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**Combined Sewer Overflow Sediment  
Quality Characterization  
2018 North Beach Pump Station  
Inlet Overflow 048b  
Sediment Data Report**

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July 2019



**King County**

Department of Natural Resources and Parks  
Water and Land Resources Division

**Science and Technical Support Section**

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# **Combined Sewer Overflow Sediment Quality Characterization 2018 North Beach Pump Station Inlet Overflow 048b Sediment Data Report**

## **Prepared for:**

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Wastewater Treatment Division, Department of Natural Resources and Parks

and

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**King County**

Department of  
Natural Resources and Parks

**Water and Land Resources Division**



## Acknowledgements

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We would like to acknowledge contributions to this study by the King County Environmental Laboratory.

## Citation

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King County. 2019. Combined Sewer Overflow Sediment Quality Characterization 2018 North Beach Pump Station Inlet Overflow 048b Sediment Data Report. Prepared by Jennifer Lanksbury and Debra Williston, Water and Land Resources Division, King County Department of Natural Resources and Parks. Seattle, Washington.

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## EXECUTIVE SUMMARY

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King County is required to perform sediment characterization following completion of combined sewer overflow (CSO) control projects as part of its National Pollutant Discharge Elimination System (NPDES) permit for the West Point Treatment Plant. Substantial completion of the North Beach Pump Station project, which controlled the North Beach CSO, occurred in spring of 2017. In accordance with the NPDES permit and King County's Post Construction Monitoring Plan, this report presents a description of the sampling and analysis methodologies and analytical results for the 2018 surface sediment quality characterization of North Beach Pump Station Inlet Overflow 048b.

King County collected sediment samples from six stations located near the Overflow 048b outlet on September 6, 2018. Samples were analyzed by the King County Environmental Laboratory for conventional parameters, trace metals, and organic compounds and the results were compared to Washington State Sediment Management Standards marine sediment quality standards (Washington Administrative Code 173-204-320). None of the sediment samples exceeded the marine sediment standards. Therefore, under the County's Sediment Management Plan, no further action is currently required for sediments at this overflow location.

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# 1.0 INTRODUCTION

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This report presents results from the 2018 King County Combined Sewer Overflow (CSO) Sediment Quality Characterization for the North Beach Pump Station Inlet Overflow 048b. King County's West Point Treatment Plant National Pollutant Discharge Elimination System (NPDES) permit No. WA0029181, effective February 1, 2015, and issued by the Washington State Department of Ecology (Ecology), requires that the County perform sediment characterization following completion of CSO control projects. Pursuant to King County's Post Construction Monitoring Plan (PCMP; King County, 2012), sediment must be characterized via sampling or modeling methods after substantial completion of CSO projects. This report presents the results of the sediment sampling required under the NPDES permit and the PCMP.

## 1.1 Project Background

Substantial completion of the North Beach Pump Station project, which brought the North Beach CSO into control status, occurred in the spring of 2017. The North Beach Pump Station receives flows from the Loyal Heights, Crown Hill, and Greenwood areas of Seattle. Required sediment characterization of the North Beach Pump Station discharge point occurred in September 2018. Figure 1 shows the location of the North Beach Pump Station and associated sediment sampling locations.

King County previously collected sediment quality data from a wide range of its CSO discharge locations, both as part of past NPDES sediment monitoring requirements and during focused environmental studies. These sediment data were provided in King County's comprehensive sediment quality report (King County, 2009) as well as a recently updated version of this report (King County, 2018). Moreover, these data were collected and reviewed consistent with the Quality Assurance and Project Plan and programmatic Sediment Sampling and Analysis Plan (SAP) approved as part of the PCMP (Appendix H of King County, 2012).

The programmatic SAP for the PCMP only listed the North Beach Pump Station Wet Well Overflow 048a as requiring sampling when the North Beach Pump Station project controlled the North Beach CSO and triggered the PCMP process. When the County determined that a second overflow point at North Beach went to a separate overflow location, a sampling plan specific to the North Beach Pump Station Inlet Overflow 048b site was developed in accordance with the PCMP. The data quality objectives of the SAP were to collect data of sufficient quantity and quality in order to do the following:

- Measure the areal extent and spatial variations of sediment chemical concentrations in front of 10 King County CSO discharge points
- Evaluate these sediment chemical concentrations relative to the current marine sediment quality standards of Chapter 173-204 Washington Administrative Code (WAC)

- Provide data for populating, calibrating, and validating the near-field sediment recontamination model as part of the process to update King County's Sediment Management Plan
- Provide pre-construction, baseline, sediment quality data at four of the County's CSO facilities at which CSO control projects are currently underway

This sampling effort addresses the first two of the four objectives.

The PCMP requires site-specific SAP addendums to be developed for each CSO because CSOs discharge at varying volumes and depths and into varying flow regimes. Informed by preliminary sediment transport model projections, collection of six sediment samples at the North Beach Pump Station Inlet Overflow site was determined to be sufficient to provide data to meet the data quality objectives listed previously.

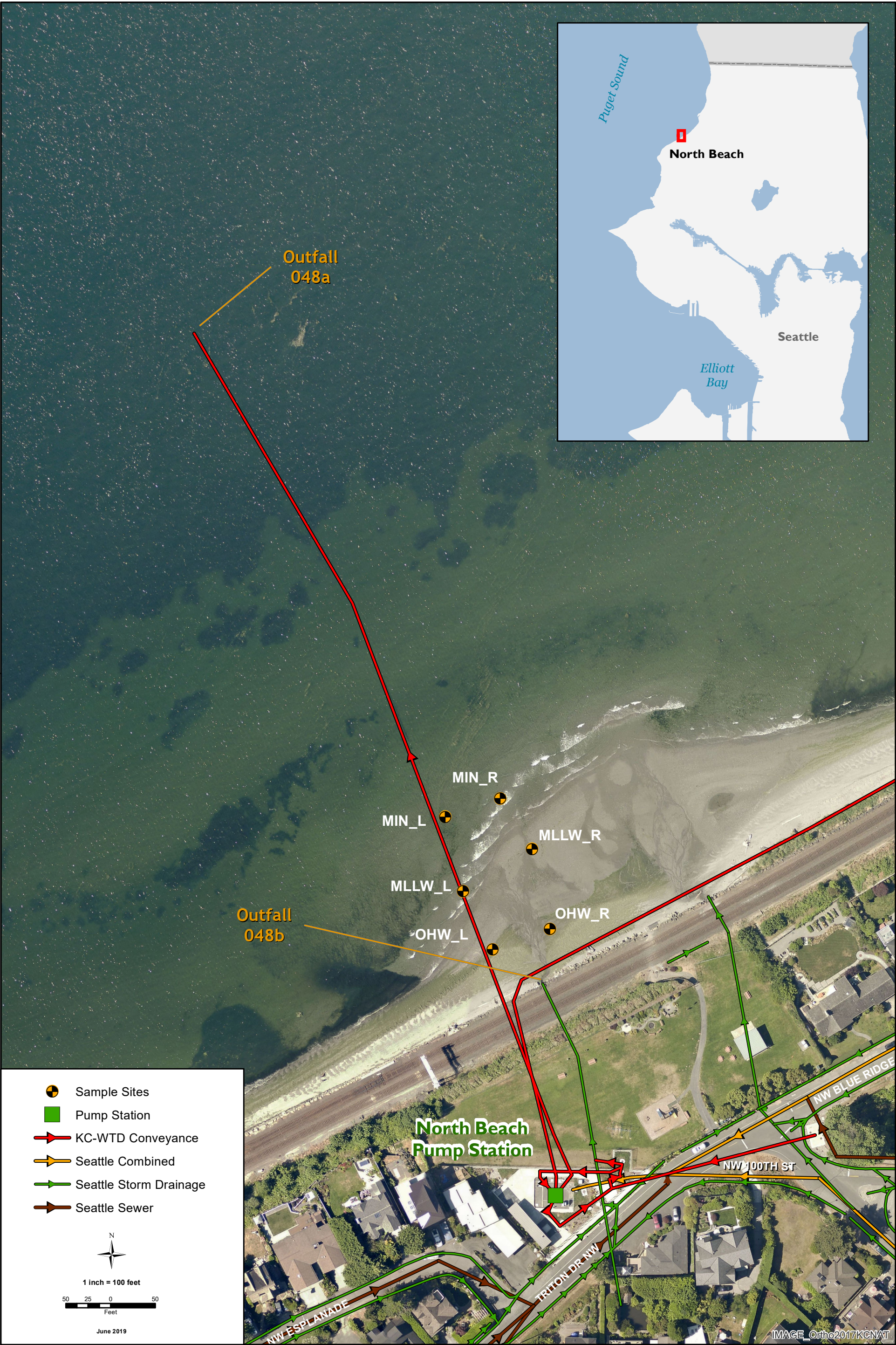
During development of the County's Sediment Management Plan Update, King County determined that the overflow at North Beach Pump Station Inlet Overflow 048b went to a second discharge location (King County, 2018). At the time, it was determined that the intertidal beach flow from this discharge was not appropriate for modeling the site conditions and that sampling would be required to characterize the sediment. Furthermore, the scaling analysis used in the PCMP to provide the optimal sampling station array was also not appropriate because it was designed for underwater discharges.

The discharge enters a small creek and storm drain basin that is released at the high-tide line of the beach, forming a classic alluvial fan (alluvial fans are deposited sediments built up as the stream channel moves across the fan surface over time). As a result, six sampling stations were spaced on a 60-foot grid along the axis of the alluvial fan from the ordinary high water mark to below mean lower low water to ensure sample collection within the deposition fan (see Figure 1 and Section 2 for station coordinates). The 60-foot spacing was slightly less than the spacing for the North Beach Pump Station Wet Well overflow in the PCMP (Appendix H of King County, 2012). Figure 1 and this rationale represent the site-specific SAP addendum, as no other changes to the programmatic SAP were needed.

## **1.2 Project Report and Associated Data Submittal**

This report includes a description of both the sampling and analytical methodologies and a summary of the sediment chemistry analytical results. Appendices to the report include an update to laboratory detection limits methods and the sediment chemistry analytical results, and quality assurance/quality control (QA/QC) results. All project data referenced in this report will be submitted electronically to Ecology's Environmental Information Management System database.





**King County**

Department of  
Natural Resources and Parks  
**Wastewater Treatment  
Division**

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Figure 1

**Sediment Sampling Locations  
for North Beach Pump Station  
Inlet Overflow 048b**



## 2.0 SAMPLE COLLECTION

On September 6, 2018, sediment samples were collected from six stations located near the North Beach Pump Station Inlet Overflow 048b (Figure 1). Sample collection followed the protocols outlined in the *CSO Sediment Quality Characterization Sampling and Analysis Plan* (King County, 2011) and the programmatic SAP, with two exceptions. Samples were collected on foot at low tide using stainless-steel spoons and bowls rather than being collected from a research vessel using a grab sampler. Coordinate data representing the actual sediment sampling points were obtained using an Android phone global positioning system (GPS) rather than differential GPS.

Coordinate data were recorded in latitude/longitude format for each site, along with the time and tide height. All but one sample was collected within  $\pm 3$  meters of the prescribed location coordinates. One sampling location, NB\_MLLW\_L, was shifted south outside of the creek bed within a  $\pm 6$ -meter radius of the prescribed sampling location. Table 1 presents the target and actual sampling station coordinates by station locator name.

**Table 1. Station coordinates by locator name for North Beach Pump Station Inlet Overflow 048b sediment sampling that occurred on September 6, 2018.**

Locator	Sample Name	Sample Coordinates (ft.)*			
		Target		Actual	
		X	Y	X	Y
NB_MIN_L	L70816-5	1256860	260176	1256861.5	260175.9
NB_MIN_R	L70816-6	1256920	260197	1256923.5	260196.9
NB_MLLW_L	L70816-3	1256880	260093	1256882.5	260093.4
NB_MLLW_R	L70816-4	1256960	260140	1256959.1	260140.4
NB_OHW_L	L70816-1	1256920	260028	1256915.2	260028.2
NB_OHW_R	L70816-2	1256980	260051	1256978.9	260051.3

\*State plane coordinates in North American Datum 1983 (NAD83) Washington State Plane North (4601)

All samples were collected from the top 10 centimeters of sediment. When sufficient sediment volume for all analyses was collected from a station, the sediment in the stainless-steel bowl was thoroughly homogenized. After homogenization, sediment aliquots were transferred to appropriate laboratory containers. Separate stainless-steel spoons and bowls were dedicated for each site, precluding the need for on-site decontamination of the sampling equipment.

Observations documented for the overall sampling event noted sampling occurred during a low tide that was ebbing, there was no precipitation, and no algal bloom was observed on the sediment surface at the time of sampling.

Sample jars were stored in ice-filled coolers from the time of collection until delivery to the King County Environmental Laboratory (KCEL) at the end of the sampling day. Samples were delivered under chain-of-custody and maintained as such throughout the analytical process. Samples for chemical analysis were stored frozen at  $-18^{\circ}\text{C}$  by KCEL until analysis; particle size distribution samples were stored at  $4^{\circ}\text{C}$ .

## 3.0 SAMPLE ANALYSIS

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Six marine sediment samples were submitted for analysis of conventional parameters, trace metals, and organic compounds in accordance with the programmatic SAP. The metals and organic compounds are those with Washington State marine sediment quality standards (WAC 173-204-320). Sediment chemistry analyses were performed following guidance recommended in the Puget Sound Protocols (PSEP 1986, 1997a, 1997b) and QA/QC practices were consistent with those outlined in Ecology's Sediment Cleanup User's Manual II (SCUM II) (Ecology, 2017). All analyses were performed by the KCEL.

Conventional parameter analyses included percent solids, particle-size distribution, and total organic carbon (TOC). Percent solids analysis was performed according to Standard Method 2540-G (APHA, 2011)—a gravimetric determination. Particle-size distribution analysis was performed according to American Society for Testing and Materials Method D422—a combination of sieve and hydrometer methodologies (ASTM, 2007). TOC analysis was performed following U.S. Environmental Protection Agency (EPA) SW-846 Method 9060—high-temperature combustion with infrared spectroscopy.

Metals analyses included arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc. Mercury was analyzed according to EPA SW-846 Method 7471B—cold vapor atomic absorption spectroscopy. The remaining metals were analyzed according to EPA SW-846 Methods 3050B/6010D—strong-acid digestion with inductively coupled plasma optical emission spectrometry.

Organics analyses included base/neutral/acid semi-volatile organic compounds (SVOCs) and polychlorinated biphenyls (PCBs) as Aroclors. SVOC analysis was performed according to EPA SW-846 Methods 3550B/8270D, which employed a mixture of 50:50 methylene chloride/acetone solvent extraction with sonication and analysis by gas chromatography/mass spectroscopy. PCB Aroclor analysis was performed according to EPA SW-846 Methods 3550B/8082A, which employed a mixture of 50:50 hexane/acetone solvent extraction with sonication and analysis by gas chromatography with electron capture detector and dual column confirmation.

## 4.0 DEVIATIONS FROM THE SAMPLING AND ANALYSIS PLAN

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There were some deviations from the programmatic SAP. The deviations, which are listed below, did not adversely affect the quality of the data.

### Field collection:

- Samples were not collected from a research vessel using a grab sampler, but rather were obtained on foot at low tide using stainless-steel spoons and bowls.
- One sampling location, NB\_MLLW\_L, was shifted south outside of the creek bed within a  $\pm 6$ -meter radius of the prescribed sampling location.
- Coordinate data representing the actual sediment sampling points were obtained using an Android phone GPS rather than a differential GPS instrument.

### Analytical methods:

- EPA SW-846 methods have replaced the method detection limit with a lower limit of quantitation (LLOQ). The analyses for TOC, metals, and organic compounds all use detection limits based on the LLOQ (see Appendix A for additional details).
- The method reference for total metals changed from 6010C to 6010D.
- Eight compounds in the SVOC analysis list were analyzed using a modification of EPA method 8270D called “selected ion monitoring” to achieve a lower detection limit. The compounds are as follows:
  - 2,4-Dimethylphenol
  - Benzoic acid
  - Benzyl alcohol
  - Dimethyl phthalate
  - Hexachlorobenzene
  - Hexachlorobutadiene
  - N-Nitrosodiphenylamine
  - Pentachlorophenol

## 5.0 SEDIMENT CHEMISTRY ANALYTICAL RESULTS

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This section presents analytical results for the 2018 North Beach Pump Station Inlet Overflow 048b sediment quality characterization. Appendix B presents a memorandum containing the complete sediment chemistry results and a summary of the analytical data quality, including laboratory QA/QC data.

Based on a review of the laboratory QA/QC data, no analytical results were rejected. A few SVOC results were qualified as estimated for the following reasons. All six benzyl alcohol results were qualified as estimated with potential low bias ("JG" flagged) because percent recovery and relative percent difference of this analyte were outside the lower and upper control limits in the matrix spike and matrix spike duplicate. All SVOC results detected below their respective LLOQs were flagged as estimated ("J" flagged). In addition, all silt and clay results were qualified as estimated because the relative standard deviation of laboratory triplicate samples was outside acceptable control limits. All qualifiers applied because of data quality issues are included in Table 2, as well as in the laboratory data report in Appendix B.

Samples were largely composed of sand and gravel and had low TOC (<0.5%).<sup>1</sup> Chromium, copper, and zinc were detected in all samples; lead was detected in four samples and cadmium in one sample. Benzoic acid and bis(2-ethylhexyl) phthalate were detected in most samples and nine polycyclic aromatic hydrocarbon (PAH) compounds were detected in one sample. Most of the remaining SVOCs and all PCB Aroclors were not detected above the LLOQ at any of the sample stations. Detections and concentrations of most chemicals were highest overall at Station NB\_OHW\_R, which is closer to the discharge point (Table 2). However, detected concentrations of copper, lead, zinc, and benzoic acid were more evenly distributed across all sample sites.

Chemical concentrations detected in the Inlet Overflow 048b surface sediment samples were compared to Washington State Sediment Management Standards sediment cleanup objective (SCO)<sup>2</sup> and cleanup screening level (CSL) criteria based on protection of benthic communities (WAC 173-204-562). Sediment data for non-ionic organic compounds are generally normalized to organic carbon content for comparison to benthic chemical criteria. However, normalization to organic carbon can produce biased results when the organic carbon content of the sample is very low (Ecology, 1992). Ecology's SCUM II, *Guidance for Implementing the Cleanup Provisions of the Sediment Management Standards* (Ecology, 2017), outlines the use of apparent effects thresholds (AETs) when a sample's TOC content is less than 0.5% dry weight. Therefore, due to the low TOC concentrations (below 0.5% dry weight) of the Inlet Overflow 048b surface sediment samples, the non-

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<sup>1</sup> See Appendix B for the particle size distribution data results.

