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ANCHOR QEA

Data Memorandum

January 8, 2019

To: Mike Brose and Bryan Lust, Kimberly-Clark Corporation

From: Nathan Soccorsy and Clay Patmont, Anchor QEA, LLC

cc: Steve Germiat, Aspect Consulting

Re: Everett East Waterway Combined Sewer Overflow Solids Sampling Data Memorandum

This data memorandum summarizes sampling and analysis of combined sewer overflow (CSO) conveyance solids in the lower portion of the City of Everett (City) CSO Puget Sound Outfall Number 4 (PS04) conveyance system. Prior to fall 2018, PS04 wastewaters were routed under the Kimberly-Clark Worldwide, Inc. (KC), property and into the Everett East Waterway (Figure 1). The City recently decommissioned the KC conveyance, rerouting PS04 wastewaters south along an alignment west of the railroad right-of-way into the adjacent PS05 system.

The data summarized in this memorandum were obtained as part of the remedial investigation/feasibility study (RI/FS) of the East Waterway Site in Everett, Washington, under Agreed Order DE 11350 between the Washington State Department of Ecology (Ecology), KC, and other potentially liable parties. All activities were performed in accordance with the Ecology-approved Sampling and Quality Assurance Project Plan (SQAPP; Anchor QEA 2018).

Sampling of PS04 conveyance solids was conducted on September 26, 2018, during relatively low-tide conditions in accordance with the SQAPP, as modified in the field following Ecology consultation. The sampling team was composed of Anchor QEA and KC staff with oversight from Ecology and support from the City. The City's consultant, Floyd|Snider, observed the sampling and collected split samples for separate physical and chemical testing that are not included in this data memorandum. All sample collection was conducted from the surface with a decontaminated stainless-steel container attached to a telescoping rod.

Following a review of health, safety, and sampling procedures, the sampling team mobilized to the first sampling station SMHQ03, located within the railroad right-of-way (Figure 1). City staff opened the bolted structure cover. The approximately 12-foot-deep structure was half filled with water. Probing with the telescoping rod revealed the structure did not contain significant accumulation of sediments suitable for sampling.

In accordance with the SQAPP, the sampling team re-mobilized to the next downgradient structure on the KC property, station SMHQ01 (Figure 1). While the conveyance channel did not contain sediment accumulations, sandy sediments suitable for sampling were identified on the southern ledge of the structure. Similar granular material was found on ledges in the two, additional accessible

downgradient structures, SMHQ16 and SMHP02. While it had not rained for several days prior to the sampling event, the SMHQ16 structure was partially filled with water. Evaluation of the upgradient and downgradient structures suggested that there was an obstruction in the downgradient pipe that impeded flow. The observation is consistent with historical City notations of solids accumulation in that pipe segment. Observations during sampling are summarized in Figure 1 from field forms included in Attachment 1.

The samples were submitted for physical and chemical testing in accordance with the SQAPP. Laboratory reports and data validation reports are included as Attachments 2 and 3, respectively. All data are suitable for use as qualified by the validator.

Validated PS04 conveyance solid data are summarized in Table 1. In general, the samples did not contain any measurable fines (clay and silt fractions) and were classified as gravelly sands with relatively low total organic carbon content (less than 0.5% by dry weight). While these coarse-grained sediment data are not representative of characteristic organic-rich wastewater solids transported through the CSO conveyance system(s), these data may nevertheless be useful for source control and recontamination assessments when used in combination with other information to be collected during the RI/FS (e.g., wastewater suspended sediments collected during overflow events). The details of future data collection efforts will be developed as part of the forthcoming Everett East Waterway RI/FS Work Plan.

References

Anchor QEA (Anchor QEA, LLC), 2018. *Sampling and Quality Assurance Project Plan*. Everett East Waterway PSO4 Combined Sewer Overflow Characterization. Prepared for Kimberly-Clark Corporation. August 2018.

Table

Table 1
Everett East Waterway PSO4 Solids Results

	Task	EEW2018	EEW2018	EEW2018	EEW2018
	Location ID	SMHPO2_2018	SMHQ01_2018	SMHQ16_2018	SMHQ16_2018
	Sample ID	KC-S-SMHP02-180926	KC-S-SMHQ01-180926	KC-S-SMHQ116-180926	KC-S-SMHQ16-180926
	Sample Date	9/26/2018	9/26/2018	9/26/2018	9/26/2018
	Sample Type	N	N	FD	N
	Matrix	CSO Solids	CSO Solids	CSO Solids	CSO Solids
	X	1301136.943	1301930.414	1301701.454	1301701.454
	Y	362175.789	362184.828	362127.123	362127.123
Conventional Parameters (pct)					
Total organic carbon	SW9060A	**0.45**	**0.17**	--	**0.28**
Total Solids	SM2540G	**74.83**	**82.7**	--	**73.51**
Grain Size (pct)					
Gravel	PSEP-PS	**15.9**	**23.4**	--	**2.7**
Sand, very coarse	PSEP-PS	**10.3**	**14.1**	--	**9.9**
Sand, coarse	PSEP-PS	**25.5**	**23.8**	--	**31.7**
Sand, medium	PSEP-PS	**29.4**	**27.8**	--	**43.7**
Sand, fine	PSEP-PS	**12.5**	**9.3**	--	**10.2**
Sand, very fine	PSEP-PS	**4.2**	**1**	--	**1.1**
Silt, coarse	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Silt, medium	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Silt, fine	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Silt, very fine	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Clay, coarse	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Clay, medium	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Clay, fine	PSEP-PS	2.2 U	0.6 U	--	0.7 U
Metals (mg/kg)					
Arsenic	SW6020A	**5.86**	**3.45**	--	**2.95**
Cadmium	SW6020A	**0.09 J**	**0.1 J**	--	**0.09 J**
Chromium	SW6020A	**40.7**	**24.5 J**	--	**36.7 J**
Lead	SW6020A	**25.9**	**697**	--	**11.5**
Mercury	SW7471B	**0.0587**	**0.103**	--	0.0265 U
Silver	SW6020A	**0.04 J**	**0.07 J**	--	**0.04 J**
Zinc	SW6020A	**84.4**	**101**	--	**65**
Semivolatile Organics (µg/kg)					
1,2,4-Trichlorobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
1,2,4-Trichlorobenzene	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
1,2-Dichlorobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
1,2-Dichlorobenzene	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
1,3-Dichlorobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
1,3-Dichlorobenzene	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
1,4-Dichlorobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
1,4-Dichlorobenzene	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
2,2'-Oxybis (1-chloropropane)	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
2,4,5-Trichlorophenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2,4,6-Trichlorophenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2,4-Dichlorophenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2,4-Dimethylphenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 UJ
2,4-Dimethylphenol	SW8270DSIM	24.3 U	24.4 U	24.2 U	24.1 UJ
2,4-Dinitrophenol	SW8270D	194 UJ	195 UJ	194 UJ	193 UJ
2,4-Dinitrotoluene	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2,6-Dinitrotoluene	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2-Chloronaphthalene	SW8270DSIM	0.5 U	4.89 U	0.47 U	0.47 U
2-Chlorophenol	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
2-Methylphenol (o-Cresol)	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
2-Methylphenol (o-Cresol)	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
2-Nitroaniline	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
2-Nitrophenol	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
3,3'-Dichlorobenzidine	SW8270D	97.1 U	97.7 UJ	96.9 U	96.5 UJ
3-Nitroaniline	SW8270D	97.1 U	97.7 U	96.9 U	96.5 UJ
4-Bromophenyl-phenyl ether	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
4-Chloro-3-methylphenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
4-Chloroaniline	SW8270D	97.1 U	97.7 U	96.9 U	96.5 UJ
4-Chlorophenyl phenyl ether	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
4-Methylphenol (p-Cresol)	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
4-Methylphenol (p-Cresol)	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U
4-Nitroaniline	SW8270D	97.1 U	97.7 U	96.9 U	96.5 UJ
4-Nitrophenol	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
Benzoic acid	SW8270D	194 U	195 U	194 U	193 U
Benzoic acid	SW8270DSIM	**66.7 J**	**55.9 J**	**58 J**	**37.5 J**
Benzyl alcohol	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Benzyl alcohol	SW8270DSIM	19.4 U	19.5 U	19.4 U	19.3 U
bis(2-Chloroethoxy)methane	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
bis(2-Chloroethyl)ether	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
bis(2-Ethylhexyl)phthalate	SW8270D	**108**	**52.8**	**80.6**	**96**
Butylbenzyl phthalate	SW8270D	**17.9 J**	19.5 U	**9.4 J**	**8.3 J**
Butylbenzyl phthalate	SW8270DSIM	**15.2**	**5.4**	**6.3**	**6.2**
Dibenzofuran	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Diethyl phthalate	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Diethyl phthalate	SW8270DSIM	19.4 U	19.5 U	19.4 U	19.3 U
Dimethyl phthalate	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Dimethyl phthalate	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 U

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	X	1301136.943	1301930.414	1301701.454	1301701.454
	Y	362175.789	362184.828	362127.123	362127.123
Di-n-butyl phthalate	SW8270D	**9.9 J**	**16.3 J**	**11.2 J**	**13.8 J**
Dinitro-o-cresol (4,6-Dinitro-2-methylphenol)	SW8270D	194 U	195 U	194 U	193 U
Di-n-octyl phthalate	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Hexachlorobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Hexachlorocyclopentadiene	SW8270D	97.1 U	97.7 U	96.9 U	96.5 U
Hexachloroethane	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Isophorone	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Nitrobenzene	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
n-Nitrosodimethylamine	SW8270D	38.8 U	39.1 U	38.7 U	38.6 UJ
n-Nitrosodimethylamine	SW8270DSIM	24.3 U	24.4 U	24.2 U	24.1 U
n-Nitrosodi-n-propylamine	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
n-Nitrosodi-n-propylamine	SW8270DSIM	19.4 U	19.5 U	19.4 U	19.3 U
n-Nitrosodiphenylamine	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
n-Nitrosodiphenylamine	SW8270DSIM	4.9 U	4.9 U	4.8 U	4.8 UJ
Pentachlorophenol	SW8270D	97.1 UJ	97.7 UJ	96.9 UJ	96.5 UJ
Pentachlorophenol	SW8270DSIM	**5.7 J**	**4.4 J**	**6.3 J**	**3.9 J**
Phenol	SW8270D	19.4 U	19.5 U	19.4 U	19.3 U
Phenol	SW8270DSIM	**5.4**	**5.9**	**5.6**	**6.3**
Polycyclic Aromatic Hydrocarbons (µg/kg)					
1-Methylnaphthalene	SW8270DSIM	**1.3**	**2.48 J**	**0.71**	**1.05**
1-Methylphenanthrene	SW8270DSIM	**1.91**	**5.53**	**1.29**	**1.69**
2,3,5-Trimethylnaphthalene (1,6,7-Trimethylnaphthalene)	SW8270DSIM	**0.37 J**	4.89 U	**0.18 J**	**0.59**
2,6-Dimethylnaphthalene	SW8270DSIM	**1.42**	4.89 U	**0.56**	**0.99**
2-Methylnaphthalene	SW8270DSIM	**2.94**	**4.52 J**	**1.32**	**1.65**
Acenaphthene	SW8270DSIM	**0.5**	**4.16 J**	**0.47 J**	**1.49**
Acenaphthylene	SW8270DSIM	**1.36**	4.89 U	**0.75**	**0.81**
Anthracene	SW8270DSIM	**2.18**	**12.7**	**2.37**	**2.49**
Benzo(a)anthracene	SW8270DSIM	**6**	**39.6**	**11.4**	**3.78**
Benzo(a)pyrene	SW8270DSIM	**8.04**	**36.6**	**9.12**	**3.21**
Benzo(b)fluoranthene	SW8270DSIM	**8.85**	**23.4**	**9.83**	**4.59**
Benzo(e)pyrene	SW8270DSIM	**10.2**	**24.5**	**8.58**	**4.83**
Benzo(g,h,i)perylene	SW8270DSIM	**14.7**	**23.6**	**9.78**	**7.09**
Benzo(j)fluoranthene	SW8270DSIM	**3.31**	**16.2**	**4.26**	**1.65**
Benzo(k)fluoranthene	SW8270DSIM	**3.8**	**17.5**	**5.03**	**1.87**
Biphenyl (1,1'-Biphenyl)	SW8270DSIM	**0.92**	4.89 U	**0.42 J**	**0.6**
Carbazole	SW8270DSIM	**1.22**	**5.29**	**1.3**	**0.85**
Chrysene	SW8270DSIM	**9.76**	**43.1**	**13.1**	**7.18**
Dibenzo(a,h)anthracene	SW8270DSIM	**1.92**	**4.56 J**	**1.75**	**0.75**
Dibenzothiophene	SW8270DSIM	**0.75**	**10.4**	**0.58**	**0.9**
Fluoranthene	SW8270DSIM	**13.4**	**70.8**	**20.2**	**16**
Fluorene	SW8270DSIM	**1.17**	**3.21 J**	**0.72**	**1.9**
Indeno(1,2,3-c,d)pyrene	SW8270DSIM	**6.56**	**17.7**	**5.45**	**2.77**
Naphthalene	SW8270DSIM	**7.11**	**5 J**	**2.62**	**3.28**
Phenanthrene	SW8270DSIM	**11.3**	**40.9**	**8.58**	**11.3 J**
Pyrene	SW8270DSIM	**13.3**	**69**	**17.2**	**13.5**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)		**10.8506**	**47.307 J**	**12.597**	**4.6578**
Total Benzofluoranthenes (b,j,k) (U = 0)		**15.96**	**57.1**	**19.12**	**8.11**
Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)		**10.8506**	**47.307 J**	**12.597**	**4.6578**
Total HPAH (SMS) (U = 0)		**89.64**	**362.06 J**	**107.12**	**62.39**
Total LPAH (SMS) (U = 0)		**23.62**	**65.97 J**	**15.51 J**	**21.27 J**
Pesticides (µg/kg)					
Hexachlorobenzene	SW8081B	0.5 U	0.49 U	0.48 U	0.48 U
Hexachlorobutadiene (Hexachloro-1,3-butadiene)	SW8081B	0.5 U	0.49 U	0.48 U	0.48 U
Dioxin Furans (ng/kg)					
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B	**0.275 J**	**0.157 J**	0.047 U	**0.188 J**
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B	**1.25**	**0.378 J**	**0.587 J**	**0.494 J**
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B	**1.74**	**0.486 J**	**0.725 J**	**0.898 J**
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B	**3.77**	**1.95**	**1.51**	**2.55 J**
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B	**3.37**	**1.15**	**1.5**	**1.73**
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B	**90**	**39.3**	**39.5**	**74.3 J**
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	E1613B	**741**	**169**	**302**	**790 J**
Total Tetrachlorodibenzo-p-dioxin (TCDD)	E1613B	**8.9**	**2.64**	**2.85**	**5.82 J**
Total Pentachlorodibenzo-p-dioxin (PeCDD)	E1613B	**8.44**	**2.47**	**3.6**	**5.71 J**
Total Hexachlorodibenzo-p-dioxin (HxCDD)	E1613B	**34.5**	**14.3**	**13**	**25.6 J**
Total Heptachlorodibenzo-p-dioxin (HpCDD)	E1613B	**144**	**64.4**	**62.3**	**120 J**
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	E1613B	**7.27**	**0.414 J**	**0.261 J**	**0.23 J**
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B	**1.94**	**0.318 J**	0.997 U	0.996 UJ
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	E1613B	**0.791 J**	**0.176 J**	**0.15 J**	**0.173 J**
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B	**1.52**	**0.409 J**	**0.396 J**	**0.505 J**
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B	**0.821 J**	**0.153 J**	**0.397 J**	**0.411 J**
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	E1613B	**0.289 J**	**0.198 J**	**0.126 J**	**0.307 J**
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	E1613B	**1.19**	**0.206 J**	**0.567 J**	**0.674 J**

