50)*	05/31/11 :06/03/11	
Butyl benzyl phthalate	ND	ug/kg dry	500		ND		*(50)*	05/31/11 :06/03/11	
Di-n-butyl phthalate	ND	ug/kg dry	500		ND		*(50)*	05/31/11 :06/03/11	
Diethyl phthalate	ND	ug/kg dry	500		ND		*(50)*	05/31/11 :06/03/11	
Dimethyl phthalate	ND	ug/kg dry	500		ND		*(50)*	05/31/11 :06/03/11	
Di-n-octyl phthalate	ND	ug/kg dry	500		ND		*(50)*	05/31/11 :06/03/11	
Bis(2-ethylhexyl) phthalate	**2520**	ug/kg dry	500		3890		43 *(50)*	05/31/11 :06/03/11	L2
Surrogate									
2-Methylnaphthalene-d10	*330*		ug/kg dry	*255*		131		05/31/11 :06/03/11	
Fluoranthene-d10	*340*		ug/kg dry	*255*		132		05/31/11 :06/03/11	

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Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Polychlorinated Biphenyls (PCBs) - QC

Analyte	Result	Units	MRL	Spike Level	Source Result	%Rec *(Limits)*	RPD *(Limit)*	Prepared: Analyzed	Qualifier
PCB Aroclors by GC-ECD - Batch B11E499									
Blank (B11E499-BLK1)									
Aroclor 1016/1242	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1221	ND	ug/kg wet	20.0					05/31/11 :06/01/11	
Aroclor 1232	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1248	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1254	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1260	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1262	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Aroclor 1268	ND	ug/kg wet	10.0					05/31/11 :06/01/11	
Surrogate									
Tetrachloro-m-xylene	*8.94*		ug/kg wet	*10.0*		89		05/31/11 :06/01/11	
Decachlorobiphenyl	*8.52*		ug/kg wet	*10.0*		85		05/31/11 :06/01/11	
LCS (B11E499-BS1)									
Aroclor 1016/1242	**90.60**	ug/kg wet	10.0	100		91 *(80-120)*		05/31/11 :06/01/11	
Aroclor 1260	**86.01**	ug/kg wet	10.0	100		86 *(65-133)*		05/31/11 :06/01/11	
Surrogate									
Tetrachloro-m-xylene	*8.43*		ug/kg wet	*10.0*		84 *(62.5-132)*		05/31/11 :06/01/11	
Decachlorobiphenyl	*8.84*		ug/kg wet	*10.0*		88 *(43.5-150)*		05/31/11 :06/01/11	
Matrix Spike (B11E499-MS1)			**Source: W11E206-01**						
Aroclor 1016/1242	**141.8**	ug/kg dry	23.9	234	ND	61 *(55.2-135.4)*		05/31/11 :06/01/11	
Aroclor 1260	**121.5**	ug/kg dry	23.9	234	ND	52 *(19.6-166.5)*		05/31/11 :06/01/11	
Surrogate									
Tetrachloro-m-xylene	*11.4*		ug/kg dry	*23.4*		49 *(62.5-132)*		05/31/11 :06/01/11	*Z0a*
Decachlorobiphenyl	*10.2*		ug/kg dry	*23.4*		44 *(43.5-150)*		05/31/11 :06/01/11	
Matrix Spike Dup (B11E499-MSD1)			**Source: W11E206-01**						
Aroclor 1016/1242	**159.8**	ug/kg dry	23.9	236	ND	68 *(55.2-135.4)*	12 *(20)*	05/31/11 :06/01/11	
Aroclor 1260	**137.7**	ug/kg dry	23.9	236	ND	58 *(19.6-166.5)*	12 *(20)*	05/31/11 :06/01/11	
Surrogate									
Tetrachloro-m-xylene	*13.5*		ug/kg dry	*23.6*		57 *(62.5-132)*		05/31/11 :06/01/11	*Z0a*
Decachlorobiphenyl	*12.9*		ug/kg dry	*23.6*		55 *(43.5-150)*		05/31/11 :06/01/11	

Reported: 07/20/11 10:12

The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.