<sup>2</sup> The benthic SCO is equivalent to the Washington State marine sediment quality standards (WAC 173-204-320).

ionic organic chemistry data were compared to the dry weight equivalents of the benthic SCOs and CSLs listed under the Marine Sediment AETs in Table 8-1 of SCUM II.

Table 2 presents a summary of the analytical results for the six samples and the applicable SCOs/CSLs; none of the sample concentrations exceeded the marine sediment standards. Therefore, sediments near the North Beach Pump Station Inlet Overflow 048b do not require any further actions under King County's Sediment Management Plan.



**Table 2. Summary of Sediment Chemistry Results and comparisons to SMS benthic criteria.**

Parameter	SMS Benthic <sup>1</sup>		Sampling Stations											
			NB_OHW_L		NB_OHW_R		NB_MLLW_L		NB_MLLW_R		NB_MIN_L		NB_MIN_R	
	SCO	CSL	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual
Total Organic Carbon (%)	n/a	n/a	<b>0.0490</b>		<0.0504		<b>0.0493</b>		<b>0.0503</b>		<b>0.0508</b>		<b>0.0505</b>	
<b>Metals (mg/Kg)</b>														
Arsenic	57	93	<2.62		<2.89		<2.89		<2.76		<3.08		<2.97	
Cadmium	5.1	6.7	<b>0.288</b>		<0.289		<0.289		<0.276		<0.308		<0.297	
Chromium	260	270	<b>17.9</b>		<b>30.3</b>		<b>14.4</b>		<b>12.7</b>		<b>13.6</b>		<b>11.7</b>	
Copper	390	390	<b>6.97</b>		<b>7.74</b>		<b>4.88</b>		<b>5.09</b>		<b>5.59</b>		<b>6.71</b>	
Lead	450	530	<b>3.15</b>		<b>4.62</b>		<2.89		<b>3.33</b>		<3.08		<b>3.09</b>	
Mercury	0.41	0.59	<0.0202		<0.0229		<0.0233		<0.0215		<0.0244		<0.0231	
Silver	6.1	6.1	<0.522		<0.579		<0.578		<0.551		<0.615		<0.592	
Zinc	410	960	<b>28.7</b>		<b>35.4</b>		<b>25.1</b>		<b>27.1</b>		<b>27.3</b>		<b>28</b>	
<b>Ionic Organic Compounds (µg/Kg)</b>														
2,4-Dimethylphenol	29	29	<6.98		<7.76		<7.74		<7.35		<8.22		<8.08	
Benzoic Acid	650	650	<b>83.8</b>	<b>J</b>	<b>83.6</b>	<b>J</b>	<b>133</b>	<b>J</b>	<b>85.9</b>	<b>J</b>	<b>123</b>	<b>J</b>	<b>133</b>	<b>J</b>
Benzyl Alcohol	57	73	<17.5	JG	<19.4	JG	<19.4	JG	<18.4	JG	<20.6	JG	<20.2	JG
2-Methylphenol	63	63	<17.5		<19.4		<19.4		<18.4		<20.6		<20.2	
3-,4-Methylphenol	670	670	<17.5		<19.4		<19.4		<18.4		<20.6		<20.2	
Phenol	420	1200	<17.5		<19.4		<19.4		<18.4		<20.6		<20.2	
<b>Non-ionic Organic Compounds (µg/Kg)<sup>2</sup></b>														
Dibenzofuran	540	540	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
N-Nitrosodiphenylamine	28	40	<6.98		<7.76		<7.74		<7.35		<8.22		<8.08	
Bis(2-Ethylhexyl)Phthalate	1300	1900	<b>44.1</b>		<b>106</b>		<b>49.3</b>		<b>32.9</b>		<b>34.5</b>		<8.08	
Benzyl Butyl Phthalate	63	900	<5.23		<5.82		<5.8		<5.51		<6.17		<6.05	
Diethyl Phthalate	200	>1200	<34.8		<38.8		<38.6		<36.7		<41.1		<b>24</b>	<b>J</b>
Dimethyl Phthalate	71	160	<17.5		<19.4		<19.4		<18.4		<b>42.4</b>		<20.2	
Di-N-Butyl Phthalate	1400	1400	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
Di-N-Octyl Phthalate	6200	6200	<6.98		<7.76		<7.74		<7.35		<8.22		<8.08	
Total PCB Aroclors <sup>3</sup>	130	1000	<2.62		<2.91		<2.9		<2.76		<3.08		<3.03	
Naphthalene	2100	2100	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
Acenaphthylene	1300	1300	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
Acenaphthene	500	500	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	

Parameter	SMS Benthic <sup>1</sup>		Sampling Stations											
			NB_OHW_L		NB_OHW_R		NB_MLLW_L		NB_MLLW_R		NB_MIN_L		NB_MIN_R	
	SCO	CSL	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual
Fluorene	540	540	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
Phenanthrene	1500	1500	<6.98		<b>7.8</b>		<7.74		<7.35		<8.22		<8.08	
Anthracene	960	960	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
2-Methylnaphthalene	670	670	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
Total LPAH <sup>4</sup>	5200	5200	<6.98		<b>7.8</b>		<7.74		<7.35		<8.22		<8.08	
Fluoranthene	1700	2500	<3.48		<b>13</b>		<3.86		<3.67		<4.11		<4.03	
Pyrene	2600	3300	<3.48		<b>10.8</b>		<3.86		<3.67		<4.11		<4.03	
Benzo(a)anthracene	1300	1600	<8.71		<9.7		<9.66		<9.18		<10.3		<10.1	
Chrysene	1400	2800	<3.48		<b>6.67</b>		<3.86		<3.67		<4.11		<4.03	
Benzo(b,j,k)fluoranthene	3200	3600	<3.48		<b>11.2</b>		<3.86		<3.67		<4.11		<4.03	
Benzo(a)pyrene	1600	1600	<3.48		<b>4.11</b>		<3.86		<3.67		<4.11		<4.03	
Indeno(1,2,3-cd)Pyrene	600	690	<3.48		<b>3</b>	<b>J</b>	<3.86		<3.67		<4.11		<4.03	
Dibenzo(a,h)anthracene	230	230	<6.98		<7.76		<7.74		<7.35		<8.22		<8.08	
Benzo(g,h,i)perylene	670	720	<3.48		<b>2.67</b>	<b>J</b>	<3.86		<3.67		<4.11		<4.03	
Total HPAH <sup>5</sup>	12000	17000	<8.71		<b>51.5</b>		<9.66		<9.18		<10.3		<10.1	
1,2,4-Trichlorobenzene	31	51	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
1,2-Dichlorobenzene	35	50	<3.48		<3.88		<3.86		<3.67		<4.11		<4.03	
1,4-Dichlorobenzene	110	110	<5.23		<5.82		<5.8		<5.51		<6.17		<6.05	
Hexachlorobenzene	22	70	<0.698		<0.776		<0.774		<0.735		<0.822		<0.808	
Hexachlorobutadiene	11	120	<1.75		<1.94		<1.94		<1.84		<2.06		<2.02	
Pentachlorophenol	360	690	<69.8		<77.6		<77.4		<73.5		<82.2		<80.8	

<sup>1</sup>Sediment Management Standards (SMS) Benthic Chemical Criteria (WAC 173-204-562); no chemicals exceeded these values.

<sup>2</sup>The benthic SCO and CSL for non-ionic organic compounds are the dry weight equivalent Marine Sediment Apparent Effects Threshold (AET) from Table 8-1 of SCUM II because the sample's total organic content was outside the recommended range of 0.5 to 3.5% for organic carbon normalization.

<sup>3</sup>Total PCB Aroclors value is based on the sum of detected PCB Aroclors; the highest Aroclor LLOQ is used when all Aroclors are not detected.

<sup>4</sup>Total low molecular weight polycyclic aromatic hydrocarbon (LPAH) value is based on the sum of detected following PAH compounds: 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene.

<sup>5</sup>Total high molecular weight polycyclic aromatic hydrocarbon (HPAH) value is based on the sum of detected following PAH compounds: benzo(a)anthracene, benzo(a)pyrene, benzo(g,h,i)perylene, total benzofluoranthenes, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3-cd)pyrene, and pyrene

#### Detected values in bold

< = sample not detected above lower limit of quantitation (LLOQ), value shown is LLOQ

SCO: Sediment Cleanup Objective

mg/kg = milligrams per kilogram

CSL: Cleanup Screening Level

µg/kg = micrograms per kilogram

Qual = qualifier

n/a = not applicable

J = estimated value

JG = estimated value with a potential low bias

## 6.0 REFERENCES

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PSEP. 1997b. Recommended Guidelines for Measuring Metals in Puget Sound Marine Water, Sediment and Tissue Samples. Prepared for the Puget Sound Estuary Program (U.S. Environmental Protection Agency Region 10) by the King County Environmental Laboratory. Seattle, Washington.

# **Appendix A**

## **Lower Limit of Quantification Description**

The terms, “method detection limit” (MDL) and “reporting detection limit” (RDL), were previously associated with analytical methods for total organic carbon (TOC), metals, and organic compounds in the programmatic Sediment Sampling and Analysis Plan (King County, 2011). The MDL is defined as the minimum concentration of a chemical constituent that can be detected, while the RDL is defined as the minimum concentration of a chemical constituent that can be reliably quantified.

U.S. Environmental Protection Agency (EPA) SW-846 methods have eliminated the concept of the MDL and have replaced it with a lower limit of quantitation (LLOQ). Details on how these quantitation limits are used to report SW-846 method analytical data by the King County Environmental Laboratory (KCEL) are described below.

The sensitivity of a particular analytical method is generally determined/defined by the reference method. The EPA reference methods used for this project belong mostly to the SW-846 compendium of analytical methods and require that sensitivity be defined as a single limit called the “lower limit of quantitation” or LLOQ. With the exception of Method 6010D (inductively coupled plasma [ICP] for metals), the LLOQ can be no lower than the lowest concentration on the calibration curve and must be verified according to the requirements in each reference method.

The LLOQ for ICP metals is verified for Method 6010D (ICP) with each run by analyzing a standard at the level of the LLOQ, which must recover within 80 to 120% of its true value (Appendix B). For trace metals (6010D, 7471B), TOC (9060C), and polychlorinated biphenyl methods (8082A), sample results may not be reported below the LLOQ and, therefore, the LLOQ value for each parameter is used as the MDL and RDL in the KCEL Laboratory Information Management System (LIMS).

Sample results for base/neutral/acid (BNA) semi-volatile organic compounds (Method 8270D) may be reported at concentrations below the LLOQ if the qualitative results for the parameter meet the requirements of the reference method. The LLOQs for BNA parameters will be reported in the LIMS RDL field, while the LIMS MDL column will be, at most, one-half of the LLOQ. The LIMS MDL may be lower than one-half of the LLOQ if the qualitative requirements of the method are fulfilled (defined as a low instrument standard that meets the qualitative requirements for the reference method). Therefore, the LIMS MDL values for BNA parameters represent the lowest qualitative instrument concentration for which a given compound can be identified.

Any BNA parameters reported below the LLOQ (LIMS RDL) will be flagged “<QL, J” because a result reported below the LLOQ (referred to as “QL” in LIMS) is an estimated value. For the tests based on non-SW-846 reference methods, sensitivity is defined as the MDL, which is calculated by the 40 CFR Part 136, Appendix B procedure. The value determined by this procedure may be increased to account for method variability, and will be reported in the LIMS MDL field. The LIMS RDL is calculated by multiplying the LIMS MDL by a factor between 2 and 10, depending on the parameter, and should be considered analogous to the practical quantitation limit.

## **Appendix B**

### **King County Environmental Laboratory Memorandum with Sample Results and Laboratory Quality Assurance/Quality Control Data**



## **King County**

Department of Natural Resources and Parks  
Water and Land Resources Division

### **Environmental Laboratory**

322 W. Ewing Street  
Seattle, WA 98119-1507  
206-684-2300 Fax 206-694-2395  
TTY Relay: 711

August 12, 2014

TO: Jeff Stern

FROM: Fritz Grothkopp

CC: Debra Williston

SUBJECT: Report for Project 423368-210-4, CSO Characterization  
North Beach Intertidal Sediments, Samples L70816-1- 6  
Collected September 6, 2018

Attached is the comprehensive report for the intertidal sediment samples delivered to the laboratory on September 6, 2018. The samples were analyzed in the Trace Metals, Conventional, and Trace Organics units of the laboratory. QA/QC data summaries are included for your information. Comprehensive report #17627 was prepared and sent via e-mail on November 26, 2018.

#### Sample Collection:

All the samples were collected within  $\pm 6$  meters of the prescribed location coordinates. One location, L70816-3, NB\_MLLW\_L, was moved out of a creek but still fell within the acceptable sampling window.

#### Conventional:

Samples were analyzed for Total Solids, Particle Size Distribution, and Total Organic Carbon. All preparations and analyses were performed within the accepted holding time for each method. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification with the following exceptions.

The RSD (Relative Standard Deviation) for the Silt and Clay portions of the Particle Size Distribution analysis were outside the acceptance limits at 87 and 42% respectively. The values have been flagged with an “\*” in the QC report. The results for the Silt and Clay portions of the QC sample, L70816-4, have been qualified with a “J” flag to indicate an estimated result. The method does not require reanalysis of the sample because these portions represent less than 10% of the overall sample mass.

#### Trace Metals:

Samples were analyzed for Total Mercury by CVAA and Total Metals by ICP. All preparations and analyses were performed within the accepted holding time for each method. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification with the following exception.



Standard Reference Material PACS3 (WG160102-7) was outside the acceptance limits of 80-120% for Cadmium (Cd) at 126% and Chromium (Cr) at 50%. Two LCS of known concentration (ERA Soil) were digested along with the samples to show that there were no systematic precision problems with the method. The recovery of both LCS were within lab control limits for all reported elements. All elements reported for PACS3 that are outside the 80-120% limits are qualified with an "\*" on the QC Report. The certified values published for PACS3 were developed by different methods than the methods used by KCEL to analyze these samples. Insufficient data exists to control chart the applicable data to develop more appropriate control limits.

#### Trace Organics:

Samples were analyzed for Polychlorinated Biphenyls and Semi Volatile Organic compounds. All preparations and analyses were performed within the accepted holding time for each method. The data have passed all internal QA/QC checks for accuracy and completeness and may be used without qualification with the following exceptions.

The surrogates listed in the table below were outside the upper control limit in the indicated samples for Semi Volatile Organic analysis (WG160709). The values have been flagged with an "\*" in the QC report. All other surrogate results were within control limits. Data was not qualified as more than one surrogate must be outside control limits for results to be flagged.

Surrogate:	2,4,6-Tri bromo phenol	2-Fluoro phenol	d5-Nitro benzene	d5-Phenol
(Lab Limits)	45--150	20--136	22--126	20--142
L70816-6	172 *	80	99	85
WG160709-7	170 *	70	77	69

The recovery of Benzyl Alcohol and Benzoic Acid were outside the lower control limit in the spike blank associated with Semi Volatile Organic – SIM analysis (WG160710). The results have been flagged with an "\*" in the QC report.

The recovery and RPD (Relative Percent Difference) of Benzyl Alcohol were outside the lower and upper control limits in the matrix spike and matrix spike duplicate associated with Semi Volatile Organic – SIM analysis (WG160710). The results have been flagged with an "\*" in the QC report. The sample results have been qualified with a "JG" flag to indicate possible low bias.

Sample results for Benzoic Acid were qualified with a "<QL,J" to indicate that the detected value was below the QL value but above ½ of the QL value and should be treated as an estimate.

The surrogates listed in the table below were outside the upper control limit in the indicated QC samples for Semi Volatile Organic - SIM analysis (WG160710). The values have been flagged with an "\*" in the QC report. All other surrogate results were within control limits.

Surrogate:	2-Fluoro biphenyl	d14-Ter phenyl	d4-2-Chloro phenol
(Lab Limits)	30--150	30--150	30--150
WG160710-1	27 *	49	25 *
WG160710-2	92	156 *	71
WG160710-3	90	152 *	80

If you have any questions or need additional information, please call me at 684-2327.