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	Y	362175.789	362184.828	362127.123	362127.123
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	E1613B	**19.4**	**3.31**	**8.63**	**13.1 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	E1613B	**1.41**	**0.173 J**	**0.506 J**	**0.75 J**
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	E1613B	**77**	**8.5**	**30.6**	**58.9 J**
Total Tetrachlorodibenzofuran (TCDF)	E1613B	**18.2**	**4.01**	**2.96**	**2.77 J**
Total Pentachlorodibenzofuran (PeCDF)	E1613B	**10.9**	**3.7**	**3.81**	**3.96**
Total Hexachlorodibenzofuran (HxCDF)	E1613B	**22.1**	**5.98**	**10**	**13.6 J**
Total Heptachlorodibenzofuran (HpCDF)	E1613B	**59.3**	**9.51**	**24.7**	**45.2 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 1/2)		**5.171 J**	**1.57502 J**	**1.804795 J**	**2.61551 J**
Total Dioxin/Furan TEQ 2005 (Mammal) (U = 0)		**5.171 J**	**1.57502 J**	**1.76634 J**	**2.60057 J**
PCB Congeners (ng/kg)					
PCB-001	E1668A	**0.807 J**	**1.84**	0.503 U	0.39 U
PCB-002	E1668A	**0.866 J**	**1.17 J**	**0.664 J**	0.363 U
PCB-003	E1668A	1.34 U	2.44 U	1.41 U	0.385 U
PCB-004	E1668A	**0.507 J**	**3.43**	**2.21**	**2.33**
PCB-005	E1668A	0.378 U	0.441 U	1.31 U	0.423 U
PCB-006	E1668A	0.312 U	**0.954**	1.08 U	0.349 U
PCB-007	E1668A	0.368 U	0.428 U	1.27 U	0.411 U
PCB-008	E1668A	**0.927**	**4.54**	**0.978**	**0.656 J**
PCB-009	E1668A	0.338 U	0.388 U	1.15 U	0.373 U
PCB-010	E1668A	0.362 U	0.42 U	0.595 U	0.369 U
PCB-011	E1668A	**32.5**	**91.1**	**27.6**	**26.9**
PCB-012/013	E1668A	0.378 U	0.434 U	1.29 U	0.417 U
PCB-014	E1668A	0.374 U	0.437 U	1.3 U	0.42 U
PCB-015	E1668A	**5.39**	**5.76**	**2.43**	**2.26**
PCB-016	E1668A	0.6 U	**4.91**	1.04 U	0.78 U
PCB-017	E1668A	**0.957 J**	**4.67**	1 U	**1.61 J**
PCB-018/030	E1668A	**1.36 J**	**8.63**	**2.88 J**	**2.79**
PCB-019	E1668A	**1.72**	**2.1 J**	**1.81**	**1.05 J**
PCB-020/028	E1668A	**4.68**	**11.7**	**4.47 J**	**4.18 J**
PCB-021/033	E1668A	**1.26 J**	**6.87**	1.43 U	**1.32 J**
PCB-022	E1668A	**1.18**	**3.63 J**	1.36 U	**0.995 J**
PCB-023	E1668A	0.493 U	0.821 U	1.55 U	0.711 U
PCB-024	E1668A	0.423 U	0.69 U	0.69 U	0.518 U
PCB-025	E1668A	0.407 U	0.65 U	1.22 U	0.563 U
PCB-026/029	E1668A	0.497 U	**2.01**	1.52 U	0.699 U
PCB-027	E1668A	**0.881 J**	0.727 U	0.726 U	0.545 U
PCB-031	E1668A	**2.58**	**9.46**	**2.8**	**2.54**
PCB-032	E1668A	**2.24**	**3.76**	**2.5**	**1.94**
PCB-034	E1668A	0.495 U	0.817 U	1.54 U	0.707 U
PCB-035	E1668A	**0.98 J**	0.824 U	1.55 U	0.714 U
PCB-036	E1668A	0.417 U	0.695 U	1.31 U	0.601 U
PCB-037	E1668A	**2.51 J**	**4.84**	**2.36**	**2.02**
PCB-038	E1668A	0.457 U	0.783 U	1.47 U	0.677 U
PCB-039	E1668A	0.458 U	0.775 U	1.46 U	0.671 U
PCB-040/071	E1668A	**5.86**	**7.55 J**	**4.55**	**3.92**
PCB-041	E1668A	0.666 U	0.691 U	1.15 U	0.603 U
PCB-042	E1668A	**2.85**	**4.44**	**2.67**	**2.13 J**
PCB-043	E1668A	0.513 U	0.486 U	0.812 U	0.424 U
PCB-044/047/065	E1668A	**13.9**	**16.3**	**10.9**	**11.3**
PCB-045	E1668A	**5.32**	**5.22**	**1.09 J**	**1.92 J**
PCB-046	E1668A	**2.99**	**2.19 J**	0.998 U	**0.668 J**
PCB-048	E1668A	0.548 U	**2.59 J**	0.855 U	0.447 U
PCB-049/069	E1668A	**7.22**	**9.22**	**5.74 J**	**5.55 J**
PCB-050/053	E1668A	**8.02 J**	**5.03**	**3.08**	**2.97**
PCB-051	E1668A	**2.42 J**	**0.512 J**	**0.813 J**	**0.798 J**
PCB-052	E1668A	**30.1**	**29**	**19.6**	**18.8**
PCB-054	E1668A	0.265 U	0.342 U	0.47 U	0.29 U
PCB-055	E1668A	0.478 U	0.411 U	0.664 U	0.386 U
PCB-056	E1668A	**4.3 J**	**5.32**	**4.22**	**4.73 J**
PCB-057	E1668A	0.52 U	0.445 U	0.719 U	0.418 U
PCB-058	E1668A	0.466 U	0.391 U	0.632 U	0.367 U
PCB-059/062/075	E1668A	**2.92**	**1.87 J**	**1.48 J**	**0.823 J**
PCB-060	E1668A	**2.55**	**2.43**	**2.39**	**2.24 J**
PCB-061/070/074/076	E1668A	**21.5**	**25.1**	**16.3**	**17.8**
PCB-063	E1668A	0.573 U	0.479 U	0.774 U	0.45 U
PCB-064	E1668A	**7.83**	**9.95**	**6.19**	**4.93**
PCB-066	E1668A	**10.4**	**11.4**	**7.3**	**8.78**
PCB-067	E1668A	0.46 U	0.38 U	0.615 U	0.357 U
PCB-068	E1668A	0.525 U	0.449 U	0.726 U	0.422 U
PCB-072	E1668A	0.491 U	0.407 U	0.657 U	0.382 U
PCB-073	E1668A	0.37 U	0.35 U	0.585 U	0.306 U
PCB-077	E1668A	**3.64**	**2.31 J**	**2.94**	**3.01**
PCB-078	E1668A	0.531 U	0.471 U	0.761 U	0.442 U

Table 1
Everett East Waterway PSO4 Solids Results

	Task	EEW2018	EEW2018	EEW2018	EEW2018
	Location ID	SMHPO2_2018	SMHQ01_2018	SMHQ16_2018	SMHQ16_2018
	Sample ID	KC-S-SMHP02-180926	KC-S-SMHQ01-180926	KC-S-SMHQ116-180926	KC-S-SMHQ16-180926
	Sample Date	9/26/2018	9/26/2018	9/26/2018	9/26/2018
	Sample Type	N	N	FD	N
	Matrix	CSO Solids	CSO Solids	CSO Solids	CSO Solids
	X	1301136.943	1301930.414	1301701.454	1301701.454
	Y	362175.789	362184.828	362127.123	362127.123
PCB-079	E1668A	**2.5 J**	**2.29**	0.614 U	0.357 U
PCB-080	E1668A	0.502 U	0.422 U	0.682 U	0.396 U
PCB-081	E1668A	0.559 U	0.51 U	0.824 U	0.479 U
PCB-082	E1668A	**20**	**11.3**	**8.5**	**6.91**
PCB-083	E1668A	**11.5**	**6.34**	**2.04 J**	**2.63 J**
PCB-084	E1668A	**78.2**	**35.4**	**20.6**	**18.1**
PCB-085/116	E1668A	**23.4**	**11.9 J**	**8.72 J**	**9.11 J**
PCB-086/087/097/108/119/125	E1668A	**90.5**	**54.2**	**34**	**33.1**
PCB-088	E1668A	0.781 U	0.854 U	1.48 U	0.711 U
PCB-089	E1668A	**1.59 J**	0.726 U	1.26 U	0.605 U
PCB-090/101/113	E1668A	**128**	**83**	**46.1**	**49.1**
PCB-091	E1668A	**41.1**	**12.3**	**7.8**	**8.36**
PCB-092	E1668A	**34**	**17.3**	**10.3**	**10.4**
PCB-093/100	E1668A	0.777 U	0.803 U	1.39 U	0.669 U
PCB-094	E1668A	0.881 U	0.833 U	1.45 U	0.694 U
PCB-095	E1668A	**240**	**97.8**	**50.7**	**54.5**
PCB-096	E1668A	**1.43**	0.42 U	0.595 U	0.364 U
PCB-098	E1668A	0.702 U	0.754 U	1.31 U	0.628 U
PCB-099	E1668A	**57**	**29.1**	**19.2**	**19.4**
PCB-102	E1668A	**4.14 J**	**2.01 J**	0.956 U	**1.23 J**
PCB-103	E1668A	**1.97**	0.694 U	1.21 U	0.578 U
PCB-104	E1668A	0.245 U	0.343 U	0.486 U	0.297 U
PCB-105	E1668A	**45.4**	**33.2**	**21.6**	**21.8**
PCB-106	E1668A	0.524 U	0.523 U	0.908 U	0.435 U
PCB-107/124	E1668A	**4.36 J**	**3.31 J**	**2.54**	**2.38**
PCB-109	E1668A	**8.43 J**	**5.29**	**3.76**	**4.05**
PCB-110	E1668A	**262**	**132**	**79.8**	**75.7**
PCB-111	E1668A	0.548 U	0.554 U	0.962 U	0.461 U
PCB-112	E1668A	0.468 U	0.461 U	0.8 U	0.384 U
PCB-114	E1668A	**1.75 J**	**1.39 J**	1.19 U	0.487 U
PCB-115	E1668A	0.505 U	0.46 U	0.799 U	0.383 U
PCB-117	E1668A	**3.79**	**2.06 J**	1.02 U	**1.21**
PCB-118	E1668A	**93.4**	**62.6**	**42.3**	**41.8**
PCB-120	E1668A	0.449 U	0.462 U	0.803 U	0.385 U
PCB-121	E1668A	0.504 U	0.494 U	0.857 U	0.411 U
PCB-122	E1668A	**2.63 J**	**1.85**	1.48 U	0.603 U
PCB-123	E1668A	**1.75 J**	**1.57**	0.897 U	**1.41**
PCB-126	E1668A	1.02 U	0.923 U	1.17 U	0.636 U
PCB-127	E1668A	0.499 U	0.538 U	1.01 U	0.476 U
PCB-128/166	E1668A	**70.2**	**30.4**	**17.1 J**	**19.2**
PCB-129/138/163	E1668A	**306**	**170**	**98.4**	**93.6**
PCB-130	E1668A	**22.7**	**12.9**	**8.57**	**7.67**
PCB-131	E1668A	**4.85**	0.482 U	0.828 U	**1.6**
PCB-132	E1668A	**114**	**60.8**	**32.4**	**32.7**
PCB-133	E1668A	**4.43**	**2.16**	0.718 U	**1.02 J**
PCB-134	E1668A	**25.1**	**10.5 J**	**5.26 J**	**7.29**
PCB-135/151	E1668A	**106**	**50.8**	**22.5 J**	**24.5**
PCB-136	E1668A	**39.2**	**23.7**	**11.3**	**11.7**
PCB-137	E1668A	**15.2**	**9.09**	**5.28**	**4.98**
PCB-139/140	E1668A	**5.87**	**3.43 J**	0.699 U	**1.73 J**
PCB-141	E1668A	**51.1**	**30.3**	**12.9 J**	**15.7**
PCB-142	E1668A	0.545 U	0.487 U	0.835 U	0.406 U
PCB-143	E1668A	0.459 U	0.419 U	0.719 U	0.35 U
PCB-144	E1668A	**16.3**	**7.44 J**	**4.4 J**	**4.45**
PCB-145	E1668A	0.277 U	0.295 U	0.54 U	0.263 U
PCB-146	E1668A	**38.8**	**17.6**	**11.6**	**10.5**
PCB-147/149	E1668A	**248**	**121**	**65.6**	**63.7**
PCB-148	E1668A	0.487 U	0.421 U	0.723 U	0.352 U
PCB-150	E1668A	0.303 U	0.314 U	0.575 U	0.28 U
PCB-152	E1668A	0.263 U	0.274 U	0.501 U	0.244 U
PCB-153/168	E1668A	**207**	**110**	**58.9**	**61.7**
PCB-154	E1668A	**3.18**	**1.16 J**	0.667 U	**0.639 J**
PCB-155	E1668A	0.272 U	0.274 U	0.502 U	0.245 U
PCB-156/157	E1668A	**26.3**	**17.5**	**10.6**	**10.6**
PCB-158	E1668A	**32.5**	**17.1**	**8.46 J**	**8.75 J**
PCB-159	E1668A	1.02 U	0.622 U	1.07 U	0.638 U
PCB-160	E1668A	0.414 U	0.368 U	0.631 U	0.307 U
PCB-161	E1668A	0.343 U	0.31 U	0.532 U	0.259 U
PCB-162	E1668A	1.22 U	0.704 U	1.22 U	0.722 U
PCB-164	E1668A	**22.7**	**11.9**	**7.7**	**6.81**
PCB-165	E1668A	0.409 U	0.359 U	0.616 U	0.3 U
PCB-167	E1668A	**11.1 J**	**5.94**	**4.55**	**4.31**
PCB-169	E1668A	1.79 U	1.1 U	1.35 U	1.24 U