Renee Chauvin, Laboratory Coordinator QA/QC

City of Portland
Water Pollution Control Laboratory
6543 N. Burlington Ave. / Portland OR 97203 (503) 823-5600 fax (503) 823-5656

Project:	**Portland Harbor**	Client:	Director's Office
Work Order:	**W11E206**	Project Mgr:	Linda Scheffler

Qualifiers

D1	The sample required dilution due to non-target matrix interferences, resulting in raised reporting limits.
H5	Holding time was exceeded due to delayed request for analysis.
L2	Recovery for this analyte in the laboratory control sample was outside the acceptance range (high). Sample results may be high estimates.
Z0	High recovery for this analyte in LCS is likely due to the low spike concentration.
Z0a	Recovery for one of two surrogate compounds was low in both the MS and MSD, possibly due to the high moisture content of the sample.
Z0b	Reporting limits are raised for this sample due to the low % solids.

Definitions

DET	Analyte Detected	ND	Analyte Not Detected at or above the reporting limit
MRL	Method Reporting Limit	MDL	Method Detection Limit
NR	Not Reportable	dry	Sample results reported on a dry weight basis
% Rec.	Percent Recovery	RPD	Relative Percent Difference

Reported: 07/20/11 10:12

The results in this report apply only to the samples analyzed. Qualifiers and case narrative comments are essential to interpretation of the analytical results. Report reproductions and/or data summaries without qualifiers and comments are incomplete.

Renee Chauvin, Laboratory Coordinator QA/QC

Date: 5/26/11

Water Pollution Control Laboratory
6543 N. Burlington Ave.
Portland, Oregon 97203-4552
Sample Custodian: (503) 823-5696
General Lab: (503) 823-5681

City of Portland Chain-of-Custody

Bureau of Environmental Services

Work Order #: W11E206

Collected By: JJM, PTB

Client Name: Director's Office

Matrix: Sediment

Project Name: **Portland Harbor**

Requested Analyses

Basin S-2 Sediment Traps

* WPCL - Care should be taken during TS analysis to retain sample volume for other analyses.

[1]Includes 1 & 2 Methylnaphthalene

Lab Number	Location ID	Install Date	Install Time	Removal Date	Removal Time	Sample Type	TS	TOC	Total Metals (As, Cd, Cr, Cu Pb, Hg, Ni, Ag, Zn)	PCB Aroclors (low-level)	PAH + Phthalates [1]	Organotins	# of Containers	Remarks
01	S2_ST1	12/22/2010	1040	4/18/2011	1235	C	●	●	●	●	●	●	1	ST-S2-AAP953-~~MMDY~~ 82111 107.7 g Total Wet Weight

Relinquished By:		Received By:		Relinquished By:		Received By:	
Signature:	Date: 5/26/11	Signature:	Date: 5/26/11	Signature:	Date:	Signature:	Date:
Printed Name: Peter Bryant	Time: 0920	Printed Name: Mackenzie Tidd	Time: 0920	Printed Name:	Time:	Printed Name:	Time:

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Portland
9405 SW Nimbus Ave.
Beaverton, OR 97008
Tel: (503) 906-9200

TestAmerica Job ID: PUF0773
Client Project/Site: W11E206
Client Project Description: Portland Harbor

For:
City of Portland Water Pollution Laboratory
6543 N. Burlington Ave.
Portland, OR 97203

Attn: Renee Chauvin

Authorized for release by:
07/20/2011 09:23:12 AM

Darrell Auvil
Project Manager
darrell.auvil@testamericainc.com

Sample Summary

Client: City of Portland Water Pollution Laboratory
Project/Site: W11E206

TestAmerica Job ID: PUF0773

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
PUF0773-01	W11E206-01 (S2_ST1)	Sediment	04/18/11 12:35	06/22/11 11:25

Definitions/Glossary

Client: City of Portland Water Pollution Laboratory
Project/Site: W11E206

TestAmerica Job ID: PUF0773

Qualifiers

TSEA

Qualifier	Qualifier Description
F	MS or MSD exceeds the control limits
H	Sample was prepped or analyzed beyond the specified holding time

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis.
EPA	United States Environmental Protection Agency
ND	Not Detected above the reporting level.
MDL	Method Detection Limit
RL	Reporting Limit
RE, RE1 (etc.)	Indicates a Re-extraction or Reanalysis of the sample.
%R	Percent Recovery
RPD	Relative Percent Difference, a measure of the relative difference between two points.