# King County Environmental Lab Analytical Report

Project: 423368-210-1  
 Locator: NB\_OHW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-1  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:02  
 TotalSolid: 95.6  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_OHW\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-2  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:25  
 TotalSolid: 85.9  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MLLW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-3  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 8:51  
 TotalSolid: 86.2  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units
<b>CV ASTM D422</b>					
Fines*	2.1		0.5	1	%
Gravel*	23.3		0.1	1	%
Sand*	75.5		0.1	1	%
Silt*	0.5	<RDL,J	0.5	1	%
Clay*	1.6	J	0.5	1	%
p+0.00*	18.4		0.1	1	%
p+1.00*	25.6		0.1	1	%
p+10.0(equal/more than)*	1.6		0.5	1	%
p+2.00*	25.7		0.1	1	%
p+3.00*	5.8		0.1	1	%
p+4.00*	0.1	<RDL	0.1	1	%
p+5.00*		<MDL	0.5	1	%
p+6.00*		<MDL	0.5	1	%
p+7.00*		<MDL	0.5	1	%
p+8.00*	0.5	<RDL	0.5	1	%
p+9.00*		<MDL	0.5	1	%
p-1.00*	14.7		0.1	1	%
p-2.00(less than)*	5.9		0.1	1	%
p-2.00*	2.7		0.1	1	%
<b>CV SM2540-G</b>					
Total Solids*	95.6		0.005	0.01	%
<b>CV SW846 9060 PSEP96</b>					
Total Organic Carbon	490		486	486	mg/Kg
<b>ES NONE</b>					
Field Personnel*	CB, AG				none
Sampcoordx1*	1256915.2				ft
Sampcoordy1*	260028.2				ft
Sampling Method*	25010				none
Sediment Sampling Depth*	11				cm
Sediment Sampling Range*	10	TA			cm
Sediment Type*	34N31				none
Tidal Condition*	F				none
Tide Height*	-0.8				ft
<b>MT SW846 3050B*SW846 6010D</b>					
Arsenic, Total, ICP		<QL	2.62	2.62	mg/Kg
Cadmium, Total, ICP	0.288		0.262	0.262	mg/Kg
Chromium, Total, ICP	17.9		0.262	0.262	mg/Kg
Copper, Total, ICP	6.97		0.522	0.522	mg/Kg
Lead, Total, ICP	3.15		2.62	2.62	mg/Kg
Silver, Total, ICP		<QL	0.522	0.522	mg/Kg
Zinc, Total, ICP	28.7		0.262	0.262	mg/Kg
<b>MT SW846 7471B</b>					
Mercury, Total, CVAA		<QL	0.0202	0.0202	mg/Kg

Value	Qual	MDL	RDL	Units
2.3		0.6	1.1	%
45.9		0.1	1.1	%
55.9		0.1	1.1	%
0.6	<RDL,J	0.6	1.1	%
1.7	J	0.6	1.1	%
8.8		0.1	1.1	%
20.6		0.1	1.1	%
1.7		0.6	1.1	%
24.6		0.1	1.1	%
1.9		0.1	1.1	%
	<MDL	0.1	1.1	%
0.6	<RDL	0.6	1.1	%
	<MDL	0.6	1.1	%
	<MDL	0.6	1.1	%
	<MDL	0.6	1.1	%
	<MDL	0.6	1.1	%
	<MDL	0.6	1.1	%
7.7		0.1	1.1	%
35.2		0.1	1.1	%
2.9		0.1	1.1	%
	<QL	504	504	mg/Kg
CB, AG				none
1256978.9				ft
260051.3				ft
25010				none
11				cm
10	TA			cm
34S31				none
F				none
-0.5				ft
	<QL	2.89	2.89	mg/Kg
	<QL	0.289	0.289	mg/Kg
30.3		0.289	0.289	mg/Kg
7.74		0.579	0.579	mg/Kg
4.62		2.89	2.89	mg/Kg
	<QL	0.579	0.579	mg/Kg
35.4		0.289	0.289	mg/Kg
	<QL	0.0229	0.0229	mg/Kg

Value	Qual	MDL	RDL	Units
2.4		0.6	1.2	%
35.6		0.1	1.2	%
65.4		0.1	1.2	%
1.2	RDL,J	0.6	1.2	%
1.2	RDL,J	0.6	1.2	%
9.6		0.1	1.2	%
24		0.1	1.2	%
1.2	RDL	0.6	1.2	%
28.1		0.1	1.2	%
3.6		0.1	1.2	%
	<MDL	0.1	1.2	%
	<MDL	0.6	1.2	%
0.6	<RDL	0.6	1.2	%
	<MDL	0.6	1.2	%
0.6	<RDL	0.6	1.2	%
	<MDL	0.6	1.2	%
8.6		0.1	1.2	%
24.9		0.1	1.2	%
2		0.1	1.2	%
CB, AG				none
1256882.5				ft
260093.4				ft
25010				none
11				cm
10	TA			cm
34S31				none
F				none
-1				ft
	<QL	2.89	2.89	mg/Kg
	<QL	0.289	0.289	mg/Kg
14.4		0.289	0.289	mg/Kg
4.88		0.578	0.578	mg/Kg
	<QL	2.89	2.89	mg/Kg
	<QL	0.578	0.578	mg/Kg
25.1		0.289	0.289	mg/Kg
	<QL	0.0233	0.0233	mg/Kg

# King County Environmental Lab Analytical Report

Project: 423368-210-1  
 Locator: NB\_OHW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-1  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:02  
 TotalSolid: 95.6  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_OHW\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-2  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:25  
 TotalSolid: 85.9  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MLLW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-3  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 8:51  
 TotalSolid: 86.2  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units
<b>OR 8270D-SIM</b>					
2,4-Dimethylphenol		<QL	3.48	6.98	ug/Kg
Benzoic Acid	83.8	<QL,J	69.8	175	ug/Kg
Benzyl Alcohol		<QL,JG	6.98	17.5	ug/Kg
Dimethyl Phthalate		<QL	6.98	17.5	ug/Kg
Hexachlorobenzene		<QL	0.348	0.698	ug/Kg
Hexachlorobutadiene		<QL	0.698	1.75	ug/Kg
N-Nitrosodiphenylamine		<QL	3.48	6.98	ug/Kg
Pentachlorophenol		<QL	34.8	69.8	ug/Kg
<b>OR SW846 3550B*SW846 8082A</b>					
Aroclor 1016		<QL	0.871	0.871	ug/Kg
Aroclor 1221		<QL	2.62	2.62	ug/Kg
Aroclor 1232		<QL	2.62	2.62	ug/Kg
Aroclor 1242		<QL	0.871	0.871	ug/Kg
Aroclor 1248		<QL	0.871	0.871	ug/Kg
Aroclor 1254		<QL	0.871	0.871	ug/Kg
Aroclor 1260		<QL	0.871	0.871	ug/Kg
Total Aroclors		<QL	2.62	2.62	ug/Kg
<b>OR SW846 3550B*SW846 8270D</b>					
1,2,4-Trichlorobenzene		<QL	1.75	3.48	ug/Kg
1,2-Dichlorobenzene		<QL	1.75	3.48	ug/Kg
1,4-Dichlorobenzene		<QL	1.75	5.23	ug/Kg
1-Methylnaphthalene		<QL	1.75	3.48	ug/Kg
2-Methylnaphthalene		<QL	1.75	3.48	ug/Kg
2-Methylphenol		<QL	8.71	17.5	ug/Kg
3,4-Methylphenol		<QL	8.71	17.5	ug/Kg
Acenaphthene		<QL	1.75	3.48	ug/Kg
Acenaphthylene		<QL	1.75	3.48	ug/Kg
Anthracene		<QL	1.75	3.48	ug/Kg
Benzo(a)anthracene		<QL	3.48	8.71	ug/Kg
Benzo(a)pyrene		<QL	1.75	3.48	ug/Kg
Benzo(b,j,k)fluoranthene		<QL	1.75	3.48	ug/Kg
Benzo(g,h,i)perylene		<QL	1.75	3.48	ug/Kg
Benzyl Butyl Phthalate		<QL	1.75	5.23	ug/Kg
Bis(2-Ethylhexyl)Phthalate	44.1		1.75	6.98	ug/Kg
Carbazole		<QL	1.75	3.48	ug/Kg
Chrysene		<QL	1.75	3.48	ug/Kg
Dibenzo(a,h)anthracene		<QL	3.48	6.98	ug/Kg
Dibenzofuran		<QL	1.75	3.48	ug/Kg
Diethyl Phthalate		<QL	17.5	34.8	ug/Kg
Di-N-Butyl Phthalate		<QL	1.75	3.48	ug/Kg
Di-N-Octyl Phthalate		<QL	1.75	6.98	ug/Kg
Fluoranthene		<QL	1.75	3.48	ug/Kg
Fluorene		<QL	1.75	3.48	ug/Kg

Value	Qual	MDL	RDL	Units
	<QL	3.88	7.76	ug/Kg
83.6	<QL,J	77.6	194	ug/Kg
	<QL,JG	7.76	19.4	ug/Kg
	<QL	7.76	19.4	ug/Kg
	<QL	0.388	0.776	ug/Kg
	<QL	0.776	1.94	ug/Kg
	<QL	3.88	7.76	ug/Kg
	<QL	38.8	77.6	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	2.91	2.91	ug/Kg
	<QL	2.91	2.91	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	0.97	0.97	ug/Kg
	<QL	2.91	2.91	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	5.82	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	9.7	19.4	ug/Kg
	<QL	9.7	19.4	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	3.88	9.7	ug/Kg
4.11		1.94	3.88	ug/Kg
11.2		1.94	3.88	ug/Kg
2.67	<QL,J	1.94	3.88	ug/Kg
	<QL	1.94	5.82	ug/Kg
106		1.94	7.76	ug/Kg
	<QL	1.94	3.88	ug/Kg
6.67		1.94	3.88	ug/Kg
	<QL	3.88	7.76	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	19.4	38.8	ug/Kg
	<QL	1.94	3.88	ug/Kg
	<QL	1.94	7.76	ug/Kg
13		1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg

Value	Qual	MDL	RDL	Units
	<QL	3.86	7.74	ug/Kg
133	<QL,J	77.4	194	ug/Kg
	<QL,JG	7.74	19.4	ug/Kg
	<QL	7.74	19.4	ug/Kg
	<QL	0.386	0.774	ug/Kg
	<QL	0.774	1.94	ug/Kg
	<QL	3.86	7.74	ug/Kg
	<QL	38.6	77.4	ug/Kg
	<QL	0.966	0.966	ug/Kg
	<QL	2.9	2.9	ug/Kg
	<QL	2.9	2.9	ug/Kg
	<QL	0.966	0.966	ug/Kg
	<QL	0.966	0.966	ug/Kg
	<QL	0.966	0.966	ug/Kg
	<QL	0.966	0.966	ug/Kg
	<QL	2.9	2.9	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	5.8	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	9.66	19.4	ug/Kg
	<QL	9.66	19.4	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	3.86	9.66	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	5.8	ug/Kg
49.3		1.94	7.74	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	3.86	7.74	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	7.74	ug/Kg
	<QL	1.94	3.86	ug/Kg
	<QL	1.94	3.86	ug/Kg

## King County Environmental Lab Analytical Report

Project: 423368-210-1  
 Locator: NB\_OHW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-1  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:02  
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Project: 423368-210-1  
 Locator: NB\_OHW\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-2  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:25  
 TotalSolid: 85.9  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MLLW\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-3  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 8:51  
 TotalSolid: 86.2  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units
Indeno(1,2,3-Cd)Pyrene	<QL		1.75	3.48	ug/Kg
Naphthalene	<QL		1.75	3.48	ug/Kg
Phenanthrene	<QL		3.48	6.98	ug/Kg
Phenol	<QL		8.71	17.5	ug/Kg
Pyrene	<QL		1.75	3.48	ug/Kg

\* Not converted to dry weight basis

Value	Qual	MDL	RDL	Units
3	<QL,J	1.94	3.88	ug/Kg
	<QL	1.94	3.88	ug/Kg
7.8		3.88	7.76	ug/Kg
	<QL	9.7	19.4	ug/Kg
10.8		1.94	3.88	ug/Kg

Value	Qual	MDL	RDL	Units
<QL		1.94	3.86	ug/Kg
<QL		1.94	3.86	ug/Kg
<QL		3.86	7.74	ug/Kg
<QL		9.66	19.4	ug/Kg
<QL		1.94	3.86	ug/Kg

# King County Environmental Lab Analytical Report

Project: 423368-210-1  
 Locator: NB\_MLLW\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-4  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:17  
 TotalSolid: 90.7  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MIN\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-5  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 8:35  
 TotalSolid: 81.1  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MIN\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-6  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:10  
 TotalSolid: 82.6  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units
<b>CV ASTM D422</b>					
Fines*	2.2		0.6	1.1	%
Gravel*	19.7		0.1	1.1	%
Sand*	79.3		0.1	1.1	%
Silt*		<MDL,J	0.6	1.1	%
Clay*	2.2	J	0.6	1.1	%
p+0.00*	8.8		0.1	1.1	%
p+1.00*	24.6		0.1	1.1	%
p+10.0(equal/more than)*	1.7		0.6	1.1	%
p+2.00*	39.9		0.1	1.1	%
p+3.00*	5.8		0.1	1.1	%
p+4.00*	0.2	<RDL	0.1	1.1	%
p+5.00*		<MDL	0.6	1.1	%
p+6.00*		<MDL	0.6	1.1	%
p+7.00*		<MDL	0.6	1.1	%
p+8.00*		<MDL	0.6	1.1	%
p+9.00*	0.6	<RDL	0.6	1.1	%
p-1.00*	6.4		0.1	1.1	%
p-2.00(less than)*	11.4		0.1	1.1	%
p-2.00*	1.9		0.1	1.1	%
<b>CV SM2540-G</b>					
Total Solids*	90.7		0.005	0.01	%
<b>CV SW846 9060 PSEP96</b>					
Total Organic Carbon	503		503	503	mg/Kg
<b>ES NONE</b>					
Field Personnel*	CB, AG				none
Sampcoordx1*	1256959.1				ft
Sampcoordy1*	260140.4				ft
Sampling Method*	25010				none
Sediment Sampling Depth*	11				cm
Sediment Sampling Range*	10	TA			cm
Sediment Type*	34N41				none
Tidal Condition*	F				none
Tide Height*	-0.6				ft
<b>MT SW846 3050B*SW846 6010D</b>					
Arsenic, Total, ICP		<QL	2.76	2.76	mg/Kg
Cadmium, Total, ICP		<QL	0.276	0.276	mg/Kg
Chromium, Total, ICP	12.7		0.276	0.276	mg/Kg
Copper, Total, ICP	5.09		0.551	0.551	mg/Kg
Lead, Total, ICP	3.33		2.76	2.76	mg/Kg
Silver, Total, ICP		<QL	0.551	0.551	mg/Kg
Zinc, Total, ICP	27.1		0.276	0.276	mg/Kg
<b>MT SW846 7471B</b>					
Mercury, Total, CVAA		<QL	0.0215	0.0215	mg/Kg

Value	Qual	MDL	RDL	Units
1.2	RDL	0.6	1.2	%
31.8		0.1	1.2	%
67.2		0.1	1.2	%
0.6	<RDL,J	0.6	1.2	%
0.6	<RDL,J	0.6	1.2	%
10.5		0.1	1.2	%
22.4		0.1	1.2	%
0.6	<RDL	0.6	1.2	%
29.4		0.1	1.2	%
4.7		0.1	1.2	%
0.2	<RDL	0.1	1.2	%
	<MDL	0.6	1.2	%
	<MDL	0.6	1.2	%
	<MDL	0.6	1.2	%
0.6	<RDL	0.6	1.2	%
	<MDL	0.6	1.2	%
12.7		0.1	1.2	%
15.6		0.1	1.2	%
3.4		0.1	1.2	%
81.1		0.005	0.01	%
508		507	507	mg/Kg
CB, AG				none
1256861.5				ft
260175.9				ft
25010				none
11				cm
10	TA			cm
34S41				none
F				none
-1				ft
<QL		3.08	3.08	mg/Kg
<QL		0.308	0.308	mg/Kg
13.6		0.308	0.308	mg/Kg
5.59		0.615	0.615	mg/Kg
	<QL	3.08	3.08	mg/Kg
	<QL	0.615	0.615	mg/Kg
27.3		0.308	0.308	mg/Kg
<QL		0.0244	0.0244	mg/Kg

Value	Qual	MDL	RDL	Units
3		0.6	1.2	%
17.4		0.1	1.2	%
80.7		0.1	1.2	%
0.6	<RDL,J	0.6	1.2	%
2.4	J	0.6	1.2	%
12.7		0.1	1.2	%
25.2		0.1	1.2	%
2.4		0.6	1.2	%
36.5		0.1	1.2	%
5.8		0.1	1.2	%
0.5	<RDL	0.1	1.2	%
	<MDL	0.6	1.2	%
	<MDL	0.6	1.2	%
	<MDL	0.6	1.2	%
0.6	<RDL	0.6	1.2	%
	<MDL	0.6	1.2	%
10.1		0.1	1.2	%
5.9		0.1	1.2	%
1.4		0.1	1.2	%
82.6		0.005	0.01	%
505		504	504	mg/Kg
CB, AG				none
1256923.5				ft
260196.9				ft
25010				none
11				cm
10	TA			cm
34S41				none
F				none
-0.8				ft
<QL		2.97	2.97	mg/Kg
<QL		0.297	0.297	mg/Kg
11.7		0.297	0.297	mg/Kg
6.71		0.592	0.592	mg/Kg
3.09		2.97	2.97	mg/Kg
	<QL	0.592	0.592	mg/Kg
28		0.297	0.297	mg/Kg
<QL		0.0231	0.0231	mg/Kg

# King County Environmental Lab Analytical Report

Project: 423368-210-1  
Locator: NB\_MLLW\_R  
Descrip: NORTH BEACH CSO BE  
Sample: L70816-4  
Matrix: SF SALTWTRSED  
ColDate: 9/6/18 9:17  
TotalSolid: 90.7  
**DRY Weight Basis**

Project: 423368-210-1  
Locator: NB\_MIN\_L  
Descrip: NORTH BEACH CSO BE  
Sample: L70816-5  
Matrix: SF SALTWTRSED  
ColDate: 9/6/18 8:35  
TotalSolid: 81.1  
**DRY Weight Basis**