Table 1
Everett East Waterway PSO4 Solids Results

	Task	EEW2018	EEW2018	EEW2018	EEW2018
	Location ID	SMHPO2_2018	SMHQ01_2018	SMHQ16_2018	SMHQ16_2018
	Sample ID	KC-S-SMHP02-180926	KC-S-SMHQ01-180926	KC-S-SMHQ116-180926	KC-S-SMHQ16-180926
	Sample Date	9/26/2018	9/26/2018	9/26/2018	9/26/2018
	Sample Type	N	N	FD	N
	Matrix	CSO Solids	CSO Solids	CSO Solids	CSO Solids
	X	1301136.943	1301930.414	1301701.454	1301701.454
	Y	362175.789	362184.828	362127.123	362127.123
PCB-170	E1668A	**60.6**	**32.2**	**26.7**	**25.5**
PCB-171/173	E1668A	**21.9**	**9.26**	**6.76 J**	**7.2**
PCB-172	E1668A	**10.8 J**	**4.93**	**5.78**	**3.66**
PCB-174	E1668A	**70.1**	**35.6**	**26**	**22.6**
PCB-175	E1668A	**3.19 J**	1.01 U	1.15 U	0.488 U
PCB-176	E1668A	**10.2**	**5.56**	**2.31**	**2.18 J**
PCB-177	E1668A	**37.1**	**18 J**	**13.8**	**14.2**
PCB-178	E1668A	**14**	**7.24**	**5.35**	**4.77 J**
PCB-179	E1668A	**29.1**	**17.2**	**8.93**	**9.59**
PCB-180/193	E1668A	**141**	**67.3**	**52.4**	**47.2**
PCB-181	E1668A	0.809 U	0.895 U	1.01 U	0.432 U
PCB-182	E1668A	0.766 U	0.835 U	0.947 U	0.404 U
PCB-183	E1668A	**43.3**	**23.2**	**15.7**	**12.8**
PCB-184	E1668A	0.346 U	0.357 U	0.555 U	0.328 U
PCB-185	E1668A	**6.56**	1 U	1.13 U	**2.71 J**
PCB-186	E1668A	0.309 U	0.334 U	0.518 U	0.306 U
PCB-187	E1668A	**96.4**	**44.8**	**34.6**	**30.3**
PCB-188	E1668A	0.325 U	0.318 U	0.493 U	0.291 U
PCB-189	E1668A	0.769 U	0.566 U	1 U	0.666 U
PCB-190	E1668A	**11.2**	**4.1 J**	**3.53 J**	**3.87 J**
PCB-191	E1668A	**2.18**	0.819 U	0.929 U	**0.874 J**
PCB-192	E1668A	0.634 U	0.707 U	0.802 U	0.341 U
PCB-194	E1668A	**31.5**	**11.6 J**	**14.9**	**13.5**
PCB-195	E1668A	**11.7**	**5.24**	**4.1 J**	**3.34 J**
PCB-196	E1668A	**19.3**	**8.88**	**5.45 J**	**5.8 J**
PCB-197	E1668A	**1.4**	0.444 U	1.24 U	0.439 U
PCB-198/199	E1668A	**43.2**	**17.7 J**	**18.8**	**15.2**
PCB-200	E1668A	**5.7**	**2.29**	**2.82 J**	**2.04**
PCB-201	E1668A	**7.87**	**2.84 J**	**2.4**	**1.84 J**
PCB-202	E1668A	**11.3**	**6.67**	**4.87 J**	**4.24**
PCB-203	E1668A	**27.4**	**11.7 J**	**9.06 J**	**7.78**
PCB-204	E1668A	0.42 U	0.439 U	1.23 U	0.434 U
PCB-205	E1668A	0.795 U	0.861 U	1.95 U	0.908 U
PCB-206	E1668A	**25.3**	**12.6**	**11.5 J**	**11**
PCB-207	E1668A	**3.16**	**1.64**	0.864 U	0.589 U
PCB-208	E1668A	**8.29**	**4.14**	**4.81**	**3.22**
PCB-209	E1668A	**11.4**	**5.03**	**6.64**	**7.22**
Total PCB Congener (U = 1/2)		**3505.906 J**	**2012.886 J**	**1215.1 J**	**1176.959 J**
Total PCB Congener (U = 0)		**3487.685 J**	**1991.456 J**	**1170.655 J**	**1157.933 J**
Total PCB Congener TEQ 2005 (Mammal) (U = 1/2)		**0.08370039 J**	**0.06663199 J**	**0.08158541**	**0.05318775**
Total PCB Congener TEQ 2005 (Mammal) (U = 0)		**0.005755 J**	**0.003897 J**	**0.0026655**	**0.0026986**

Notes:

Bold: detected result

Data Qualifiers:

J: estimated value

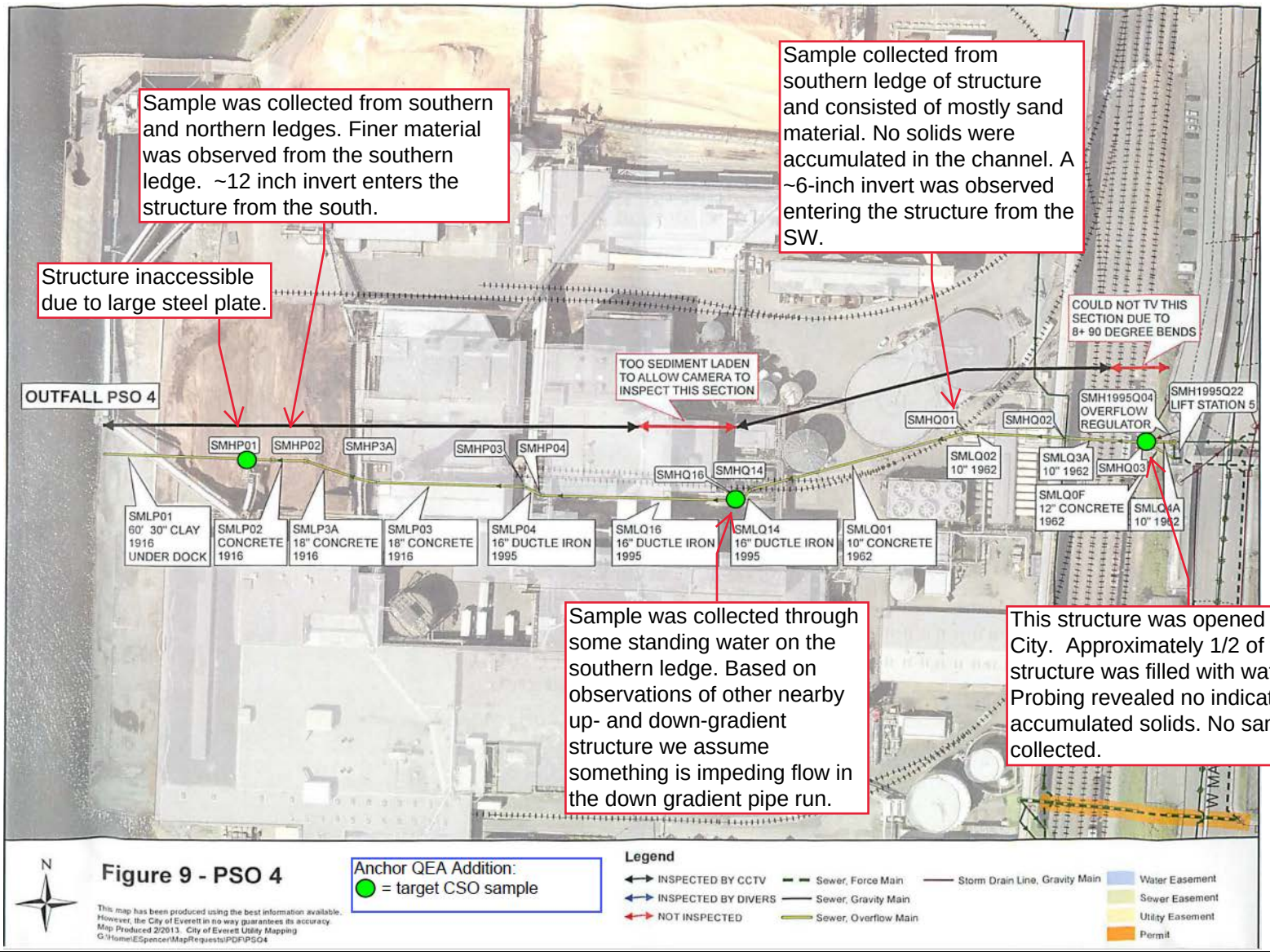
U: Compound analyzed, but not detected above detection limit

UJ: Compound analyzed, but not detected above estimated detection limit

Abbreviations:

µg/kg: micrograms per kilogram
CAEPA: California Environmental Protection Agency
cPAH: carcinogenic polycyclic aromatic hydrocarbons
CSO: combined sewer overflow
FD: field duplicate
HPAH: high-molecular-weight polycyclic aromatic hydrocarbons
LPAH: low-molecular-weight polycyclic aromatic hydrocarbons
mg/kg: milligrams per kilogram
N: normal sample
ng/kg: nanograms per kilogram
PCB: polychlorinated biphenyl
pct: percent
PSEP: Puget Sound Estuary Program
SMS: Sediment Management Standards
TEQ: toxic equivalency

Figure



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ANCHOR QEA

Figure 1
CSO Sampling Location and Notes
Everett East Waterway

Attachment 1
Field Forms

Daily Log

ANCHOR QEA

Anchor QEA, LLC
720 Olive Way, Suite 1900
Seattle, WA 98101
Phone 206.287.9130 Fax 206.287.9131

PROJECT NAME: EEW 2504 Sampling **DATE:** 9/26/18

SITE ADDRESS: **PERSONNEL:** NWS / NB / A. Kallos / CW / B. Lost

WEATHER: **WIND FROM:** N | NE | E | SE | S | SW | W | NW

SUNNY | CLOUDY | RAIN | ?