Client: City of Portland Water Pollution Laboratory
Project/Site: W11E206

TestAmerica Job ID: PUF0773

Client Sample ID: W11E206-01 (S2_ST1)
Date Collected: 04/18/11 12:35
Date Received: 06/22/11 11:25

Lab Sample ID: PUF0773-01
Matrix: Sediment

Method: 9060 - Organic Carbon, Total (TOC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	92000	H	2000		mg/Kg		07/05/11 15:21	07/05/11 15:21	1

Method: Moisture - Percent Moisture

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Moisture	52		0.10		%		06/23/11 12:06	06/23/11 12:06	1
Percent Solids	48		0.10		%		06/23/11 12:06	06/23/11 12:06	1

Method: Organotins Dry - Organotins, PSEP (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	170	H	2.7		ug/Kg dry	☼	06/23/11 11:42	06/23/11 22:20	1
Monobutyltin	110	H	2.7		ug/Kg dry	☼	06/23/11 11:42	06/23/11 22:20	1
Tetra-n-butyltin	ND	H	7.3		ug/Kg dry	☼	06/23/11 11:42	06/23/11 22:20	1
Tributyltin	52	H	2.7		ug/Kg dry	☼	06/23/11 11:42	06/23/11 22:20	1

Surrogate	*% Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*126*		*20 - 151*	*06/23/11 11:42*	*06/23/11 22:20*	*1*

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: 89590-3
Matrix: Soil
Analysis Batch: 89590

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 89590_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		2000		mg/Kg		07/05/11 15:21	07/05/11 15:21	1

Lab Sample ID: 89590-4
Matrix: Soil
Analysis Batch: 89590

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 89590_P

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Total Organic Carbon			2720	3600		mg/Kg		132	34 - 166		

Lab Sample ID: 89590-6
Matrix: Soil
Analysis Batch: 89590

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 89590_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits		
Total Organic Carbon			20000	27600		mg/Kg		117	76 - 128		

Lab Sample ID: 89590-7
Matrix: Soil
Analysis Batch: 89590

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 89590_P

Analyte	Sample Result	Sample Qualifier		Duplicate Result	Duplicate Qualifier	Unit	D			RPD	RPD Limit
Total Organic Carbon				3700		mg/Kg				13	50

Method: Moisture - Percent Moisture

Lab Sample ID: 88675-2
Matrix: Soil
Analysis Batch: 88675

Client Sample ID: Duplicate
Prep Type: Total
Prep Batch: 88675_P

Analyte	Sample Result	Sample Qualifier		Duplicate Result	Duplicate Qualifier	Unit	D			RPD	RPD Limit
Percent Moisture				13		%					
Percent Solids				87		%					

Method: Organotins Dry - Organotins, PSEP (GC/MS)

Lab Sample ID: 88738-31
Matrix: Soil
Analysis Batch: 88691

Client Sample ID: Method Blank
Prep Type: Total
Prep Batch: 88691_P

Analyte	Blank Result	Blank Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dibutyltin	ND		1.3		ug/Kg dry		06/23/11 11:42	06/23/11 20:52	1
Monobutyltin	ND		1.3		ug/Kg dry		06/23/11 11:42	06/23/11 20:52	1
Tetra-n-butyltin	ND		3.6		ug/Kg dry		06/23/11 11:42	06/23/11 20:52	1
Tributyltin	ND		1.3		ug/Kg dry		06/23/11 11:42	06/23/11 20:52	1

Surrogate	*Blank % Recovery*	*Blank Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Tripentyltin	*113*		*20 - 151*	*06/23/11 11:42*	*06/23/11 20:52*	*1*

Method: Organotins Dry - Organotins, PSEP (GC/MS) (Continued)

Lab Sample ID: 88738-32
Matrix: Soil
Analysis Batch: 88691

Client Sample ID: Lab Control Sample
Prep Type: Total
Prep Batch: 88691_P

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits		
Dibutyltin			102	86.0		ug/Kg dry		84	25 - 142		
Monobutyltin			83.1	70.5		ug/Kg dry		85	24 - 125		
Tetra-n-butyltin			133	121		ug/Kg dry		91	26 - 149		
Tributyltin			119	93.6		ug/Kg dry		79	20 - 146		

Surrogate	*LCS % Recovery*	*LCS Qualifier*	*Limits*
Tripentyltin	*98*		*20 - 151*