Project: 423368-210-1  
Locator: NB\_MIN\_R  
Descrip: NORTH BEACH CSO BE  
Sample: L70816-6  
Matrix: SF SALTWTRSED  
ColDate: 9/6/18 9:10  
TotalSolid: 82.6  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units	Value	Qual	MDL	RDL	Units
OR 8270D-SIM															
2,4-Dimethylphenol		<QL	3.67	7.35	ug/Kg		<QL	4.11	8.22	ug/Kg		<QL	4.03	8.08	ug/Kg
Benzoic Acid	85.9	<QL,J	73.5	184	ug/Kg	123	<QL,J	82.2	206	ug/Kg	133	<QL,J	80.8	202	ug/Kg
Benzyl Alcohol		<QL,JG	7.35	18.4	ug/Kg		<QL,JG	8.22	20.6	ug/Kg		<QL,JG	8.08	20.2	ug/Kg
Dimethyl Phthalate		<QL	7.35	18.4	ug/Kg	42.4		8.22	20.6	ug/Kg		<QL	8.08	20.2	ug/Kg
Hexachlorobenzene		<QL	0.367	0.735	ug/Kg		<QL	0.411	0.822	ug/Kg		<QL	0.403	0.808	ug/Kg
Hexachlorobutadiene		<QL	0.735	1.84	ug/Kg		<QL	0.822	2.06	ug/Kg		<QL	0.808	2.02	ug/Kg
N-Nitrosodiphenylamine		<QL	3.67	7.35	ug/Kg		<QL	4.11	8.22	ug/Kg		<QL	4.03	8.08	ug/Kg
Pentachlorophenol		<QL	36.7	73.5	ug/Kg		<QL	41.1	82.2	ug/Kg		<QL	40.3	80.8	ug/Kg
OR SW846 3550B*SW846 8082A															
Aroclor 1016		<QL	0.918	0.918	ug/Kg		<QL	1.03	1.03	ug/Kg		<QL	1.01	1.01	ug/Kg
Aroclor 1221		<QL	2.76	2.76	ug/Kg		<QL	3.08	3.08	ug/Kg		<QL	3.03	3.03	ug/Kg
Aroclor 1232		<QL	2.76	2.76	ug/Kg		<QL	3.08	3.08	ug/Kg		<QL	3.03	3.03	ug/Kg
Aroclor 1242		<QL	0.918	0.918	ug/Kg		<QL	1.03	1.03	ug/Kg		<QL	1.01	1.01	ug/Kg
Aroclor 1248		<QL	0.918	0.918	ug/Kg		<QL	1.03	1.03	ug/Kg		<QL	1.01	1.01	ug/Kg
Aroclor 1254		<QL	0.918	0.918	ug/Kg		<QL	1.03	1.03	ug/Kg		<QL	1.01	1.01	ug/Kg
Aroclor 1260		<QL	0.918	0.918	ug/Kg		<QL	1.03	1.03	ug/Kg		<QL	1.01	1.01	ug/Kg
Total Aroclors		<QL	2.76	2.76	ug/Kg		<QL	3.08	3.08	ug/Kg		<QL	3.03	3.03	ug/Kg
OR SW846 3550B*SW846 8270D															
1,2,4-Trichlorobenzene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
1,2-Dichlorobenzene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
1,4-Dichlorobenzene		<QL	1.84	5.51	ug/Kg		<QL	2.06	6.17	ug/Kg		<QL	2.02	6.05	ug/Kg
1-Methylnaphthalene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
2-Methylnaphthalene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
2-Methylphenol		<QL	9.18	18.4	ug/Kg		<QL	10.3	20.6	ug/Kg		<QL	10.1	20.2	ug/Kg
3- 4-Methylphenol		<QL	9.18	18.4	ug/Kg		<QL	10.3	20.6	ug/Kg		<QL	10.1	20.2	ug/Kg
Acenaphthene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Acenaphthylene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Anthracene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Benzo(a)anthracene		<QL	3.67	9.18	ug/Kg		<QL	4.11	10.3	ug/Kg		<QL	4.03	10.1	ug/Kg
Benzo(a)pyrene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Benzo(b,j,k)fluoranthene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Benzo(g,h,i)perylene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Benzyl Butyl Phthalate		<QL	1.84	5.51	ug/Kg		<QL	2.06	6.17	ug/Kg		<QL	2.02	6.05	ug/Kg
Bis(2-Ethylhexyl)Phthalate	32.9		1.84	7.35	ug/Kg	34.5		2.06	8.22	ug/Kg		<QL	2.02	8.08	ug/Kg
Carbazole		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Chrysene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Dibenzo(a,h)anthracene		<QL	3.67	7.35	ug/Kg		<QL	4.11	8.22	ug/Kg		<QL	4.03	8.08	ug/Kg
Dibenzofuran		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Diethyl Phthalate		<QL	18.4	36.7	ug/Kg		<QL	20.6	41.1	ug/Kg	24	<QL,J	20.2	40.3	ug/Kg
Di-N-Butyl Phthalate		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Di-N-Octyl Phthalate		<QL	1.84	7.35	ug/Kg		<QL	2.06	8.22	ug/Kg		<QL	2.02	8.08	ug/Kg
Fluoranthene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg
Fluorene		<QL	1.84	3.67	ug/Kg		<QL	2.06	4.11	ug/Kg		<QL	2.02	4.03	ug/Kg

## King County Environmental Lab Analytical Report

Project: 423368-210-1  
 Locator: NB\_MLLW\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-4  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:17  
 TotalSolid: 90.7  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MIN\_L  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-5  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 8:35  
 TotalSolid: 81.1  
**DRY Weight Basis**

Project: 423368-210-1  
 Locator: NB\_MIN\_R  
 Descrip: NORTH BEACH CSO BE  
 Sample: L70816-6  
 Matrix: SF SALTWTRSED  
 ColDate: 9/6/18 9:10  
 TotalSolid: 82.6  
**DRY Weight Basis**

Parameters	Value	Qual	MDL	RDL	Units
Indeno(1,2,3-Cd)Pyrene	<QL		1.84	3.67	ug/Kg
Naphthalene	<QL		1.84	3.67	ug/Kg
Phenanthrene	<QL		3.67	7.35	ug/Kg
Phenol	<QL		9.18	18.4	ug/Kg
Pyrene	<QL		1.84	3.67	ug/Kg

\* Not converted to dry weight basis

Value	Qual	MDL	RDL	Units
<QL		2.06	4.11	ug/Kg
<QL		2.06	4.11	ug/Kg
<QL		4.11	8.22	ug/Kg
<QL		10.3	20.6	ug/Kg
<QL		2.06	4.11	ug/Kg

Value	Qual	MDL	RDL	Units
<QL		2.02	4.03	ug/Kg
<QL		2.02	4.03	ug/Kg
<QL		4.03	8.08	ug/Kg
<QL		10.1	20.2	ug/Kg
<QL		2.02	4.03	ug/Kg

# King County Environmental Lab Analytical MATRIX Report

Owner: SEEDPAK  
 Matrix Class: SOLID/TISSUE  
 User select: DRY Weight Basis

LOCATOR	PROJECT	SAMPLE	COLLECTED	*Sampcoordx1 ft	*Sampcoordy1 ft	*Sampling Method none	*Sediment Sampling Depth cm	*Sediment Sampling Range cm	*Tide Height ft	*Fines %	*Gravel %	*Sand %	*Silt %	*Clay %	*p+0.00 %	*p+1.00 %	*p+10.0(equal/more than) %	*p+2.00 %	*p+3.00 %	*p+4.00 %	*p+5.00 %	*p+6.00 %	*p+7.00 %
NB_OHW_L	423368-210-1	L70816-1	9/6/2018 9:02	1256915.2	260028.2	25010	11	10	-0.8	2.1	23.3	75.5	0.5	1.6	18.4	25.6	1.6	25.7	5.8	0.1	<MDL	<MDL	<MDL
NB_OHW_R	423368-210-1	L70816-2	9/6/2018 9:25	1256978.9	260051.3	25010	11	10	-0.5	2.3	45.9	55.9	0.6	1.7	8.8	20.6	1.7	24.6	1.9	<MDL	0.6	<MDL	<MDL
NB_MLLW_L	423368-210-1	L70816-3	9/6/2018 8:51	1256882.5	260093.4	25010	11	10	-1	2.4	35.6	65.4	1.2	1.2	9.6	24	1.2	28.1	3.6	<MDL	<MDL	0.6	<MDL
NB_MLLW_R	423368-210-1	L70816-4	9/6/2018 9:17	1256959.1	260140.4	25010	11	10	-0.6	2.2	19.7	79.3		2.2	8.8	24.6	1.7	39.9	5.8	0.2	<MDL	<MDL	<MDL
NB_MIN_L	423368-210-1	L70816-5	9/6/2018 8:35	1256861.5	260175.9	25010	11	10	-1	1.2	31.8	67.2	0.6	0.6	10.5	22.4	0.6	29.4	4.7	0.2	<MDL	<MDL	<MDL
NB_MIN_R	423368-210-1	L70816-6	9/6/2018 9:10	1256923.5	260196.9	25010	11	10	-0.8	3	17.4	80.7	0.6	2.4	12.7	25.2	2.4	36.5	5.8	0.5	<MDL	<MDL	<MDL
* Not converted to dry weight basis																							
If a parameter/analyte appears twice in the column header, it implies that they were analyzed by two different method codes																							



# King County Environmental Lab Analytical MATRIX Report

Owner: SEEDPAK  
 Matrix Class: SOLID/TISSUE  
 User select: DRY Weight Basis

LOCATOR	PROJECT	SAMPLE	COLLECTED	*p+8.00	*p+9.00	*p-1.00	*p-2.00	*p-2.00(less than)	*Total Solids	Total Organic Carbon	Chromium, Total, ICP	Copper, Total, ICP	Lead, Total, ICP	Zinc, Total, ICP	Benzoic Acid	Dimethyl Phthalate	Benzo(a)pyrene	Benzo(b,j,k)fluoranthene	Benzo(g,h,i)perylene	Bis(2-Ethylhexyl)Phthalate	Chrysene
NB_OHW_L	423368-210-1	L70816-1	9/6/2018 9:02	0.5	<MDL	14.7	2.7	5.9	95.6	490	17.9	6.97	3.15	28.7	83.8	<QL	<QL	<QL	<QL	44.1	<QL
NB_OHW_R	423368-210-1	L70816-2	9/6/2018 9:25	<MDL	<MDL	7.7	2.9	35.2	85.9	<QL	30.3	7.74	4.62	35.4	83.6	<QL	4.11	11.2	2.67	106	6.67
NB_MLLW_L	423368-210-1	L70816-3	9/6/2018 8:51	0.6	<MDL	8.6	2	24.9	86.2	493	14.4	4.88	<QL	25.1	133	<QL	<QL	<QL	<QL	49.3	<QL
NB_MLLW_R	423368-210-1	L70816-4	9/6/2018 9:17	<MDL	0.6	6.4	1.9	11.4	90.7	503	12.7	5.09	3.33	27.1	85.9	<QL	<QL	<QL	<QL	32.9	<QL
NB_MIN_L	423368-210-1	L70816-5	9/6/2018 8:35	0.6	<MDL	12.7	3.4	15.6	81.1	508	13.6	5.59	<QL	27.3	123	42.4	<QL	<QL	<QL	34.5	<QL
NB_MIN_R	423368-210-1	L70816-6	9/6/2018 9:10	0.6	<MDL	10.1	1.4	5.9	82.6	505	11.7	6.71	3.09	28	133	<QL	<QL	<QL	<QL	<QL	<QL
* Not converted to dry weight basis																					
If a parameter/analyte appears twice in the column header, it																					

## King County Environmental Lab Analytical MATRIX Report

**Owner:** SEEDPAK  
**Matrix Class:** SOLID/TISSUE  
**User select:** DRY Weight Basis

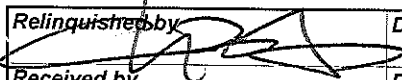
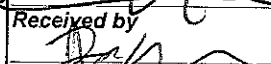
LOCATOR	PROJECT	SAMPLE	COLLECTED	Diethyl Phthalate	Fluoranthene	Indeno(1,2,3-Cd)Pyrene	Phenanthrene	Pyrene
				ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
NB_OHW_L	423368-210-1	L70816-1	9/6/2018 9:02	<QL	<QL	<QL	<QL	<QL
NB_OHW_R	423368-210-1	L70816-2	9/6/2018 9:25	<QL	13	3	7.8	10.8
NB_MLLW_L	423368-210-1	L70816-3	9/6/2018 8:51	<QL	<QL	<QL	<QL	<QL
NB_MLLW_R	423368-210-1	L70816-4	9/6/2018 9:17	<QL	<QL	<QL	<QL	<QL
NB_MIN_L	423368-210-1	L70816-5	9/6/2018 8:35	<QL	<QL	<QL	<QL	<QL
NB_MIN_R	423368-210-1	L70816-6	9/6/2018 9:10	24	<QL	<QL	<QL	<QL
* Not converted to dry weight basis								
If a parameter/analyte appears twice in the column header, it								

# King County Environmental Lab Analytical Text Value Report

Project	Sample	Parameter	Textvalue
423368-210-1	L70816-1	Field Personnel	CB, AG
423368-210-1	L70816-1	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-1	Sediment Type	34N31
423368-210-1	L70816-1	Tidal Condition	F
423368-210-1	L70816-2	Field Personnel	CB, AG
423368-210-1	L70816-2	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-2	Sediment Type	34S31
423368-210-1	L70816-2	Tidal Condition	F
423368-210-1	L70816-3	Field Personnel	CB, AG
423368-210-1	L70816-3	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-3	Sediment Type	34S31
423368-210-1	L70816-3	Tidal Condition	F
423368-210-1	L70816-4	Field Personnel	CB, AG
423368-210-1	L70816-4	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-4	Sediment Type	34N41
423368-210-1	L70816-4	Tidal Condition	F
423368-210-1	L70816-5	Field Personnel	CB, AG
423368-210-1	L70816-5	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-5	Sediment Type	34S41
423368-210-1	L70816-5	Tidal Condition	F
423368-210-1	L70816-6	Field Personnel	CB, AG
423368-210-1	L70816-6	Sediment Sampling Range	0-10 cm
423368-210-1	L70816-6	Sediment Type	34S41
423368-210-1	L70816-6	Tidal Condition	F

Project: 423368-210-1

## CHAIN OF CUSTODY

Relinquished by 	Date 9/6/18	Time 0958
Received by 	Date 9/6/18	Time 0958
Sample Numbers		

(All)

Sample Number	P70816-1	P70816-2	P70816-3
QC Link			
Locator	✓ NB_OHW_L	✓ NB_OHW_R	✓ NB_MLLW_L
Short Loc Desc	NB_OHW_L	NB_OHW_R	NB_MLLW_L
Locator Desc	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA
Site	CARK PK OFFSHORE	CARK PK OFFSHORE	CARK PK OFFSHORE
Comments			
Start Date/Time	09/06/18 / 0902	→ 0925	→ 0851
End Date/Time			
Time Span			
Sample Depth			
PERSONNEL	CB, AG	CB, AG	CB, AG
SAMP METH	25010	→	→
SAMPCOORDX1	47.702217	47.702284	47.702394
SAMPCOORDY1	-122.390925	-122.390668	-122.391063
SED DEPTH	11	11	11
SED SAMP RANGE	0-10	0-10	0-10
SED TYPE	34N31	34N 34S31	3431 34S31
TIDE COND	Flood	Flood	Flood
TIDE HT	-0.8'	-0.5'	-1.0'
Dept, Matrix, Prod	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL

WG-159906

Hired to shift out  
of creek.

Project: 423368-210-1

Sample Number	P70816-4	P70816-5	P70816-6
QC Link		<i>in Range</i>	
Locator	NB_MLLW_R	<del>NB_MIN_L</del> <i>NB_MIN_L</i>	NB_MIN_R
Short Loc Desc	NB_MLLW_R	<del>NB_MIN_L</del>	NB_MIN_R
Locator Desc	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA	NORTH BEACH CSO BEACH OUTFALL 048B BEACH LOCA
Site	CARK PK OFFSHORE	CARK PK OFFSHORE	CARK PK OFFSHORE
Comments			
Start Date/Time	09/06/18 / 0917	09/06/18 / 0835	→ / 0910
End Date/Time			
Time Span			
Sample Depth			
PERSONNEL	CB, AG	CB, AG	CB, AG
SAMP METH	25010	→	→
SAMPCOORDX1	47.702527	47.702619	47.702680
SAMPCOORDY1	-122.390756	-122.391155	-122.390905
SED DEPTH	0-10	0-10	0-10
SED SAMP RANGE	11	11	11
SED TYPE	34N41	34S41	34S41
TIDE COND	Flood	Flood	Flood
TIDE HT	-0.6'	-1.0'	-0.8'
Dept, Matrix, Prod	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL	3 SF PSD 3 SF TOC-QL 3 SF TOTS 6 SF AG-ICP-QL 6 SF AS-ICP-QL 6 SF CD-ICP-QL 6 SF CR-ICP-QL 6 SF CU-ICP-QL 6 SF HG-CVAA-H-QL 6 SF PB-ICP-QL 6 SF ZN-ICP-QL 7 SF BNASMS-QL 7 SF BNASMS-SIM-QL 7 SF PCB-QL

## King County Environmental Laboratory Batch Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG159884 Total Solids

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70797-8	421185	WP INPLANT 3 Day INTENSIVE STUDY	CVTOTS	SLUDGE	9/6/2018 7:40	9/11/2018 14:14	9/12/2018 10:05	WG159884-2,-3,-1,- 4,-5,-6,-7	
L70816-1	423368-210-1	CSO Sediment Quality Characterization	CVTOTS	SALTWTRSED	9/6/2018 9:02	9/11/2018 14:14	9/12/2018 10:00		
L70816-2	423368-210-1		CVTOTS	SALTWTRSED	9/6/2018 9:25	9/11/2018 14:14	9/12/2018 10:02		
L70816-3	423368-210-1		CVTOTS	SALTWTRSED	9/6/2018 8:51	9/11/2018 14:14	9/12/2018 10:03		
L70816-4	423368-210-1		CVTOTS	SALTWTRSED	9/6/2018 9:17	9/11/2018 14:14	9/12/2018 10:03		
L70816-5	423368-210-1		CVTOTS	SALTWTRSED	9/6/2018 8:35	9/11/2018 14:14	9/12/2018 10:04		
L70816-6	423368-210-1		CVTOTS	SALTWTRSED	9/6/2018 9:10	9/11/2018 14:14	9/12/2018 10:04		
L70882-1	421304	Forestland- Weyerhaeuser Operations	CVTOTS	SOIL	9/6/2018 11:40	9/11/2018 14:14	9/12/2018 9:54		
L70882-2	421304		CVTOTS	SOIL	9/6/2018 11:40	9/11/2018 14:14	9/12/2018 9:54		
L70882-3	421304		CVTOTS	SOIL	9/6/2018 11:40	9/11/2018 14:14	9/12/2018 9:56		
L70882-4	421304		CVTOTS	SOIL	9/6/2018 11:00	9/11/2018 14:14	9/12/2018 9:56		
L70882-5	421304		CVTOTS	SOIL	9/6/2018 11:00	9/11/2018 14:14	9/12/2018 9:57		
L70882-6	421304		CVTOTS	SOIL	9/6/2018 11:00	9/11/2018 14:14	9/12/2018 9:57		
L70882-7	421304		CVTOTS	SOIL	9/6/2018 10:25	9/11/2018 14:14	9/12/2018 9:58		
L70882-8	421304		CVTOTS	SOIL	9/6/2018 10:25	9/11/2018 14:14	9/12/2018 9:58		
L70882-9	421304		CVTOTS	SOIL	9/6/2018 10:01	9/11/2018 14:14	9/12/2018 9:59		
L70882-10	421304		CVTOTS	SOIL	9/6/2018 10:01	9/11/2018 14:14	9/12/2018 9:59		
L70882-11	421304		CVTOTS	SOIL	9/6/2018 12:20	9/11/2018 14:14	9/12/2018 9:59		
L70882-12	421304		CVTOTS	SOIL	9/6/2018 12:20	9/11/2018 14:14	9/12/2018 10:00		
WG159884-1	MB		CVTOTS	OTHR SOLID		9/11/2018 14:14	9/12/2018 9:53		MB 180911
WG159884-2	LD		CVTOTS	SOIL		9/11/2018 14:14	9/12/2018 9:55		L70882-2
WG159884-3	LT		CVTOTS	SOIL		9/11/2018 14:14	9/12/2018 9:55		WG159884-2 L70882-2
WG159884-4	LD		CVTOTS	SALTWTRSED		9/11/2018 14:14	9/12/2018 10:01		L70816-1
WG159884-5	LT		CVTOTS	SALTWTRSED		9/11/2018 14:14	9/12/2018 10:02		WG159884-4 L70816-1
WG159884-6	LD		CVTOTS	SLUDGE		9/11/2018 14:14	9/12/2018 10:05		L70797-8
WG159884-7	LT		CVTOTS	SLUDGE		9/11/2018 14:14	9/12/2018 10:06		WG159884-6 L70797-8