LIGHT | MEDIUM | HEAVY

TEMPERATURE: °F . °C [Circle appropriate units]

TIME	COMMENTS
9-	Arrive on site, prep for sampling.
9:45	H&S meeting (see daily H&S form)
10-	City arrives
10:05	Access upgradient structure. City removed bolts and opened. Water was standing to approx 6' depth to bottom 12.2". Probed w/ sampling apparatus revealed hard bottom. Hard bottom concurrence by Ecology. Discussed sampling feasibility and agreed no collection is possible. Potential to re-evaluate when the structure is dewatered.
10:27	Mobilized to upgradient area of KC Property "~~SMH002~~ MH002" SMHQ01
10:32	Bryan L. described pipe configuration and above ground DWO and gas lines entering KC Property
10:48	Sample collected from bench of SMHQ01. Structure channel had no accumulation. Approx 6" pipe invert from the southwest into structure. Sample consisted of Sand
11:05	Sample processing complete.
11:18	Mob to SMHQ16. Standing Water ~ 2'
11:22	Checked downgradient MH - SMHP04. No significant standing water flow observed
11:30	Observed SMHQ14 - Going to attempt to sample SMHQ16
11:36	Sample collected - limited siphoning required of overlying water. Sampled through standing water
11:44	Sample processing
11:55	Homogenate duplicate taken SMHQ116 (2-4oz & 1-16oz)
12:17	Start sampling SMHP02 - Sample from N&S sides somewhat more coarse GS on North shelf
12:46	Sampling Complete - Demob

Signature: _____

Daily Safety Briefing Form

ANCHOR QEA

Date: 9/26/18
Project No: 170092-01.01
Project Name: Everett East Waterway PS04

Person Conducting Meeting: N. Bacher
Health & Safety Officer: C. Torell
Project Manager: N. Soccorsy ~~Soccorsy~~

TOPICS COVERED:

- ☒ Emergency Procedures and Evacuation Route
- ☒ Directions to Hospital
- ☒ HASP Review and Location
- ☒ Safety Equipment Location
- ☒ Proper Safety Equipment Use
- ☐ Employee Right-to-Know/ SDS Location
- ☐ Fire Extinguisher Location
- ☐ Eye Wash Station Location
- ☐ Buddy System
- ☐ Self and Coworker Monitoring
- ☒ Lines of Authority
- ☐ Communication
- ☒ Site Security
- ☐ Vessel Safety Protocols
- ☒ Work Zones
- ☒ Vehicle Safety and Driving/ Road Conditions
- ☐ Equipment Safety and Operation
- ☒ Proper Use of PPE
- ☒ Decontamination Procedures
- ☒ Near Miss Reporting Procedures
- ☒ Lifting Techniques
- ☒ Slips, Trips, and Falls
- ☐ Hazard Exposure Routes
- ☒ Heat and Cold Stress
- ☒ Overhead and Underfoot Hazards
- ☒ Chemical Hazards
- ☐ Flammable Hazards
- ☒ Biological Hazards
- ☐ Eating/Drinking/Smoking
- ☐ Reviewed Prior Lessons Learned
- ☐ Field Team Medical Conditions for Emergency Purposes (Confidential): _____
- ☐ Other: _____

Weather Conditions: overcast, 50s

Daily Work Scope: collect solids from manholes (PS04)

Site-specific Hazards: working over open manholes, uneven ground, heavy lifting, trains

Safety Comments: stay focused when working near open manholes.

Attendees

Printed Name	Signature
~~N. Soccorsy~~	
Corey Wilson	
Andy Kallus	
BRYAN LUST	
Nik Bacher	

End of Day Wellness Check

PLAYING IT SAFE

ANCHOR QEA

Storm Drain Solids Collection Log

Project Name: EEW PS04 Sampling **Project No:** 160105-02.02 **Station ID:** SMHQ01

Field Personnel: NB / NS **Sampling Method:** SS canister on extended pole

Sample Date: 9/26/18 **Catchment Type:**

Station Coordinates: N/Lat. **Weather:** Overcast, 50s

E/Long.

Horizontal Datum:

Sample ID: KC-S-SMHQ01-180926 **Sample Location:** SMHQ01

Analyses:

Depth of CB: ~8' **DTW:** N/A **Grab Recovery:** N/A

Time: 1054 **Sample Interval:** Not measured, sampled material available on structure

Stormwater Observations (e.g., color, clarity, sheen, odor):

~~No solids collected in channel.~~ NS

No appreciable flow observed.

Solids (Sediment) Description:

gray, moist, medium to coarse sand w/ scattered gravel up to 3/4". minor silt (<10%) few glass shards. no odor, no sheen

Additional Observations/Comments:

Sample collected from southern ledge of structure

No solids observed in the channel.

Recorded by: Nate Palmer

ANCHOR QEA

Storm Drain Solids Collection Log

Project Name: EEW PS04 Sampling **Project No:** 160105-02.02 **Station ID:** SMHQ16

Field Personnel: NB | NS **Sampling Method:** SS canister on extended pole

Sample Date: 9/26/18 **Catchment Type:**

Station Coordinates: N/Lat. **Weather:** Overcast, 50s

E/Long.

Horizontal Datum:

Sample ID: KC-S-SMHQ16-160926 **Sample Location:** SMHQ16

Analyses:

Depth of CB: ~8' **DTW:** N/A **Grab Recovery:** N/A

Time: 1144 **Sample Interval:** Not measured

Stormwater Observations (e.g., color, clarity, sheen, odor):

Some stagnant water in bottom of structure. No appreciable flow observed.

Solids (Sediment) Description:

gray, wet, medium sand w/ trace silt, few gravel up to 3/4". no odor, no sheen.

Additional Observations/Comments:

Collected duplicate @ this station.

Sample collected through standing water on southern ledge of structure.

Recorded by: NBalm

ANCHOR QEA

Storm Drain Solids Collection Log

Project Name: EEW PSOA Sampling **Project No:** 160105-02.02 **Station ID:** SMHP02

Field Personnel: NB, NS **Sampling Method:** SS canister on extended pole

Sample Date: 9/26/18 **Catchment Type:**

Station Coordinates: N/Lat. **Weather:** Overcast, 50s

E/Long.

Horizontal Datum:

Sample ID: KC-S-SMHP02-180926 **Sample Location:** SMHP02

Analyses:

Depth of CB: ~7.5' **DTW:** N/A **Grab Recovery:** N/A

Time: 1226 **Sample Interval:** Not measured

Stormwater Observations (e.g., color, clarity, sheen, odor):

No appreciable flow observed.

Solids (Sediment) Description:

gray, wet, medium to coarse sand w/ trace silt, few gravel up to 3/4" no odor, no sheen

Additional Observations/Comments:

Sample was collected from northern & southern ledges of the structure.

Recorded by: [signature]

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: Standard
ARI Client Company: Anchor QEA	Phone: 206-287-9130
Client Contact: Cheronne Oveiro	
Client Project Name: Everett East Waterway PSO4 CSO Investigation	
Client Project #: 170092-01.01	Samplers: N. Bacher, N. Soccorsy

Page: 1 of 1

Date: 9/26/18 | Ice Present?

No. of Coolers: 1 | Cooler Temps:

Analytical Resources, Incorporated
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)
www.arilabs.com

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: METALS 6020A 7471A/7196A	TOC 9060A	DIOXIN/FURAN 1613B	PCB Congeners 1668	SVOCs 8270-SIM	GRAIN SIZE PSEP 1986	ARCHIVE		Notes/Comments
KC-S-SMHQ01-180926	9/26/18	1034	7	Sed.	X	X	X	X	X	X	X		sample may contain glass
KC-S-SMHQ16-180926		1144	8	Sed.	X	X	X	X	X	X	X		One extra 4oz. for MS/MSD.
KC-S-SMHQ116-180926		1158	3	Sed.			X	X	X				
KC-S-SMHP02-180926		1226	7	Sed.	X	X	X	X	X	X	X		

Comments/Special Instructions

	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Nik Bacher	Printed Name: Stephanie Fishel	Printed Name:	Printed Name:
	Company: AQ	Company: ARI	Company:	Company:
	Date & Time: 9/27/18 1009	Date & Time: 9-27-18 1010	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Attachment 2
Laboratory Reports

Attachment 3
Data Validation Reports

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
720 Olive Way, Suite 900
Seattle, WA 98101
ATTN: Ms. Cindy Fields

November 21, 2018

SUBJECT: REVISED Everett East Waterway, Data Validation

Dear Ms. Fields,

Enclosed are the revised validation reports for the fractions listed below. This SDG was received on October 30, 2018. Attachment 1 is a summary of the samples that were reviewed for each analysis.

- Added the MS/MSD outlier.

LDC Project #43524_RV1:

SDG #	Fraction
18I0403/B2663	Semivolatiles, Polynuclear Aromatic Hydrocarbons, Chlorinated Pesticides, Metals, Polychlorinated Dioxins/Dibenzofurans, Polychlorinated Biphenyls as Congeners

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combine Sewer Overflow Characterization; August 2018
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review; January 2017
- USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review; January 2017
- USEPA Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins and Chlorinated Dibenzofurans Data Review; September 2011
- USEPA National Functional Guidelines for High Resolution Superfund Methods Data Review; April 2016
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
Project Manager/Senior Chemist

EDD Stage 2B

LDC #43524 (Anchor Environmental-Seattle WA / Everett East Waterway)

LDC	SDG#	DATE REC'D	(3) DATE DUE	SVOA (8270D)		PAHs (8270D-SIM/DSL)		PAHs (8270D-SIM/LL)		(2) Pest. (8081B)		PCB as Cong. (1668A)		(2) Metals (6020A)		Hg (7471B)		Dioxins (1613B)		Total Solids (2540G)		TOC (9060A)		Part. Size (PSEP)											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	18I0403/B2663	10/30/18	11/20/18	0	4	0	4	0	5	0	4	0	4	0	3	0	3	0	4	0	3	0	3	0	3										
Total	J/CR			0	4	0	4	0	5	0	4	0	4	0	3	0	3	0	4	0	3	0	3	0	3	0	0	0	0	0	0	0	0	0	40

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 9, 2018

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
09/21/18	2,4-Dinitrophenol Pentachlorophenol	45.6 30.5	All samples in SDG 18I0403	UJ (all non-detects) UJ (all non-detects)	A

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
10/08/18	3,3'-Dichlorobenzidine	28.0	KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	UJ (all non-detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
KC-S-SMHQ016-180926MS/MSD (KC-S-SMHQ016-180926)	4-Chloroaniline	26.6 (50-150)	27.4 (50-150)	UJ (all non-detects)	A
	3-Nitroaniline	38.9 (50-150)	39.3 (50-150)	UJ (all non-detects)	
	4-Nitroaniline	40.9 (50-150)	-	UJ (all non-detects)	
	3,3'-Dichlorobenzidine	30.8 (50-150)	33.8 (50-150)	UJ (all non-detects)	
	2,4-Dimethylphenol	-	43.6 (50-150)	UJ (all non-detects)	
	N-Nitrosodimethylamine	-	49.5 (50-150)	UJ (all non-detects)	

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Di-n-butylphthalate	13.8	11.2	21 (≤50)
Butylbenzylphthalate	8.3	9.4	12 (≤50)
Bis(2-ethylhexyl)phthalate	96.0	80.6	17 (≤50)

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to ICV %D, continuing calibration %D, and MS/MSD %R, data were qualified as estimated in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Semivolatiles - Data Qualification Summary - SDG 18I0403

Sample	Compound	Flag	A or P	Reason
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926 KC-S-SMHQ116-180926 KC-S-SMHP02-180926	2,4-Dinitrophenol Pentachlorophenol	UJ (all non-detects) UJ (all non-detects)	A	Initial calibration verification (%D)
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	3,3'-Dichlorobenzidine	UJ (all non-detects)	A	Continuing calibration (%D)
KC-S-SMHQ016-180926	4-Chloroaniline 3-Nitroaniline 4-Nitroaniline 3,3'-Dichlorobenzidine 2,4-Dimethylphenol N-Nitrosodimethylamine	UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

Everett East Waterway
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

LDC #: 43524A2a
SDG #: 18I0403
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 11/7/18
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS Semivolatiles (EPA SW 846 Method 8270D)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/SW	RSD≤20% or r² ICV≤30%
IV.	Continuing calibration	SW	CCV≤20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	SW	D=2+3
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
4	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
5	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
6	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
7				
8				

Notes:

	MB-BEF1000TBK1						

EVERETT

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o''-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2.Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2.Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. Biphenyl	G1. 2-Acetylaminofluorene	I2.Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	

LDC #: ~~43524A~~ 2a

VALIDATION FINDINGS WORKSHEET
Initial Calibration Verification

Reviewer: ~~JVG~~
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was an initial calibration verification standard analyzed after each ICAL for each instrument?

Y (N) N/A Were all %D within the validation criteria of ≤30 %D ?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤30.0%)	Associated Samples	Qualifications
	9/21/18	5GJ0392-SCV1	HH	45.6	All (ND)	J/UJ/A
			TT	30.5		

LDC #: 43524A2a

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Y (N) N/A Were percent differences (%D) ≤20 % and relative response factors (RRF) within the method criteria?