Lab Sample ID: 88738-33
Matrix: Soil
Analysis Batch: 88691

Client Sample ID: Lab Control Sample Dup
Prep Type: Total
Prep Batch: 88691_P

Analyte			Spike Added	LCS Dup Result	LCS Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Dibutyltin			102	88.0		ug/Kg dry		86	25 - 142	2	30
Monobutyltin			83.1	73.2		ug/Kg dry		88	24 - 125	4	36
Tetra-n-butyltin			133	119		ug/Kg dry		89	26 - 149	1	25
Tributyltin			119	91.1		ug/Kg dry		77	20 - 146	3	28

Surrogate	*LCS Dup % Recovery*	*LCS Dup Qualifier*	*Limits*
Tripentyltin	*98*		*20 - 151*

Lab Sample ID: 269811D
Matrix: Soil
Analysis Batch: 88691

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total
Prep Batch: 88691_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Dup Result	Matrix Spike Dup Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Dibutyltin	170	H	207	301	H	ug/Kg dry	☼	61	25 - 142	0	30
Monobutyltin	110	H	169	188	H	ug/Kg dry	☼	49	24 - 125	4	36
Tetra-n-butyltin	ND	H	270	380	H	ug/Kg dry	☼	140	26 - 149	22	25
Tributyltin	52	H	241	248	H	ug/Kg dry	☼	81	20 - 146	15	28

Surrogate	*Matrix Spike Dup % Recovery*	*Matrix Spike Dup Qualifier*	*Limits*
Tripentyltin	*121*		*20 - 151*

Lab Sample ID: 269811S
Matrix: Soil
Analysis Batch: 88691

Client Sample ID: Matrix Spike
Prep Type: Total
Prep Batch: 88691_P

Analyte	Sample Result	Sample Qualifier	Spike Added	Matrix Spike Result	Matrix Spike Qualifier	Unit	D	% Rec	% Rec. Limits		
Dibutyltin	170	H	208	299	H	ug/Kg dry	☼	60	25 - 142		
Monobutyltin	110	H	169	180	H	ug/Kg dry	☼	44	24 - 125		
Tetra-n-butyltin	ND	H	271	473	H F	ug/Kg dry	☼	175	26 - 149		
Tributyltin	52	H	241	288	H	ug/Kg dry	☼	98	20 - 146		

Surrogate	*Matrix Spike % Recovery*	*Matrix Spike Qualifier*	*Limits*
Tripentyltin	*114*		*20 - 151*

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

9405 SW Nimbus Ave., Beaverton, OR 97008
Phone: (503) 906-9200
FAX: (503) 906-9210

WORK ORDER
PUF0773

Client:	City of Portland Water Pollution Laboratory	**Project Name:**	Portland Harbor
Client Code:	1411084	**Project Number:**	W11E206
Project	Darrell Auvil	**Printed:**	6/22/2011 12:44:04PM

Report Information

Client Name: City of Portland Water Pollution Laboratory
Client PM: Renee Chauvin
Address: 6543 N. Burlington Ave.
Portland, OR 97203
Phone: (503) 823-5612
Fax: 503-823-5656
Due Date: 06/29/11 18:00 (5 day TAT)
Delivery Method: Email

PONumber: 30001516

Sample Receipt Information

Samples Received at: 3.4°C
Sampled By:
_FO
Samples Received By:
Philip M. Svabik 06/22/11 11:25
Samples Logged By:
Jessica Morgan 06/22/11 12:43

Invoice Information

City of Portland Water Pollution Laboratory
Chuck Lytle
6543 N. Burlington Ave.
Portland, OR 97203
Phone: (503) 823-5568
Fax: 823-5656

Pricing Information:
Acct Mgr.: Noi Tran
Contract # 30001516 - 2010-2013

Custody Seals Present	No	Samples received on ice	Yes
All Containers Intact	Yes	Preservation Confirmed	No
Sample labels/COC agree	Yes		
Samples Preserved Properly	Yes		

Work Order Comments

W11E206 Autolog from WPCL 06/22/11 12:43

Analysis	Due	TAT	Expires	Price	Comments
TestAmerica Seattle					
PUF0773-01 W11E206-01 (S2_ST1) Other dry	**Sampled: 04/18/11 12:35**				
Organotins - SUB	06/29/11 16:00	5	10/15/11 12:35	$235.00+50%	
Solids, Dry Weight	06/29/11 16:00	5	05/16/11 12:35	$0.00	Auto-Included
TOC-9060-SUB	06/29/11 16:00	5	05/16/11 12:35	$55.00+50%	Soil - Sub to CT or Seattle if low volume