Workgroup: WG159884 Total Solids

MB:WG159884-1 Matrix: OTHR SOLID Listtype:CVTOTS Method:SM2540-G Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Solids	0.005	0.01	%		<MDL

LT:WG159884-3 LD:WG159884-2 L70882-2 Matrix: SOIL Listtype:CVTOTS Method:SM2540-G Project:421304 Pkey:STD  
(Lab Triplicate, Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP			RSD	Qual	Lab Limit
				Value	LD Value	LT Value			
Total Solids	0.005	0.01	%	82.6	79.9	80.2	2		0--20

LT:WG159884-5 LD:WG159884-4 L70816-1 Matrix: SALTWTRSED Listtype:CVTOTS Method:SM2540-G Project:423368-210-1 Pkey:SED  
(Lab Triplicate, Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP			RSD	Qual	Lab Limit
				Value	LD Value	LT Value			
Total Solids	0.005	0.01	%	95.6	94.6	94.8	1		0--20

LT:WG159884-7 LD:WG159884-6 L70797-8 Matrix: SLUDGE Listtype:CVTOTS Method:SM2540-G Project:421185 Pkey:STD  
(Lab Triplicate, Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP			RSD	Qual	Lab Limit
				Value	LD Value	LT Value			
Total Solids	0.005	0.01	%	25.8	25.9	25.8	0		0--20

## King County Environmental Laboratory Batch Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG159932 Total Organic Carbon

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70816-1	423368-210-1	CSO Sediment Quality Characterization	CVTOC-QL	SALTWTRSED	9/6/2018 9:02	9/11/2018 14:30	10/16/2018 11:15	WG159932-1,-2,-3,-4,-5,-6,-7	
L70816-2	423368-210-1		CVTOC-QL	SALTWTRSED	9/6/2018 9:25	9/11/2018 14:30	10/16/2018 11:39		
L70816-3	423368-210-1		CVTOC-QL	SALTWTRSED	9/6/2018 8:51	9/11/2018 14:30	10/16/2018 13:43		
L70816-4	423368-210-1		CVTOC-QL	SALTWTRSED	9/6/2018 9:17	9/11/2018 14:30	10/16/2018 14:07		
L70816-5	423368-210-1		CVTOC-QL	SALTWTRSED	9/6/2018 8:35	9/11/2018 14:30	10/16/2018 14:32		
L70816-6	423368-210-1		CVTOC-QL	SALTWTRSED	9/6/2018 9:10	9/11/2018 14:30	10/16/2018 14:56		
WG159932-1	QLCK		CVTOC-QL	OTHR SOLID		9/11/2018 14:30	10/16/2018 9:37		LEVEL1
WG159932-2	MB		CVTOC-QL	OTHR SOLID		9/11/2018 14:30	10/16/2018 9:53		MB1 9/11/18
WG159932-3	SB		CVTOC-QL	OTHR SOLID		9/11/2018 14:30	10/16/2018 10:19		WG159932-2
WG159932-4	LCS		CVTOC-QL	OTHR SOLID		10/16/2018 10:51	10/16/2018 10:51		LEVEL1
WG159932-5	LD		CVTOC-QL	SALTWTRSED		9/11/2018 14:30	10/16/2018 12:04		L70816-2
									WG159932-5 L70816-2
WG159932-6	LT		CVTOC-QL	SALTWTRSED		9/11/2018 14:30	10/16/2018 12:28		2
WG159932-7	MS		CVTOC-QL	SALTWTRSED		9/11/2018 14:30	10/16/2018 12:52		L70816-2



Workgroup: WG159932 Total Organic Carbon

MB:WG159932-2 Matrix: OTHR SOLID Listtype:CVTOC-QL Method:SW846 9060 PSEP96 Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Total Organic Carbon	249	498	mg/Kg		<QL

SB:WG159932-3 MB:WG159932-2 Matrix: OTHR SOLID Listtype:CVTOC-QL Method:SW846 9060 PSEP96 Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec. Qual	Lab Limit
Total Organic Carbon	249	498	mg/Kg	<QL	3734.19	3800	102	80--120

LCS:WG159932-4 Matrix: OTHR SOLID Listtype:CVTOC-QL Method:SW846 9060 PSEP96 Project: Pkey:STD  
(Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit
Total Organic Carbon	6340	6340	mg/Kg	33510	32900	98		80--120

LT:WG159932-6 LD:WG159932-5 L70816-2 Matrix: SALTWTRSED Listtype:CVTOC-QL Method:SW846 9060 PSEP96 Project:423368-210-1 Pkey:SED  
(Lab Triplicate, Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	LT Value	RSD	Qual	Lab Limit
Total Organic Carbon	448	448	mg/Kg	<QL	449	434	5		0--20

MS:WG159932-7 L70816-2 Matrix: SALTWTRSED Listtype:CVTOC-QL Method:SW846 9060 PSEP96 Project:423368-210-1 Pkey:SED  
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec. Qual	Lab Limit
Total Organic Carbon	433	433	mg/Kg	<QL	3248.85	3710	114	75--125

## King County Environmental Laboratory Batch Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG160275 Particle Size Distribution

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70816-1	423368-210-1	CSO Sediment Quality Characterization	CVPSD	SALTWTRSED	9/6/2018 9:02	9/27/2018 15:46	10/1/2018 8:30	WG160275-1,-2	
L70816-2	423368-210-1		CVPSD	SALTWTRSED	9/6/2018 9:25	9/27/2018 15:46	10/1/2018 8:30		
L70816-3	423368-210-1		CVPSD	SALTWTRSED	9/6/2018 8:51	9/27/2018 15:46	10/1/2018 8:30		
L70816-4	423368-210-1		CVPSD	SALTWTRSED	9/6/2018 9:17	9/27/2018 15:46	10/1/2018 8:30		
L70816-5	423368-210-1		CVPSD	SALTWTRSED	9/6/2018 8:35	9/27/2018 15:46	10/1/2018 8:30		
L70816-6	423368-210-1		CVPSD	SALTWTRSED	9/6/2018 9:10	9/27/2018 15:46	10/1/2018 8:30		
WG160275-1	LD		CVPSD	SALTWTRSED		9/27/2018 15:46	10/1/2018 8:30		L70816-4
WG160275-2	LT		CVPSD	SALTWTRSED		9/27/2018 15:46	10/1/2018 8:30		WG160275-1 L70816-4

Workgroup: WG160275 Particle Size Distribution

LT:WG160275-2 LD:WG160275-1 L70816-4 Matrix: SALTWTRSED Listtype:CVPSD Method:ASTM D422 Project:423368-210-1 Pkey:SED  
(Lab Triplicate, Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP	LD Value	LT Value	RSD Qual	Lab Limit
				Value				
Gravel	0.1	1.1	%	19.7	20.7	24.2	11	0--20
Sand	0.1	1.1	%	79.3	79.6	76.8	2	0--20
Silt	0.6	1.1	%	<MDL	1.1	1.1	87 *	0--20
Clay	0.6	1.1	%	2.2	1.1	1.1	42 *	0--20

## King County Environmental Laboratory Batch Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG159939 Total Mercury, CVAA

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70816-1	423368-210-1	CSO Sediment Quality Characterization	MTHG-SED-QL	SALTWTRSED	9/6/2018 9:02	9/13/2018 12:30	9/18/2018 13:16	WG159939-1,-2,-3,-4,-5,-6,-7,-8	
L70816-2	423368-210-1		MTHG-SED-QL	SALTWTRSED	9/6/2018 9:25	9/13/2018 12:30	9/18/2018 13:18		
L70816-3	423368-210-1		MTHG-SED-QL	SALTWTRSED	9/6/2018 8:51	9/13/2018 12:30	9/18/2018 13:19		
L70816-4	423368-210-1		MTHG-SED-QL	SALTWTRSED	9/6/2018 9:17	9/13/2018 12:30	9/18/2018 13:21		
L70816-5	423368-210-1		MTHG-SED-QL	SALTWTRSED	9/6/2018 8:35	9/13/2018 12:30	9/18/2018 13:29		
L70816-6	423368-210-1		MTHG-SED-QL	SALTWTRSED	9/6/2018 9:10	9/13/2018 12:30	9/18/2018 13:34		
WG159939-1	MB		MTHG-SED-QL	SOLIDBLANK		9/13/2018 12:30	9/18/2018 13:12		MB
WG159939-2	SB		MTHG-SED-QL	SOLIDBLANK		9/13/2018 12:30	9/18/2018 13:14		WG159939-1 HG-SOL
WG159939-3	LD		MTHG-SED-QL	SALTWTRSED		9/13/2018 12:30	9/18/2018 13:23		L70816-4 RPD-SOL
WG159939-4	MS		MTHG-SED-QL	SALTWTRSED		9/13/2018 12:30	9/18/2018 13:25		L70816-4 HG-SOL
WG159939-5	MSD		MTHG-SED-QL	SALTWTRSED		9/13/2018 12:30	9/18/2018 13:27		WG159939-4 L70816-4 HG-SOL-MSD
WG159939-6	SRM		MTHG-SED-QL	SALTWTRSED		9/13/2018 12:30	9/18/2018 13:36		PACS3 M-15-002
WG159939-7	SRMD		MTHG-SED-QL	SALTWTRSED		9/13/2018 12:30	9/18/2018 13:38		WG159939-6 PACS3 M-15-002
WG159939-8	QLCK		MTHG-SED-QL	SOLIDBLANK		9/13/2018 12:30	9/18/2018 13:39		HIGH #2

Workgroup: WG159939 Total Mercury, CVAA

MB:WG159939-1 Matrix: SOLIDBLANK Listtype:MTHG-SED-QL Method:SW846 7471B Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Mercury, Total, CVAA	0.00952	0.019	mg/Kg		<QL

SB:WG159939-2 MB:WG159939-1 Matrix: SOLIDBLANK Listtype:MTHG-SED-QL Method:SW846 7471B Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec. Qual	Lab Limit
Mercury, Total, CVAA	0.00952	0.019	mg/Kg	<QL	0.476	0.494	104	85--115

LD:WG159939-3 L70816-4 Matrix: SALTWTRSED Listtype:MTHG-SED-QL Method:SW846 7471B Project:423368-210-1 Pkey:SED  
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual Lab Limit
Mercury, Total, CVAA	0.0195	0.0195	mg/Kg	<QL	<QL		0--20

MSD:WG159939-5 MS:WG159939-4 L70816-4 Matrix: SALTWTRSED Listtype:MTHG-SED-QL Method:SW846 7471B Project:423368-210-1 Pkey:SED  
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec. Qual	Lab Limit	True Value	MSD Value	% Rec. Qual	RPD	Qual	Lab Limit
Mercury, Total, CVAA	0.0199	0.0199	mg/Kg	<QL	0.497	0.516	104	75--125	0.498	0.517	104	0		0--20

SRMD:WG159939-7 SRM:WG159939-6 Matrix: SALTWTRSED Listtype:MTHG-SED-QL Method:SW846 7471B Project: Pkey:SED  
(Std Reference Material Duplicate, Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual Lab Limit	True Value	SRMD Value	% Rec.	Qual RPD	Qual	Lab Limit
Mercury, Total, CVAA	0.193	0.193	mg/Kg	2.98	2.76	93	80--120	2.98	2.82	95	2		0--20

## King County Environmental Laboratory Batch Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG160102 Total Metals, ICP

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70816-1	423368-210-1	CSO Sediment Quality Characterization	MTICP-SED-QL	SALTWTRSED	9/6/2018 9:02	9/21/2018 10:30	9/24/2018 8:51	WG160102-1,-2,-3,-4,-5,-6,-7	
L70816-2	423368-210-1		MTICP-SED-QL	SALTWTRSED	9/6/2018 9:25	9/21/2018 10:30	9/24/2018 9:03		
L70816-3	423368-210-1		MTICP-SED-QL	SALTWTRSED	9/6/2018 8:51	9/21/2018 10:30	9/24/2018 9:06		
L70816-4	423368-210-1		MTICP-SED-QL	SALTWTRSED	9/6/2018 9:17	9/21/2018 10:30	9/24/2018 9:17		
L70816-5	423368-210-1		MTICP-SED-QL	SALTWTRSED	9/6/2018 8:35	9/21/2018 10:30	9/24/2018 9:21		
L70816-6	423368-210-1		MTICP-SED-QL	SALTWTRSED	9/6/2018 9:10	9/21/2018 10:30	9/24/2018 9:24		
WG160102-1	SB		MTICP-SED-QL	SOLIDBLANK		9/21/2018 10:30	9/24/2018 8:33		WG160102-2
WG160102-2	MB		MTICP-SED-QL	SOLIDBLANK		9/21/2018 10:30	9/24/2018 8:37		ICPMARINE
WG160102-3	LD		MTICP-SED-QL	SALTWTRSED		9/21/2018 10:30	9/24/2018 8:55		METHOD BLANK
									L70816-1 RPD-SOL
									L70816-1
WG160102-4	MS		MTICP-SED-QL	SALTWTRSED		9/21/2018 10:30	9/24/2018 8:59		ICPMARINE
WG160102-5	LCS		MTICP-SED-QL	SOIL		9/21/2018 10:30	9/24/2018 8:41		ERASOIL
									WG160102-5
WG160102-6	LCSD		MTICP-SED-QL	SOIL		9/21/2018 10:30	9/24/2018 8:44		ERASOIL
WG160102-7	SRM		MTICP-SED-QL	SALTWTRSED		9/21/2018 10:30	9/24/2018 8:48		PACS3

## King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Workgroup: WG160102 Total Metals, ICP

SB:WG160102-1 MB:WG160102-2 Matrix: SOLIDBLANK Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec. Qual	Lab Limit
Silver, Total, ICP	0.238	0.476	mg/Kg	<QL	47.6	46.8	98	85--115
Arsenic, Total, ICP	1.19	2.38	mg/Kg	<QL	47.6	49.3	104	85--115
Cadmium, Total, ICP	0.119	0.238	mg/Kg	<QL	47.6	47.7	100	85--115
Chromium, Total, ICP	0.119	0.238	mg/Kg	<QL	47.6	47	99	85--115
Copper, Total, ICP	0.238	0.476	mg/Kg	<QL	47.6	45.1	95	85--115
Lead, Total, ICP	1.19	2.38	mg/Kg	<QL	47.6	46.4	98	85--115
Zinc, Total, ICP	0.119	0.238	mg/Kg	<QL	238	244	103	85--115

MB:WG160102-2 Matrix: SOLIDBLANK Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Silver, Total, ICP	0.238	0.476	mg/Kg		<QL
Arsenic, Total, ICP	1.19	2.38	mg/Kg		<QL
Cadmium, Total, ICP	0.119	0.238	mg/Kg		<QL
Chromium, Total, ICP	0.119	0.238	mg/Kg		<QL
Copper, Total, ICP	0.238	0.476	mg/Kg		<QL
Lead, Total, ICP	1.19	2.38	mg/Kg		<QL
Zinc, Total, ICP	0.119	0.238	mg/Kg		<QL

LD:WG160102-3 L70816-1 Matrix: SALTWTRSED Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project:423368-210-1 Pkey:SED  
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Silver, Total, ICP	0.499	0.499	mg/Kg	<QL	<QL			0--20
Arsenic, Total, ICP	2.5	2.5	mg/Kg	<QL	<QL			0--20
Cadmium, Total, ICP	0.25	0.25	mg/Kg	0.275	0.265	4		0--20
Chromium, Total, ICP	0.25	0.25	mg/Kg	17.1	14.5	17		0--20
Copper, Total, ICP	0.499	0.499	mg/Kg	6.66	6.64	0		0--20
Lead, Total, ICP	2.5	2.5	mg/Kg	3.01	2.6	15		0--20
Zinc, Total, ICP	0.25	0.25	mg/Kg	27.4	28.7	5		0--20

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

MS:WG160102-4 L70816-1 Matrix: SALTWTRSED Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project:423368-210-1 Pkey:SED  
(Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit
Silver, Total, ICP	0.499	0.499	mg/Kg	<QL	49.9	46.3	93		75--125
Arsenic, Total, ICP	2.5	2.5	mg/Kg	<QL	49.9	57.6	115		75--125
Cadmium, Total, ICP	0.25	0.25	mg/Kg	0.275	49.9	53.6	107		75--125
Chromium, Total, ICP	0.25	0.25	mg/Kg	17.1	49.9	60.4	87		75--125
Copper, Total, ICP	0.499	0.499	mg/Kg	6.66	49.9	52.9	93		75--125
Lead, Total, ICP	2.5	2.5	mg/Kg	3.01	49.9	48.3	91		75--125
Zinc, Total, ICP	0.25	0.25	mg/Kg	27.4	249	307	112		75--125

LCSD:WG160102-6 LCS:WG160102-5 Matrix: SOIL Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project: Pkey:STD  
(Lab Control Sample Duplicate, Lab Control Sample)

Parameter	MDL	RDL	Units	True Value	LCS Value	% Rec.	Qual	Lab Limit	True Value	LCSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Silver, Total, ICP	2	2	mg/Kg	31.3	29	93		75--125	31.3	28.2	90		3		0--20
Arsenic, Total, ICP	10	10	mg/Kg	145	144	99		79--122	145	144	99		0		0--20
Cadmium, Total, ICP	1	1	mg/Kg	87.6	87.2	99		80--120	87.6	85.9	98		1		0--20
Chromium, Total, ICP	1	1	mg/Kg	143	135	94		79--120	143	130	91		4		0--20
Copper, Total, ICP	2	2	mg/Kg	173	177	102		80--120	173	169	98		4		0--20
Lead, Total, ICP	10	10	mg/Kg	146	137	94		80--120	146	130	89		6		0--20
Zinc, Total, ICP	1	1	mg/Kg	194	198	102		80--120	194	192	99		3		0--20