#	Date	Standard ID	Compound	Finding %D (Limit: ≤20.0%)	Finding RRF (Limit)	Associated Samples	Qualifications
	10/8/18	NT1018100802	BBB	28.0		1-2, 5-6, MB (ND)	J/UJ/A

CONCAL.2SD

LDC #: 43624A29

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		5/6	T	26.6 (50-150)	27.4 (50-150)	( )	2 (ND)	J/UJ/A
			FF	38.9 ( )	39.3 ( )	( )		↓
			OO	40.9 ( )	( )	( )		↓
			BBB	30.8 ( )	33.8 ( )	( )		↓
			O	( )	43.6 ( )	( )		↓
			OOO	( )	49.5 ( )	( )		↓
				( )	( )	( )		
				( )	( )	( )		
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LDC#: 43524A2a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer:

METHOD: GCMS SVOA 8270D

Compound	Concentration (ug/KG)		(≤50)
	2	3	RPD
XX	13.8	11.2	21
AAA	8.3	9.4	12
EEE	96.0	80.6	17

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 20, 2018

Parameters: Semivolatiles

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Semivolatile Organic Compounds (SVOCs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode Dual Scan List

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds with the following exceptions:

Date	Compound	%D	Associated Samples	Flag	A or P
10/08/18	Pentachlorophenol	37.7	KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	J (all detects)	A
10/09/18	Benzoic acid Pentachlorophenol	25.6 33.7	KC-S-SMHQ116-180926 KC-S-SMHP02-180926	J (all detects) J (all detects)	A

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
BGJ0007-BLK2	10/02/18	Diethylphthalate	5.5 ug/Kg	All samples in SDG 18I0403

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>10X for common contaminants, >5X for other contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
KC-S-SMHQ01-180926	Diethylphthalate	6.5 ug/Kg	19.5U ug/Kg
KC-S-SMHQ016-180926	Diethylphthalate	7.3 ug/Kg	19.4U ug/Kg
KC-S-SMHQ116-180926	Diethylphthalate	10.5 ug/Kg	19.4U ug/Kg
KC-S-SMHP02-180926	Diethylphthalate	7.1 ug/Kg	19.3U ug/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
KC-S-SMHQ016-180926MS/MSD (KC-S-SMHQ016-180926)	2,4-Dimethylphenol N-Nitrosodiphenylamine	- -	45.5 (50-150) 49.8 (50-150)	UJ (all non-detects) UJ (all non-detects)	A

Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Phenol	6.3	5.6	12 (≤50)
Benzoic acid	37.5	58.0	43 (≤50)
Diethylphthalate	7.1	7.3	3 (≤50)
Pentachlorophenol	3.9	6.3	47 (≤50)
Butylbenzylphthalate	6.2	6.3	2 (≤50)

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to continuing calibration %D and MS/MSD %R, data were qualified as estimated in four samples.

Due to laboratory blank contamination, data were qualified as not detected in four samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Semivolatiles - Data Qualification Summary - SDG 18I0403

Sample	Compound	Flag	A or P	Reason
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	Pentachlorophenol	J (all detects)	A	Continuing calibration (%D)
KC-S-SMHQ116-180926 KC-S-SMHP02-180926	Benzoic acid Pentachlorophenol	J (all detects) J (all detects)	A	Continuing calibration (%D)
KC-S-SMHQ016-180926	2,4-Dimethylphenol N-Nitrosodiphenylamine	UJ (all non-detects) UJ (all non-detects)	A	Matrix spike/Matrix spike duplicate (%R)

Everett East Waterway
Semivolatiles - Laboratory Blank Data Qualification Summary - SDG 18I0403

Sample	Compound	Modified Final Concentration	A or P
KC-S-SMHQ01-180926	Diethylphthalate	19.5U ug/Kg	A
KC-S-SMHQ016-180926	Diethylphthalate	19.4U ug/Kg	A
KC-S-SMHQ116-180926	Diethylphthalate	19.4U ug/Kg	A
KC-S-SMHP02-180926	Diethylphthalate	19.3U ug/Kg	A

LDC #: 43524A2b

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 11/7/18

SDG #: 18I0403

Page: 1 of 1

Laboratory: Analytical Resources, Inc.

Reviewer: [illegible]

2nd Reviewer: [illegible]

METHOD: GC/MS ~~Polynuclear Aromatic Hydrocarbons~~ SVOAs (EPA SW 846 Method 8270D-SIM Dual Scan List)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A	RSD≤30% or r²≥0.99 ICV≤30%
IV.	Continuing calibration	A	
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	A	8=3+4
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	~~KC-S-SMHQ01-180926RE~~	~~18I0403-01RE~~	~~Sediment~~	~~09/26/18~~
3	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
4	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
5	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
6	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
7	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
8				

Notes:

10	BEJ0007-BK2						

EVERETT

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o''-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2.Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2.Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. Biphenyl	G1. 2-Acetylaminofluorene	I2.Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	J2 Benzo(j)fluoranthene

LDC #: 43524A36

VALIDATION FINDINGS WORKSHEET
Continuing Calibration

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a continuing calibration standard analyzed at least once every 12 hours for each instrument?

Y N N/A Were percent differences (%D) ≤20 % and relative response factors (RRF) within the method criteria?

#	Date	Standard ID	Compound	Finding %D (Limit: <20.0%)	Finding RRF (Limit)	Associated Samples	Qualifications
	10/3/18	NT1018100883	TT	37.7		1,3,6-TMB (dets)	J (all det) / A
	10/9/18	NT1018100965	~~PP~~ TT	25.6 33.7		4-5 (dets)	J (all det) / A q

LDC #: 43524A3b

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 2

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/5/18 **Blank analysis date:** 10/5/18
Conc. units: ug/kg Associated Samples: All

Compound	Blank ID	Sample Identification								
[redacted]	PBS200T-BLK2	(5x)	1	3	4	5				
Bis(2-ethylhexyl)phthalate										
LL	5.5	27.5	6.5/19.4U	7.3/19.4U	10.5/19.4U	7.1/19.3U				

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
[redacted]										

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 43524A2b

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD : GC/MS SVOA (EPA SW 846 Method 8270D-DIM)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		6/7	O	( )	45.5 (50-150)	( )	3	J/UJ/A (ND)
			QQ	( )	49.8 (50-150)	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		

LDC#: 43524A2a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GCMS SVOA 8270D-SIM

Compound	Concentration (ug/KG)		(≤50)
	3	4	RPD
A	6.3	5.6	12
PPP	37.5	58.0	43
LL	7.1	7.3	3
TT	3.9	6.3	47
AAA	6.2	6.3	2

LDC Report# 43524A2c

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ01-180926DL	18I0403-01DL	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode Low Level

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

For compounds where average relative response factors (RRFs) were utilized, percent relative standard deviations (%RSD) were less than or equal to 20.0%.

In the case where the laboratory used a calibration curve to evaluate the compounds, all coefficients of determination (r^2) were greater than or equal to 0.990.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
BGJ0028-BLK1	10/04/18	Acenaphthylene Phenanthrene Anthracene Fluoranthene Pyrene Benzo(a)anthracene Chrysene Benzo(b)fluoranthene Benzo(k)fluoranthene Benzo(a)pyrene Benzo(g,h,i)perylene	0.07 ug/Kg 0.12 ug/Kg 0.09 ug/Kg 0.27 ug/Kg 0.30 ug/Kg 0.15 ug/Kg 0.16 ug/Kg 0.12 ug/Kg 0.11 ug/Kg 0.12 ug/Kg 0.33 ug/Kg	All samples in SDG 18I0403

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

Relative percent differences (RPD) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
KC-S-SMHQ016-180926MS/MSD (KC-S-SMHQ016-180926)	Phenanthrene	37.3 (≤35)	J (all detects)	A

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Naphthalene	3.28	2.62	22 (≤50)
2-Methylnaphthalene	1.65	1.32	22 (≤50)
Acenaphthylene	0.81	0.75	8 (≤50)
Acenaphthene	1.49	0.47	104 (≤50)
Biphenyl	0.60	0.42	35 (≤50)
2,6-Dimethylnaphthalene	0.99	0.56	55 (≤50)
Fluorene	1.90	0.72	90 (≤50)
Phenanthrene	11.3	8.58	27 (≤50)
Anthracene	2.49	2.37	5 (≤50)
2,3,5-Trimethylnaphthalene	0.59	0.18	106 (≤50)
Fluoranthene	16.0	20.2	23 (≤50)
Pyrene	13.5	17.2	24 (≤50)
Benzo(a)anthracene	3.78	11.4	100 (≤50)
Dibenzothiophene	0.90	0.58	43 (≤50)
Chrysene	7.18	13.1	58 (≤50)
Benzo(b)fluoranthene	4.59	9.83	73 (≤50)
Benzo(k)fluoranthene	1.87	5.03	92 (≤50)
Carbazole	0.85	1.30	42 (≤50)
1-Methylphenanthrene	1.69	1.29	27 (≤50)

Compound	Concentration (ug/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Benzo(j)fluoranthene	1.65	4.26	88 (≤50)
Benzo(a)pyrene	3.21	9.12	96 (≤50)
Indeno(1,2,3-cd)pyrene	2.77	5.45	65 (≤50)
Dibenzo(a,h)anthracene	0.75	1.75	80 (≤50)
Benzo(g,h,i)perylene	7.09	9.78	32 (≤50)
1-Methylnaphthalene	1.05	0.71	39 (≤50)
Benzo(e)pyrene	4.83	8.58	56 (≤50)
Benzofluoranthenes, total	8.12	19.1	81 (≤50)

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

In the case where more than one result was reported for an individual sample, the least technically acceptable results were deemed not reportable as follows:

Sample	Compound	Reason	Flag	A or P
KC-S-SMHQ01-180926	Fluoranthene Pyrene	Results exceeded calibration range.	Not reportable	-
KC-S-SMHQ01-180926DL	All compounds except Fluoranthene Pyrene	Results from undiluted analyses were more usable.	Not reportable	-

Due to MS/MSD RPD, data were qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 18I0403

Sample	Compound	Flag	A or P	Reason
KC-S-SMHQ016-180926	Phenanthrene	J (all detects)	A	Matrix spike/Matrix spike duplicate (RPD)
KC-S-SMHQ01-180926	Fluoranthene Pyrene	Not reportable	-	Overall assessment of data
KC-S-SMHQ01-180926DL	All compounds except Fluoranthene Pyrene	Not reportable	-	Overall assessment of data

Everett East Waterway
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

LDC #: 43524A2c
SDG #: 18I0403
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 11/7/18
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-SIM Low Level)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A SW	RSDs ≤ 30%, r² ≥ 0.99 ICV ≤ 30%
IV.	Continuing calibration	A SW	CCV ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	A	
VIII.	Matrix spike/Matrix spike duplicates	SW	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	SW	D = 2+3
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	SW	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
4	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
5	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
6	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
7	#1 DL	-01 DL	"	"
8				

Notes:

11	BEJ0028-BLK1						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o''-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2.Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2.Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. Biphenyl	G1. 2-Acetylaminofluorene	I2.Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	

LDC #: 43021A2C

VALIDATION FINDINGS WORKSHEET
Blanks

Page: 1 of 1
Reviewer: 9
2nd Reviewer: a

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a method blank analyzed for each matrix?
Y N N/A Was a method blank analyzed for each concentration preparation level?
Y N N/A Was a method blank associated with every sample?
Y N N/A Was the blank contaminated? If yes, please see qualification below.

Blank extraction date: 10/4/18 **Blank analysis date:** 10/9/18
Conc. units: ug/kg Associated Samples: All

Compound	Blank ID	Sample Identification								
~~BEQ0028-BK1 (5x)~~										
~~Bis(2-ethylhexyl)phthalate~~ DD	0.07	0.35								
UU	0.12	060								
VV	0.09	0.45								
YY	0.27	1.35								
ZZ	0.30	1.50								
CCC	0.15	0.75								
DDD	0.16	0.80								

Blank extraction date: _____ **Blank analysis date:** _____
Conc. units: _____ Associated Samples: _____

Compound	Blank ID	Sample Identification								
~~FFF~~	0.12	0.60								
HHH	0.11	0.55								
III	0.12	0.60								
LLL	0.33	1.65								

CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
Common contaminants such as the phthalates and TICs noted above that were detected in samples within ten times the associated method blank concentration were qualified as not detected, "U". Other contaminants within five times the method blank concentration were also qualified as not detected, "U".

LDC #: 43524A2c

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

(Y) N N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y (N) N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		5/6	UU	( )	( )	37.3 (≤35)	2 (dets)	J dets/A
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
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				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 43524A2bc

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer:

METHOD: GCMS PAHs 8270D-SIM

Compound	Concentration (ug/kg)		(≤50)
	2	3	RPD
S	3.28	2.62	22
W	1.65	1.32	22
DD	0.81	0.75	8
GG	1.49	0.47	104
EEEE	0.60	0.42	35
XXX	0.99	0.56	55
NN	1.90	0.72	90
UU	11.3	8.58	27
VV	2.49	2.37	5
YYY	0.59	0.18	106
YY	16.0	20.2	23
ZZ	13.5	17.2	24
CCC	3.78	11.4	100
AAAA	0.90	0.58	43
DDD	7.18	13.1	58
GGG	4.59	9.83	73
HHH	1.87	5.03	92
WW	0.85	1.30	42
HHHH	1.69	1.29	27
J2	1.65	4.26	88
III	3.21	9.12	96
JJJ	2.77	5.45	65
KKK	0.75	1.75	80
LLL	7.09	9.78	32
TTT	1.05	0.71	39
WWW	4.83	8.58	56
Benzofluoranthenes, Total	8.12	19.1	81

LDC #: 43524A2e

VALIDATION FINDINGS WORKSHEET
Overall Assessment of Data

Page: 1 of 1
Reviewer: 9
2nd Reviewer: G

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
All available information pertaining to the data were reviewed using professional judgement to compliment the determination of the overall quality of the data.