6/22/11
Reviewed By

Date

Time

6/22/2011 12:44:04PM
Page 1 of 1

SUBCONTRACT ORDER

City of Portland Water Pollution Control Lab

W11E206

PVF0773

SENDING LABORATORY:

City of Portland Water Pollution Control Lab
6543 N. Burlington Ave
Portland, OR 97203
Phone: 503-823-5600
Fax: 503-823-5656
Invoice To: Charles Lytle using P.O.# 30001516

RECEIVING LABORATORY:

TestAmerica
9405 SW Nimbus Ave
Beaverton, OR 97008
Phone :(503) 906-9200
Fax: (503) 906-9210

WPCL Project Name
Portland Harbor

TURNAROUND REQUEST
[X] Standard
[ ] Rush _ day(s)

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: W11E206-01	**Solid**	**Sampled:04/18/11 12:35**		
Out-TOC Solid	06/10/11 17:00	05/02/11 12:35		
Out-Organotin Compounds	06/10/11 17:00	05/02/11 12:35		
Containers Supplied:				
G jar amber 8 oz (A)				

*We are aware sample is out of hold
*limited volume

Released By	Date	Received By	Date
	6/22/11 @10:42		6/22/11 @ 10:42
	6/22/11 @ 11:25		6/22/11 @ 1125

Page 1 of 1

3.4°C

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Portland Sample Control Checklist

Work Order #: PUF0773 **Date/Time Received:** 6/22/11 @ 1125
Client Name: PORTLAND WATER POLLUTION CONTROL LAB
Project Name: PORTLAND HARBOR
Time Zone:
☐EDT/EST ☐CDT/CST ☐MDT/MST ☑PDT/PST ☐AK ☐HI ☐OTHER

Unpacking Checks:
Cooler (s): 1
Temperature (s): 3.4
Digi #1 ☐ Digi #2 ☐ IR Gun ☑ (☑Plastic ☐Glass)
Raytek ☐ (☐Plastic ☐Glass)
Ice used: (circle one) GEL (LOOSE) BLUE NONE OTHER: _____ Initials: JS

Temperature out of Range:
__Not enough or No Ice
__Ice Melted
__W/in 4 Hrs of collection
__Ice Not Needed
__ Other:_____

N/A	Yes	No	
☑	☐	☐	1. If ESI client, were temp blanks received? If no, document on NOD.
☑	☐	☐	2. Cooler Seals intact? (N/A if hand delivered) if no and ESI client, document on NOD.
☑	☐	☐	3. Chain of Custody present? If no, document on NOD. Along with "received by" & "relinquished by" signatures with date & time?
☑	☐	☐	4. Bottles received intact? If no, document on NOD.
☑	☐	☐	5. Sample is not multiphasic? If no, document on NOD.
☐	☐	☑	6. Sampler name/signature documented on COC?
☑	☐	☐	7. Proper Container and preservatives used? If no, document on NOD.
☑	☐	☐	8. pH for HN03/ESI samples checked and meet requirements? If no, document on NOD.
☑	☐	☐	9. Cyanide samples checked for sulfides and meet requirements? If no, notify PM.
☑	☐	☐	10. HF Dilution required?
☑	☐	☐	11. Sufficient volume provided for all analysis and requested MS/MSD? If no, document on NOD and consult PM before proceeding.
☑	☐	☐	12. Did chain of custody agree with samples received? If no, document on NOD.
☑	☐	☐	13. Were VOA samples received without headspace?
☐	☐	☑	14. Did samples require preservation with sodium thiosulfate?
☑	☐	☐	15. If yes to #14, was the residual chlorine test negative? If no, document on NOD.
☑	☐	☐	16. Are dissolved/field filtered metals bottles sediment-free? If no, document on NOD.
☐	☐	☑	17. Are analyses with short holding times received in hold?
☑	☐	☐	18. Were special log- in instructions read and followed?

RECEIVED OUT OF HOLD & VERY LIMITED VOLUME. -PS

Checklist Reviewed: **Log-in initials:** JM **Labeler initials:** JM