SRM:WG160102-7 Matrix: SALTWTRSED Listtype:MTICP-SED-QL Method:SW846 3050B\*SW846 6010D Project: Pkey:SED  
(Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual	Lab Limit
Arsenic, Total, ICP	10	10	mg/Kg	30.3	30.4	100		80--120
Cadmium, Total, ICP	1	1	mg/Kg	2.23	2.81	126	*	80--120
Chromium, Total, ICP	1	1	mg/Kg	90.6	45.3	50	*	80--120
Copper, Total, ICP	2	2	mg/Kg	326	309	95		80--120
Lead, Total, ICP	10	10	mg/Kg	188	160	85		80--120
Zinc, Total, ICP	1	1	mg/Kg	376	365	97		80--120



## King County Environmental Laboratory Batch Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG160676 Polychlorinated Biphenyls

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70566-1	423660-200	Michigan Combined	ORPCB-QL	IN-LINESED	7/3/2018 0:00	10/23/2018 17:00	10/30/2018 10:41	WG160676-1,-2,-3,-4,-5	
L70566-2	423660-200	Sewer Sys. Inline	ORPCB-QL	IN-LINESED	7/3/2018 0:00	10/23/2018 17:00	10/30/2018 10:59		
L70568-1	423589-340-4	CSO Source	ORPCB-QL	IN-LINESED	7/5/2018 0:00	10/23/2018 17:00	10/30/2018 11:17		
L70568-2	423589-340-4	Characterization	ORPCB-QL	IN-LINESED	7/3/2018 0:00	10/23/2018 17:00	10/30/2018 11:36		
L70568-3	423589-340-4		ORPCB-QL	IN-LINESED	7/5/2018 0:00	10/23/2018 17:00	10/30/2018 11:54		
		LDW Source Control							
L70569-1	423368-310-4	WTD	ORPCB-QL	IN-LINESED	7/5/2018 0:00	10/23/2018 17:00	10/30/2018 12:12		
L70816-1	423368-210-1	CSO Sediment Quality	ORPCB-QL	SALTWTRSED	9/6/2018 9:02	10/23/2018 17:00	10/30/2018 12:30		
L70816-2	423368-210-1	Characterization	ORPCB-QL	SALTWTRSED	9/6/2018 9:25	10/23/2018 17:00	10/30/2018 12:48		
L70816-3	423368-210-1		ORPCB-QL	SALTWTRSED	9/6/2018 8:51	10/23/2018 17:00	10/30/2018 13:07		
L70816-4	423368-210-1		ORPCB-QL	SALTWTRSED	9/6/2018 9:17	10/23/2018 17:00	10/30/2018 13:25		
L70816-5	423368-210-1		ORPCB-QL	SALTWTRSED	9/6/2018 8:35	10/23/2018 17:00	10/30/2018 13:43		
L70816-6	423368-210-1		ORPCB-QL	SALTWTRSED	9/6/2018 9:10	10/23/2018 17:00	10/30/2018 14:01		
WG160676-1	MB		ORPCB-QL	OTHR SOLID		10/23/2018 17:00	10/30/2018 9:10		MB181023
WG160676-2	SB		ORPCB-QL	OTHR SOLID		10/23/2018 17:00	10/30/2018 9:28		WG160676-1
WG160676-3	MS		ORPCB-QL	SALTWTRSED		10/23/2018 17:00	10/30/2018 9:47		L70816-1
									WG160676-3
WG160676-4	MSD		ORPCB-QL	SALTWTRSED		10/23/2018 17:00	10/30/2018 10:05		L70816-1
WG160676-5	LD		ORPCB-QL	SALTWTRSED		10/23/2018 17:00	10/30/2018 10:23		L70816-6

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Workgroup: WG160676 Polychlorinated Biphenyls

MB:WG160676-1 Matrix: OTHR SOLID Listtype:ORPCB-QL Method:SW846 3550B\*SW846 8082A Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Aroclor 1016	0.417	0.833	ug/Kg		<QL
Aroclor 1221	1.25	2.5	ug/Kg		<QL
Aroclor 1232	1.25	2.5	ug/Kg		<QL
Aroclor 1242	0.417	0.833	ug/Kg		<QL
Aroclor 1248	0.417	0.833	ug/Kg		<QL
Aroclor 1254	0.417	0.833	ug/Kg		<QL
Aroclor 1260	0.417	0.833	ug/Kg		<QL
Total Aroclors	1.25	2.5	ug/Kg		<QL

SB:WG160676-2 MB:WG160676-1 Matrix: OTHR SOLID Listtype:ORPCB-QL Method:SW846 3550B\*SW846 8082A Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Aroclor 1242	0.417	0.833	ug/Kg	<QL	66.7	43.1	65		38--100
Aroclor 1260	0.417	0.833	ug/Kg	<QL	66.7	63.9	96		70--109

MSD:WG160676-4 MS:WG160676-3 L70816-1 Matrix: SALTWTRSED Listtype:ORPCB-QL Method:SW846 3550B\*SW846 8082A Project:423368-210-1 Pkey:SED  
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit	True Value	MSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Aroclor 1242	0.833	0.833	ug/Kg	<QL	66.7	57.7	87		51--100	66.7	56.6	85		2		0--35
Aroclor 1260	0.833	0.833	ug/Kg	<QL	66.7	66.9	100		35--108	66.7	67.7	102		1		0--35

LD:WG160676-5 L70816-6 Matrix: SALTWTRSED Listtype:ORPCB-QL Method:SW846 3550B\*SW846 8082A Project:423368-210-1 Pkey:SED  
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Aroclor 1016	0.833	0.833	ug/Kg	<QL	<QL			0--35
Aroclor 1221	2.5	2.5	ug/Kg	<QL	<QL			0--35
Aroclor 1232	2.5	2.5	ug/Kg	<QL	<QL			0--35
Aroclor 1242	0.833	0.833	ug/Kg	<QL	<QL			0--35
Aroclor 1248	0.833	0.833	ug/Kg	<QL	<QL			0--35
Aroclor 1254	0.833	0.833	ug/Kg	<QL	<QL			0--35
Aroclor 1260	0.833	0.833	ug/Kg	<QL	<QL			0--35
Total Aroclors	2.5	2.5	ug/Kg	<QL	<QL			0--35

## King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Surrogate: (Lab Limits)	2,4,5,6- Tetra chloro m- xylene 22--113	Deca chloro biphenyl 51--115
L70566-1	46	52
L70566-2	68	73
L70568-1	50	56
L70568-2	51	56
L70568-3	68	80
L70569-1	60	70
L70816-1	63	83
L70816-2	74	85
L70816-3	66	93
L70816-4	62	87
L70816-5	66	93
L70816-6	63	89
WG160676-1	22	70
WG160676-2	40	88
WG160676-3	67	87
WG160676-4	66	90
WG160676-5	61	86

## King County Environmental Laboratory Batch Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG160709 Semi Volatile Organics

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70566-1	423660-200	Michigan Combined	ORBNASMS-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	10/31/2018 19:44	WG160709-1,-2,-3,-4,-5,-6,-7	
L70566-2	423660-200	Sewer Sys. Inline	ORBNASMS-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	10/31/2018 20:21		
L70568-1	423589-340-4	CSO Source	ORBNASMS-QL	IN-LINESED	7/5/2018 0:00	10/24/2018 17:00	11/1/2018 11:19		
L70568-2	423589-340-4	Characterization	ORBNASMS-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	11/1/2018 11:55		
		LDW Source Control							
L70569-1	423368-310-4	WTD	ORBNASMS-QL	IN-LINESED	7/5/2018 0:00	10/24/2018 17:00	10/31/2018 20:57		
L70816-1	423368-210-1	CSO Sediment Quality Characterization	ORBNASMS-QL	SALTWTRSED	9/6/2018 9:02	10/24/2018 17:00	10/31/2018 13:05		
L70816-2	423368-210-1		ORBNASMS-QL	SALTWTRSED	9/6/2018 9:25	10/24/2018 17:00	10/31/2018 13:42		
L70816-3	423368-210-1		ORBNASMS-QL	SALTWTRSED	9/6/2018 8:51	10/24/2018 17:00	10/31/2018 14:18		
L70816-4	423368-210-1		ORBNASMS-QL	SALTWTRSED	9/6/2018 9:17	10/24/2018 17:00	10/31/2018 14:54		
L70816-5	423368-210-1		ORBNASMS-QL	SALTWTRSED	9/6/2018 8:35	10/24/2018 17:00	10/31/2018 15:31		
L70816-6	423368-210-1		ORBNASMS-QL	SALTWTRSED	9/6/2018 9:10	10/24/2018 17:00	10/31/2018 16:07		
WG160709-1	MB		ORBNASMS-QL	OTHR SOLID		10/24/2018 17:00	10/31/2018 10:36		MB181024
WG160709-2	SB		ORBNASMS-QL	OTHR SOLID		10/24/2018 17:00	10/31/2018 11:17		WG160709-1
WG160709-3	MS		ORBNASMS-QL	SALTWTRSED		10/24/2018 17:00	10/31/2018 11:53		L70816-1
									WG160709-3
WG160709-4	MSD		ORBNASMS-QL	SALTWTRSED		10/24/2018 17:00	10/31/2018 12:29		L70816-1
WG160709-5	SRM		ORBNASMS-QL	SALTWTRSED		10/24/2018 17:00	10/31/2018 16:43		
WG160709-6	SRMD		ORBNASMS-QL	SALTWTRSED		10/24/2018 17:00	10/31/2018 17:19		WG160709-5
WG160709-7	LD		ORBNASMS-QL	SALTWTRSED		10/24/2018 17:00	10/31/2018 17:56		L70816-4

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Workgroup: WG160709 Semi Volatile Organics

MB:WG160709-1 Matrix: OTHR SOLID Listtype:ORBNASMS-QL Method:SW846 3550B\*SW846 8270D Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Phenol	8.33	16.7	ug/Kg		<QL
1,4-Dichlorobenzene	1.67	5	ug/Kg		<QL
1,2-Dichlorobenzene	1.67	3.33	ug/Kg		<QL
2-Methylphenol	8.33	16.7	ug/Kg		<QL
3-,4-Methylphenol	8.33	16.7	ug/Kg		<QL
1,2,4-Trichlorobenzene	1.67	3.33	ug/Kg		<QL
Naphthalene	1.67	3.33	ug/Kg		<QL
2-Methylnaphthalene	1.67	3.33	ug/Kg		<QL
1-Methylnaphthalene	1.67	3.33	ug/Kg		<QL
Acenaphthylene	1.67	3.33	ug/Kg		<QL
Acenaphthene	1.67	3.33	ug/Kg		<QL
Dibenzofuran	1.67	3.33	ug/Kg		<QL
Diethyl Phthalate	16.7	33.3	ug/Kg		<QL
Fluorene	1.67	3.33	ug/Kg		<QL
Phenanthrene	3.33	6.67	ug/Kg		<QL
Anthracene	1.67	3.33	ug/Kg		<QL
Carbazole	1.67	3.33	ug/Kg		<QL
Di-N-Butyl Phthalate	1.67	3.33	ug/Kg		<QL
Fluoranthene	1.67	3.33	ug/Kg		<QL
Pyrene	1.67	3.33	ug/Kg		<QL
Benzyl Butyl Phthalate	1.67	5	ug/Kg		<QL
Benzo(a)anthracene	3.33	8.33	ug/Kg		<QL
Chrysene	1.67	3.33	ug/Kg		<QL
Bis(2-Ethylhexyl)Phthalate	1.67	6.67	ug/Kg		<QL
Di-N-Octyl Phthalate	1.67	6.67	ug/Kg		<QL
Benzo(b,j,k)fluoranthene	1.67	3.33	ug/Kg		<QL
Benzo(a)pyrene	1.67	3.33	ug/Kg		<QL
Indeno(1,2,3-Cd)Pyrene	1.67	3.33	ug/Kg		<QL
Dibenzo(a,h)anthracene	3.33	6.67	ug/Kg		<QL
Benzo(g,h,i)perylene	1.67	3.33	ug/Kg		<QL

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

SB:WG160709-2 MB:WG160709-1 Matrix: OTHR SOLID Listtype:ORBNASMS-QL Method:SW846 3550B\*SW846 8270D Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec. Qual	Lab Limit
Phenol	8.33	16.7	ug/Kg	<QL	833	631	76	26--136
1,4-Dichlorobenzene	1.67	5	ug/Kg	<QL	833	509	61	40--103
1,2-Dichlorobenzene	1.67	3.33	ug/Kg	<QL	833	527	63	44--105
2-Methylphenol	8.33	16.7	ug/Kg	<QL	833	615	74	20--123
3-,4-Methylphenol	8.33	16.7	ug/Kg	<QL	833	260	31	22--119
1,2,4-Trichlorobenzene	1.67	3.33	ug/Kg	<QL	833	465	56	39--94
Naphthalene	1.67	3.33	ug/Kg	<QL	833	515	62	28--109
2-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	833	546	65	20--128
1-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	833	547	66	20--128
Acenaphthylene	1.67	3.33	ug/Kg	<QL	833	632	76	45--132
Acenaphthene	1.67	3.33	ug/Kg	<QL	833	688	83	43--126
Dibenzofuran	1.67	3.33	ug/Kg	<QL	833	830	100	52--133
Diethyl Phthalate	16.7	33.3	ug/Kg	<QL	833	787	94	75--131
Fluorene	1.67	3.33	ug/Kg	<QL	833	752	90	57--150
Phenanthrene	3.33	6.67	ug/Kg	<QL	833	807	97	47--141
Anthracene	1.67	3.33	ug/Kg	<QL	833	809	97	48--149
Carbazole	1.67	3.33	ug/Kg	<QL	833	878	105	48--149
Di-N-Butyl Phthalate	1.67	3.33	ug/Kg	<QL	833	854	102	71--142
Fluoranthene	1.67	3.33	ug/Kg	<QL	833	800	96	56--143
Pyrene	1.67	3.33	ug/Kg	<QL	833	799	96	60--144
Benzyl Butyl Phthalate	1.67	5	ug/Kg	<QL	833	863	104	36--150
Benzo(a)anthracene	3.33	8.33	ug/Kg	<QL	833	785	94	51--150
Chrysene	1.67	3.33	ug/Kg	<QL	833	782	94	45--150
Bis(2-Ethylhexyl)Phthalate	1.67	6.67	ug/Kg	<QL	833	926	111	61--150
Di-N-Octyl Phthalate	1.67	6.67	ug/Kg	<QL	833	890	107	43--150
Benzo(b,j,k)fluoranthene	1.67	3.33	ug/Kg	<QL	2500	1930	77	45--143
Benzo(a)pyrene	1.67	3.33	ug/Kg	<QL	833	763	92	61--140
Indeno(1,2,3-Cd)Pyrene	1.67	3.33	ug/Kg	<QL	833	968	116	42--150
Dibenzo(a,h)anthracene	3.33	6.67	ug/Kg	<QL	833	1090	131	41--150
Benzo(g,h,i)perylene	1.67	3.33	ug/Kg	<QL	833	754	90	28--150

## King County Environmental Laboratory QC Report

## CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

MSD:WG160709-4 MS:WG160709-3 L70816-1 Matrix: SALTWTRSED Listtype:ORBNASMS-QL Method:SW846 3550B\*SW846 8270D Project:423368-210-1 Pkey:SED  
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit	True Value	MSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Phenol	8.33	16.7	ug/Kg	<QL	833	691	83		21--142	833	635	76		8		0--35
1,4-Dichlorobenzene	1.67	5	ug/Kg	<QL	833	507	61		20--105	833	494	59		3		0--35
1,2-Dichlorobenzene	1.67	3.33	ug/Kg	<QL	833	536	64		20--110	833	500	60		7		0--35
2-Methylphenol	8.33	16.7	ug/Kg	<QL	833	647	78		21--126	833	630	76		3		0--35
3-,4-Methylphenol	8.33	16.7	ug/Kg	<QL	833	356	43		24--129	833	399	48		11		0--35
1,2,4-Trichlorobenzene	1.67	3.33	ug/Kg	<QL	833	527	63		22--95	833	494	59		6		0--35
Naphthalene	1.67	3.33	ug/Kg	<QL	833	631	76		20--112	833	570	68		10		0--35
2-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	833	379	45		22--109	833	377	45		0		0--35
1-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	833	371	45		22--109	833	323	39		14		0--35
Acenaphthylene	1.67	3.33	ug/Kg	<QL	833	606	73		44--134	833	643	77		6		0--35
Acenaphthene	1.67	3.33	ug/Kg	<QL	833	671	81		37--129	833	794	95		17		0--35
Dibenzofuran	1.67	3.33	ug/Kg	<QL	833	799	96		49--135	833	872	105		9		0--35
Diethyl Phthalate	16.7	33.3	ug/Kg	<QL	833	804	96		71--130	833	962	115		18		0--35
Fluorene	1.67	3.33	ug/Kg	<QL	833	723	87		52--150	833	874	105		19		0--35
Phenanthrene	3.33	6.67	ug/Kg	<QL	833	769	92		51--136	833	971	117		23		0--35
Anthracene	1.67	3.33	ug/Kg	<QL	833	750	90		37--150	833	826	99		10		0--35
Carbazole	1.67	3.33	ug/Kg	<QL	833	853	102		37--150	833	957	115		11		0--35
Di-N-Butyl Phthalate	1.67	3.33	ug/Kg	<QL	833	821	99		64--150	833	883	106		7		0--35
Fluoranthene	1.67	3.33	ug/Kg	<QL	833	767	92		53--144	833	1070	128		33		0--35
Pyrene	1.67	3.33	ug/Kg	<QL	833	737	88		59--143	833	935	112		24		0--35
Benzyl Butyl Phthalate	1.67	5	ug/Kg	<QL	833	811	97		27--150	833	847	102		4		0--35
Benzo(a)anthracene	3.33	8.33	ug/Kg	<QL	833	728	87		52--149	833	848	102		15		0--35
Chrysene	1.67	3.33	ug/Kg	<QL	833	628	75		47--141	833	757	91		19		0--35
Bis(2-Ethylhexyl)Phthalate	1.67	6.67	ug/Kg	42.2	833	909	104		54--150	833	987	113		8		0--35
Di-N-Octyl Phthalate	1.67	6.67	ug/Kg	<QL	833	809	97		43--150	833	884	106		9		0--35
Benzo(b,j,k)fluoranthene	1.67	3.33	ug/Kg	<QL	1670	1620	97		48--135	1670	2150	129		28		0--35
Benzo(a)pyrene	1.67	3.33	ug/Kg	<QL	833	700	84		62--136	833	811	97		15		0--35
Indeno(1,2,3-Cd)Pyrene	1.67	3.33	ug/Kg	<QL	833	853	102		41--150	833	912	109		7		0--35
Dibenzo(a,h)anthracene	3.33	6.67	ug/Kg	<QL	833	632	76		25--150	833	540	65		16		0--35
Benzo(g,h,i)perylene	1.67	3.33	ug/Kg	<QL	833	680	82		27--150	833	747	90		9		0--35