Y N N/A Was the overall quality and usability of the data acceptable?

#	Date	Compound	Finding	Associated Samples	Qualifications
		1	YY. ZZ > calib	lange	NR
		T	All except YY. ZZ		V

Comments: _____

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Chlorinated Pesticides

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Chlorinated Pesticides by Environmental Protection Agency (EPA) SW 846 Method 8081B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC Instrument Performance Check

Instrument performance was checked at 12 hour intervals.

The individual 4,4'-DDT and Endrin breakdowns (%BD) were less than or equal to 15.0%.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 20.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates/Internal Standards

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Column	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
KC-S-SMHP02-180926	STX-CLP	Tetrachloro-m-xylene	784 (30-160)	All compounds	NA	-

All internal standard areas and retention times were within QC limits.

VIII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples.

XI. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

XIII. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Everett East Waterway
Chlorinated Pesticides - Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

Everett East Waterway
Chlorinated Pesticides - Laboratory Blank Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

LDC #: 43524A3a
SDG #: 18I0403
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 1/7/19
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: GC Chlorinated Pesticides (EPA SW846 Method 8081B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	GC Instrument Performance Check	A	
III.	Initial calibration/ICV	A/A	%RSD ≤ 20% ICV ≤ 20%
IV.	Continuing calibration	A	ccv ≤ 20%
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes /IS	SW/A	(IS out – Not ass'd to spl)
VIII.	Matrix spike/Matrix spike duplicates	A	
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	ND	D = 2x
XI.	Compound quantitation/RL/LOQ/LODs	N	
XII.	Target compound identification	N	
XIII.	System Performance	N	
XIV	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
4	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
5	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
6	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
7				
8				
9				
10				

Notes:

EVERETT

LDC #: 43524A3a

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: ✓ GC __ HPLC

Are surrogates required by the method? Yes____ or No____.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were surrogates spiked into all samples and blanks?

Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	4	STX-CLP	Y	784 * (30-160)	J dets / P (ND)
				( )	
				(lab reported as NRS the %R was calculated using raw data)	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	1,2-Dinitrobenzene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Metals

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
KC-S-SMHQ016-180926DUP	18I0403-02DUP	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic, Cadmium, Chromium, Lead, Silver, and Zinc by Environmental Protection Agency (EPA) SW 846 Method 6020A
Mercury by EPA SW 846 Method 7471B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the methods.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits with the following exceptions:

ICS ID	Date/ Time	Analyte	%R (Limits)	Associated Samples	Flag	A or P
IFB1	10/09/18 (16:24)	Chromium	134 (80-120)	KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	J (all detects)	A

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analyte	Maximum Concentration	Associated Samples
PB (prep blank)	Chromium	0.07 mg/Kg	KC-S-SMHQ01-180926 KC-S-SMHQ016-180926
ICB/CCB	Chromium	0.138 ug/L	KC-S-SMHQ01-180926

Data qualification by the laboratory blanks was based on the maximum contaminant concentration in the laboratory blanks in the analysis of each analyte. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Analyte	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
KC-S-SMHQ016-180926MS/MSD (KC-S-SMHQ01-180926 KC-S-SMHQ016-180926)	Chromium	39.2 (75-125)	62.9 (72-125)	J (all detects)	A

Relative percent differences (RPD) were within QC limits.

VIII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Analyte	RPD (Limits)	Flag	A or P
KC-S-SMHQ016-180926DUP (KC-S-SMHQ01-180926 KC-S-SMHQ016-180926)	Chromium	45 (≤25)	J (all detects)	A

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

No field duplicates were identified in this SDG.

XII. Internal Standards (ICP-MS)

Raw data were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to ICS %R, MS/MSD %R, and DUP RPD, data were qualified as estimated in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Metals - Data Qualification Summary - SDG 18I0403

Sample	Analyte	Flag	A or P	Reason
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	Chromium	J (all detects)	A	ICP interference check sample analysis (%R)
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	Chromium	J (all detects)	A	Matrix spike/Matrix spike duplicate (%R)
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926	Chromium	J (all detects)	A	Duplicate sample analysis (RPD)

Everett East Waterway
Metals - Laboratory Blank Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

LDC #: 43524A4a
SDG #: 18I0403
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 11/14/18
Page: 1 of 1
Reviewer: ATV
2nd Reviewer:

METHOD: Metals (EPA SW 846 Method 6020A/7471B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	SW	
V.	Laboratory Blanks	SW	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	SW	(4,5)
VIII.	Duplicate sample analysis	SW	6
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	N	
XII.	Internal Standard (ICP-MS)	N	
XIII.	Sample Result Verification	N	
XIV.	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
4	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
5	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
6	KC-S-SMHQ016-180926DUP	18I0403-02DUP	Sediment	09/26/18
7				
8				
9				
10				
11				
12				

Notes:

EVERETT

LDC #: 43524A4a

VALIDATION FINDINGS WORKSHEET
Sample Specific Element Reference

Reviewer: ATL

2nd reviewer: [signature]

All circled elements are applicable to each sample.

Sample ID	Matrix	Target Analyte List (TAL)
1→3	S	Al, Sb, **As**, Ba, Be, **Cd**, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, **Hg**, Ni, K, Se, **Ag**, Na, Tl, V, **Zn**, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
QC		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
4,5,6	S	Al, Sb, **As**, Ba, Be, **Cd**, Ca, **Cr**, Co, Cu, Fe, **Pb**, Mg, Mn, **Hg**, Ni, K, Se, **Ag**, Na, Tl, V, **Zn**, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
Analysis Method		
ICP		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
ICP-MS		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___
GFAA		Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Tl, V, Zn, Mo, B, Sn, Ti, ___ ___

Comments: Mercury by CVAA if performed

LDC #: 43524A4a

VALIDATION FINDINGS WORKSHEET
ICP Interference Check Sample

Reviewer: ATL
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were ICP interference check samples performed as required?

Y N N/A Were the AB solution percent recoveries (%R) within the control limits of 80-120% ?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	ICS Identification	Analyte	Finding	Associated Samples	Qualifications
	10/09/18	IFB1 (16:24)	Cr-53	134 (80-120)	1,2	Jdet/A (all detect)

Comments:

LDC #: 43524A4a

VALIDATION FINDINGS WORKSHEET
PB/ICB/CCB QUALIFIED SAMPLES

Reviewer: ATL
2nd Reviewer:

METHOD: Trace metals (EPA SW 864 Method 6010B/6020/7000) Soil preparation factor applied: NA
Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: 1 ,2

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Level								
Cr-53	0.07			0.35								

Sample Concentration units, unless otherwise noted: mg/kg Associated Samples: 1

Analyte	Maximum PB[a] (mg/Kg)	Maximum PB[a] (ug/L)	Maximum ICB/CCB[a] (ug/L)	Action Level								
Cr-53			0.138	0.0345								

Samples with analyte concentrations within five times the associated ICB, CCB or PB concentration are listed above with the identifications from the Validation Completeness Worksheet. These sample results were qualified as not detected, "U".
Note : a - The listed analyte concentration is the highest ICB, CCB, or PB detected in the analysis of each element.

LDC #: 43524A4a

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Reviewer: ATL
2nd Reviewer:

METHOD: Trace metals (EPA SW 846 Method 6010/6020/7000)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Was a matrix spike analyzed for each matrix in this SDG?

Y N N/A Were matrix spike percent recoveries (%R) within the control limits of 75-125? If the sample concentration exceeded the spike concentration by a factor of 4 or more, no action was taken.

Y N N/A Were all duplicate sample relative percent differences (RPD) ≤ ~~20~~ 25% for samples?

LEVEL IV ONLY:

Y N N/A Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	MS/MSD ID	Matrix	Analyte	MS %Recovery	MSD %Recovery	RPD (Limits)	Associated Samples	Qualifications
	4/5	S	Cr-53	39.2 (75-125)	62.9 (75-125)		1,2	J/UJ/A (detect)

Comments:

LDC #: 43524A4a

VALIDATION FINDINGS WORKSHEET
Duplicate Analysis

Reviewer: ATL
2nd Reviewer:

METHOD: Trace Metals (EPA SW 846 Method 6010/6020/7000)
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Was a duplicate sample analyzed for each matrix in this SDG?

Y (N) N/A Were all duplicate sample relative percent differences (RPD) ≤ 20% for water samples and ≤ ~~35~~ 25% for soil samples? If no, see qualifications below. A control limit of ±R.L. (±2X R.L. for soil) was used for sample values that were <5X the R.L., including the case when only one of the duplicate sample values was <5X R.L.. If field blanks were used for laboratory duplicates, note in the Overall Assessment.

LEVEL IV ONLY:

Y N (N/A) Were recalculated results acceptable? See Level IV Recalculation Worksheet for recalculations.

#	Date	Duplicate ID	Matrix	Analyte	RPD (Limits)	Difference (Limits)	Associated Samples	Qualifications
		6	S	Cr-53	45 (≤ 25%)		1,2	J/UJ/A (all detect)

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926DUP1	18I0403-02DUP1	Sediment	09/26/18
KC-S-SMHQ016-180926DUP2	18I0403-02DUP2	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Solids by Standard Method 2540G
Total Organic Carbon by Environmental Protection Agency (EPA) SW 846 Method 9060A
Particle Size by Puget Sound Estuary Protocol (PSEP)

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Standard Reference Materials

Standard reference materials (SRM) were analyzed as required by the method. The results were within QC limits.

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Everett East Waterway
Wet Chemistry - Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

Everett East Waterway
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 18I0403

No Sample Data Qualified in this SDG

LDC #: 43524A6

SDG #: 18I0403

Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET

Stage 2B

Date: 11/14/18

Page: 1 of 1

Reviewer: ATC

2nd Reviewer:

METHOD: (Analyte) Total Solids (SM 2540G), TOC EPA SW 846 Method 9060A), Particle Size (PSEP)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	4
VII.	Duplicate sample analysis	A	5,6
VIII.	Laboratory control samples	A	SRM
IX.	Field duplicates	N	
X.	Sample result verification	N	
XI	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
4	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
5	KC-S-SMHQ016-180926DUP1	18I0403-02DUP1	Sediment	09/26/18
6	KC-S-SMHQ016-180926~~TRP~~ DUP2	18I0403-02~~TRP~~ DUP2	Sediment	09/26/18
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

DC #: 43524A6

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: ATL

2nd reviewer: [signature]

ll circled methods are applicable to each sample.

Sample ID	Parameter
1,2,3	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 TS (circled) TOC (circled) particle size (circled)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
QC	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
5,6	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 TS (circled)
4,5,6	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC (circled) Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4

Comments:

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Polychlorinated Dioxins/Dibenzofurans

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 18I0403

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926DUP	18I0403-02DUP	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and the USEPA Contract Laboratory Program (CLP) National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review (September 2011). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Dioxins/Dibenzofurans by Environmental Protection Agency (EPA) Method 1613B

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all homologues. The chromatographic resolution between 2,3,7,8-TCDD and peaks representing any other unlabeled TCDD isomer was less than or equal to 25%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration and Initial Calibration Verification

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were within the QC limits for unlabeled compounds and labeled compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration results were within the QC limits for unlabeled compounds and labeled compounds.

The ion abundance ratios for all PCDDs and PCDFs were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
BGJ0793-BLK1	10/02/18	1,2,3,7,8-PeCDF 1,2,3,4,6,7,8-HpCDF OCDD Total PeCDF Total HpCDF	0.0508 ng/Kg 0.0406 ng/Kg 0.188 ng/Kg 0.0508 ng/Kg 0.0406 ng/Kg	All samples in SDG 18I0403

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
KC-S-SMHQ016-180926	1,2,3,7,8-PeCDF	0.136 ng/Kg	0.996U ng/Kg
KC-S-SMHQ116-180926	1,2,3,7,8-PeCDF	0.121 ng/Kg	0.997U ng/Kg

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates/Duplicate Sample Analysis

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits with the following exceptions:

DUP ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
KC-S-SMHQ016-180926DUP (KC-S-SMHQ016-180926)	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,6,7,8-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDF Total TCDD Total PeCDD Total HxCDF Total HxCDD Total HpCDF Total HpCDD	43.9 (≤35) 41.8 (≤35) 50.3 (≤35) 82.1 (≤35) 48.5 (≤35) 52.9 (≤35) 76.1 (≤35) 75.5 (≤35) 96.8 (≤35) 35.5 (≤35) 74.4 (≤35) 62.6 (≤35) 37.8 (≤35) 75.8 (≤35) 69.2 (≤35) 75.9 (≤35)	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ng/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
2,3,7,8-TCDF	0.230	0.261	13 (≤50)
2,3,7,8-TCDD	0.188	0.997U	Not calculable
1,2,3,7,8-PeCDF	0.136	0.121	12 (≤50)
2,3,4,7,8-PeCDF	0.173	0.150	14 (≤50)
1,2,3,7,8-PeCDD	0.494	0.587	17 (≤50)
1,2,3,4,7,8-HxCDF	0.505	0.396	24 (≤50)
1,2,3,6,7,8-HxCDF	0.411	0.397	3 (≤50)
2,3,4,6,7,8-HxCDF	0.674	0.567	17 (≤50)
1,2,3,7,8,9-HxCDF	0.307	0.126	84 (≤50)
1,2,3,4,7,8-HxCDD	0.898	0.725	21 (≤50)
1,2,3,6,7,8-HxCDD	2.55	1.51	51 (≤50)
1,2,3,7,8,9-HxCDD	1.73	1.50	14 (≤50)
1,2,3,4,6,7,8-HpCDF	13.1	8.63	41 (≤50)
1,2,3,4,7,8,9-HpCDF	0.750	0.506	39 (≤50)
1,2,3,4,6,7,8-HpCDD	74.3	39.5	61 (≤50)
OCDF	58.9	30.6	63 (≤50)
OCDD	790	302	89 (≤50)

Compound	Concentration (ng/Kg)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Total TCDF	2.77	2.96	7 (≤50)
Total TCDD	5.82	2.85	69 (≤50)
Total PeCDF	3.96	3.81	4 (≤50)
Total PeCDD	5.71	3.60	45 (≤50)
Total HxCDF	13.6	10.0	31 (≤50)
Total HxCDD	25.6	13.0	65 (≤50)
Total HpCDF	45.2	24.7	59 (≤50)
Total HpCDD	120	62.3	63 (≤50)

X. Labeled Compounds

All percent recoveries (%R) for labeled compounds used to quantitate target compounds were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG 18I0403	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to DUP RPD and results reported as EMPC, data were qualified as estimated in four samples.

Due to laboratory blank contamination, data were qualified as not detected in two samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Polychlorinated Dioxins/Dibenzofurans - Data Qualification Summary - SDG 18I0403

Sample	Compound	Flag	A or P	Reason
KC-S-SMHQ016-180926	1,2,3,7,8-PeCDF 1,2,3,4,7,8-HxCDF 2,3,4,6,7,8-HxCDF 1,2,3,7,8,9-HxCDF 1,2,3,6,7,8-HxCDD 1,2,3,4,6,7,8-HpCDF 1,2,3,4,6,7,8-HpCDD OCDF OCDD Total TCDF Total TCDD Total PeCDD Total HxCDF Total HxCDD Total HpCDF Total HpCDD	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Duplicate sample analysis (RPD)
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926 KC-S-SMHQ116-180926 KC-S-SMHP02-180926	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)

Everett East Waterway
Polychlorinated Dioxins/Dibenzofurans - Laboratory Blank Data Qualification Summary - SDG 18I0403

Sample	Compound	Modified Final Concentration	A or P
KC-S-SMHQ016-180926	1,2,3,7,8-PeCDF	0.996U ng/Kg	A
KC-S-SMHQ116-180926	1,2,3,7,8-PeCDF	0.997U ng/Kg	A

LDC #: 43524A21
SDG #: 18I0403
Laboratory: Analytical Resources, Inc.

VALIDATION COMPLETENESS WORKSHEET
Stage 2B

Date: 11/7/18
Page: 1 of 1
Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Dioxins/Dibenzofurans (EPA Method 1613B)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	RSD≤20/35%. ICV≤QC limits
IV.	Continuing calibration	A	CCV≤QC limits
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates /DUP	N/SW	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	D=2+3
X.	Labeled Compounds	A	
XI.	Compound quantitation RL/LOQ/LODs	N	2MPC - Undets/A
XII.	Target compound identification	N	
XIII.	System performance	N	
XIV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
4	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
5	KC-S-SMHQ016-180926DUP	18I0403-02DUP	Sediment	09/26/18
6				
7				
8				
9				

Notes:

VALIDATION FINDINGS WORKSHEET

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA SW 846 Method 8290A)

A. 2,3,7,8-TCDD	F. 1,2,3,4,6,7,8-HpCDD	K. 1,2,3,4,7,8-HxCDF	P. 1,2,3,4,7,8,9-HpCDF	U. Total HpCDD
B. 1,2,3,7,8-PeCDD	G. OCDD	L. 1,2,3,6,7,8-HxCDF	Q. OCDF	V. Total TCDF
C. 1,2,3,4,7,8-HxCDD	H. 2,3,7,8-TCDF	M. 2,3,4,6,7,8-HxCDF	R. Total TCDD	W. Total PeCDF
D. 1,2,3,6,7,8-HxCDD	I. 1,2,3,7,8-PeCDF	N. 1,2,3,7,8,9-HxCDF	S. Total PeCDD	X. Total HxCDF
E. 1,2,3,7,8,9-HxCDD	J. 2,3,4,7,8-PeCDF	O. 1,2,3,4,6,7,8-HpCDF	T. Total HxCDD	Y. Total HpCDF

Notes:_____

LDC #: 43524A21

VALIDATION FINDINGS WOR/UHEET
Blanks

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins (EPA Method 1613B)

Blank extraction date: 10/2/18 **Blank analysis date:** 10/5/18
Conc. units: ng/kg **Associated samples:** All qual U

Compound	Blank ID	Sample Identification											
	BGI0793-BLK1	5X	2	3									
I	0.0508	0.254	0.136/0.996	0.121/0.997									
O	0.0406	0.203											
G	0.188	0.94											
W	0.0508	0.254											
Y	0.0406	0.203											

LDC #: ~~13524A2~~

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: S

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA ~~SW 846~~ Method ~~8290A~~ 1613B)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG? If no, indicate which matrix does not have an associated MS/MSD. Soil / Water.

Y (N) N/A Was a MS/MSD analyzed every 20 samples of each matrix?

Y N (N/A) Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	Date	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
		5	I	( )	( )	43.9 (≤35)	2 (dets)	dets/A
			K	( )	( )	41.8 ( )		
			M	( )	( )	50.3 ( )		
			N	( )	( )	52.1 ( )		
			D	( )	( )	48.5 ( )		
			O	( )	( )	57.9 ( )		
			F	( )	( )	76.1 ( )		
			~~R~~	( )	( )	75.5 ( )		
			G	( )	( )	96.8 ( )		
			V	( )	( )	35.5 ( )		
			R	( )	( )	74.4 ( )		
			S	( )	( )	62.6 ( )		
			X	( )	( )	37.8 ( )		
			T	( )	( )	75.8 ( )		
			Y	( )	( )	69.2 ( )		
			U	( )	( )	75.9 ( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		
				( )	( )	( )		

LDC#: 43524A21

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer:

METHOD: HRGC/HRMS Dioxins/Dibenzofurans (EPA Method 1613B

Compound	Concentration (ng/kg)		(≤50) RPD
	2	3	
H	0.230*	0.261	13
A	0.188*	0.997U	NC
I	0.136	0.121	12
J	0.173	0.150	14
B	0.494	0.587*	17
K	0.505*	0.396	24
L	0.411	0.397*	3
M	0.674	0.567	17
N	0.307*	0.126*	84
C	0.898	0.725	21
D	2.55	1.51	51
E	1.73	1.50	14
O	13.1	8.63	41
P	0.750	0.506*	39
F	74.3	39.5	61
Q	58.9	30.6	63
G	790	302	89
V	2.77	2.96	7
R	5.82	2.85	69
W	3.96	3.81	4
S	5.71	3.60	45
X	13.6	10.0	31
T	25.6	13.0	65
Y	45.2	24.7	59
U	120	62.3	63

LDC Report# 43524A31

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Everett East Waterway

LDC Report Date: November 14, 2018

Parameters: Polychlorinated Biphenyls as Congeners

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc./SGS North America, Inc.

Sample Delivery Group (SDG): 18I0403/B2663

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Sampling and Quality Assurance Project Plan for Everett East Waterway PSO4 Combined Sewer Overflow Characterization (August 2018) and a modified outline of the USEPA National Functional Guidelines (NFG) for High Resolution Superfund Methods Data Review (April 2016). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polychlorinated Biphenyls (PCBs) as Congeners by Environmental Protection Agency (EPA) Method 1668A

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. HRGC/HRMS Instrument Performance Check

Instrument performance was checked at the required frequency.

Retention time windows were established for all congeners. The chromatographic resolution between the congeners PCB-23 and PCB-34 and congeners PCB-182 and PCB-187 was resolved with a valley of less than or equal to 40%.

The static resolving power was at least 10,000 (10% valley definition).

III. Initial Calibration

A five point initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for unlabeled compounds and less than or equal to 35.0% for labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

All of the continuing calibration percent differences (%D) between the initial calibration RRF and the continuing calibration RRF were less than or equal to 30.0% for unlabeled compounds and less than or equal to 50.0% for labeled compounds.

The ion abundance ratios for all compounds were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Extraction Date	Compound	Concentration	Associated Samples
MB B2663_16243	10/18/18	Monochlorobiphenyl Dichlorobiphenyl Tetrachlorobiphenyl PCB-3 PCB-11 PCB-52	1.25 pg/g 4.24 pg/g 0.888 pg/g 1.25 pg/g 4.24 pg/g 0.888 pg/g	All samples in SDG 18I0403/B2663

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks with the following exceptions:

Sample	Compound	Reported Concentration	Modified Final Concentration
KC-S-SMHQ01-180926	Monochlorobiphenyl PCB-3	4.28 pg/g 2.44 pg/g	4.28U pg/g 2.44U pg/g
KC-S-SMHQ116-180926	Monochlorobiphenyl PCB-3	1.41 pg/g 1.41 pg/g	1.41U pg/g 1.41U pg/g
KC-S-SMHP02-180926	Monochlorobiphenyl PCB-3	3.01 pg/g 1.34 pg/g	3.01U pg/g 1.34U pg/g

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits with the following exceptions:

Spike ID (Associated Samples)	Compound	MS (%R) (Limits)	MSD (%R) (Limits)	Flag	A or P
KC-S-SMHQ016-180926MS/MSD (KC-S-SMHQ016-180926)	PCB-126	153 (50-150)	-	NA	-

Relative percent differences (RPD) were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples KC-S-SMHQ016-180926 and KC-S-SMHQ116-180926 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (pg/g)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
Monochlorobiphenyl	0.388U	1.41	Not calculable
Dichlorobiphenyl	32.1	33.2	3 (≤50)
Trichlorobiphenyl	9.28	9.46	2 (≤50)
Tetrachlorobiphenyl	71.5	81.7	13 (≤50)
Pentachlorobiphenyl	348	347	0 (≤50)
Hexachlorobiphenyl	381	315	19 (≤50)
Heptachlorobiphenyl	173	192	10 (≤50)
Octachlorobiphenyl	42.8	36	17 (≤50)
Nonachlorobiphenyl	14.2	4.81	99 (≤50)
Decachlorobiphenyl	7.22	6.64	8 (≤50)
PCB-2	0.363U	0.664	Not calculable
PCB-3	0.385U	1.41	Not calculable
PCB-4	2.33	2.21	5 (≤50)
PCB-8	0.656	0.978	39 (≤50)
PCB-11	26.9	27.6	3 (≤50)
PCB-15	2.26	2.43	7 (≤50)
PCB-19	1.05	1.81	53 (≤50)
PCB-30/18	2.79	2.88	3 (≤50)
PCB-17	1.61	1U	Not calculable
PCB-32	1.94	2.5	25 (≤50)
PCB-31	2.54	2.8	10 (≤50)
PCB-28/20	4.18	4.47	7 (≤50)

Compound	Concentration (pg/g)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
PCB-21/33	1.32	1.43U	Not calculable
PCB-22	0.995	1.36U	Not calculable
PCB-37	2.02	2.36	16 (≤50)
PCB-50/53	2.97	3.08	4 (≤50)
PCB-45	1.92	1.09	55 (≤50)
PCB-51	0.798	0.813	2 (≤50)
PCB-52	18.8	19.6	4 (≤50)
PCB-69/49	5.55	5.74	3 (≤50)
PCB-44/47/65	11.3	10.9	4 (≤50)
PCB-59/62/75	0.823	1.48	57 (≤50)
PCB-42	2.13	2.67	23 (≤50)
PCB-71/40	3.92	4.55	15 (≤50)
PCB-64	4.93	6.19	23 (≤50)
PCB-61/70/74/76	17.8	16.3	9 (≤50)
PCB-66	8.78	7.3	18 (≤50)
PCB-56	4.73	4.22	11 (≤50)
PCB-60	2.24	2.39	6 (≤50)
PCB-77	3.01	2.94	2 (≤50)
PCB-95	54.5	50.7	7 (≤50)
PCB-102	1.23	0.956U	Not calculable
PCB-91	8.36	7.8	7 (≤50)
PCB-84	18.1	20.6	13 (≤50)