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

SRMD:WG160709-6 SRM:WG160709-5 Matrix: SALTWTRSED Listtype:ORBNASMS-QL Method:SW846 3550B\*SW846 8270D Project: Pkey:SED  
(Std Reference Material Duplicate, Std Reference Material)

Parameter	MDL	RDL	Units	True Value	SRM Value	% Rec.	Qual	Lab Limit	True Value	SRMD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Phenanthrene	167	333	ug/Kg	5200	4780	92		48--112	5200	4510	87		6		0--35
Fluoranthene	83.3	167	ug/Kg	8800	8660	98		51--127	8800	8020	91		8		0--35
Pyrene	83.3	167	ug/Kg	9570	7690	80		55--119	9570	7290	76		5		0--35
Benzo(a)anthracene	167	417	ug/Kg	4660	3750	80		45--122	4660	3510	75		7		0--35
Chrysene	83.3	167	ug/Kg	4800	6020	126		68--144	4800	5530	115		9		0--35
Benzo(b,j,k)fluoranthene	83.3	167	ug/Kg	8150	8800	108		50--122	8150	7880	97		11		0--35
Benzo(a)pyrene	83.3	167	ug/Kg	4240	2870	68		38--117	4240	2630	62		9		0--35
Indeno(1,2,3-Cd)Pyrene	83.3	167	ug/Kg	2740	2450	89		36--127	2740	2250	82		9		0--35
Dibenzo(a,h)anthracene	167	333	ug/Kg	419	723	173		51--200	419	664	159		8		0--35
Benzo(g,h,i)perylene	83.3	167	ug/Kg	2800	2320	83		32--133	2800	2090	75		10		0--35



## King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

LD:WG160709-7 L70816-4 Matrix: SALTWTRSED Listtype:ORBNASMS-QL Method:SW846 3550B\*SW846 8270D Project:423368-210-1 Pkey:SED  
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Phenol	8.33	16.7	ug/Kg	<QL	<QL			0--35
1,4-Dichlorobenzene	1.67	5	ug/Kg	<QL	<QL			0--35
1,2-Dichlorobenzene	1.67	3.33	ug/Kg	<QL	<QL			0--35
2-Methylphenol	8.33	16.7	ug/Kg	<QL	<QL			0--35
3-,4-Methylphenol	8.33	16.7	ug/Kg	<QL	<QL			0--35
1,2,4-Trichlorobenzene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Naphthalene	1.67	3.33	ug/Kg	<QL	<QL			0--35
2-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	<QL			0--35
1-Methylnaphthalene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Acenaphthylene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Acenaphthene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Dibenzofuran	1.67	3.33	ug/Kg	<QL	<QL			0--35
Diethyl Phthalate	16.7	33.3	ug/Kg	<QL	<QL			0--35
Fluorene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Phenanthrene	3.33	6.67	ug/Kg	<QL	<QL			0--35
Anthracene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Carbazole	1.67	3.33	ug/Kg	<QL	<QL			0--35
Di-N-Butyl Phthalate	1.67	3.33	ug/Kg	<QL	<QL			0--35
Fluoranthene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Pyrene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Benzyl Butyl Phthalate	1.67	5	ug/Kg	<QL	<QL			0--35
Benzo(a)anthracene	3.33	8.33	ug/Kg	<QL	<QL			0--35
Chrysene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Bis(2-Ethylhexyl)Phthalate	1.67	6.67	ug/Kg	29.8	38.9	27		0--35
Di-N-Octyl Phthalate	1.67	6.67	ug/Kg	<QL	<QL			0--35
Benzo(b,j,k)fluoranthene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Benzo(a)pyrene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Indeno(1,2,3-Cd)Pyrene	1.67	3.33	ug/Kg	<QL	<QL			0--35
Dibenzo(a,h)anthracene	3.33	6.67	ug/Kg	<QL	<QL			0--35
Benzo(g,h,i)perylene	1.67	3.33	ug/Kg	<QL	<QL			0--35

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Surrogate: (Lab Limits)	2,4,6-Tri bromo phenol 45--150	2-Fluoro phenol 20--136	d5-Nitro benzene 22--126	d5-Phenol 20--142
L70566-1	76	75	89	89
L70566-2	83	82	85	86
L70568-1	74	67	69	78
L70568-2	61	62	81	84
L70569-1	65	66	54	41
L70816-1	150	68	82	71
L70816-2	145	75	91	78
L70816-3	105	44	48	45
L70816-4	127	91	80	97
L70816-5	128	67	79	74
L70816-6	172 *	80	99	85
WG160709-1	47	61	60	67
WG160709-2	96	71	82	84
WG160709-3	88	74	86	87
WG160709-4	102	67	76	80
WG160709-5	86	81	84	99
WG160709-6	80	66	84	85
WG160709-7	170 *	70	77	69

## King County Environmental Laboratory Batch Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

## WG160710 Semi Volatile Organics - SIM

Sample	Project	Project Description	List Type	Matrix	Collect Date	Prep Date	Anal Date	QC Association	Comments
L70566-1	423660-200	Michigan Combined	ORBNASMS-SIM-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	11/6/2018 11:07	WG160710-1,-7,-2,-3,-4	
L70566-2	423660-200	Sewer Sys. Inline	ORBNASMS-SIM-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	11/6/2018 11:44		
L70568-1	423589-340-4	CSO Source	ORBNASMS-SIM-QL	IN-LINESED	7/5/2018 0:00	10/24/2018 17:00	11/6/2018 12:14		
L70568-2	423589-340-4	Characterization	ORBNASMS-SIM-QL	IN-LINESED	7/3/2018 0:00	10/24/2018 17:00	11/6/2018 12:44		
		LDW Source Control							
L70569-1	423368-310-4	WTD	ORBNASMS-SIM-QL	IN-LINESED	7/5/2018 0:00	10/24/2018 17:00	11/6/2018 13:14		
L70816-1	423368-210-1	CSO Sediment Quality Characterization	ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 9:02	10/24/2018 17:00	11/5/2018 14:39		
L70816-2	423368-210-1		ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 9:25	10/24/2018 17:00	11/5/2018 15:10		
L70816-3	423368-210-1		ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 8:51	10/24/2018 17:00	11/5/2018 15:39		
L70816-4	423368-210-1		ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 9:17	10/24/2018 17:00	11/5/2018 16:09		
L70816-5	423368-210-1		ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 8:35	10/24/2018 17:00	11/5/2018 16:39		
L70816-6	423368-210-1		ORBNASMS-SIM-QL	SALTWTRSED	9/6/2018 9:10	10/24/2018 17:00	11/5/2018 17:09		
WG160710-1	MB		ORBNASMS-SIM-QL	OTHR SOLID		10/24/2018 17:00	11/5/2018 10:55		MB181024
WG160710-2	SB		ORBNASMS-SIM-QL	OTHR SOLID		10/24/2018 17:00	11/14/2018 10:55		WG160710-1
WG160710-3	MS		ORBNASMS-SIM-QL	SALTWTRSED		10/24/2018 17:00	11/14/2018 11:28		L70816-1
									WG160710-3
WG160710-4	MSD		ORBNASMS-SIM-QL	SALTWTRSED		10/24/2018 17:00	11/14/2018 11:58		L70816-1
WG160710-7	LD		ORBNASMS-SIM-QL	SALTWTRSED		10/24/2018 17:00	11/5/2018 14:09		L70816-4

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

Workgroup: WG160710 Semi Volatile Organics - SIM

MB:WG160710-1 Matrix: OTHR SOLID Listtype:ORBNASMS-SIM-QL Method:8270D-SIM Project: Pkey:STD  
(Method Blank)

Parameter	MDL	RDL	Units	MB Value	Qual
Benzyl Alcohol	6.67	16.7	ug/Kg		<QL
2,4-Dimethylphenol	3.33	6.67	ug/Kg		<QL
Benzoic Acid	66.7	167	ug/Kg		<QL
Hexachlorobutadiene	0.667	1.67	ug/Kg		<QL
Dimethyl Phthalate	6.67	16.7	ug/Kg		<QL
N-Nitrosodiphenylamine	3.33	6.67	ug/Kg		<QL
Hexachlorobenzene	0.333	0.667	ug/Kg		<QL
Pentachlorophenol	33.3	66.7	ug/Kg		<QL

SB:WG160710-2 MB:WG160710-1 Matrix: OTHR SOLID Listtype:ORBNASMS-SIM-QL Method:8270D-SIM Project: Pkey:STD  
(Spike Blank, Method Blank)

Parameter	MDL	RDL	Units	MB Value	True Value	SB Value	% Rec.	Qual	Lab Limit
Benzyl Alcohol	6.67	16.7	ug/Kg	<QL	833	90.9	11	*	20--150
2,4-Dimethylphenol	3.33	6.67	ug/Kg	<QL	833	356	43		20--150
Benzoic Acid	66.7	167	ug/Kg	<QL	833	<QL	0	*	20--150
Hexachlorobutadiene	0.667	1.67	ug/Kg	<QL	833	407	49		20--150
Dimethyl Phthalate	6.67	16.7	ug/Kg	<QL	833	885	106		20--150
N-Nitrosodiphenylamine	3.33	6.67	ug/Kg	<QL	833	1050	126		20--150
Hexachlorobenzene	0.333	0.667	ug/Kg	<QL	833	692	83		20--150
Pentachlorophenol	33.3	66.7	ug/Kg	<QL	833	454	55		20--150

MSD:WG160710-4 MS:WG160710-3 L70816-1 Matrix: SALTWTRSED Listtype:ORBNASMS-SIM-QL Method:8270D-SIM Project:423368-210-1 Pkey:SED  
(Matrix Spike Duplicate, Matrix Spike)

Parameter	MDL	RDL	Units	SAMP Value	True Value	MS Value	% Rec.	Qual	Lab Limit	True Value	MSD Value	% Rec.	Qual	RPD	Qual	Lab Limit
Benzyl Alcohol	66.7	167	ug/Kg	<QL	833	133	16	*	20--150	833	85.9	10	*	43	*	0--35
2,4-Dimethylphenol	33.3	66.7	ug/Kg	<QL	833	886	106		20--150	833	798	96		11		0--35
Benzoic Acid	333	1670	ug/Kg	80.1	833	602	63		20--150	833	579	60		4		0--35
Hexachlorobutadiene	6.67	16.7	ug/Kg	<QL	833	434	52		20--150	833	405	49		7		0--35
Dimethyl Phthalate	66.7	167	ug/Kg	<QL	833	844	101		20--150	833	907	109		7		0--35
N-Nitrosodiphenylamine	33.3	66.7	ug/Kg	<QL	833	1010	121		20--150	833	1160	139		14		0--35
Hexachlorobenzene	3.33	6.67	ug/Kg	<QL	833	725	87		20--150	833	791	95		9		0--35
Pentachlorophenol	333	667	ug/Kg	<QL	833	345	41		20--150	833	337	40		2		0--35

# King County Environmental Laboratory QC Report

CSO Sed Charac., North Beach Seds, L70816, Sept 6, 2018

LD:WG160710-7 L70816-4 Matrix: SALTWTRSED Listtype:ORBNASMS-SIM-QL Method:8270D-SIM Project:423368-210-1 Pkey:SED  
(Lab Duplicate)

Parameter	MDL	RDL	Units	SAMP Value	LD Value	RPD	Qual	Lab Limit
Benzyl Alcohol	6.67	16.7	ug/Kg	<QL	<QL			0--35
2,4-Dimethylphenol	3.33	6.67	ug/Kg	<QL	<QL			0--35
Benzoic Acid	66.7	167	ug/Kg	77.9	101			0--35
Hexachlorobutadiene	0.667	1.67	ug/Kg	<QL	<QL			0--35
Dimethyl Phthalate	6.67	16.7	ug/Kg	<QL	<QL			0--35
N-Nitrosodiphenylamine	3.33	6.67	ug/Kg	<QL	<QL			0--35
Hexachlorobenzene	0.333	0.667	ug/Kg	<QL	<QL			0--35
Pentachlorophenol	33.3	66.7	ug/Kg	<QL	<QL			0--35

Surrogate: (Lab Limits)	2-Fluoro biphenyl 30--150	d14-Ter phenyl 30--150	d4-2- Chloro phenol 30--150
L70566-1	80	115	78
L70566-2	106	123	84
L70568-1	117	124	90
L70568-2	106	115	83
L70569-1	68	119	65
L70816-1	95	138	72
L70816-2	98	124	84
L70816-3	97	128	87
L70816-4	100	128	76
L70816-5	97	127	73
L70816-6	90	128	73
WG160710-1	27 *	49	25 *
WG160710-2	92	156 *	71
WG160710-3	90	152 *	80
WG160710-4	93	150	57
WG160710-7	97	133	73

## FSU Field Observations – WG159906

**Date:** 9/6/2018

**Reported By:** CB

**Sample #(s):** LL70816-1 through -6

**Project Name:** CSO Saltwater Seds

**Project Number:** 423368-210-1

**Field Personnel:** CB and AG

### Weather During Sampling Run

Precipitation	Precipitation totals	Temperature	Wind	Tide
<input checked="" type="checkbox"/> No precipitation <input type="checkbox"/> Sunny <input type="checkbox"/> Overcast <input type="checkbox"/> On and off rain <input type="checkbox"/> Light Rain <input type="checkbox"/> Steady Rain <input type="checkbox"/> Heavy Rain <input type="checkbox"/> Snow <input type="checkbox"/> Other	<input checked="" type="checkbox"/> No precipitation <input type="checkbox"/> Trace <input type="checkbox"/> 0 - .25in <input type="checkbox"/> .25 - .50 in <input type="checkbox"/> .50 - .75 in <input type="checkbox"/> .75 - 1.0 in <input type="checkbox"/> Above 1.0 in	<input type="checkbox"/> 20°s <input type="checkbox"/> 30°s <input type="checkbox"/> 40°s <input type="checkbox"/> 50°s <input checked="" type="checkbox"/> 60°s <input type="checkbox"/> 70°s <input type="checkbox"/> 80°s <input type="checkbox"/> 90°s	<input type="checkbox"/> No wind <input checked="" type="checkbox"/> 0 – 5 knots <input type="checkbox"/> 5 - 10 knots <input type="checkbox"/> 10 - 15 knots <input type="checkbox"/> 15 - 20 knots <input type="checkbox"/> 20 - 25 knots <input type="checkbox"/> Above 25 knots <input type="checkbox"/> Variable to <input checked="" type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> E <input type="checkbox"/> W	<input type="checkbox"/> NA <input checked="" type="checkbox"/> Ebbing <input type="checkbox"/> Flooding <input type="checkbox"/> High tide <input checked="" type="checkbox"/> Low Tide <input type="checkbox"/> Slack

**Additional comments:**

Arrived on site at low tide- started flooding as we sampled.

### Recent weather or conditions that may influence on water quality/quantity:

Precipitation	Precipitation totals	Temperature	Wind	Tide
<input checked="" type="checkbox"/> No precipitation <input type="checkbox"/> Sunny <input type="checkbox"/> Overcast <input type="checkbox"/> On and off rain <input type="checkbox"/> Light Rain <input type="checkbox"/> Steady Rain <input type="checkbox"/> Heavy Rain <input type="checkbox"/> Snow <input type="checkbox"/> Other	<input checked="" type="checkbox"/> No precipitation <input type="checkbox"/> Trace <input type="checkbox"/> 0 - .25in <input type="checkbox"/> .25 - .50 in <input type="checkbox"/> .50 - .75 in <input type="checkbox"/> .75 - 1.0 in <input type="checkbox"/> Above 1.0 in	<input type="checkbox"/> 20°s <input type="checkbox"/> 30°s <input type="checkbox"/> 40°s <input type="checkbox"/> 50°s <input checked="" type="checkbox"/> 60°s <input type="checkbox"/> 70°s <input checked="" type="checkbox"/> 80°s <input type="checkbox"/> 90°s	<input type="checkbox"/> No wind <input type="checkbox"/> 0 – 5 knots <input type="checkbox"/> 5 - 10 knots <input checked="" type="checkbox"/> 10 - 15 knots <input type="checkbox"/> 15 - 20 knots <input type="checkbox"/> 20 - 25 knots <input type="checkbox"/> Above 25 knots <input type="checkbox"/> Variable to <input type="checkbox"/> N <input type="checkbox"/> S <input type="checkbox"/> E <input type="checkbox"/> W	<input checked="" type="checkbox"/> NA <input type="checkbox"/> Ebbing <input type="checkbox"/> Flooding <input type="checkbox"/> High tide <input type="checkbox"/> Low Tide <input type="checkbox"/> Slack

**Additional comments:**

Dry over the past few days. North winds 10-15 daily.