Compound	Concentration (pg/g)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
PCB-92	10.4	10.3	1 (≤50)
PCB-113/90/101	49.1	46.1	6 (≤50)
PCB-83	2.63	2.04	25 (≤50)
PCB-99	19.4	19.2	1 (≤50)
PCB-108/119/86/97/125/87	33.1	34	3 (≤50)
PCB-117	1.21	1.02U	Not calculable
PCB-116/85	9.11	8.72	4 (≤50)
PCB-110	75.7	79.8	5 (≤50)
PCB-82	6.91	8.5	21 (≤50)
PCB-107/124	2.38	2.54	7 (≤50)
PCB-109	4.05	3.76	7 (≤50)
PCB-123	1.41	0.897U	Not calculable
PCB-118	41.8	42.3	1 (≤50)
PCB-105	21.8	21.6	1 (≤50)
PCB-136	11.7	11.3	3 (≤50)
PCB-151/135	24.5	22.5	9 (≤50)
PCB-154	0.639	0.667U	Not calculable
PCB-144	4.45	4.4	1 (≤50)
PCB-147/149	63.7	65.6	3 (≤50)
PCB-134	7.29	5.26	32 (≤50)
PCB-139/140	1.73	0.699U	Not calculable
PCB-131	1.6	0.828U	Not calculable

Compound	Concentration (pg/g)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
PCB-132	32.7	32.4	1 (≤50)
PCB-133	1.02	0.718U	Not calculable
PCB-146	10.5	11.6	10 (≤50)
PCB-153/168	61.7	58.9	5 (≤50)
PCB-141	15.7	12.9	20 (≤50)
PCB-130	7.67	8.57	11 (≤50)
PCB-137	4.98	5.28	6 (≤50)
PCB-164	6.81	7.7	12 (≤50)
PCB-163/138/129	93.6	98.4	5 (≤50)
PCB-158	8.75	8.46	3 (≤50)
PCB-128/166	19.2	17.1	12 (≤50)
PCB-167	4.31	4.55	5 (≤50)
PCB-156/157	10.6	10.6	0 (≤50)
PCB-179	9.59	8.93	7 (≤50)
PCB-176	2.18	2.31	6 (≤50)
PCB-178	4.77	5.35	11 (≤50)
PCB-187	30.3	34.6	13 (≤50)
PCB-183	12.8	15.7	20 (≤50)
PCB-185	2.71	1.13U	Not calculable
PCB-174	22.6	26	14 (≤50)
PCB-177	14.2	13.8	3 (≤50)
PCB-171/173	7.2	6.76	6 (≤50)

Compound	Concentration (pg/g)		RPD (Limits)
	KC-S-SMHQ016-180926	KC-S-SMHQ116-180926	
PCB-172	3.66	5.78	45 (≤50)
PCB-180/193	47.2	52.4	10 (≤50)
PCB-191	0.874	0.929U	Not calculable
PCB-170	25.5	26.7	5 (≤50)
PCB-190	3.87	3.53	9 (≤50)
PCB-202	4.24	4.87	14 (≤50)
PCB-201	1.84	2.4	26 (≤50)
PCB-200	2.04	2.82	32 (≤50)
PCB-198/199	15.2	18.8	21 (≤50)
PCB-196	5.8	5.45	6 (≤50)
PCB-203	7.78	9.06	15 (≤50)
PCB-195	3.34	4.1	20 (≤50)
PCB-194	13.5	14.9	10 (≤50)
PCB-208	3.22	4.81	40 (≤50)
PCB-206	11	11.5	4 (≤50)
PCB-209	7.22	6.64	8 (≤50)

X. Internal Standards

All internal standard recoveries (%R) were within QC limits.

XI. Compound Quantitation

All compound quantitations were within validation criteria with the following exceptions:

Sample	Compound	Flag	A or P
All samples in SDG 18I0403/B2663	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A

Raw data were not reviewed for Stage 2B validation.

XII. Target Compound Identification

Raw data were not reviewed for Stage 2B validation.

XIII. System Performance

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to results reported as EMPC, data were qualified as estimated in four samples.

Due to laboratory blank contamination, data were qualified as not detected in three samples.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the data validation all other results are considered valid and usable for all purposes.

Everett East Waterway
Polychlorinated Biphenyls as Congeners - Data Qualification Summary - SDG 18I0403/B2663

Sample	Compound	Flag	A or P	Reason
KC-S-SMHQ01-180926 KC-S-SMHQ016-180926 KC-S-SMHQ116-180926 KC-S-SMHP02-180926	All compounds reported as estimated maximum possible concentration (EMPC).	J (all detects)	A	Compound quantitation (EMPC)

Everett East Waterway
Polychlorinated Biphenyls as Congeners - Laboratory Blank Data Qualification Summary - SDG 18I0403/B2663

Sample	Compound	Modified Final Concentration	A or P
KC-S-SMHQ01-180926	Monochlorobiphenyl PCB-3	4.28U pg/g 2.44U pg/g	A
KC-S-SMHQ116-180926	Monochlorobiphenyl PCB-3	1.41U pg/g 1.41U pg/g	A
KC-S-SMHP02-180926	Monochlorobiphenyl PCB-3	3.01U pg/g 1.34U pg/g	A

LDC #: 43524A31 **VALIDATION COMPLETENESS WORKSHEET** Date: 11/7/18
SDG #: 18I0403/B2663 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc./SGS North America, Inc. Reviewer: 1
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A	
II.	HRGC/HRMS Instrument performance check	A	
III.	Initial calibration/ICV	A	RSD ≤ 20/35%0
IV.	Continuing calibration	A	CCV ≤ 30/50%.
V.	Laboratory Blanks	SW	
VI.	Field blanks	N	
VII.	Matrix spike/Matrix spike duplicates	SW	
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	D = 2+3
X.	Labeled Compounds	A	
XI.	Compound quantitation RL/LOQ/LODs	N	EMPC - Vdets/A
XII.	Target compound identification	N	
XIII.	System performance	N	
XIV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	KC-S-SMHQ01-180926	18I0403-01	Sediment	09/26/18
2	KC-S-SMHQ016-180926	18I0403-02	Sediment	09/26/18
3	KC-S-SMHQ116-180926	18I0403-03	Sediment	09/26/18
4	KC-S-SMHP02-180926	18I0403-04	Sediment	09/26/18
5	KC-S-SMHQ016-180926MS	18I0403-02MS	Sediment	09/26/18
6	KC-S-SMHQ016-180926MSD	18I0403-02MSD	Sediment	09/26/18
7				
8				
9				

Notes:

LDC #: 43524A31

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer:
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Blank extraction date: 10/18/18 **Blank analysis date:** 10/22/18
Conc. units: pg/g **Associated samples:** All Qual U

Compound	Blank ID	Sample Identification									
	MB B2663_16243	5X	1	3	4						
Mono-CB	1.25	6.25	4.28	1.41	3.01*						
Di-CB	4.24	21.2									
Tetra-CB	0.888*	4.44									
PCB-3	1.25	6.25	2.44	1.41	1.34*						
PCB-11	4.24	21.2									
PCB-52	0.888*	4.44									

* EMPC

LDC #: 43524A31

VALIDATION FINDINGS WORKSHEET
Matrix Spike/Matrix Spike Duplicates

Page: 1 of 1
Reviewer: 9
2nd Reviewer: 2

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were a matrix spike (MS) and matrix spike duplicate (MSD) analyzed for each matrix in this SDG?
Y N N/A Was a MS/MSD analyzed every 20 samples of each matrix?
Y N N/A Were the MS/MSD percent recoveries (%R) and the relative percent differences (RPD) within the QC limits?

#	MS/MSD ID	Compound	MS %R (Limits)	MSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	5/6	PCB-126	153 (50-150)	( )	( )	2 (NB)	J (all det) / A
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

LDC#[illegible]

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: [illegible]
2nd Reviewer: [illegible]

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Compound	Concentration (pg/g)		(≤50)
	2	3	RPD
Mono-CB	0.388U	1.41	NC
Di-CB	32.1	33.2	3
Tri-CB	9.28	9.46	2
Tetra-CB	71.5	81.7	13
Penta-CB	348	347	0
Hexa-CB	381	315	19
Hepta-CB	173	192	10
Octa-CB	42.8	36	17
Nona-CB	14.2	4.81	99
Deca-CB	7.22	6.64	8
PCB-2	0.363U	0.664*	NC
PCB-3	0.385U	1.41	NC
PCB-4	2.33	2.21	5
PCB-8	0.656	0.978	39
PCB-11	26.9	27.6	3
PCB-15	2.26	2.43	7
PCB-19	1.05*	1.81	53
PCB-30/18	2.79	2.88*	3
PCB-17	1.61*	1U	NC
PCB-32	1.94	2.5	25
PCB-31	2.54	2.8	10
PCB-28/20	4.18*	4.47*	7
PCB-21/33	1.32*	1.43U	NC
PCB-22	0.995*	1.36U	NC
PCB-37	2.02	2.36	16
PCB-50/53	2.97	3.08	4
PCB-45	1.92*	1.09*	55
PCB-51	0.798*	0.813*	2
PCB-52	18.8	19.6	4

LDC#: 25431

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 9
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Compound	Concentration (pg/g)		(≤50)
	2	3	RPD
PCB-69/49	5.55*	5.74*	3
PCB-44/47/65	11.3	10.9	4
PCB-59/62/75	0.823*	1.48	57
PCB-42	2.13*	2.67	23
PCB-71/40	3.92	4.55	15
PCB-64	4.93	6.19	23
PCB-61/70/74/76	17.8	16.3	9
PCB-66	8.78	7.3	18
PCB-56	4.73*	4.22	11
PCB-60	2.24*	2.39	6
PCB-77	3.01	2.94	2
PCB-95	54.5	50.7	7
PCB-102	1.23*	0.956U	NC
PCB-91	8.36	7.8	7
PCB-84	18.1	20.6	13
PCB-92	10.4	10.3	1
PCB-113/90/101	49.1	46.1	6
PCB-83	2.63*	2.04*	25
PCB-99	19.4	19.2	1
PCB-108/119/86/97/125/87	33.1	34	3
PCB-117	1.21	1.02U	NC
PCB-116/85	9.11*	8.72*	4
PCB-110	75.7	79.8	5
PCB-82	6.91	8.5	21
PCB-107/124	2.38	2.54	7
PCB-109	4.05	3.76	7
PCB-123	1.41	0.897U	NC
PCB-118	41.8	42.3	1
PCB-105	21.8	21.6	1

LDC#: 43243\1

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: 2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Compound	Concentration (pg/g)		(≤50)
	2	3	RPD
PCB-136	11.7	11.3	3
PCB-151/135	24.5	22.5*	9
PCB-154	0.639*	0.667U	NC
PCB-144	4.45	4.4*	1
PCB-147/149	63.7	65.6	3
PCB-134	7.29	5.26*	32
PCB-139/140	1.73*	0.699U	NC
PCB-131	1.6	0.828U	NC
PCB-132	32.7	32.4	1
PCB-133	1.02*	0.718U	NC
PCB-146	10.5	11.6	10
PCB-153/168	61.7	58.9	5
PCB-141	15.7	12.9*	20
PCB-130	7.67	8.57	11
PCB-137	4.98	5.28	6
PCB-164	6.81	7.7	12
PCB-163/138/129	93.6	98.4	5
PCB-158	8.75*	8.46*	3
PCB-128/166	19.2	17.1*	12
PCB-167	4.31	4.55	5
PCB-156/157	10.6	10.6	0
PCB-179	9.59	8.93	7
PCB-176	2.18*	2.31	6
PCB-178	4.77*	5.35	11
PCB-187	30.3	34.6	13
PCB-183	12.8	15.7	20
PCB-185	2.71*	1.13U	NC
PCB-174	22.6	26	14
PCB-177	14.2	13.8	3

LDC#: 43524A31

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: Q
2nd Reviewer:

METHOD: HRGC/HRMS Polychlorinated Biphenyl Congeners (EPA Method 1668A)

Compound	Concentration (pg/g)		(≤50)
	2	3	RPD
PCB-171/173	7.2	6.76*	6
PCB-172	3.66	5.78	45
PCB-180/193	47.2	52.4	10
PCB-191	0.874*	0.929U	NC
PCB-170	25.5	26.7	5
PCB-190	3.87*	3.53*	9
PCB-202	4.24	4.87*	14
PCB-201	1.84*	2.4	26
PCB-200	2.04	2.82*	32
PCB-198/199	15.2	18.8	21
PCB-196	5.8*	5.45*	6
PCB-203	7.78	9.06*	15
PCB-195	3.34*	4.1*	20
PCB-194	13.5	14.9	10
PCB-208	3.22	4.81	40
PCB-206	11	11.5*	4
PCB-209	7.22	6.64	8

* EMPC

LDC #: 43524

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 11/15/18
Page: 1 of 1
2nd Reviewer:

The LDC job number listed above was entered by FM.
Entered from Body or Summary

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	y	FM	
Ia.	- All methods present?	y		
Ib.	- All samples present/match report?	y		
Ic.	- All reported analytes present?	y		
Id.	- 10% or 100% verification of EDD?	y		
II.	EDD Preparation/Entry	y	FM	
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	y		
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	y		
III.	Reasonableness Checks	y	FM	
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	y		
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	y		
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	y		
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	y		
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	y		
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	y/N		
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	y		
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	N/A		
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N		

Notes: *see discrepancy sheet