**Specific observations that may affect results:**

**Algae Bloom Observed**

☐ Yes ☒ No

**Type:**

- ☐ Flecks  
☐ Thin Film  
☐ Thick Scum  
☐ Small Clumps  
☐ Filamentous Green Algae

	<input type="checkbox"/> Marine  <b>Location:</b>
--	---

<b>Equipment used for sampling:</b> Stainless spoons, bowls.	<b>Issues:</b> None    <b>Specific settings:</b>
---	--

<b>Equipment used for field analysis:</b> Android phone GPS.	<b>Issues:</b> None    <b>Specific settings:</b>
---	---

<b>Other observations:</b> Access was through park. Needed WTD to let us in both sets of gates. Sample L70816-3 (NB_MLLW_L) had to be shifted out of creek. Still within 6 meters of prescribed locator.
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## Trace Metals Data Anomaly Form

Date(s) Occurred: 9/24/18

WG #(s): WG160102

☐ All samples in WKGP(s) or ☒ Sample #(s): WG160102-7

Project #(s): 423368-210-1

Matrix: ☐ Liquid ☒ Solid ☒ QA1 ☐ QA2 ☐ Tissue ☐ Calibration ☐ Other:

### I. Analysis/Digestion

☒ Total ☐ TCLP ☐ Other:  
☐ Dissolved ☐ SEM ☐ Subcontracted:

### II. Instrument

CVAA-Mercury (☐ M-7500B ☐ M-7500J)  
ICP (☒ iCAP 7400)

CVAF-Mercury ☐  
ICP-MS (☐ XII-E ☐ X II-O ☐ PE)

### III. Type of Sample/Analytical Anomaly

- ☐ Method Blank (MB) Contamination
- ☐ Spiked Blank (SB) Recoveries
- ☐ Matrix Spike/Matrix Spike Duplicate (MS/MSD) Recoveries
- ☐ MS/MSD Relative Percent Difference (RPD)
- ☐ Sample/Lab Duplicate (LD) RPD
- ☒ Laboratory Control Sample/Standard Reference Material (LCS/SRM) Recoveries  
☒ Certified values developed by a method other than that which was used for the analysis.
- ☐ Internal Standard (ISTD) Recoveries
- ☐ Elements over range:
- ☐ Field Blank, Equipment Blank or Field/Lab Filter Blank Contamination.
- ☐ Holding time exceeded by:
- ☐ Insufficient sample amount.
- ☐ Inappropriate storage, container, or preservation.
- ☐ Other

**Anomaly Description:** 6) Standard Reference Material PACS3 (WG160102-7) was outside the acceptance limits of 80-120% for Cadmium (Cd) at 126% and Chromium (Cr) at 50%.

### IV. Type of Project Anomaly

- ☐ SAP/Work Plan specified MDLs not met.
- ☐ SAP/Work Plan specified QC frequency or QC type not met.
- ☐ SAP/Work Plan specified methodology not used.
- ☐ Sample exceeds regulatory and/or hazardous waste limits.



- ☐ Sample data results are unusual or inconsistent with expected results.  
☐ Other

**Anomaly Description:**

**V. Corrective Action Taken**

- |  |  |
|--|--|
| <input type="checkbox"/> Sample(s) re-analyzed                                 | <input type="checkbox"/> Sample(s) re-prepared and re-analyzed   |
| <input checked="" type="checkbox"/> Sample(s) reported "AS IS"                 | <input type="checkbox"/> Post Digestion Spike(s) (PDS) performed |
| <input type="checkbox"/> Exposure Deleted                                      | <input type="checkbox"/> Serial Dilution(s) (SD) performed       |
| <input checked="" type="checkbox"/> Data qualified with the following flags: * |  |
| <input type="checkbox"/> Other   |  |

**Corrective Action Description:** *6) Two LCS of known concentration (ERA Soil) were digested along with the samples to show that there were no systematic precision problems with the method. The recovery of both LCS were within lab control limits for all reported elements. All elements reported for PACS3 that are outside the 80-120% limits are qualified with an "\*" on the Lab QC Report.*

**VI. Potential Effects on Data Quality** (explanation mandatory):

*6) The certified values published for PACS3 were developed by different methods than the methods used by KCEL to analyze these samples. Insufficient data exists to control chart the applicable data to develop more appropriate control limits. We may not be able to quantify Cd and Cr within acceptance limits for this SRM.*

	Signatures	Signature Dates
<b>Reported By:</b> David Chin		
<b>Reviewer:</b> Anthony Ocana	_____	_____
<b>Supervisor:</b> Kevin Cummings	_____	_____
<b>QA Officer:</b> Colin Elliott (For QA1 only)	_____	_____
<b>cc: LPM:</b> Fritz Grothkopp		

## Conventional Data Anomaly Form

Date(s) Occurred: *10/01/18*

WG #(s): *WG160275*

☒ All samples in WKGP(s) or ☐ Sample #(s):

Project #(s): *423368*

Matrix: ☐ Liquid ☒ Solid ☐ Air ☐ Tissue ☐ Calibration ☐ Other:

### I. Analysis

- ☐ Anions:
- ☐ Chlorophylls:
- ☐ Cyanides:
- ☐ Demands:
- ☐ Nutrients:
- ☒ Particle Size Distribution: *Silt and Clay Categories*
- ☐ Physicals:
- ☐ Solids:
- ☐ Subcontract:
- ☐ Sulfide:
- ☐ Other:

### II. Instrument

- Analytical Balance: ☐ Mettler Toledo XP205 ☐ Ohaus Voyager Pro  
☐ Mettler Toledo AT201
- Autoanalyzer: ☐ Astoria2+2 (CONNUTS1) ☐ Astoria2+2 (CONNUTS3)  
☐ Astoria2 (total nutrients system) ☐ Astoria2 (cyanide/TKN system)
- Autotitrator: ☐ Metrohm Tiamo 855 Autotitrator with integrated 712 Conductometer
- Dissolved Oxygen: ☐ Metrohm 888 Titrando ☐ YSI 5100 ☐ Brinkmann Bottletop Buret 25
- Fluorometer: ☐ Turner 10-AU
- Ion Chromatography: ☐ Metrohm 882
- Laser PSD: ☐ Malvern Mastersizer 2000
- pH Probe: ☐ Metrohm 736GP ☐ Hach SensION MM340
- Salinometer: ☐ Portosal 8410A
- Spectrophotometer: ☐ Hitachi U3900 UV/VIS  
☐ Hach DR 2800
- TOC Analyzer: ☐ Skalar Formacs HT ☐ Skalar Primacs SLC
- Turbidimeter: ☐ Hach 2100AN
- Other: ☒ Description: *PSD-Hydrometer*

### III. Type of Sample/Analytical Anomaly

- ☒ Values Outside of Control Limits:
- |   |   |   |
|---|---|---|
| <sup>1</sup> <input type="checkbox"/> Initial Calibration           | <sup>4</sup> <input type="checkbox"/> MB Anomaly                  | <sup>7</sup> <input type="checkbox"/> MS RPD        |
| <sup>2</sup> <input type="checkbox"/> Continuing Calibration Checks | <sup>5</sup> <input type="checkbox"/> LCS/SRM Recoveries          | <sup>8</sup> <input type="checkbox"/> Sample/LD RPD |
| <sup>3</sup> <input type="checkbox"/> SB Spike Recoveries           | <sup>6</sup> <input checked="" type="checkbox"/> Sample/LD/LT RSD | <sup>9</sup> <input type="checkbox"/> MS Recoveries |
- <sup>10</sup> ☐ Holding time exceeded by:  
<sup>11</sup> ☐ Insufficient sample amount.  
<sup>12</sup> ☐ Inappropriate storage, container or preservation.  
☐ Other

**Anomaly Description:** *The laboratory triplicate (LT) analysis for particle size distribution (PSD) on sample L70816-4 had a percent relative standard deviation (% RSD) of 87% for the Silt category and 42% for the Clay category, exceeding the 20% acceptance limits. The Silt category represented a small fraction (0 to 1.1%) of the overall sample mass associated with sample L70816-4. And the Clay category represented a small fraction (1.1 to 2.2%) of the overall sample mass associated with sample L70816-4. Variability due to the low contribution of these categories is the probable cause.*

### IV. Type of Project Anomaly

- ☐ SAP/Work Plan specified MDLs not met.  
☐ SAP/Work Plan specified QC frequency or QC type not met.  
☐ SAP/Work Plan specified methodology not used.  
☐ Sample exceeds regulatory and/or hazardous waste limits.  
☐ Sample data results are unusual or inconsistent with expected results.  
☐ Other

**Anomaly Description:**

### V. Corrective Action Taken

- ☐ Sample(s) re-analyzed ☐ Sample(s) re-prepared and re-analyzed  
☒ Sample(s) reported "AS IS"  
☒ Data qualified with the following flags: J,\*  
☐ Text added:  
☐ Other

**Corrective Action Description:** *No reanalysis was performed because the individual Silt and Clay categories represented less than 10% of the overall sample mass. The Silt and Clay categories for sample L70816-4 and its associated matrix QC were each reported with the "J" qualifier to identify these data as estimated values based on the high category % RSD value for L70816-4LD (WG160275-1) and L70816-4LT (WG160275-2). The Silt and Clay categories for all samples were "J" qualified as they were the same consistency as sample L70816-4.*

**VI. Potential Effects on Data Quality** (explanation mandatory): *The Silt and Clay categories represented a relatively small fraction of the sample mass for the matrix QC sample included in this batch. The high % RSD associated with these categories for L70816-4 does not affect the quality of the data. Inherent variability at low levels can be expected in the method. In these instances, a high % RSD does not necessarily indicate poor precision or poor method performance. In the case of this sample, the QC data suggest that the Silt and Clay categories represent too small a fraction of the overall sample constituency to be considered appropriate for evaluation against a 20% control window.*

	Signatures	Signature Dates
<b>Reported By:</b> <i>Duc Nguyen</i>	_____	_____
<b>Reviewer:</b> <i>Casey Maggart</i>	_____	_____
<b>Supervisor:</b> <i>Brian Prosch</i>	_____	_____
<b>QA Officer:</b> <i>Colin Elliott</i> (For QA1 only)	_____	_____
<b>cc: LPM:</b> <i>Fritz Grothkopp</i>		

# Trace Organics Data Anomaly Form

Date(s) Occurred: *10/31/2018*

WG #(s): *160709*

☒ All samples in WKGP(s) or ☐ Sample #(s):

Project #(s): *423660-200, 423589-340-4, 423368-210-1*

Matrix: ☒ Liquid ☐ Solid ☐ Air ☐ Tissue ☐ Calibration ☐ Other:

## I. Analysis/Extraction

- |  |                                   |                                   |                                     |
|--|-----------------------------------|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> BNA                             | <input type="checkbox"/> BNALL    | <input type="checkbox"/> EDC      | <input type="checkbox"/> EDC-LVI    |
| <input type="checkbox"/> CLPESTPCB                       | <input type="checkbox"/> PEST     | <input type="checkbox"/> PCB      | <input type="checkbox"/> OPPEST     |
| <input type="checkbox"/> VOA-GCMS                        | <input type="checkbox"/> NWTPH-GX | <input type="checkbox"/> NWTPH-DX | <input type="checkbox"/> NWTPH-HCID |
| <input type="checkbox"/> BUTYL TIN                       | <input type="checkbox"/> HERB     | <input type="checkbox"/> CEC      |                                     |
| <input checked="" type="checkbox"/> Other: <i>BNASMS</i> |                                   |                                   |                                     |
| <input type="checkbox"/> Subcontracted:                  |                                   |                                   |                                     |

## II. Instrument

- LC/MS/MS: ☐ 6460QqQ
- GC/MS: ☐ A ☐ E ☐ F ☒ G ☐ H ☐ I ☐ J
- GC ECD: ☐ B ☐ C
- GC FID: ☐ D ☐ Q TCD/ECD
- Extraction/Cleanup: ☐ PFE ☐ GPC
- ☐ Other:

## III. Type of Sample/Analytical Anomaly

- ☒ Values Outside of Control Limits:
- |  |  |
|--|--|
| 1 <input type="checkbox"/> Blank Contamination     | 8 <input checked="" type="checkbox"/> Surrogate Spike Recoveries |
| 2 <input type="checkbox"/> SB/SBD Spike Recoveries | 9 <input type="checkbox"/> SB/SBD RPD                            |
| 3 <input type="checkbox"/> MS/MSD Spike Recoveries | 10 <input type="checkbox"/> MS/MSD RPD                           |
| 4 <input type="checkbox"/> LCS/SRM Recoveries      | 11 <input type="checkbox"/> Sample/LD RPD                        |
| 5 <input type="checkbox"/> Initial Calibration     | 12 <input type="checkbox"/> Continuing Calibration Checks        |
| 6 <input type="checkbox"/> Performance Checks      | 13 <input type="checkbox"/> Tuning Criteria                      |
| 7 <input type="checkbox"/> ISTD %Differences       | 14 <input type="checkbox"/> Interferences in Sample Matrix       |
- 15 ☐ Holding time exceeded by:
- 16 ☐ Insufficient sample amount.
- 17 ☐ Inappropriate storage, container or preservation.
- 18 ☐ Other

### Anomaly Description:

*8. 2 of 72 surrogate spikes exceed QC Lab Limits.*

#### IV. Type of Project Anomaly

- ☐ SAP/Work Plan specified MDLs not met.
- ☐ SAP/Work Plan specified QC frequency or QC type not met.
- ☐ SAP/Work Plan specified methodology not used.
- ☐ Sample exceeds regulatory and/or hazardous waste limits.
- ☐ Sample data results are unusual or inconsistent with expected results.
- ☐ Other

#### Anomaly Description:

#### V. Corrective Action Taken

- ☐ Sample(s) re-analyzed
- ☒ Sample(s) reported "AS IS"
- ☐ Sample(s) Diluted
- ☐ Data qualified with the following flags:
- ☐ Other
- ☐ Sample(s) re-prepared and re-analyzed
- ☒ Asterisk(s) applied to QC Report outlier(s)

#### Corrective Action Description:

*8. The compounds were asterisked in the Lab QC Report.*

#### VI. Potential Effects on Data Quality (mandatory):

*8. Samples can be reported with no further qualification.*

	Signatures	Signature Dates
<b>Reported By:</b> Colin McKean		
<b>Reviewer:</b> Mike Doubrava		
<b>Supervisor:</b> Michael Doubrava		
<b>QA Officer:</b> <i>Colin Elliott</i> (For QA1 only)		
<b>cc: LPM:</b> Fritz Grothkopp		

# Trace Organics Data Anomaly Form

Date(s) Occurred: *11/05/2018*

WG #(s): *160710*

☒ All samples in WKGP(s) or ☐ Sample #(s):

Project #(s): *423660-200, 423589-340-4, 423368-210-1*

Matrix: ☒ Liquid ☐ Solid ☐ Air ☐ Tissue ☐ Calibration ☐ Other:

## I. Analysis/Extraction

- |  |                                   |                                   |                                     |
|--|-----------------------------------|-----------------------------------|-------------------------------------|
| <input type="checkbox"/> BNA                             | <input type="checkbox"/> BNALL    | <input type="checkbox"/> EDC      | <input type="checkbox"/> EDC-LVI    |
| <input type="checkbox"/> CLPESTPCB                       | <input type="checkbox"/> PEST     | <input type="checkbox"/> PCB      | <input type="checkbox"/> OPPEST     |
| <input type="checkbox"/> VOA-GCMS                        | <input type="checkbox"/> NWTPH-GX | <input type="checkbox"/> NWTPH-DX | <input type="checkbox"/> NWTPH-HCID |
| <input type="checkbox"/> BUTYL TIN                       | <input type="checkbox"/> HERB     | <input type="checkbox"/> CEC      |                                     |
| <input checked="" type="checkbox"/> Other: <i>BNASMS</i> |                                   |                                   |                                     |
| <input type="checkbox"/> Subcontracted:                  |                                   |                                   |                                     |

## II. Instrument

- LC/MS/MS: ☐ 6460QqQ
- GC/MS: ☐ A ☐ E ☐ F ☒ G ☐ H ☐ I ☐ J
- GC ECD: ☐ B ☐ C
- GC FID: ☐ D ☐ Q TCD/ECD
- Extraction/Cleanup: ☐ PFE ☐ GPC
- ☐ Other:

## III. Type of Sample/Analytical Anomaly

- ☒ Values Outside of Control Limits:
- |   |  |
|---|--|
| 1 <input type="checkbox"/> Blank Contamination                | 8 <input checked="" type="checkbox"/> Surrogate Spike Recoveries |
| 2 <input checked="" type="checkbox"/> SB/SBD Spike Recoveries | 9 <input type="checkbox"/> SB/SBD RPD                            |
| 3 <input checked="" type="checkbox"/> MS/MSD Spike Recoveries | 10 <input checked="" type="checkbox"/> MS/MSD RPD                |
| 4 <input type="checkbox"/> LCS/SRM Recoveries                 | 11 <input type="checkbox"/> Sample/LD RPD                        |
| 5 <input type="checkbox"/> Initial Calibration                | 12 <input type="checkbox"/> Continuing Calibration Checks        |
| 6 <input type="checkbox"/> Performance Checks                 | 13 <input type="checkbox"/> Tuning Criteria                      |
| 7 <input type="checkbox"/> ISTD %Differences                  | 14 <input type="checkbox"/> Interferences in Sample Matrix       |
- 15 ☐ Holding time exceeded by:
- 16 ☐ Insufficient sample amount.
- 17 ☐ Inappropriate storage, container or preservation.
- 18 ☐ Other

### Anomaly Description:

*2. WG160710-2 SB had 2 of 8 spiked compounds exceed QC Lab Limits.*

*3. WG160710-3 MS and WG160710-4 MSD had 2 of 16 compounds exceed QC Lab Limits.*

*8. 4 of 48 surrogate spikes exceed QC Lab Limits.*

*10. 1 of 8 MS/MSD %RPD's exceed QC Lab Limits.*

#### **IV. Type of Project Anomaly**

- ☐ SAP/Work Plan specified MDLs not met.
- ☐ SAP/Work Plan specified QC frequency or QC type not met.
- ☐ SAP/Work Plan specified methodology not used.
- ☐ Sample exceeds regulatory and/or hazardous waste limits.
- ☐ Sample data results are unusual or inconsistent with expected results.
- ☐ Other

#### **Anomaly Description:**

#### **V. Corrective Action Taken**

- ☐ Sample(s) re-analyzed
- ☒ Sample(s) reported "AS IS"
- ☐ Sample(s) Diluted
- ☒ Data qualified with the following flags: *JG, <QL,J*
- ☐ Other
- ☐ Sample(s) re-prepared and re-analyzed
- ☒ Asterisk(s) applied to QC Report outlier(s)

#### **Corrective Action Description:**

*2. The compounds were asterisked on the Lab QC Report.*

*3. The compounds were asterisked on the Lab QC Report.*

*8. The compounds were asterisked in the Lab QC Report.*

*10. The compounds were asterisked in the Lab QC Report.*

#### **VI. Potential Effects on Data Quality (mandatory):**

*2,3. Due to low recoveries in the SB/MS/MSD, Benzyl Alcohol was flagged "JG".*

*8. Samples can be reported with no further qualification.*

*10. Samples can be reported with no further qualification.*

*Sample results qualified with a "<QL, J" flag indicate that the sample result was detectable but below the QL value for the sample.*



	Signatures	Signature Dates
<b>Reported By:</b> Colin McKean		
<b>Reviewer:</b> Mike Doubrava		
<b>Supervisor:</b> Michael Doubrava		
<b>QA Officer:</b> <i>Colin Elliott</i>		
(For QA1 only)		
<b>cc: LPM:</b> Fritz Grothkopp		